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**CONTRIBUTION OF THE HYDROMORPHOLOGICAL -
GEOLOGICAL AND CLIMATOLOGICAL
PARAMETERS TO THE WATERSHED TYPOLOGY,
APPLICATION IN BASINS OF NORTHERN GREECE**

PHD THESIS

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**ΑΡΙΣΤΟΤΕΛΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ
ΘΕΣΣΑΛΟΝΙΚΗΣ
ΤΜΗΜΑ ΓΕΩΛΟΓΙΑΣ
ΤΟΜΕΑΣ ΦΥΣΙΚΗΣ ΚΑΙ ΠΕΡΙΒΑΛΛΟΝΤΟΛΟΓΙΚΗΣ
ΓΕΩΓΡΑΦΙΑΣ**



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ΓΕΩΛΟΓΙΚΩΝ ΚΑΙ ΚΛΙΜΑΤΟΛΟΓΙΚΩΝ
ΠΑΡΑΜΕΤΡΩΝ ΣΤΟΝ ΠΡΟΣΔΙΟΡΙΣΜΟ ΤΗΣ
ΤΥΠΟΛΟΓΙΑΣ ΤΩΝ ΛΕΚΑΝΩΝ ΑΠΟΡΡΟΗΣ,
ΕΦΑΡΜΟΓΗ ΣΕ ΛΕΚΑΝΕΣ ΤΗΣ ΒΟΡΕΙΑΣ ΕΛΛΑΔΑΣ**

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**ΘΕΣΣΑΛΟΝΙΚΗ
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APPLICATION IN BASINS OF NORTHERN GREECE

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CONTRIBUTION OF THE HYDROMORPHOLOGICAL - GEOLOGICAL AND CLIMATOLOGICAL PARAMETERS TO THE WATERSHED TYPOLOGY, APPLICATION IN BASINS OF NORTHERN GREECE – *Ph.D. Thesis*

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Με επιφύλαξη παντός δικαιώματος.

ΣΥΜΒΟΛΗ ΤΩΝ ΥΔΡΟΜΟΡΦΟΛΟΓΙΚΩΝ, ΓΕΩΛΟΓΙΚΩΝ ΚΑΙ ΚΛΙΜΑΤΟΛΟΓΙΚΩΝ ΠΑΡΑΜΕΤΡΩΝ ΣΤΟΝ ΠΡΟΣΔΙΟΡΙΣΜΟ ΤΗΣ ΤΥΠΟΛΟΓΙΑΣ ΤΩΝ ΛΕΚΑΝΩΝ ΑΠΟΡΡΟΗΣ, ΕΦΑΡΜΟΓΗ ΣΕ ΛΕΚΑΝΕΣ ΤΗΣ ΒΟΡΕΙΑΣ ΕΛΛΑΔΑΣ. – *Διδακτορική Διατριβή*

Citation:

Georgios I. Grimpylakos, 2020 - Contribution of the Hydromorphological - Geological and Climatological parameters to the watershed typology, application in basins of Northern Greece. Ph.D. Thesis, School of Geology, Aristotle University of Thessaloniki, Annex Number of Scientific Annals of the School of Geology No 202, 580 pp

Γεωργιος Ι. Γρημπυλάκος, 2020 - Συμβολή των υδρομορφολογικών, γεωλογικών και κλιματολογικών παραμέτρων στον προσδιορισμό της τυπολογίας των λεκανών απορροής, εφαρμογή σε λεκάνες της Βόρειας Ελλάδας. Διδακτορική Διατριβή, Τμήμα Γεωλογίας Α.Π.Θ., Αριθμός Παραρτήματος Επιστημονικής Επετηρίδας Τμ. Γεωλογίας No 202, 580 σελ.

Απαγορεύεται η αντιγραφή, αποθήκευση και διανομή της παρούσας εργασίας, εξ ολοκλήρου ή τμήματος αυτής, για εμπορικό σκοπό. Επιτρέπεται η ανατύπωση, αποθήκευση και διανομή για σκοπό μη κερδοσκοπικό, εκπαιδευτικής ή ερευνητικής φύσης, υπό την προϋπόθεση να αναφέρεται η πηγή προέλευσης και να διατηρείται το παρόν μήνυμα. Ερωτήματα που αφορούν τη χρήση της εργασίας για κερδοσκοπικό σκοπό πρέπει να απευθύνονται προς το συγγραφέα.

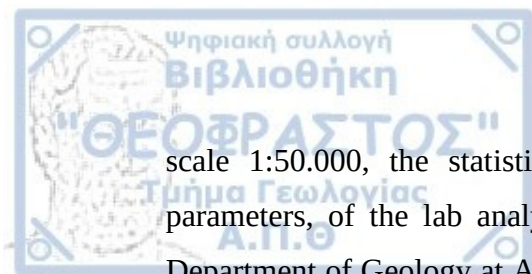
Οι απόψεις και τα συμπεράσματα που περιέχονται σε αυτό το έγγραφο εκφράζουν το συγγραφέα και δεν πρέπει να ερμηνευτεί ότι εκφράζουν τις επίσημες θέσεις του Α.Π.Θ.

INTRODUCTION

The European Union has established the (WFD) Water Framework Directive 2000/60 for Community action in the field of water policy. The purpose of the Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater (WFD 2000), while achieving better water protection and management by the Member States, who must identify and analyse European waters, on the basis of individual river basin and district. According to the WFD, Member States are obliged to classify all surface waters by one of the two typology systems, A or B. System A has fixed types with specific categorisation (WFD). System B can include alternative factors alongside with the obligatory factors of System A, but it must achieve at least the same degree of differentiation as would System A; it should result in no greater degree of variability in type specific reference conditions than if System A had been used. System B reflects better the diversity of the landscape and the uniqueness of Greek water bodies (Skoulikidis et al. 2004; Skoulikidis et al. 2006; Skoulikidis et al., 2009; Kasapi et al. 2009; Kanli 2009; Koukidou 2009; Apostolaki 2009). This thesis was initiated by the fact that a great research effort was made in recent years by many scientists on the implementation of the Water Framework Directive 2000/60 (WFD), dealing with surface waters and the establishment of reliable methodologies for the determination of a typology system destined to estimate the ecological quality of water.

This research focuses on defining the framework for the spatial-temporal distribution and continuity of data for the study of hydromorphological, geological and climate parameters.

The implementation of the thesis has as follows: Literature review, methodology approach, selection of research areas and the timetable for sampling. In situ analysis of abiotic parameters took place during sampling. The lab analysis of samples took place at the chemical labs of Hellas Gold, at Department of Geology of Aristotle University of Thessaloniki and at the Democritus "National Centre for Scientific Research". The digitisation of handwritten 1,150.000 measurements from 82 different meteorological – climatological stations of Macedonia's district was held at the Ministry of Rural Development and Food. The digitisation of Macedonia's geology at



scale 1:50.000, the statistical analysis and correlation of the in situ measured parameters, of the lab analysed parameters and the digitised ones occurred at the Department of Geology at Aristotle University of Thessaloniki, at the Natural History Museum of the Lesvos Petrified Forest and at the Geography Department of Aegean University.

Specifically the XRD analysis was held at the Democritus “National Centre for Scientific Research” and at the Department of Mineralogy-Economic Geology of Faculty of Science, at Aristotle’s University of Thessaloniki. The sedimentological analysis occurred at the Department of Geology and Physical Geography of Faculty of Science, at Aristotle’s University of Thessaloniki. The chemical analysis of the water samples was held at the Chemical labs of Hellas Gold. The digitisation of the meteorological – climatological data was held at the Ministry of Rural Development and Food.

The research was funded for two years by the Greek State Scholarships Foundation “IKY” and after this period by me and my family. The overall cost of travels expenditures, sampling and publicity was 12.000 €.



To my beloved family...

Ioannis Grimpylakos

Eleftheria Grimpylakou

Lina Grimpylakou

Eleftherios Kakalis

Giannis Kakalis

Research never ends and so scientists can never put a full stop at any field of their research. Research is an ongoing investigation for “truth-answer”, or more likely an effort to reach and describe to the rest scientific community, of your expertise, the bubble you found and inside which you believe lays the “truth”. “Truth” is a data point suspended in a space-time environment of infinite dimensions and if you ever find this point, it will be only by accident; even then and with thorough investigation the point you found will prove to be another universe. In such way, research never ends, it continues to the forefront by creating new questions and opening new horizons for research. It’s like searching for a path in a thick fog; therefore all researchers are obliged in using real and accurate data in order to publish their work in such way that it will serve as “Myrtle of Ariadne” for the rest and future scientific community, so that they will know your path and decide if they will follow it or start a new one...

Grimpylakos Georgios

Εκτεταμένη Περίληψη

Η παρούσα διδακτορική διατριβή διερευνά και κατηγοριοποιεί τις γεωλογικές, κλιματολογικές και υδρομορφολογικές παραμέτρους με τρόπο ώστε να αντικατοπτρίζεται η αλληλεπίδρασή τους και να είναι εφικτή η χρήση τους στο μέλλον. Βασικό κομμάτι της έρευνας είναι να προσδιοριστεί, σε τι βαθμό επηρεάζεται η κάθε παράμετρος σε σχέση με τα χωροχρονικά δεδομένα ή/και την κλίμακα γεωλογικής χαρτογράφησης που χρησιμοποιείται.

Έναυσμα για την έρευνα αποτέλεσε η εφαρμογή της Κοινοτικής Οδηγίας 2000/60 της Ε.Ε. στην Ελλάδα, που υποδεικνύει μια πιθανή ταξινόμηση, του συστήματος Β, για την τυπολογία των αβιοτικών παραμέτρων σε σχέση με την οικολογική ποιότητα των επιφανειακών υδάτων. Κατά την έρευνα προέκυψαν σημαντικά ερωτήματα στην προσπάθεια χρήσης των αποτελεσμάτων και των δεδομένων προηγούμενων ερευνών. Αυτό το ομιχλώδες τοπίο οφείλεται στην απουσία σαφές πλαισίου για τη χωροχρονική κατανομή και συνέχεια της σειράς των δεδομένων που πρέπει να χρησιμοποιούνται στην έρευνα των παραπάνω παραμέτρων. Ως εκ τούτου, η αξιολόγηση και η σύγκριση των αποτελεσμάτων μεταξύ των ερευνητών δεν είναι εφικτή. Η παρούσα διατριβή προσπαθεί να ξεδιαλύνει το τοπίο και να αφήσει σαφή στοιχεία για μελλοντική έρευνα αλλά και την δυνατότητα αμφισβήτησης των αποτελεσμάτων της ώστε να εξελιχθεί η έρευνα.

Τα δεδομένα που χρησιμοποιηθήκανε είναι χειρόγραφες ημερήσιες καταγραφές θερμοκρασίας και βροχόπτωσης από 82 μετεωρολογικούς-κλιματολογικούς σταθμούς τμήματος της βόρειας Ελλάδας (1930-2010) και από 3 ψηφιακούς σταθμούς. Ψηφιοποιήθηκαν 1.150.000 μετρήσεις και δημιουργήθηκε μία βάση δεδομένων με 1.500.000 μετρήσεις. Έγινε ψηφιοποίηση γεωλογικών χαρτών κλίμακας 1:500.000 και 1:50.000 της βόρειας Ελλάδας (περίπου 14.500.000 κελιά μεγέθους 50x50μ.). Έγινε ψηφιοποίηση του υδρογραφικού δικτύου των 14 περιοχών μελέτης με τοπογραφικούς χάρτες 1:50.000 (συνολικό μήκος ρεμάτων 4.763.630μ.) και με το ArcMap 10.3 με χρήση ψηφιακού μοντέλου εδάφους ASTER (28,3x28,3μ.).

Πραγματοποιήθηκε δειγματοληψία νερού και ιζήματος σε συνθήκες χαμηλής, μέσης και υψηλής ροής, στο κέντρο, αριστερά και δεξιά της κοίτης σύμφωνα με τη

ροή, σε 9 σταθμούς αναφοράς και σε 5 λεκάνες με υψηλή ανθρωπογενή παρέμβαση. Έγινε χημική ανάλυση του νερού, ορυκτολογική και ιζηματολογική ανάλυση του ιζήματος ενώ πραγματοποιήθηκε RHS και GEORHS σε μήκος 500 μέτρων ανάντη των περιοχών δειγματοληψίας.

Τα δεδομένα θερμοκρασίας και κατακρημνισμάτων 85 μετεωρολογικών σταθμών (1930-2010) χωρίστηκαν σε χρονικές περιόδους και περιοχές ώστε να προσδιοριστεί η βέλτιστη χωροχρονική κατανομή τους, ενώ εξετάσθηκε η κλιματική ταξινόμηση κατά Köppen, οι κλιματικοί δείκτες ΕΘΕ και Κ. Δημιουργήθηκαν χάρτες θερμοκρασίας, κατακρημνισμάτων και εξατμισοδιαπνοής κατά Turc, Coutagne, Thornthwaite με τις μεθόδους IDW, Spline, Kriging και με χρήση ομάδας ελέγχου. Μελετήθηκαν 17 υδρομορφολογικές παράμετροι για συσχέτιση μεταξύ τους και με την πλημμυρική παροχή κατά Giandotti.

Ο τεράστιος όγκος των δεδομένων έδωσε τη δυνατότητα για χιλιάδες συμπεράσματα. Όμως η παρουσίαση όλων των αποτελεσμάτων με παράλληλη παράθεση των αρχικών δεδομένων δεν είναι εφικτή. Στην παρούσα εργασία παρουσιάζονται μόνο τα αποτελέσματα για τα οποία μπορούν να παρατεθούν και τα αρχικά δεδομένα. Εντός της εργασίας υπάρχουν 500 σελίδες με πρωταρχικά δεδομένα. Συγκεκριμένα 200 σελίδες με μετεωρολογικά-κλιματικά δεδομένα, 150 σελίδες με πίνακες και γραφήματα, 103 θεματικοί χάρτες, ορυκτολογικές αναλύσεις 27 δειγμάτων, ιζηματολογικές αναλύσεις κατά Folk και μετρήσεις σφαιρικότητας και στρογγυλότητας (100 ανά δείγμα Krumbein και Sloss 1963) 40 δειγμάτων ενώ υπολογιστήκανε 18 υδρομορφολογικές παράμετροι σε 14 διαφορετικές λεκάνες ποτάμιων συστημάτων. Στη διατριβή επισημαίνονται 48 συμπεράσματα, ενώ υπολείπονται πολύ περισσότερα που είτε δεν ανέφερα ή δεν εντόπισα και σας καλώ να συνεχίσετε την έρευνα. Τα βασικότερα εξ' αυτών είναι:

Έγινε συσχέτιση της κλίμακας χαρτογράφησης της γεωλογίας: α) με τη γεωχημική και ορυκτολογική σύσταση του ιζήματος, β) με 17 υδρομορφολογικές παραμέτρους και γ) με τη μέγιστη πλημμυρική παροχή. Δημιουργήθηκε χάρτης με το συντελεστή επιφανειακής απορροής σε κλίμακα 1:50.000 και 1.500.000.

Για την ακριβή κλιματική ταξινόμηση, η ελάχιστη χωρική κατανομή των σταθμών είναι 1 ανά 2.000 km², τα δεδομένα πρέπει να είναι ίδιας χρονικής περιόδου με ελάχιστη διάρκεια 30 χρόνων και πληρότητα >75%. Η χρήση χαμηλότερης ποιότητας δεδομένων δεν οδηγεί σε αποδεκτές κλιματικές ταξινομήσεις.

Δημιουργήθηκε ένας νέος χάρτης με κλιματική ταξινόμηση κατά Köppen της βόρειας Ελλάδας όπου εντοπίστηκε ένας νέος κλιματικός δείκτης Cfb-εύκρατο ωκεάνιο κλίμα, μαζί με τους γνωστούς Csa-μεσογειακό κλίμα και τον Cfa – υποτροπικό ωκεάνιο κλίμα. Η βόρεια Ελλάδα ανήκει στον ηπειρωτικό κλιματικό τύπο σύμφωνα με τους κλιματικούς δείκτες Ετήσιο Θερμοκρασιακό Εύρος (Supan) και το Δείκτη Ηπειρωτικότητας του Gorczynski. Δημιουργήθηκε λεπτομερής χάρτης κατακρημνισμάτων, μέσης ετήσιας θερμοκρασίας με τον τύπο $T = - 0,004 * E + 14,908$ και $R^2 = 73,64\%$ και χάρτης εξατμισοδιαπνοής. Εντοπίστηκε κλιματική αλλαγή την περίοδο 1950-2004 με τους κλιματικούς δείκτες του Gorczynski και Supan.

Η χρήση κλίμακας 1:50.000 στη γεωλογική ταξινόμηση οδηγεί σε πολύ καλή συσχέτιση της γεωλογίας της λεκάνης απορροής με την ορυκτολογική ανάλυση του ιζήματος σε αντίθεση με την κλίμακα 1:500.000. Η γεωλογία της βόρειας Ελλάδας ταξινομήθηκε σε 6 τάξεις σύμφωνα με την περιεκτικότητα σε SiO_2 και CaO . Ο χάρτης με το συντελεστή επιφανειακής απορροής σε κλίμακα 1:500.000 υπολείπεται 57,14% σε ακρίβεια σε σχέση με το χάρτη σε κλίμακα 1:50.000.

Ο προσδιορισμός της τάξης των ποταμών κατά Strahler με τη μέθοδο του ArcMap και χρήσης DEM (ASTER) έναντι τοπογραφικών χαρτών 1:50.000 έχει αποτελεσματικότητα 92,86% όταν αφαιρούνται οι κλάδοι 1^{ης} και 2^{ης} τάξης. Η ταξινόμηση των ποταμών κατά Shreve είναι πιο αποτελεσματική από την κατά Strahler και προτείνεται για υδρομορφολογικές έρευνες. Η χρήση του μεγέθους λεκάνης απορροής εναλλακτικά της μέσης ετήσιας επιφανειακής απορροής είναι λάθος σε 27 από τις 49 λεκάνες και δεν προτείνεται. Η μέση ετήσια επιφανειακή απορροή μπορεί να χρησιμοποιείται εναλλακτικά της μέγιστης πλημμυρικής παροχής κατά Giandotti με ακρίβεια $R^2 = 99,57\%$.

Με βάση τα παραπάνω οι λεκάνες απορροής της Βόρειας Ελλάδας ομαδοποιήθηκαν σε 16 κατηγορίες σύμφωνα με την επιφανειακή απορροή $Q_{μέση}$, την περιεκτικότητα σε SiO_2 - CaO και την κλιματική ταξινόμηση κατά Köppen.

Τα παραπάνω είναι η αρχή οριοθέτησης ενός πλαισίου για τη μελέτη των υδρομορφολογικών, γεωλογικών και κλιματικών παραμέτρων.



ABSTRACT

This research was initiated by the implementation of the Water Framework Directive 2000/60 (WFD) in Greece alongside the classification of system B, for the typology of abiotic parameters in relation to the ecological quality of surface water.

Significant questions came in the attempt to use the results and data of previous research, due to the lack of a specific framework for the spatial-temporal distribution and continuity of data for the study of hydromorphological, geological and climate parameters. A key part of the research is to define this framework.

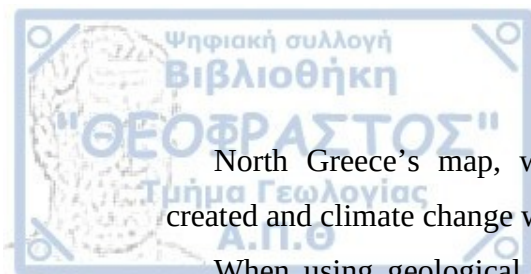
The watersheds of North Greece were studied and their corresponding geological maps of scale 1:500.000 and 1:50.000 were digitised. The hydrographic network of 14 study areas was digitised using topographic maps of scale 1:50.000 and by ArcMap 10.3 with DEM.

Sampling took place, in a three year period, at 9 reference stations and 5 highly altered sites. Chemical analysis of water samples and sedimentological-mineralogical analysis of sediment took place.

The precipitation and temperature data (1.500.000 measurements) of 85 stations (1930-2010) were divided in different time periods and areas in order to determine their optimal spatial-temporal distribution. Climate classification by Köppen, Annual Temperature Range and CGI climate indicators were studied. Thematic maps of temperature, precipitation, evapotranspiration by Turc, Coutagne and Thornthwaite with the methods of IDW, Spline, Kriging, were produced and evaluated by a control group. Seventeen hydromorphological parameters were studied for possible correlation among them and with the maximum flood by Giandotti.

Having in mind the definition of an appropriate framework with defined methodologies and open access data; only conclusions accompanied by corresponding methodology and data are presented in this thesis. Specifically the researcher had 48 main conclusions and the most important are:

For optimal climate classification, the minimum spatial distribution of stations is 1 per 2.000 km², all data should be of the same period with a minimum duration of 30 years and completeness >75%. The use of lower quality data is not acceptable.



North Greece's map, with Köppen climate classification (Cfb-Csa-Cfa), was created and climate change was identified within 1950-2004.

When using geological maps of scale 1:50.000 the river watershed geology is highly correlated with the mineralogical analysis of the sediment in contrast to maps of scale 1:500.000.

The runoff coefficient map of scale 1:500.000 is 57,14% less accurate than of scale 1:50.000.

The mean annual surface runoff can be used alternatively for the maximum flood by Giandotti with an accuracy of $R^2 = 99,57\%$. The use of watershed size is not acceptable.

The calculation of stream order by Strahler using the ArcMap method and using DEM (ASTER), versus 1:50.000 topographic maps, is effective 92,86% when 1st and 2nd torrents are removed. Stream order by Shreve is more accurate than stream order by Strahler.

In coherence to the above, North Greece's basins are grouped into 16 categories according to average annual surface runoff, concentration of SiO_2 - CaO and Köppen climate classification.

All of the above define a framework for the study of hydromorphological, geological and climate parameters. If different scale or spatial-temporal distribution is used it must be mentioned.

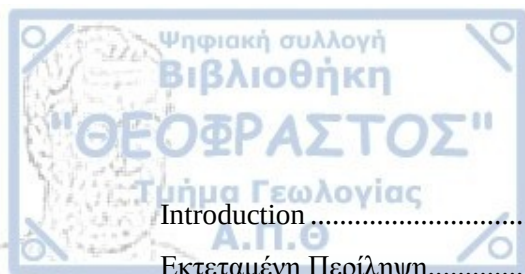
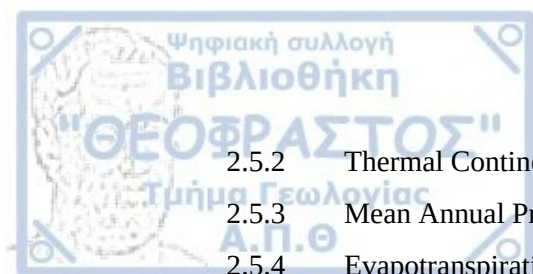
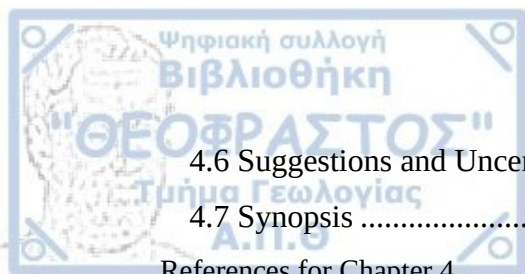


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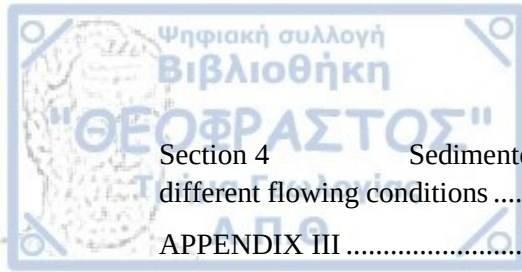
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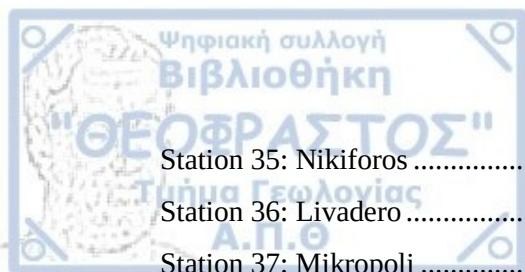


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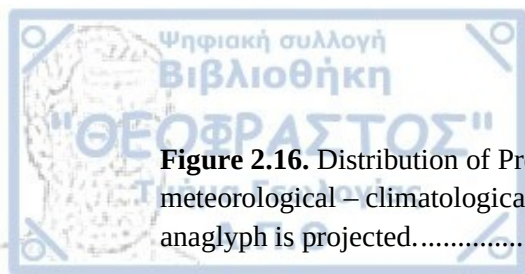


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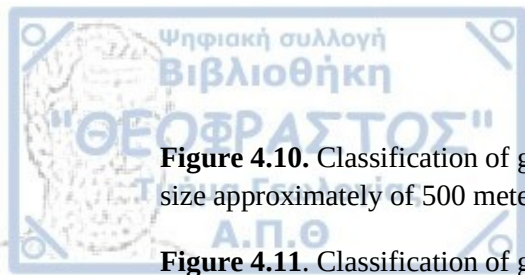


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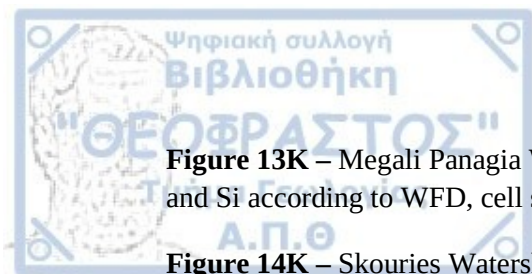


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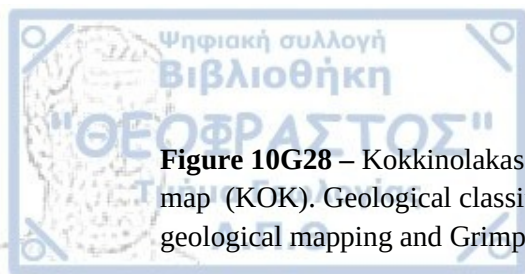


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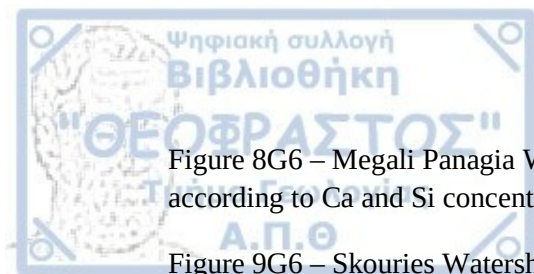


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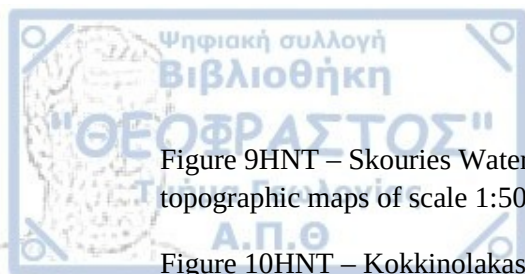


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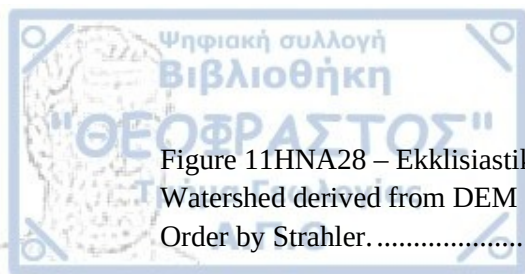


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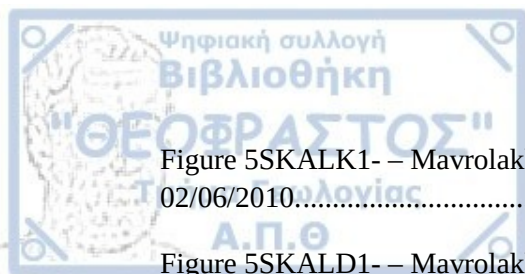


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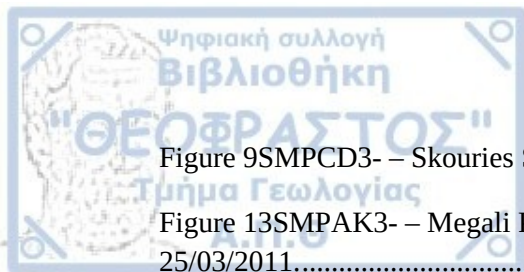


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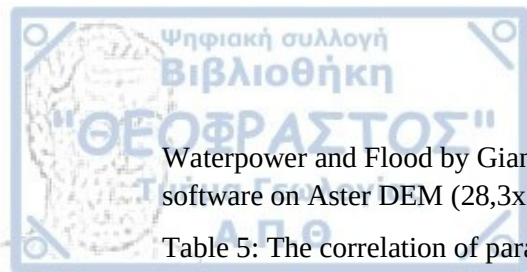
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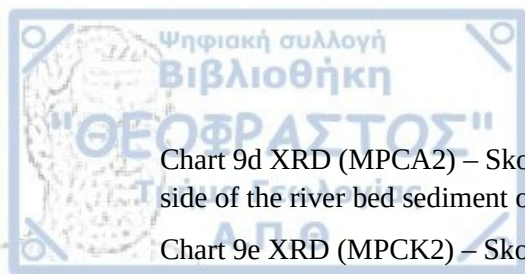


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CHAPTER 1: INTRODUCTION

In recent years, a significant proportion of the research effort of the scientific community that deals with surface water devoted to research and establishment of reliable methodologies for the determination of the ecological quality of surface water in response to the implementation of the Water Framework Directive 2000/60 (WFD). The research is on a level of water basin systems and essential is the interdisciplinary collaboration. At Greece, many researchers have "borrowed" different methodologies from other European countries but no systematic effort has been successful in adapting these methods on Greek geomorphological data, many small basins, inner-mountain plains with significant retention of sediment while rivers ending to their final recipient through narrow canyons etc.

Due to increased demand and use of water resources, the European Union has established the (WFD) Water Framework Directive 2000/60 for Community action in the field of water policy. In order to achieve better water protection and management, Member States must identify and analyze European waters, on the basis of individual river catchment and district. According to the WFD, Member States are obliged to classify all surface waters by one of the two typology systems, A or B. System A has fixed types with specific categorisation. System B can include alternative factors alongside with the obligatory factors of System A, but leaves to the analyst's discretion the categorisation of these factors as long as the new typology achieves at least the same level of differentiation as would System A (Kanli 2009; Lazaridou et al. 2013).

"The typology process is divided in four steps [in line with the Guidance Documents NO 2 (Working Group on Water Bodies 2003), No 5 (Working Group 2.4 – COAST 2003) and No 10 (Working Group on 2.3 – REFCOND 2003) of the WFD]: (a) the delineation of the catchment area, according to Article 3 (paragraph 1), (b) the classification into one of the categories of surface water (rivers, lakes, transitional, coastal, artificial and heavily modified water bodies) according to ANNEX II, 1.1 (i), (c) type distinction based on System A (Bottom-up approach) or B

(Top-down approach) according to the ANNEX II 1.2 using hydro-morphological, climatic and/or geological descriptors and (d) the subdivision of each type in water bodies based on pressures and impacts” (Lazaridou et.al., 2013).

Since 2000 the scientific research community of Greece has been constantly working on applying System A and System B typology in Greece and checking the effectiveness of these two different approaches and their parameters interaction with the ecological quality of the surface water systems. According to the research community system B reflects better the diversity of the landscape and the uniqueness of Greece water bodies (Skoulikidis et al., 2004; Skoulikidis et al., 2006; Skoulikidis et al., 2009; Kasapi et al., 2009; Kanli 2009; Koukidou 2009; Apostolaki 2009; Lazaridou et al., 2013).

During the last years, the collaboration between different research teams was little. Furthermore the suffocating time pressure combined with the low funding and the necessity to search for possible correlation of the parameters with the ecological status, resulted in using measurements of parameters at low scale aiming swift results. However, it is very important to notice that when combining factors of different scales, the lowest scale of a mapped factor defines the overall scale of the outcome result or of the corresponding thematic map. Therefore in order to reach the highest possible resolution for the output map, the highest resolution must be applied to all parameters.

Greece may not be a huge country however it has a unique and diverged geography due to its neo-tectonic and seismic activity in recent geological times. In order to capture this diversity, the mapping of geological and hydromorphological parameters in high scale is necessary.

1.1 RESEARCH SCOPE

Surface water can be categorized by their abiotic characteristics in infinite combinations. However, the objective is not to create a huge and detailed database with a chaotic crowd of classifications but the integration of these abiotic parameters in a simplified and practicable separation. In this context lies the implementation of

this research. More specifically, the main aim is to separate the basins of Macedonia under abiotic characteristics, in such a way that they may be comparable with the river basins of other countries regarding their abiotic parameters.

This thesis is part of a research that tries to determine possible alternative factors and their categorisation for Greek rivers. The alternative factors address the hydromorphological, climatological and geological characteristics of the river's watershed and the interactions of these parameters to the ecological quality of surface water systems (= body), within the Greek borders.

Specifically the determination of the scale in measuring these parameters is essential. Under this theme the measurement scale of previous work was taking as the lowest scale and at all cases that the accuracy could be questioned the parameters were measured in higher resolution scale. The measured parameters were compared in different scales and calibrated by in situ and lab measurements in order to determine the effectiveness of its scale and its correlation with time and cost; thus the most applicable are proposed.

1.2 PURPOSE

Through this research, the author wishes to address issues and clarify uncertainties initiated by previous research projects during the implementation of the WFD 2000/60 EU at Greece, while suggest a possible classification –typology for “calibrating” previous and future work in the research field that uses geological, hydromorphological or climatological parameters. The impact factor between the measuring scale of each parameter and the accuracy plays a very important role. Additionally, the need of each parameter's precision in relation to time and cost, that its scale requires, must be evaluated and the best combination of these parameters must be used.

Specifically, the geology of reference sites that were used from previous research groups (Kanli 2009; Lazaridou et al. 2013) will be examined in different scales. The geology of each site, which was used by Kanli (2009), derived from the digitization of the IGME geological maps of scale 1:500.000. In this project, these areas will be digitized at scale 1:50.000 and the differences will be cross-validate using GIS

software and in situ measurements. The riverbed sediment of each reference site will be sampled and its mineralogical composition will be determined with XRD analysis. Afterwards, each sediment mineralogical composition will be cross checked and correlated with the corresponding geology of each river watershed, by using digitized geological maps of two different scales, 1:500.000 and 1:50.000.

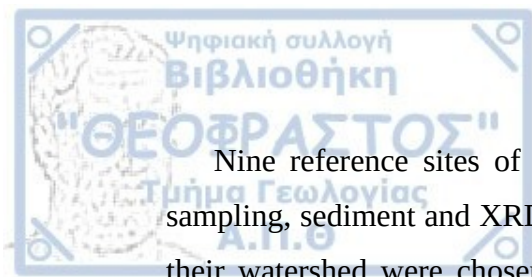
Regarding the climatological classification of Macedonia, Kanli used the Köppen methodology (Köppen, W. 1884, Köppen, W. 1918, Köppen, W. 1930) and monthly measurements of precipitation and temperature of period 1961-2001. These data were derived from only two stations in Macedonia, missing possible spatial and temporal alterations, ending up with low resolution results. In this project the same area will be classified by using data from 85 meteorological – climatological stations, aiming for a new climatological classification of Macedonia of higher resolution. Ending up, all diverged results will be examined and evaluated.

The mean annual surface runoff, Q_{mean} , for Macedonia's catchments will be estimated using the suggested equation ($A=\Lambda(B-E)\alpha/1000$) (EMP 2008) and by different quality, quantity and density of meteorological – climatological data and scale of geological mapping which is directly correlated with the runoff coefficient and the Watershed mean annual surface runoff.

1.3 PROJECT PLAN - SELECTION OF STUDY AREA AND SAMPLING SITES

The project plan is focused on testing the geological, climatological and hydromorphological parameters of typology system A and B (Skoulikidis et al. 2004; Skoulikidis et al. 2006; Skoulikidis et al. 2009; Kasapi et al. 2009; Kanli 2009; Koukidou 2009; Apostolaki 2009; Lazaridou et al., 2013). Essential is the calibration of each parameter in correlation with the scale, time and cost factor, while desirable is to combine application and effectiveness.

Sampling sites were chosen in such way in order to capture the diversity of climatological, geological and hydromorphological characteristics. As there was no funding for travel, sampling and lab analysis costs, sampling areas were sorted and chosen by best combination of highest diversity and low travel - analysis cost.



Nine reference sites of excellent ecological status (table 3.1), were chosen for sampling, sediment and XRD analysis. Five sites with specific geological coverage of their watershed were chosen to be sampled for XRD analysis purposes, regardless anthropogenic interference.

1.4 PARAMETERS DATA AND METHODOLOGY

The research goal is the customization of the geological, hydromorphological and climatological parameters in such way that their corresponding diversity on Macedonia's district torrents is captured at best. During research, the determination of the scale factor in digitizing and logging of these parameters was found to be crucial, setting the selection of the appropriate scale as an essential goal. The methodology was defined in such way to better serve the research scope goals.

Geology is a four dimension parameter that is mapped in three dimensions and is put on a two dimension paper losing most of its characteristics and information. Greece has a unique and complicated geology with very high space and time diversity that is very difficult to be captured in a two dimension environment and in such way the scale factor of the geological mapping is important. As previous work was focused on entire Greece and there was a strong time pressure the geology was mapped, digitized and statistically analysed and correlated at 1:500.000 scale (Kasapi et al. 2009; Kanli 2009; Lazaridou et al. 2013). In such way the first goal of this Thesis is the calibration and determination of the differences of Macedonia's district, geology by digitizing it in two different scales; 1:500.000 and 1:50.000 as the second one is 100 times more detailed and has multiple information. Secondly is the qualitative and quantitative analysis of the sediment, by using XRD analysis, in the river bed and its correlation with the digitized geology of the river's watershed at the aforementioned scales is examined.

Concerning the climatological parameters, the main aim is not a suggestion of a complicated and highly diverged classification, but a simply, easily applied and tested classification based on a worldwide accepted methodology, in order for the results to be comparable worldwide. Specifically, the climatological classification by Köppen (Köppen, W. 1884, Köppen, W. 1918, Köppen, W. 1930) method is chosen as a



worldwide approved method which is easily applied and all of the necessary data are available at most areas of Europe. However Greece is a much diverged country with many small catchments and natural torrents and so the climatological parameters are examined and combined in such way that they are better applied in the typology classification of Macedonia.

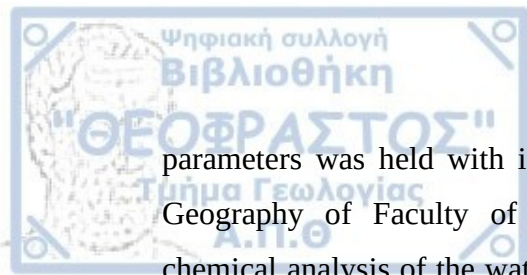
1.5 IMPLEMENTATION OF THE RESEARCH

“Research never ends and so scientists can never put a full stop at any field of their research. Research is an ongoing investigation for “truth-answer”, or more likely an effort to reach and describe to the rest scientific community, of your expertise, the bubble you found and inside which you believe lays the “truth”. “Truth” is a data point suspended in a space-time environment of infinite dimensions and if you ever find this point, it will be only by accident; even then and with thorough investigation the point you found will prove to be another universe. In such way, research never ends, it continues to the forefront by creating new questions and opening new horizons for research. It’s like searching for a path in a thick fog; therefore all researchers are obliged in using real and accurate data in order to publish their work in such way that it will serve as “Myrtle of Ariadne” for the rest and future scientific community, so that they will know your path and decide if they will follow it or start a new one...”.

Under this scope, this research project sets predefined targets and tries to put semicolons to some of them while sets new questions and goals for research. In this way, the literature review started on the beginning of the research and it was put on hold at the last day of writing this Thesis, but research keeps on going.

Initially the scope of research for the geological, hydromorphological and climatological parameters was set, alongside the design of the methodology approach, selection of research areas and the timetable for sampling.

Water and sediment sampling took place on three different flow conditions, low, medium and high flow; while before sampling the River Habitat Survey (RHS) (Raven et al., 1998) and Geomorphological River Habitat Survey (GeoRHS) (Environment Agency, 2006) was applied. In situ analysis of chemical and abiotic



parameters was held with instruments of the Department of Geology and Physical Geography of Faculty of Science, Aristotle's University of Thessaloniki. The chemical analysis of the water samples was held at the Chemical labs of Hellas Gold and occurred within 24 hours of sampling day to ensure the excellent quality of the 9 reference sites.

The XRD analysis of the riverbed sediment of the studying sites was held at the Democritus "National Centre for Scientific Research" and at the Department of Mineralogy-Economic Geology of Faculty of Science, at Aristotle's University of Thessaloniki. The sedimentological analysis took place at the Department of Geology and Physical Geography of Faculty of Science, at Aristotle's University of Thessaloniki.

The digitisation of measurements from 82 different meteorological - climatological stations of Macedonia's district was held at the Ministry of Rural Development and Food, while the data from 3 stations of Hellas Gold were provided digitised. The digitisation of Macedonia's geology at scale 1:50.000 alongside statistical analysis and correlation of the in situ measured parameters, of the lab analysed parameters and the digitised ones occurred at the Department of Geology at Aristotle University of Thessaloniki, at the Natural History Museum of the Lesvos Petrified Forest and at the Geography Department of Aegean University.

The Department of Geology and Physical Geography of Faculty of Science, Aristotle's University of Thessaloniki provided all instruments for fieldwork measurements and the consumables for the lab analysis. Living expenses, travel costs and overall research was funded by the Hellenic State Scholarships Foundation "IKY" for two years and then by my family and me.

CHAPTER 2: CLIMATOLOGICAL – METEOROLOGICAL PARAMETERS

2.1 ABSTRACT

The main aim of this chapter is the Climatic Classification by Köppen (Köppen, W. 1884, Köppen, W. 1918, Köppen, W. 1930) that will be addressed as CCK from now on, by Annual temperature range (A) and by Gorczynski thermal Continentality Index (GCI) of North Greece, specifically of Macedonia political district and the surrounding area. The differences of CCK with a sparse network of only 17 stations at Greece and only 2 at North Greece (Kanli 2009) was cross checked with the climatic classification of North Greece by Grimpylakos et al. (2013) with a dense network of 20 stations at North Greece. The CCK gave one more climatic type Cfb at North Greece and many differences regarding the spatial distribution of the other 2 climatic types Cfa and Csa.

Second aim was to examine the effect of spatial-temporal distribution of the meteorological – climatological data to the climatic classification and the range of differences at the creation of thematic maps regarding precipitation, temperature and evapotranspiration which are directly and indirectly correlated with the runoff and stream waterpower.

The publication of the results (Grimpylakos et al. 2013) alongside the International Congress of the Geological Society of Greece (GSG) 2013 at Chania (Greece) raised a lot of questions regarding the differences of climatic classification and the thematic maps with the spatial-temporal distribution and continuity of meteorological– climatological data. Therefore two-three scenarios were examined for each climatic parameter with differences regarding the spatial-temporal distribution and the continuity of the meteorological – climatological stations and daily data. At first scenario 25 stations were used, that do not correspond to the exact same period, as shown at table 2.2. At second scenario 20 stations were used which

correspond to the same period 1974-2004 and with continuous data of more than 23 years (Table 2.2 and figure 2.2). This last part of the research was examined at 2018-2020. The outcomes were extremely important. The CCK at first scenario gave 5 types, 2 Csb and Cwa (Figure 2.15) which were not observed at second scenario (Figures 2.12 and 2.13). The GCI and A climatic classification were different for North Greece at the two scenarios.

2.2 INTRODUCTION

This chapter is part of a research, which examines the spatial and temporal distribution of climatic parameters in Macedonia (Greece). The key question is to determine which of these parameters and at what scale they should be used for research purposes. A secondary objective is to examine the importance that the spatial temporal distribution of the meteorological – climatological stations to the climatic classification of an area and in order to set any possible rules for future and previous research.

Macedonia has numerous torrents of different watershed size, diverged geological and hydromorphological characteristics which in correlation with the spatial and temporal distribution of precipitation and temperature determine the water runoff of each torrent watershed. In that order, as precipitation, air temperature and evapotranspiration are directly related and interacted with the water cycle, their spatial and temporal distribution is essential for the Macedonia typology classification.

In this research, climatological and meteorological parameters are manipulated shaped and combined in such format so that they can capture at best the diversity of Macedonia's torrents regarding these factors (Grimpylakos et al. 2013).

2.3 CLIMATIC CLASSIFICATION

Since the mid of 18th century, a large number of climatic classifications have been suggested. Of these, some are based on the circulation of the atmosphere or in the distribution of air masses, like classification of Flöhn, Alissov, Brochet, etc., while others rely on a combination of different climatic parameters, like classification of de

Martone, Köppen, Thornthwaite, etc. (Chronopoulou & Flokas 2010). Classification by Köppen is considered as the most prevalent theory by many climatologists (Chronopoulou & Flokas 2010) and it has the considerable advantage of being simple in its implementation while it uses climatic data that are available by most meteorological – climatological stations (Flokas 1992).

Climatic Classification by Köppen (CCK) (Köppen, W. 1884, Köppen, W. 1918, Köppen, W. 1930) will be used in this research project for the climatic classification of Macedonia, at North Greece. Köppen system is based on the concept that native vegetation is the best expression of climate. Thus, climate zone boundaries have been selected with vegetation distribution in mind (Flokas 1992). CCK is mainly based on the annual and monthly distribution of precipitation and temperature and the seasonality of precipitation through the year. In Köppen system, the main climatic frame and its subdivisions are determined by interpreting, separately and in combination, these two parameters, of precipitation and temperature (Chronopoulou & Flokas 2010).

Köppen, in his effort to determine the main observed climatic types used three sets of symbols - letters. The symbols of the first sets are the caption letters A, B, C, D, E, H of the Latin alphabet and each one of them define different general Temperature status, except B which determines the precipitation in connection to the temperature. The letters A, B, C, D, and E represent the main five groups of climates, as H group is a variation of E group. Climates of B group are considered dry, as potential evapotranspiration (PET) during the year is higher to precipitation. On the other hand the rest types (A, C, D, E) are considered wet, as the mean annual precipitation is higher to PET. The symbols of the second group F, f, m, s, T and w, are describing the precipitation's characteristics except for the caption F and T which are referring to temperature. Lastly the symbols of the third group a, b, c, d, h, k define specific variations of temperature.

Specifically, each of these five climatic groups by Köppen and each of their subdivisions have the following characteristics:

A. Tropical climates. These areas are characterized by constant high temperatures (at sea level and low elevations) – temperature of the cooler month (T_c) of the year has average temperature higher of 18°C ($T_c > 18^{\circ}\text{C}$; 64°F).

B. Dry climates. These climates have no temperature limitations and are characterized by actual precipitation less than a threshold value set equal to the potential evapotranspiration.

C. Temperate/mesothermal climates. In this category are all rainy climates with mild winters. The average monthly temperature of the warmest month (T_w) is higher of 10°C and of the cooler month is between 18°C and -3°C , meaning $T_w > 10^{\circ}\text{C}$ (50°F) and $-3^{\circ}\text{C} < T_c < 18^{\circ}\text{C}$ ($27^{\circ}\text{F} < T_c < 64^{\circ}\text{F}$).

D. Continental/microthermal climates of cool rainy forest with harsh winters. The warmest month has an average temperature above 10°C (50°F) while the cooler month has a temperature lower than -3°C (27°F).

E. Polar or arctic climates. The lowest mean temperature of the warmest month is below 10°C , meaning $T_c < 10^{\circ}\text{C}$ (50°F).

Later on, climatologists added a 6th group of climates with the symbol H. This group is an alteration of group E and it characterizes climates with high altitude, generally more than 1500 meters regardless latitude, meaning this category includes mountain climates where $T_w < 10^{\circ}\text{C}$ (50°F).

All of the above groups except the H are divided in 2 or more secondary groups, with the addition of one more letter of these F, f, m, s, T, w. Furthermore, climates B, C, and D are divided in more categories by adding one third symbol from the group {a, b, c, d, h, k}, referring to temperature distribution. Later on, a group of researchers suggested a fourth group of symbols to describe specific conditions, however it is not so widespread.

In order to avoid a long and confusing text by fully analysing CCK methodology, only the corresponding climates types in the project area are analysed. In Greece, only the temperate/mesothermal climates are found ($T_w > 10^{\circ}\text{C}$ and $-3^{\circ}\text{C} < T_c < 18^{\circ}\text{C}$) and specifically the following five (5) climatic subtypes are met:

- **Cfa:** Humid subtropical climate of long hot summer. $T_w \geq 22^{\circ}\text{C}$.
- **Cfb:** Oceanic humid with hot summer and average temperature of 4 warmest months $T_w \geq 10^{\circ}\text{C}$ and of hottest month $T_w < 22^{\circ}\text{C}$
- **Cfc:** Oceanic. Cool and short-term summers. Calm winters and humid seasons. Mean monthly temperatures for one to three months $\geq 10^{\circ}\text{C}$.
- **Csa:** Mediterranean climate. Very hot and dry summers. Calm winters. $T_w \geq 22^{\circ}\text{C}$ and $r_{\xi} < 30$, $r_{\xi} < r_u/3$.

- **Csb**: Coastal Mediterranean. Calm winters, with short term dry and hot summers. $T_w < 22^\circ\text{C}$ and $r_\xi < 30$, $r_\xi < r_u/3$.
- **Cwa**: Subtropical monsoons. Calm dry winters, with very dry summers. $T_w \geq 22^\circ\text{C}$ and $r_\xi < r_u/10$.
- **Cwb**: Subtropical with a relevant high altitude. Calm and dry winters with short term hot summer. $T_w < 22^\circ\text{C}$ and $r_\xi < r_u/10$.

Specifically in North Greece the following 5 subtypes are met at stations: Cfa, Cfb, Csa, Csb and Cwa when the continuity of data is sparse (Table 2.2, figure 2.15). On the other hand, when data are continuous >23 years, only Cfa, Csa and Cfb types correspond to areas (Figures 2.12 and 2.13,).

2.4 PARAMETERS DATA AND METHOD

2.4.1. Climatic Parameters

2.4.1.1. Annual Temperature Range

The annual course of temperature depends on the deviation of the sun (position of the sun according to the earth in general), the latitude of a place and the respective path of solar radiation. At North hemisphere, higher temperature is observed during July or August while minimum during January or February (Zampakas 1981). Mean annual Temperature range at each station, derives by calculating the mean monthly temperature for a 30-year period and abstracting from the maximum monthly temperature the minimum monthly temperature as shown at table 2.2. Annual temperature range can be used to categorise the climate type in 4 different types (Supan 1880):

- $A \leq 15^\circ\text{C}$ Equator climate type,
- $15^\circ\text{C} < A \leq 20^\circ\text{C}$ Transitional maritime climate type
- $20^\circ\text{C} < A \leq 40^\circ\text{C}$ Continental climate type
- $40^\circ\text{C} < A$ Extreme continental climate type.

2.4.1.2 Parameter K of Thermal Continuality

The Gorczynski thermal Continuality Index (GCI), parameter K, which is most often used in Europe was proposed by Gorczynski in 1918 and applied by many researchers (Brázdil et al. 2008b, Mikolaskova 2009, Ciaranek 2014, Szabó-Takács et al. 2015, and Vilček et al. 2016).

Equation 1 – Gorczynski for Thermal Continuality

$$K = 1,7(A - 12\sin\theta)/\sin\theta \text{ or } K = 1,7A/\sin\theta - 20,4$$

Parameter K is the index of continentality expressed as a percent, A is annual range of temperature in °C and θ is latitude in degrees (WGS84). Expression $A=12\sin\theta$ corresponds well to observations above the sea (Gorczynski 1922); constant value 1,7 derives from the assumption that Verchojansk, in eastern Siberia, is representative of 100% continentality. K value range is 0-100, where 0 is observed at sea locations, where climate is no longer influenced by continental surface and 100 at purely continental areas, where there is no influence from maritime air masses. This parameter is not applicable at low latitudes (Conrad and Pollak 1950) but it is applicable in Greece. Gorczynski suggests three degrees of continentality according to parameter K value:

- i. $0\% \leq K \leq 33\%$ Transitional maritime climate type
- ii. $33\% < K \leq 66\%$ Continental climate type
- iii. $66\% < K \leq 100\%$ Extreme continental climate type.

2.4.1.3 Precipitation

Precipitation, in meteorology, is any product of the condensation of atmospheric water vapour that under gravity falls in atmosphere and eventually reaches earth's surface, in solid or liquid form (Flokas 1990; Chronopoulou & Flokas 2010). The main forms of precipitation include drizzle, rain, sleet, snow and hail. The measurements of precipitation were daily, monthly and annual during an eighty year period (1930-2010). There were 85 meteorological – climatological stations of Ministry of Rural Development and Food and Hellas Gold (Figure 2.1), spatial distributed in Macedonia district, in such a way, as to serve at best the agriculture activities.

2.4.1.4 Evapotranspiration

Although several variations of the definition exist, potential evapotranspiration (PET) can be generally defined as the amount of water that could evaporate and transpire from a vegetated landscape without restrictions other than the atmospheric demand (Thornthwaite 1948; Penman 1948; Jensen et al. 1990). Evapotranspiration (ET) is the sum of evaporation and plant transpiration from the Earth's land surface to atmosphere. To estimate ET, three methods were used in this study: Turc, Coutagne and Thornthwaite. These methods need the mean monthly and annual precipitation and the mean monthly and annual temperature.

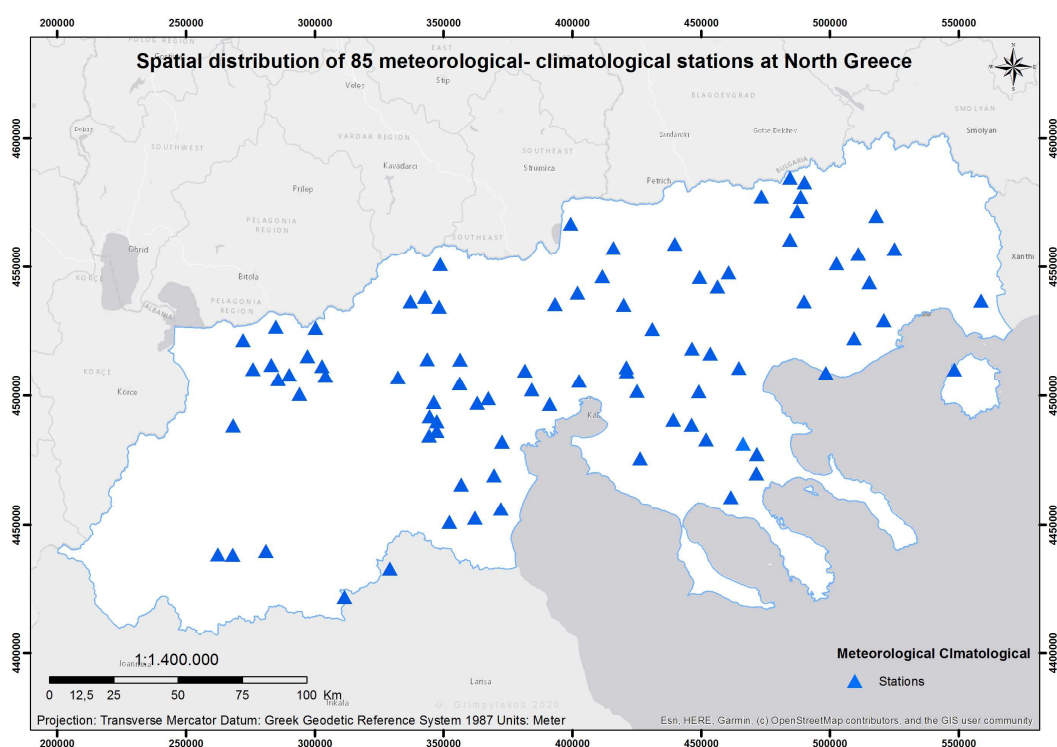


Figure 2.1. Map projecting the spatial distribution of the 85 meteorological -climatological stations, of the Ministry of Rural Development and Food and Hellas Gold, at Macedonia district.

- Turc algorithm, equation 2, for estimating ET, uses P mean annual precipitation in mm and T which is the mean annual temperature in °C.

Equation 2 – Turc algorithm for Evapotranspiration

$$E = P / \sqrt{(0.9 + P^2/L^2)}, \text{ with } L = 300 + 25T + 0.05T^3$$

- Coutagne algorithm, equation 3, for estimating ET is applicable when the condition $1/8\lambda \leq P \leq 1/\lambda$ is valid, P is the mean annual precipitation in meters and T is mean annual temperature in °C.

Equation 3 – Coutagne algorithm for Evapotranspiration

$$E = P - \lambda P^2, \text{ with } \lambda = 1 / (0,8 + 0,14T)$$

- Thornthwaite algorithm requires latitude, daylight coefficient, soil moisture, mean monthly precipitation in mm and mean monthly temperature in °C (Palmer & Havens 1958; Pereira & Camargo 1989; Kerkidis et.al. 1996; Mardikis et al. 2005; Dalezios & Bartzokas 2009).

Equation 4 – Thornthwaite algorithm for Evapotranspiration

$$PET_i(L) = K * PET_i(0)$$

- $PET_i(0) = 1,6 * (10T_i/J)^c$,
- $J = \sum_{i=1}^{12} (I_i)$
- $I_i = (T_i/5)^{1,514}$
- $T_i = \text{mean } i \text{ monthly temperature}$
- $C = 0,000000675 * J^3 - 0,0000771 * J^2 + 0,01792 * J + 0,49239$

$PET_i(0)$ = Potential Evapotranspiration at 0 latitude. Constant K differs according to latitude. For our case study at all meteorological – climatological stations the same constant K values were used and these are shown at table 2.1.

Table 2.1. Constant K values for appliance at the Thornthwaite equation

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
K	0,83	0,83	1,3	1,11	1,25	1,26	1,27	1,19	1,04	0,96	0,82	0,8

Average monthly precipitation is estimated by averaging the overall precipitation for each month for 1974-2004. Mean annual precipitation is very reliable measured at points where meteorological – climatological stations are situated and was estimated by summing the average monthly precipitation for the same period. Average monthly

temperature is estimated by averaging the average temperature for each month during the period of 1974-2004. Mean annual temperature was estimated by averaging the monthly average temperature for the aforementioned period.

2.4.2 Studying area and Data

Macedonia is a district of North Greece as shown at figure 2.1. Studying area is a polygon that includes all the watersheds of Macedonia's torrents and rivers, resulting in a polygon the boundaries of which differ from the boundaries of Macedonia's political district and define it as an area of North Greece. The boundaries of each watershed were determined by the Ministry of Rural Development and Food in collaboration with the Institute of Geology and Mineral Exploration and always according to the WFD guidelines for water bodies. Studying area is 36.290 km², has a perimeter of 2.163 km and includes 77 different torrents in which main rivers are divided according to WFD and their watersheds area is of 2,9-4.775 km².

Ministry of Rural Development and Food (82) and Hellas Gold (3) provided data from 85 meteorological – climatological stations, which correspond to different time periods during an eighty year period (1930-2010) and include daily, monthly and annual measurements of precipitation, while 43 of them included also daily monthly and annual measurements of temperature. In order to study the climatic parameters for a given area, a 30-year period with good spatial and temporal distribution is needed. For our studying area, after sorting the data from all 85 meteorological – climatological stations the best period corresponded to 1974-2004, as the number of stations with daily and continuous data was higher.

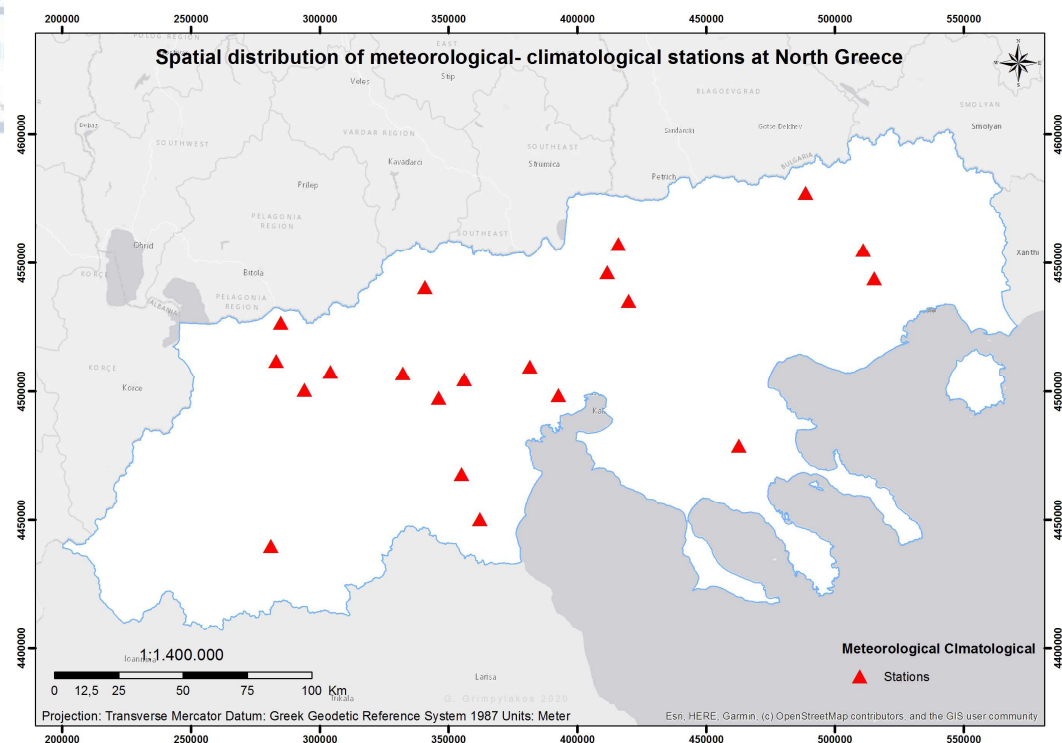


Figure 2.2. Map projecting the spatial distribution of the 20 meteorological – climatological stations with continuous temperature data during period 1974-2004, at North Greece.

Data from 43 meteorological – climatological stations, of the studying area, were available to be used in order to calculate the mean monthly and annual temperature, the annual temperature range A and the parameter K of thermal continentality. The data were of different periods during 1950-2010 and of different time continuity, 12-65 years. Period 1974-2004 was chosen to be used because most stations had data for this period. After sorting the data from the meteorological – climatological stations, 32 of them had data during the aforementioned period but only 20 had continuously data for the whole period of 30 years; therefore these stations were used (Table 2.2, figure 2.2).

For the mean annual precipitation analysis, over the 85 meteorological – climatological stations, only 40 had continuous data for the period 1974-2004 (Table 2.3, figure 2.3) and included the 20 stations that were used to calculate the annual temperature range A. As there was a big diversity in the spatial distribution of the 20 and 40 meteorological – climatological stations, it was decided that two thematic maps should be constructed, with the spatial and temporal distribution of the

precipitation through Macedonia. Afterwards, these thematic maps were checked for similarities and differences (Figures 2.9 and 2.10).

The data for calculating the potential evapotranspiration at each station derived from daily data of 20 stations at 1974-2004 period that were used for the estimation of annual temperature range, thermal continentality K and mean annual precipitation. These stations and data were chosen because Turc, Coutagne and Thornthwaite methods needed the mean monthly and annual temperature and precipitation in order to calculate PET. The high resolution Digital elevation model (DEM) with 28.3mx28.3m cell size was used, which was constructed from the Advanced Space borne Thermal Emission and Reflection Radiometer (ASTER) of NASA Terra satellite.

Table 2.2. Annual Temperature Range A at each station with the Mean annual temperature minimum temperature and maximum temperature for period 1974-2004

S/N	Station	County	A	A 1974 - 2004	Mean Monthly T	Minimum T	Maximum T	Years with daily data
1	Ano Kalliniki	Florina	21,3	22,6	13,1	2,0 Jan	23,3 July	24,9
2	Limnochori	Florina	19,9	20,9	12,4	2,6 Jan	22,5 July	29,5
3	Amuntaio	Florina	20,0	21,0	12,8	3,0 Jan	23,0 July	27,0
4	Tropeouchos	Florina	20,6	21,7	11,3	1,0 Jan	21,6 July	27,2
5	Monospita	Imathia	20,6	21,5	14,5	4,2 Jan	24,8 July	24,6
6	Rodochori	Imathia	19,9	21,6	13,3	3,7 Jan	23,6 July	28,5
7	Exaplatanios	Pella	20,0	21,0	14,1	4,5 Jan	24,5 July	25,0
8	Vrontous	Pieria	19,7	20,9	15,0	5,5 Jan	24,5 July	27,2
9	Moschopotamos	Pieria	19,5	21,1	14,1	4,9 Jan	24,3 July	26,8
10	Agia Paraskevi	Grevena	19,8	21,2	12,6	3,0 Jan	22,7 July	23,1
11	Alatopetra	Grevena	19,2	18,8	11,1	2,2 Feb	21,5 July	10,0
12	Krua Vrusi	Pella	20,5	21,0	14,2	4,0 Jan	24,5 July	30,5
13	Plana	Chalkidiki	19,1	19,2	14,2	5,3 Jan	24,5 Aug	10,9
14	Arnaia	Chalkidiki	19,9	21,3	12,2	2,4 Jan	22,2 July	28,3

15	Ano Theodoraki	Kilkis	19,2	20,9	13,2	4,0 Jan	23,2 July	30,5
16	Metaxochori	Kilkis	19,4	21,2	14,9	3,4 Jan	22,8 July	25,6
17	Melanthio	Kilkis	19,4	21,0	12,8	3,4 Jan	22,8 July	30,3
18	Nea Chalkidona	Thes\niki	20,5	21,3	15,0	4,7 jan	25,2 July	28,5
19	Chalastra	Thes\niki	20,2	21,9	15,0	4,7 jan	24,9 July	22,2
20	Drama	Drama	21,0	21,7	14,4	4,1 Jan	25,1 July	23,9
21	Kato Nevrokopi	Drama	20,8	22,5	10,9	0,2 jan	21 July	26,3
22	Kalampaki	Drama	20,5	21,2	14,4	4,2 Jan	24,7 July	27,5
23	Argyroupoli	Drama	21,6	22,9	13,7	3,7 Jan	24,3 Aug	6,7
24	Leukogia	Drama	21,7	25,0	10,5	0,6 Jan	22,1 July	6,6
25	Prinos Thasou	Kavala	20,0	20,1	14,6	4,9 Jan	24,9 July	8,0

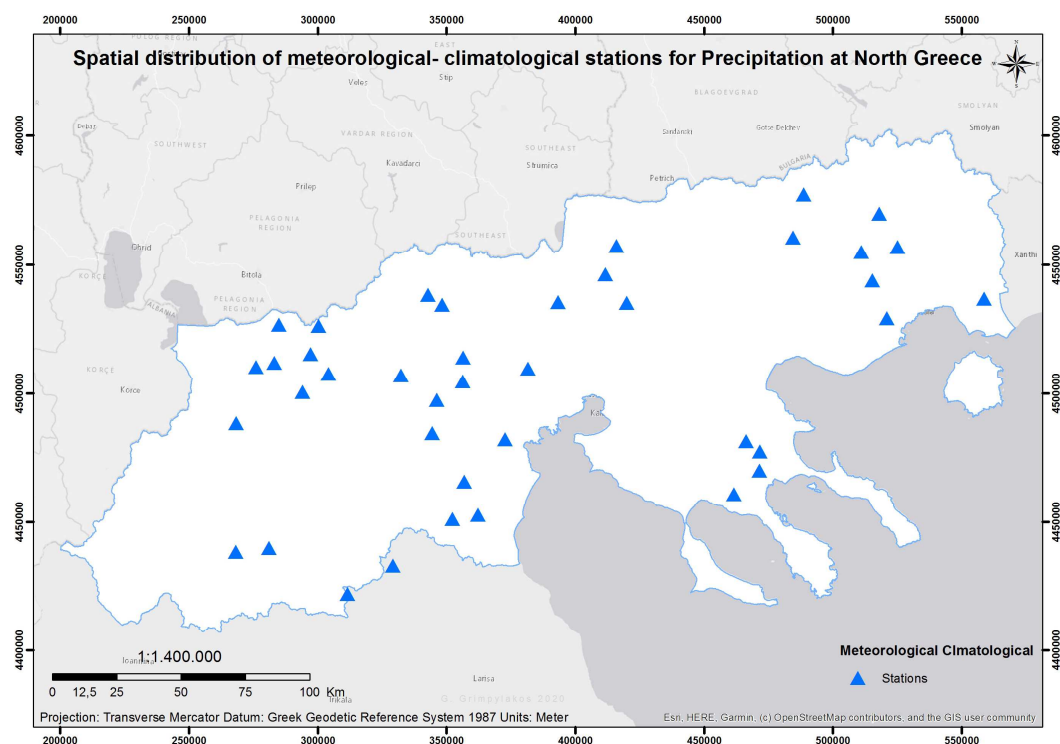


Figure 2.3. Map projecting the spatial distribution of the 40 meteorological – climatological stations with continuous precipitation data during period 1974-2004, at North Greece.

Table 2.3. Mean Precipitation at each one of the 40 stations for the corresponding period 1974-2004. The geographical position of each station is given in EGSA 87 (meters)

S/N	Station	County	Annual P(mm) Operation	Data during operation (years)	Annual P(mm) 1974-2004	Data during 1974-2004 (years)	Altitude	Longitude	Latitude
1	Ano kalliniki	Florina	521,1	36	496,21	27,17	634,6	284948,045	4526799,972
2	Limnochori	Florina	541,3	79	507,38	29,42	598,9	294062,520	4500615,249
3	Amuntaio	Florina	438,1	46	417,09	26,75	579,0	304125,020	4507749,929
4	Polypotamos	Florina	619,0	42	622,87	26,00	1000,0	276016,096	4510396,803
5	Skopos	Florina	435,7	36	417,08	26,42	775,0	300399,873	4526365,940
6	Tropeouchos	Florina	622,7	42	593,98	29,50	695,0	283109,746	4512037,983
7	Veui	Florina	535,1	36	491,33	28,33	734,7	297286,337	4515340,333
8	Monospita	Imathia	596,9	32	580,33	25,25	47,0	346179,189	4497504,857
9	Koumaria	Imathia	1020,6	36	999,84	28,92	700,0	344499,751	4484582,860
10	Rodochori	Imathia	801,2	36	799,46	29,67	545,0	332288,798	4507060,477
11	Exaplatanios	Pella	635,6	29	630,40	26,08	133,0	342816,284	4538298,946
12	Theodoraki	Pella	876,7	33	859,15	28,58	424,0	348348,671	4534480,631
13	Promachonas	Pella	890,2	33	876,08	29,25	250,0	329206,902	4433086,364
14	Kariotissa	Pella	533,1	9	534,04	29,58	9,0	356483,832	4514111,447
15	Krua Vrusi	Pella	524,2	8	545,00	28,42	8,0	356302,515	4504740,156
16	Ktima Kastorias	Kastoria	596,0	30	560,78	23,67	690,0	268286,411	4488408,209
17	Vrontou	Pieria	850,2	37	853,87	30,67	180,0	352321,397	4451109,708
18	Kolundros	Pieria	664,2	44	657,26	31,00	300,0	372715,011	4482198,998
19	Lofos	Pieria	821,8	37	839,29	30,58	250,0	362285,404	4452772,325
20	Moschopotamos	Pieria	775,1	43	767,06	30,92	516,0	356858,373	4465828,328
21	Deskati	Grevena	668,0	37	584,31	26,58	850,0	311867,150	4422388,357
22	Agia Paraskevi	Grevena	727,1	32	681,94	22,92	615,0	281013,000	4439877,045
23	Anabruta	Grevena	920,2	32	921,87	23,08	860,0	282381,140	4437985,969
24	Megali Panagia	Chalkidiki	679,8	35	658,42	25,17	440,0	471584,641	4477471,821
25	Plana	Chalkidiki	550,8	35	535,81	26,92	11,5	471556,731	4470071,868

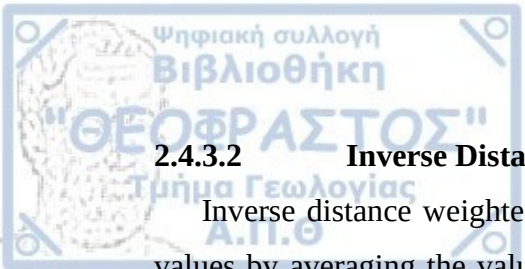
26	Ormulia	Chalkidiki	472,8	35	453,35	24,17	40,0	461606,877	4460865,882
27	Arnaia	Chalkidiki	737,8	59	702,16	31,33	585,0	466373,529	4481532,566
28	Ano Theodoraki	Kilkis	495,2	46	464,33	29,67	480,0	415959,912	4557455,098
29	Metaxochori	Kilkis	565,1	47	524,70	29,17	63,0	411631,530	4546402,983
30	Melanthio	Kilkis	618,8	47	570,81	29,92	490,0	419912,640	4535205,366
31	Nea Chalkidona	Thessaloniki	508,6	58	476,10	28,33	29,5	381632,419	4509811,675
32	Chalastra	Thessaloniki	443,1	34	419,82	24,25	4,0	393266,166	4535543,332
33	Drama	Drama	645,5	58	597,15	26,17	101,0	511038,602	4555131,545
34	Kato Nevrokopi	Drama	725,7	44	700,00	25,67	580,0	488696,344	4577334,585
35	Nikiforos	Drama	642,1	47	586,60	25,75	236,0	525017,441	4557016,570
36	Livadero	Drama	877,5	47	837,51	25,67	650,0	517855,148	4625457,932
37	Mikropoli	Drama	934,4	47	898,26	25,42	360,0	484478,409	4560689,863
38	Kalampaki	Drama	645,2	58	602,63	23,91	67,3	515257,514	4544037,941
39	Eleftheroupoli	Kavala	719,7	38	709,18	24,17	80,0	520902,445	4529250,503
40	Chrysoupoli	Kavala	569,8	38	530,97	23,08	18,0	558736,979	4536856,957
Data from stations that were not used because of lack of continuity of data (less than 23 years)									
41	Alexandria	Imathia	690,2	40	719,36	10,33	750,0	367360,434	4498948,430
42	Trilofos	Imathia	697,2	5,75	697,22	5,75	151,5	344653,693	4491983,540
43	Trikala	Imathia	572,1	13	626,50	4,92	7,0	363097,862	4497174,779
44	Ergochori	Imathia	643,2	30	620,59	14,75	107,0	347437,793	4490075,164
45	Notia	Pella	446,2	18	446,17	18,25	590,0	348692,164	4551133,402
46	Skydra	Pella	550,7	14		0	46,0	343710,041	4514215,579
47	Trilofos	Pieria	695,9	5	695,9	5	318,0	369664,889	4469296,912
48	Alatopetra	Grevena	857,0	20	823,18	9,50	1250,0	262479,391	4438582,591
49	Argyroupoli	Drama	746,5	13	682,9	6,00	74,0	502648,896	4551423,084
50	Leukogia	Drama	856,5	13	804,1	5,92	621,4	490098,077	4582883,456
51	Exochi	Drama	715,0	17	698,8	8,25	620,0	484529,212	4584743,409
52	Katafygio	Drama	745,1	19	790,00	8,17	761,0	473359,448	4577374,373
53	Ochyro	Drama	1127,5	18	1351,00	8,08	543,0	487292,487	4571786,029
54	Iraklia	Serres	515,9	17	0	0	35,0	439744,333	4559070,950

55	Provatas	Serres	467,5	16	0	0	18,0	449439,899	4546045,337
56	Kato Kamila	Serres	554,4	19	0	0	10,0	456419,478	4542300,120
57	Worksite Serres	Serres	523,1	31	NO	10	56,0	460652,182	4547827,040
58	Rizes	Chalkidiki	742,0	17	673,32	9,08	350,0	451902,804	4483187,002
59	Kalamoto	Thessaloniki	787,0	8	809,00	2,75	220,0	446284,268	4488778,629
60	Mavrouda	Thessaloniki	687,0	8	749,43	2,58	360,0	453583,750	4516454,322
61	Diavata	Thessaloniki	461,3	21	442,75	18,00	14,0	402694,802	4505804,818
62	Vraxia	Thessaloniki	415,6	6	319,20	1,00	2,0	384332,087	4502366,704
63	Gialochoria	Kavala	485,6	8	485,7	7,17	7,0	498443,104	4508869,290
64	Prinos Thasou	Kavala	716,7	13	716,73	8,58	684,0	548325,837	4510168,565
65	Moustheni	Kavala	701,0	13	701,02	9,17	151,0	509333,916	4522296,22

2.4.3 Method

2.4.3.1 Spatial Interpolation

A very basic problem in spatial analysis is interpolating a spatially continuous variable from point samples. Spatial interpolation techniques predict values for cells in raster from a limited number of sample point data. According to first law of Geography, "Everything is related to everything else, but near things are more related than distant things" (Tobler 1970). Unknown values are predicted with a mathematical formula that uses the values measured at nearby points. There are many different spatial interpolation techniques. Some of the most commonly used interpolation methods to model spatially distribution from point data are the following three: Inverse Distance Weighting (IDW), spline and ordinary kriging. Overall, anomalies of local scale can be adjusted without affecting the values derived from interpolation at other points on the surface (Burrough and McDonnell 1998).



2.4.3.2 Inverse Distance Weighted IDW

Inverse distance weighted (IDW) is a method of interpolation that estimates cell values by averaging the values of nearby measured data points. The main logic rule behind this technique is that the cell values next to each other are most likely to have same values, so the value of the predicted cell is more influenced by the value of cells closer than those that are further away. This technique weights the points closer to the prediction location greater than those farther away, hence the name inverse distance weighted (Watson and Philip 1985). However the main problem with this technique is that it assumes that maximum and minimum values are measured at the sampled points and all other points have values between those values.

2.4.3.3 Spline Interpolation

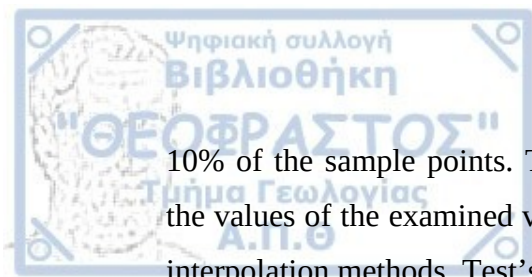
Spline is an interpolation method in which cell values are estimated using a mathematical function that minimizes overall surface curvature, resulting in a smooth surface that passes exactly through the input points. It is a deterministic, locally stochastic interpolation technique, which represents two-dimensional curves on three-dimensional surfaces (Eckstein 1989; Hutchinson and Gessler 1994).

2.4.3.4 Kriging

The aforementioned methods are known as deterministic interpolation methods because they are directly based on the surrounding measured values and use specified mathematical formulas that determine the smoothness of the resulting surface. On the other hand, kriging uses statistical models that include autocorrelation among measured points, in order to predict the values at unknown points. The most commonly applied form uses “semivariogram” among pairs of sampled points. Kriging interpolation method was developed by Matheron (1970).

2.4.3.5 Validation

All data were divided in 2 groups. The first group was named “training” and content 90% of sample points while the second group was named “test” and content



10% of the sample points. Training group's measurements were used for predicting the values of the examined variable at whole Macedonia by using the aforementioned interpolation methods. Test's group was used to validate the results of each method.

2.5 RESULTS

2.5.1 Annual Temperature Range

The Annual Temperature Range was estimated twice. At first scenario at 24 stations (Figure 2.4) and at second scenario at 20 meteorological – climatological stations (Figure 2.5) at Macedonia North Greece for the whole time of the station operation and for the 30 year period of 1974-2004 (Table 2.2 and figures 2.4, 2.5). At first scenario, A was estimated for the whole period there were 2 different climatic types Continental and Transitional maritime climatic type.

For the period 1974-2004 all stations have $20 < A < 40$ and there was no need to estimate the A at the between areas. Entire Macedonia of North Greece is one Continental climate type, according to A values (Supan 1880) as shown at figure 2.5. In addition the possible correlation between A and elevation was checked and was found $R^2=0.034$ for linear equation meaning not significant correlation; while for nonlinear equation the $R^2=0.2513$ for a polynomial equation which is still not significant.

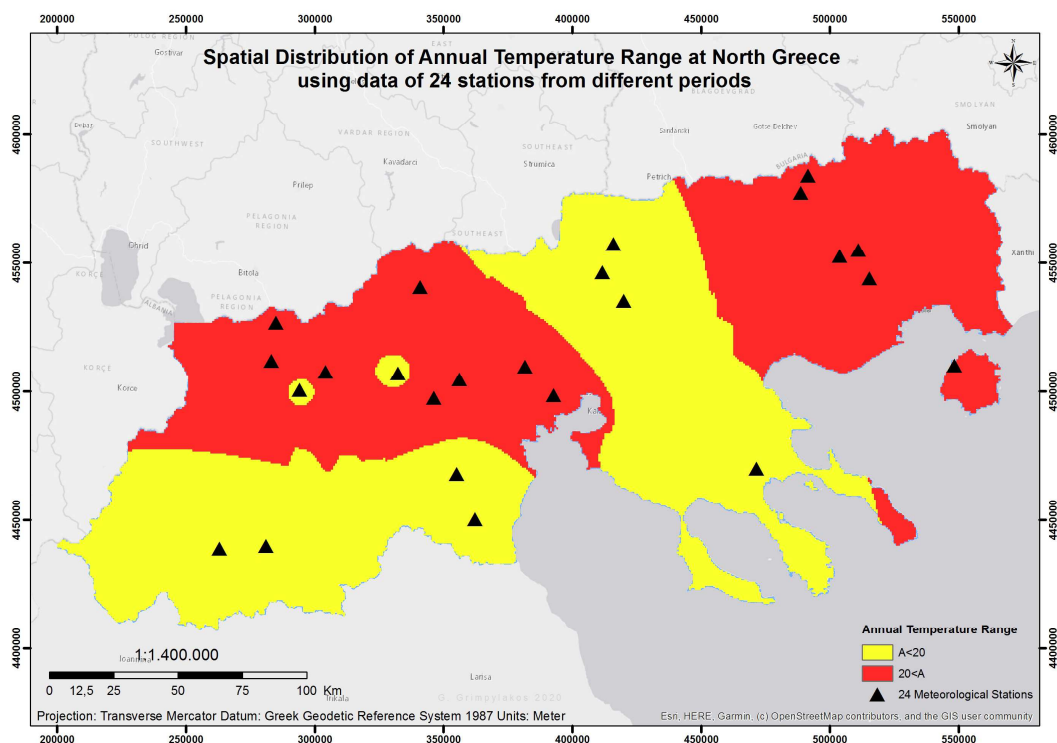


Figure 2.4. Climate types according to A value (Supan 1880) at North Greece, during station operation that may differ from 8 to 50 years during period 1954-2004.

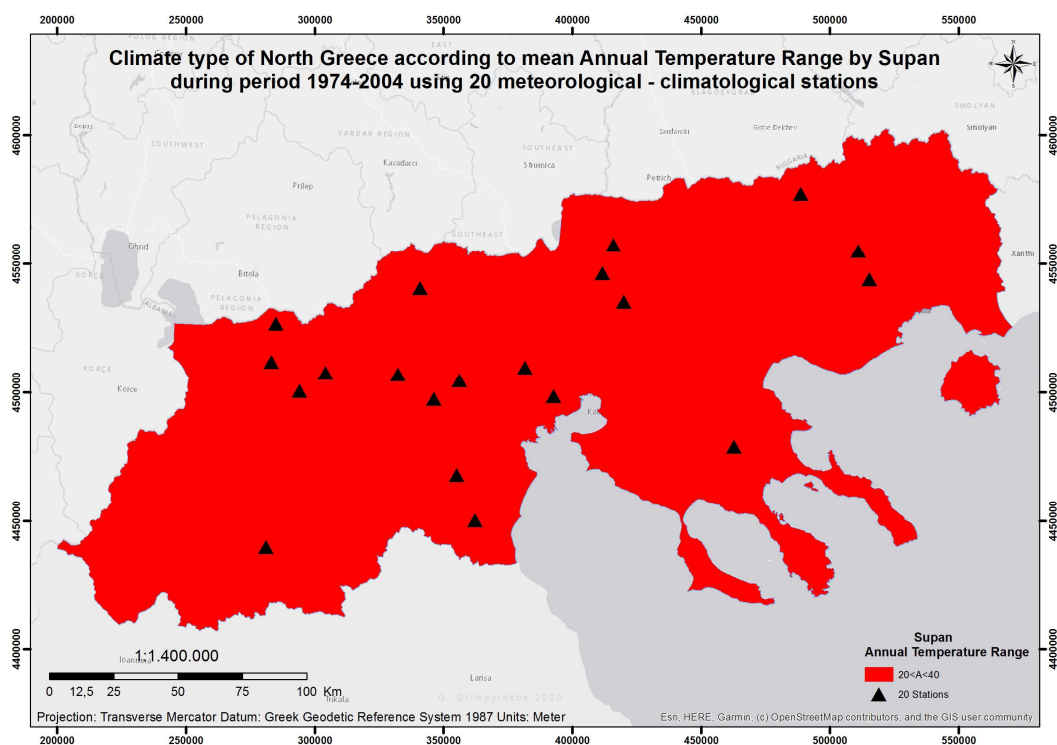


Figure 2.5. Climate types according to A value during 1974-2004 (Supan 1880) at North Greece.

2.5.2 Thermal Continentality

Thermal continentality was estimated by applying the K algorithm at data of table 2.2 for the whole operation period of the stations and for the stations with continuous data during 1974-2004. By using raster calculator of ArcMap 10.3, two raster files of cell size 750 meters from annual temperature range and a second one with the latitude values per cell in WGS84 (Grimpylakos et al. 2013).

North Greece was divided in two different climate types according to the categorization of Gorczynski (Table 2.4, figure 2.6) when using the data from the whole operation time of the stations and at one climatic type when using data for the period 1974-2004 (Table 2.4, figure 2.7). Finally possible correlation between K and elevation at the second scenario for the period 1974-2004 was checked and $R^2=0,2513$ meaning not high significant correlation (chart 2.1).

Table 2.4. Annual Temperature Range A and the corresponding Thermal continentality (Gorczynski 1922) at each station during the whole operation (varies from 8-50 years during the period 1954-2004) and during period 1974-2004.

S/N	Station	A	A 1974 - 2004	K all years	K during 1974-2004	Years with daily data
1	Ano Kalliniki	21,3	22,6	36	39	24,9
2	Limnochori	19,9	20,9	32	35	29,5
3	Amuntaio	20,0	21,0	32	35	27,0
4	Tropeouchos	20,6	21,7	34	37	27,2
5	Monospita	20,6	21,5	34	36	24,6
6	Rodochori	19,9	21,6	32	37	28,5
7	Exaplatanos	20,0	21,0	32	35	25,0
8	Vrontous	19,7	20,9	34	35	27,2
9	Moschopotamos	19,5	21,1	32	35	26,8
10	Agia Paraskevi	19,8	21,2	31	35	23,1

11	Arnaia	19,9	21,3	32	36	28,3
12	Krua Vrusi	20,5	21,0	32	36	30,5
13	Ano Theodoraki	19,2	20,9	30	35	30,5
14	Metaxochori	19,4	21,2	31	36	25,6
15	Melanthio	19,4	21,0	31	35	30,3
16	Nea Chalkidona	20,5	21,3	34	36	28,5
17	Chalastra	20,2	21,9	33	38	22,2
18	Drama	21,0	21,7	35	37	23,9
19	Kato Nevrokopi	20,8	22,5	35	39	26,3
20	Kalampaki	20,5	21,2	34	36	27,5

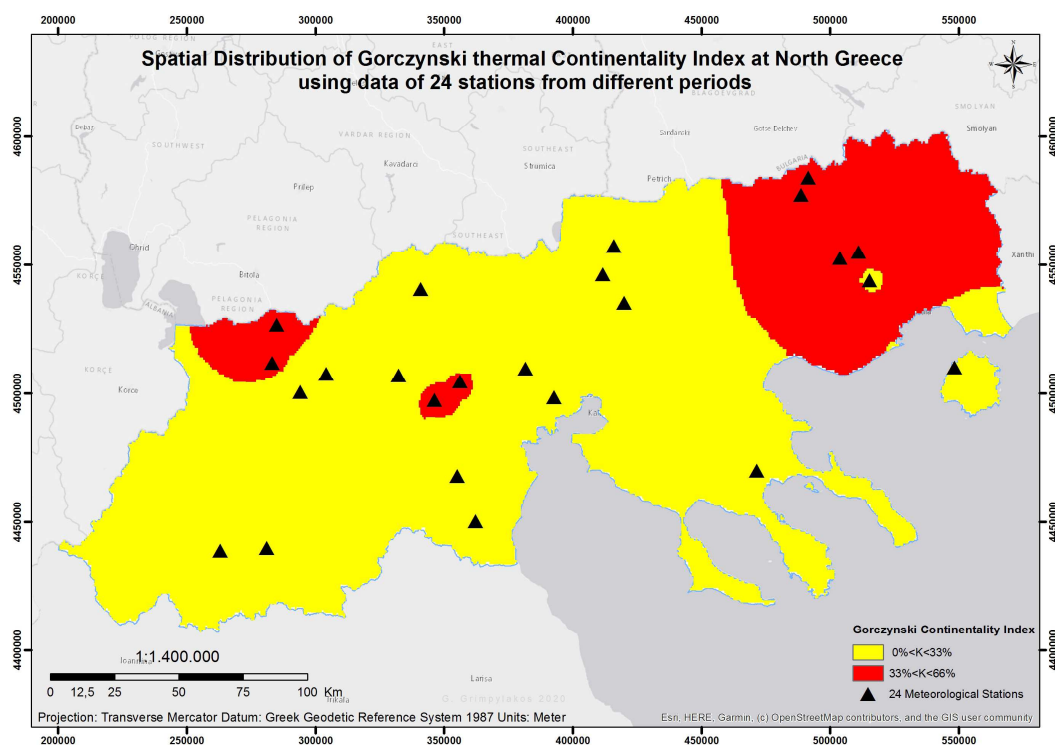


Figure 2.6. Macedonia area climate types according to GCI value (Gorczynski 1922) during the whole operation of the stations, during the period 1954-2004 and with a timeline of data 8-50 years.

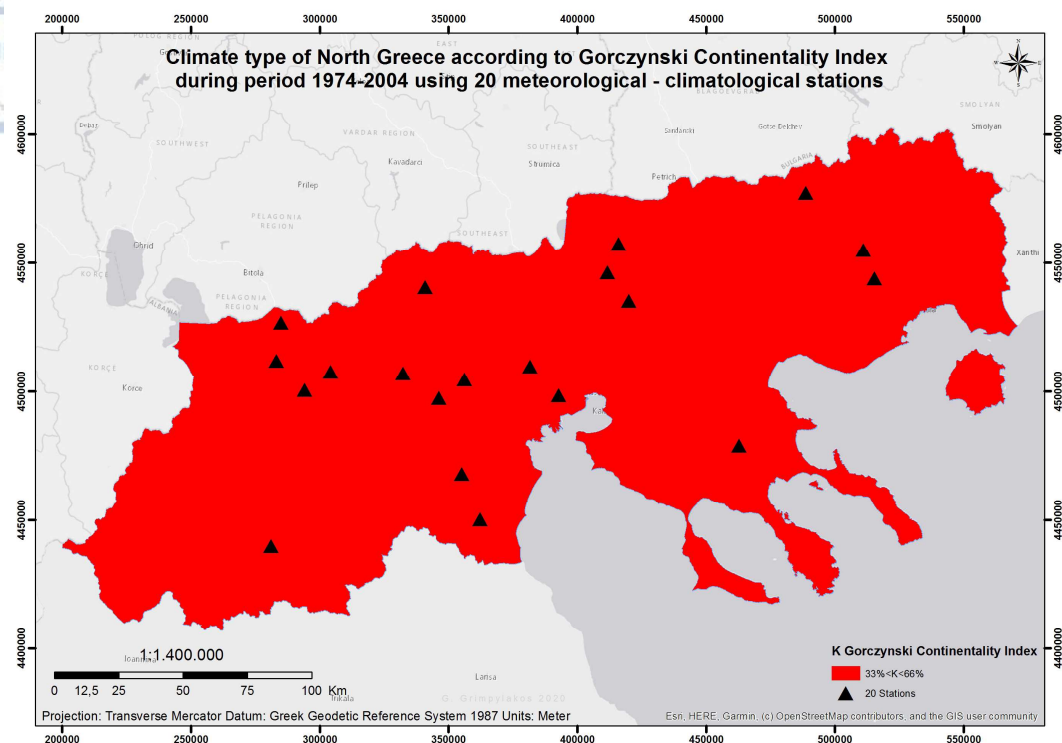


Figure 2.7. Macedonia area continental climate type according to GCI value (Gorczynski 1922) during period 1974-2004.

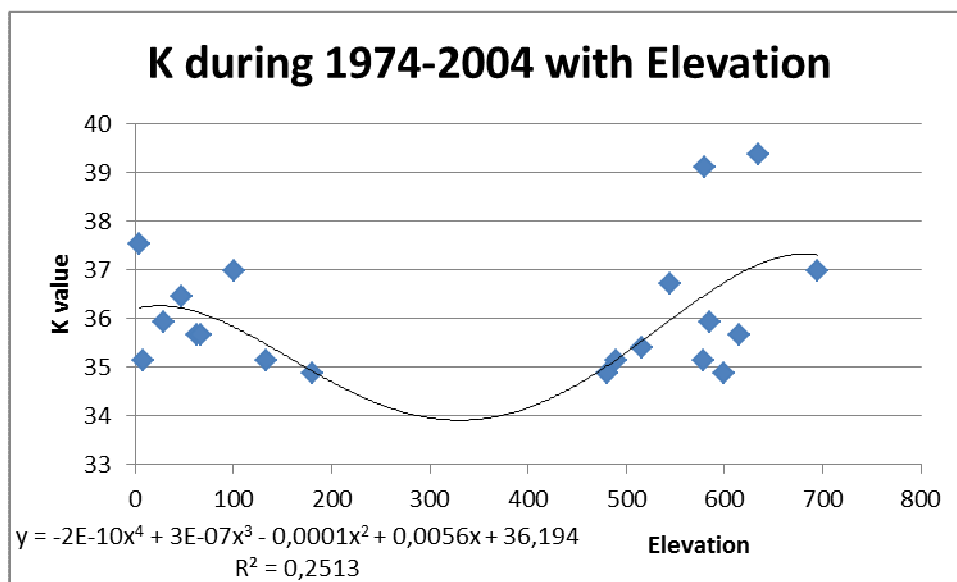


Chart 2.1. Correlation of K with elevation during 1974-2004 using nonlinear polynomial equation.

Mean annual temperature was estimated for each of the 20 meteorological – climatological stations that had continuous data for 1974-2004. Firstly, the mean monthly temperature for each meteorological – climatological station was calculated and then, the mean of these values gave the mean annual temperature. There is significant correlation between Mean annual Temperature and elevation with a linear equation as shown at chart 2.2 where $R^2 = 0,7364$. Equation 5 was adapted and implemented (Figure 2.8).

Equation 5 – Suggested equation for estimation of mean annual Temperature correlated to elevation applicable to research area

$T = -0,004 * E + 14,908$ (T is the mean annual temperature and E the elevation).

The R square value (R^2), means that the mean annual temperature is 73,64% explained by elevation. Finally the equation was applied at raster calculator of ArcMap in order to estimate the temperature at the meteorological – climatological stations with no Temperature data.

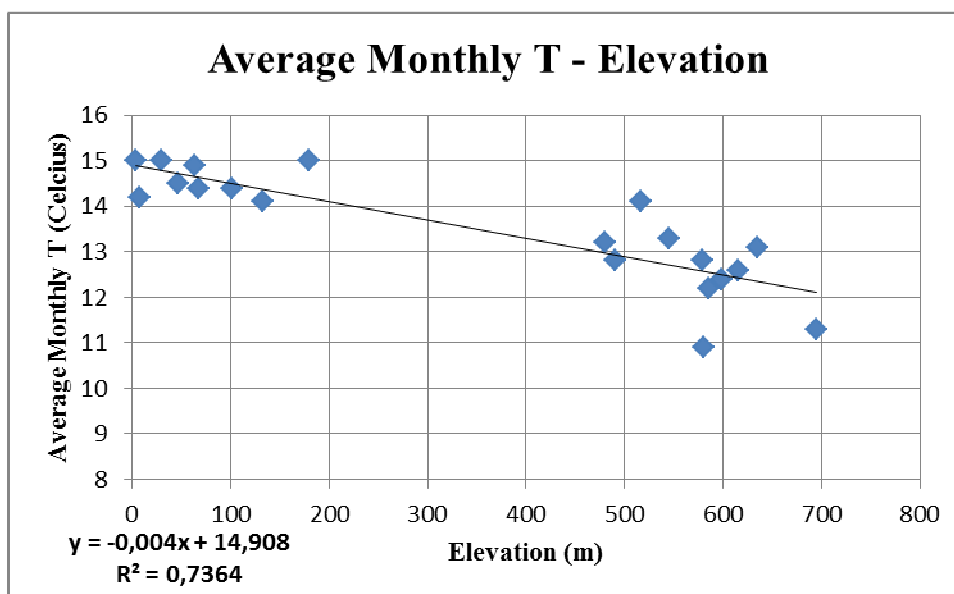


Chart 2.2. Correlation of mean annual temperature with elevation using linear equation.

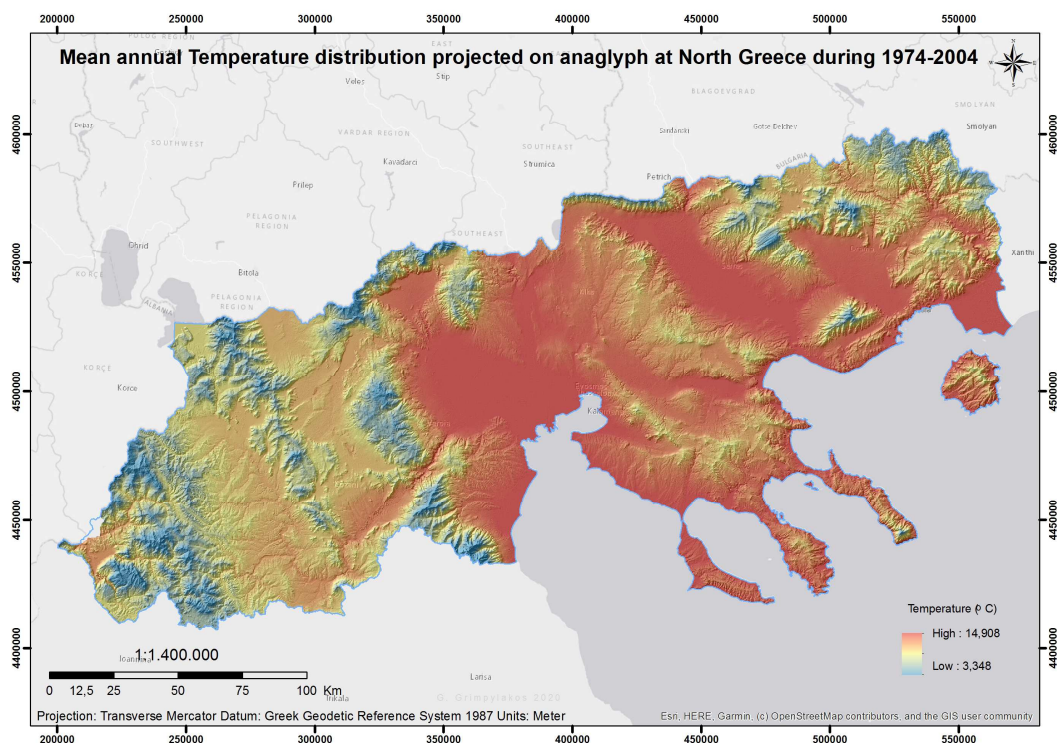


Figure 2.8. Mean annual temperature distribution at North Greece derived from 20 meteorological – climatological stations during period 1974-2004, projected on anaglyph.

2.5.3 Mean Annual Precipitation

Mean monthly precipitation was estimated for each month at all 20 and 40 meteorological – climatological stations and then the mean annual precipitation was calculated for all of them. Two thematic maps were created showing the mean annual precipitation in Macedonia North Greece by using the interpolation method of Inverse distance weighted. The spatial distribution of the mean annual precipitation that derived from the data of 40 meteorological – climatological during 1974-2004 is projected at figure 2.9. The spatial distribution of the mean annual precipitation that derived from the data of 20 meteorological – climatological during 1974-2004 is projected at figure 2.10. The correlation between elevation and precipitation was checked with SPSS programme (Table 2.5). The highest possible correlation was not significant $R^2 < 0,29$ and so the mean annual precipitation for each cell of Macedonia could not be estimated and the corresponding thematic map using an equation

between the elevation and the mean annual precipitation was not projected as it would have been inaccurate.

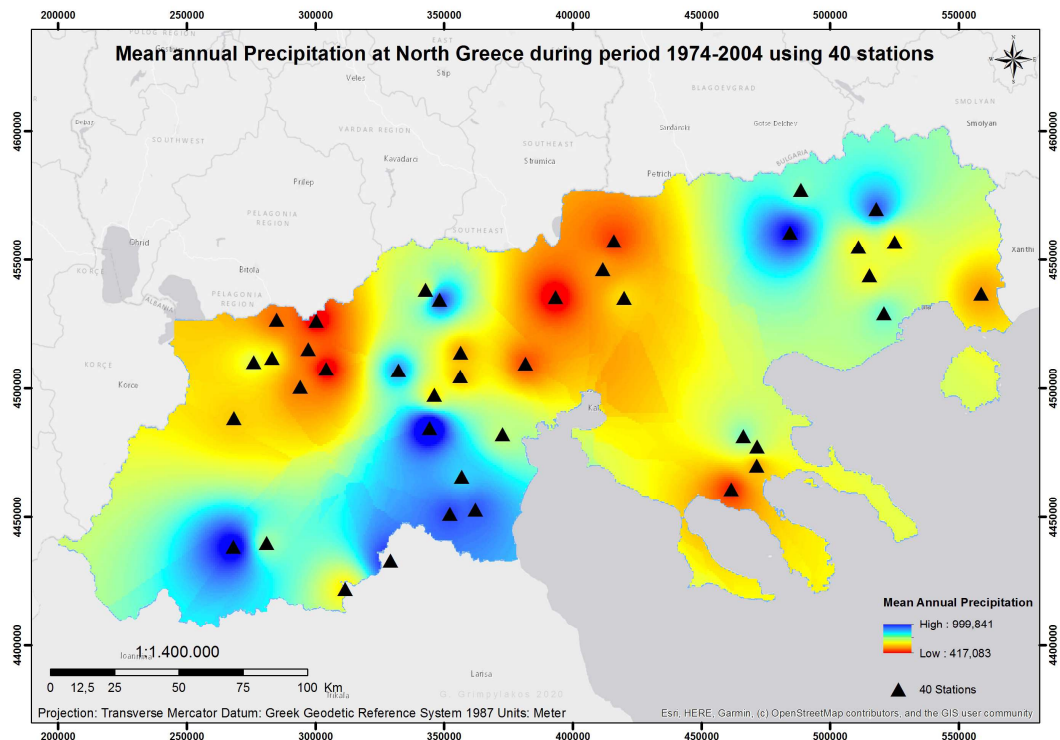


Figure 2.9. Thematic map that projects the spatial distribution of mean annual precipitation (mm) at Macedonia of North Greece. The data derived from 40 meteorological – climatological stations during period 1974-2004 and the cell size is 750m.

The thematic map that derived from the 20 stations (Figure 2.10) did not included 20 stations (Figure 2.9) and it was missing mean annual precipitation values between 417,0 – 417,3 and 853,8 – 999,8 as these data did not exist at the 20 stations. The data distribution of the 20 stations at West, central and South Macedonia is very sparse resulting in much less zones of precipitation. The map of 40 stations has good spatial distribution and is more accurate and should be used for analysis purposes.

Table 2.5. Correlation of Variables Temperature, Precipitation, K GCI value (Gorczynski 1922), A value Annual Temperature Range (Supan 1880) and evapotranspiration of each method of Thornthwaite, Turc and Coutagne with Elevation.

Elevation	Examined Variable						
	T (°C)	P(mm)	K	A	Thornthwaite	Turc	Coutagne
Pearson	-0,851	0,306	-0,157	-0,184	0,156	-0,072	0,108
R-square	0,723	0,094	0,025	0,034	0,024	0,005	0,012

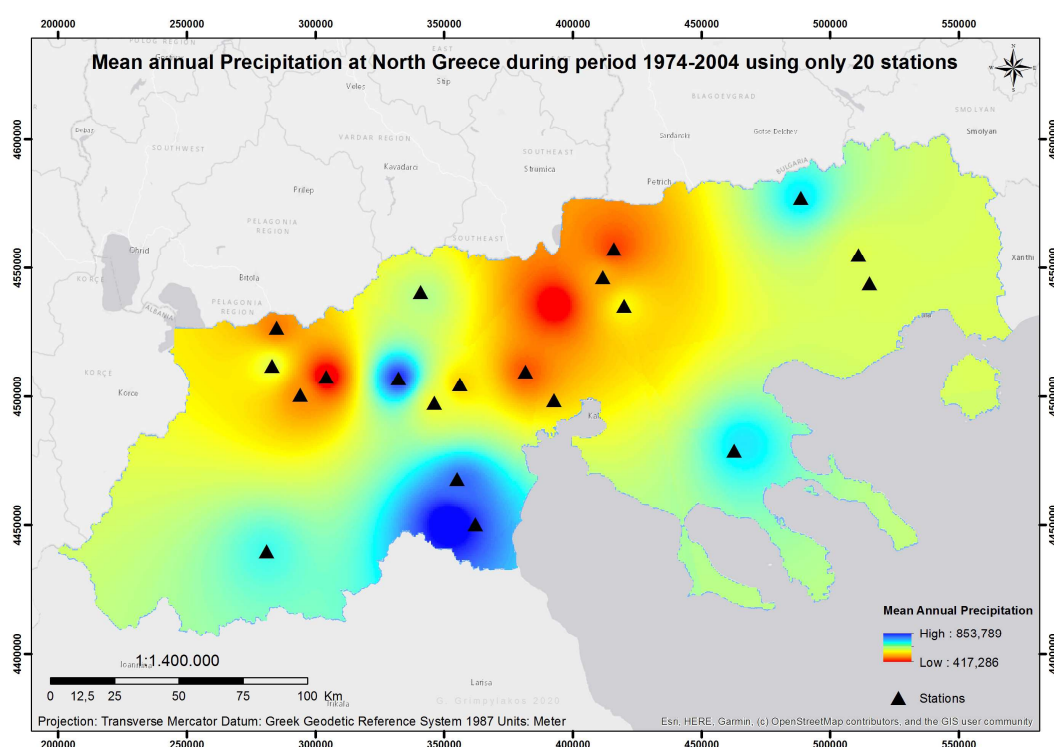


Figure 2.10. Spatial distribution of mean annual precipitation at Macedonia Greece derived from 20 meteorological stations during period 1974-2004

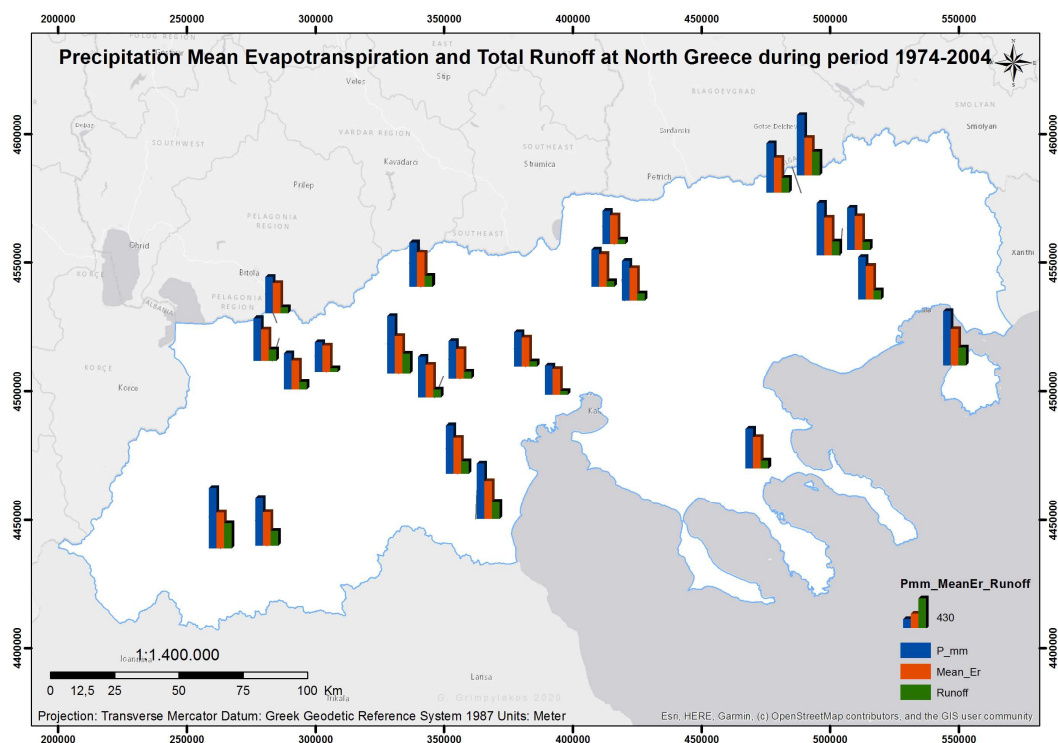


Figure 2.11. Evapotranspiration at each meteorological – climatological station of North Greece by three different methods.

2.5.4 Evapotranspiration

Evapotranspiration was calculated with all three methods for each of the 20 stations (Figure 2.2). Evapotranspiration by Turc method is higher than Thornthwaite method at all stations except Melanthio and in 19 of 20 stations it is higher than Coutagne method, while Coutagne is higher than Thornthwaite method at 15 of 20 stations (Figure 2.11). On the other hand, Turc method is the most easily applied method of all, as Coutagne method is not always applicable and Thornthwaite's method uses parameters that differ according to elevation and the spatial distribution of each examined place, which makes it very difficult to apply this method at all stations. No significant correlation between elevation and evapotranspiration was found (Table 2.5). Thornthwaite method is underestimating the evapotranspiration in comparison with the other two methods.

Turc method for evapotranspiration is suggested to be implemented.

2.6 CLASSIFICATION OF NORTH GREECE BY KÖPPEN

In order to effectively apply the Köppen climatological classification (Köppen, W. 1884, Köppen, W. 1918, Köppen, W. 1930), the 20 stations with continuous daily and monthly data of precipitation and temperature for the corresponding period 1974-2004, were used. CCK method was applied at each individual station and the map (Figure 2.12) was created projecting the corresponding climatic type. By interpreting these results and using IDW method, a new thematic map, projecting the spatial distribution of climate classification by Köppen method at entirely Macedonia district, was created (Figure 2.13). All stations with single climatic types were isolated and joint to the area's climatic type.

The climatic classification of Macedonia district in Greece, by Köppen method (Köppen, W. 1884, Köppen, W. 1918, Köppen, W. 1930), is extremely interesting. The density of the applied station network is very good and the results are unquestioned. Specifically, 20 meteorological – climatological stations were used in Macedonia in contrast to the 2 stations that were used by previous researchers (Kanli 2009, Lazaridou et al. 2013) for the same area (Figure 2.14), while only 17 stations were used for entirely Greece. Conclusively, it is absolute necessary for the climatic classification to be applied in entirely Greece by using a station network of similar density. By increasing the density of stations the Climatic classification of North Greece was altered.

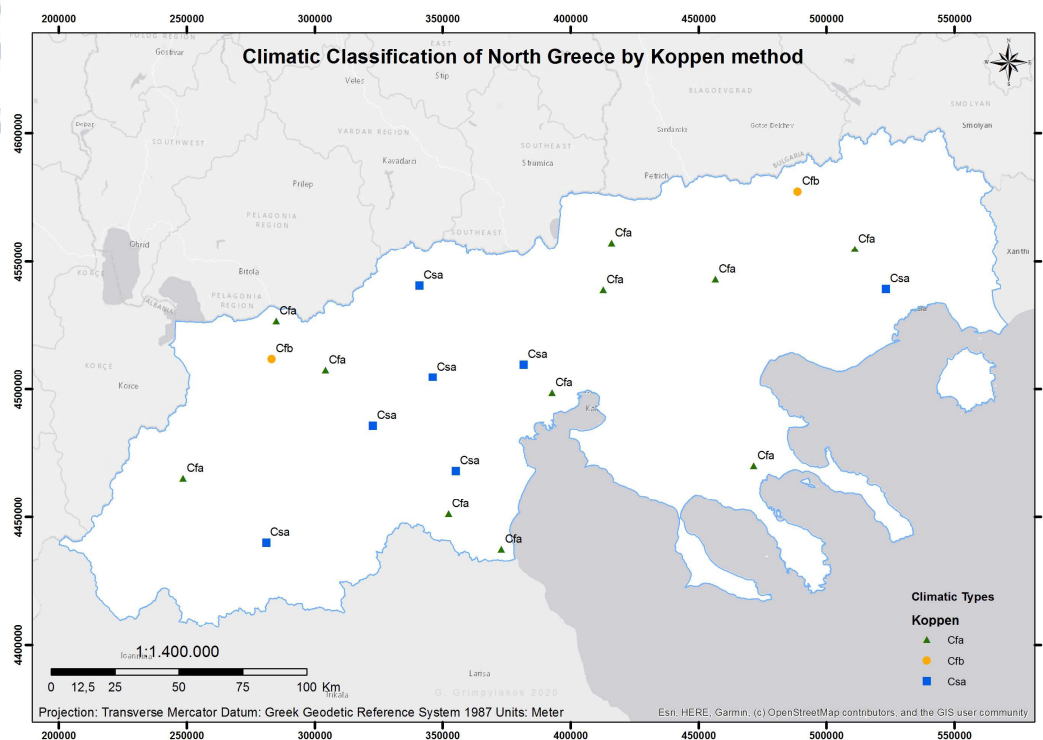


Figure 2.12. Climatic classification at each meteorological – climatological station of Macedonia district in Greece, using Köppen methodology (Köppen, W. 1884, Köppen, W. 1918, Köppen, W. 1930).

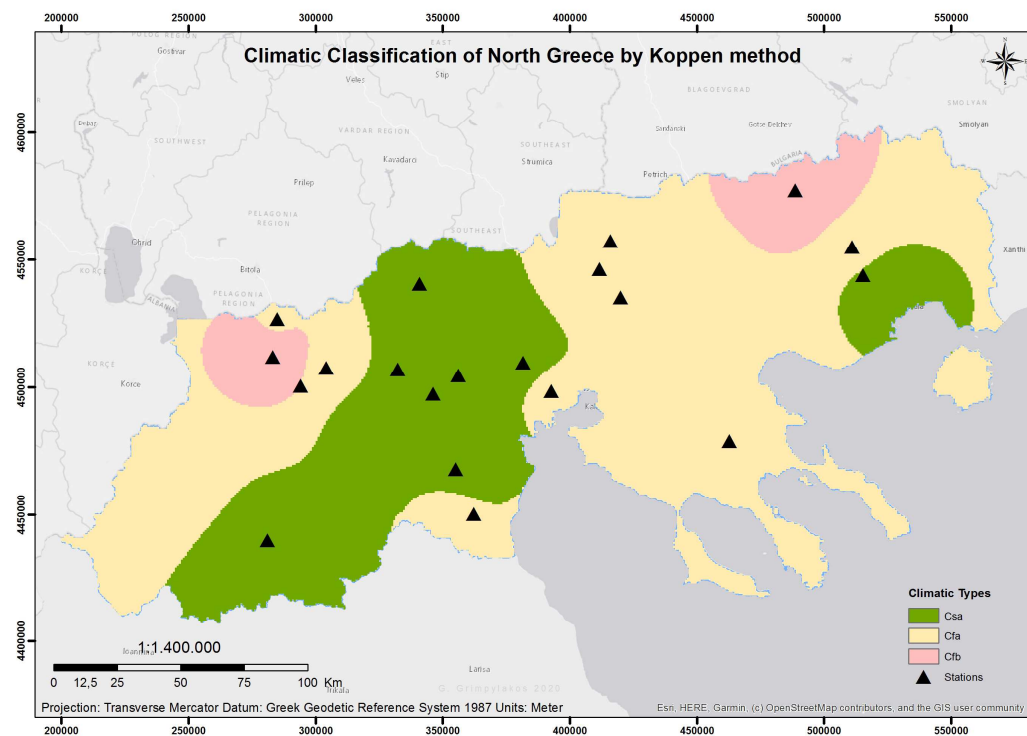


Figure 2.13. Climatic classification, of Macedonia district in Greece by Grimpylakos, using Köppen methodology (Köppen, W. 1884, Köppen, W. 1918, Köppen, W. 1930).

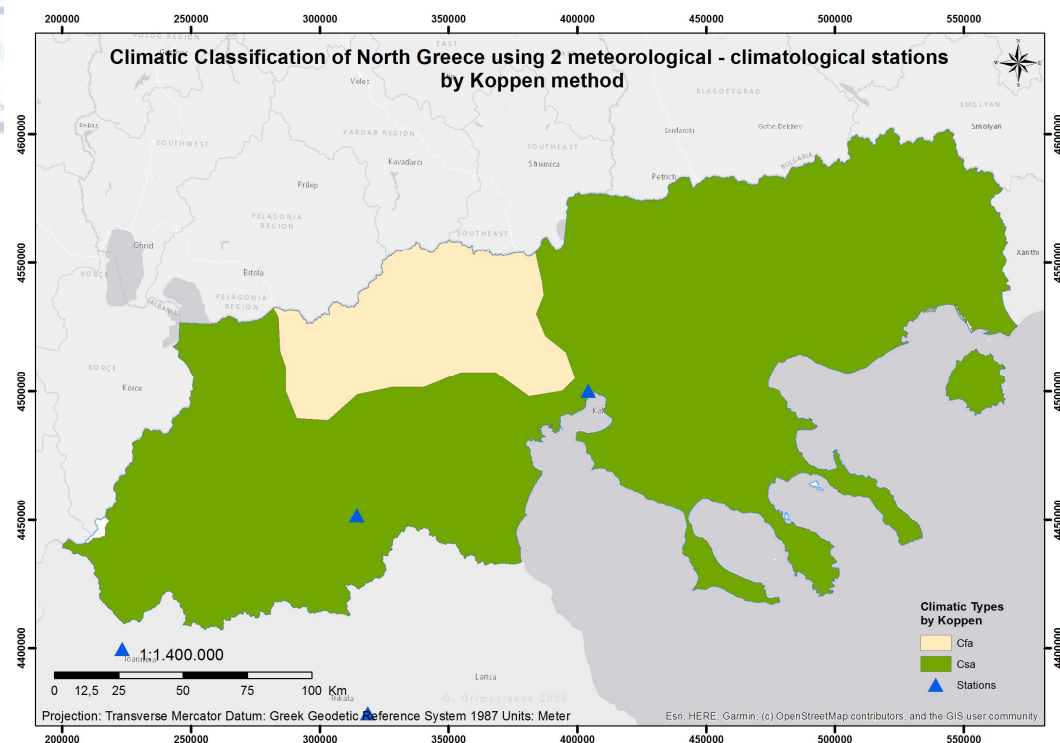


Figure 2.14. Climatic classification, of Macedonia district in Greece by Kanli (2019) using Köppen methodology. (Köppen, W. 1884, Köppen, W. 1918, Köppen, W. 1930)

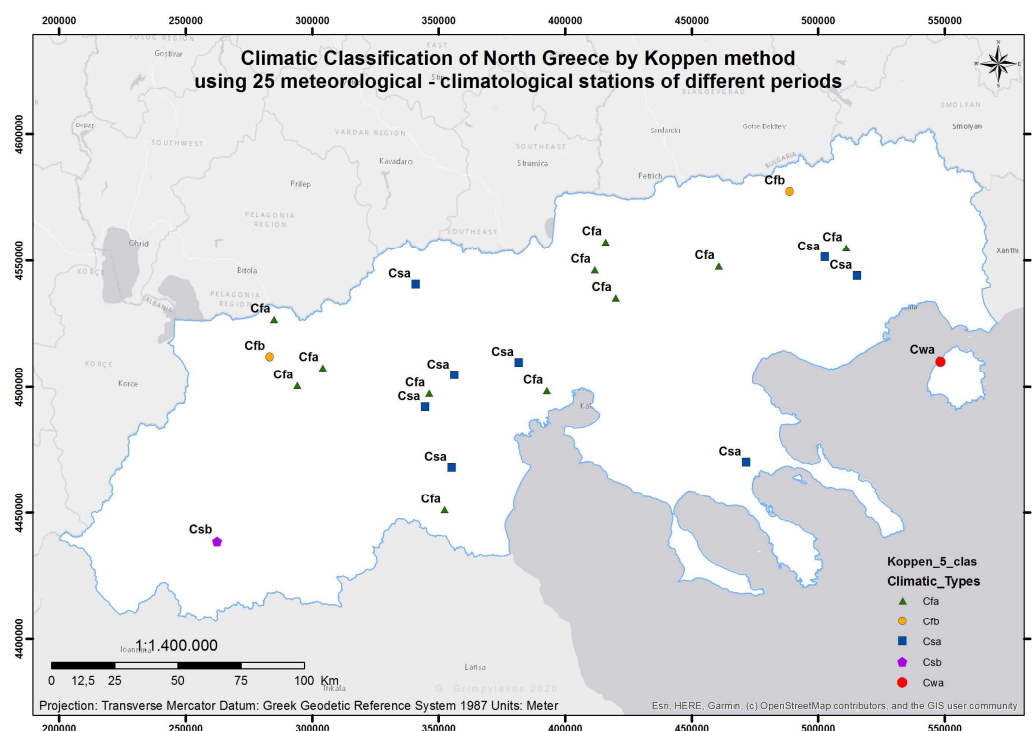


Figure 2.15. Climatic classification, of Macedonia district in Greece, using Köppen methodology (Köppen, W. 1884, Köppen, W. 1918, Köppen, W. 1930) (Grimpylakos et al., 2013).

2.7 DISCUSSION

There are significant differences between the map that was created in this research based on a dense network of 1 meteorological – climatological station per 2.000 km² (Figure 2.13) and a sparse network of 1 meteorological – climatological station per 18.000 km² Kanli 2009 (Figure 2.14). The main difference is that a new climatic type was found, the climatic type Cfb found on the western part of Macedonia and at Nevrokopi North, Northeast of Macedonia. Entire Chalkidiki, Thessaloniki and Serres have a different climatic type, Cfa and not Csa. The methodology used by the two researchers is exactly the same. However the density of the meteorological – climatological stations used is very different. This high density of meteorological – climatological stations (20) is quite innovative for Greece leading to unquestionable conclusions; it replaces the existing climatic classification at the study area and strongly challenges the climatic classification of entire Greece.

Regarding Annual Temperature Range it is crucial that the lack of same period of data could lead to false A estimations and false results and categorization of North Greece in two climatic types as shown at table 2.2, Transitional maritime climate type where $15^{\circ}\text{C} < A \leq 20^{\circ}\text{C}$ and Continental climate type $20^{\circ}\text{C} < A \leq 40^{\circ}\text{C}$ (chapter 2.3.3.1). In result there are strong indications that North Greece climatic type has been altered from 1950 -1974 to 1974-2004 from mixed type of transitional maritime climate and continental climate type to just continental climate type (Figures 2.4-2.5). Furthermore, there should be a thoroughly investigation regarding the previous period before 1974 and during the 1974-2004 period in order to define the period where the A value is $\leq 20^{\circ}\text{C}$. Annual temperature range value is increasing as the distance from sea is increasing and while moving to the North (Nastos et al. 1999).

Regarding Thermal continentality classification by Gorczynski (1922), North Greece was divided in two different climate types when using the data from the whole operation time of the stations and at one climatic type when using data for the period 1974-2004 (Table 2.4, figure 2.7). As with Annual temperature range, there are strong indications that North Greece CGI (Gorczynski 1922) has been altered from 1950 - 1974 to 1974-2004 from mixed type of transitional maritime climate and continental climate type to just continental climate type (Figures 2.6-2.7). Furthermore, there

should be a thoroughly investigation regarding the previous period before 1974 and during the 1974-2004 period in order to define the period where the k value is $\leq 33^{\circ}\text{C}$.

Both classifications, regarding Annual Temperature Range (Supan 1880) and CGI (Gorczynski 1922) classify entire North Greece to the Continental climate type.

The elevation distribution of the meteorological – climatological stations was not adequate to check the possible correlation between Precipitation and Elevation at Macedonia and to create an equation. Mean annual precipitation, evapotranspiration and total runoff at each meteorological – climatological station were estimated and projected (Figure 2.16) alongside with the anaglyph. Total runoff is very strong correlated with high elevation and low temperature. The strong correlation with elevation is explained by the fact that at high elevation precipitation is higher while mean monthly and annual temperature is lower. This correlation is a proof that elevation distribution of each torrent watershed should be included in the classification of rivers typology; however in the elevation classification the relationship with the total runoff should be taken in consideration.

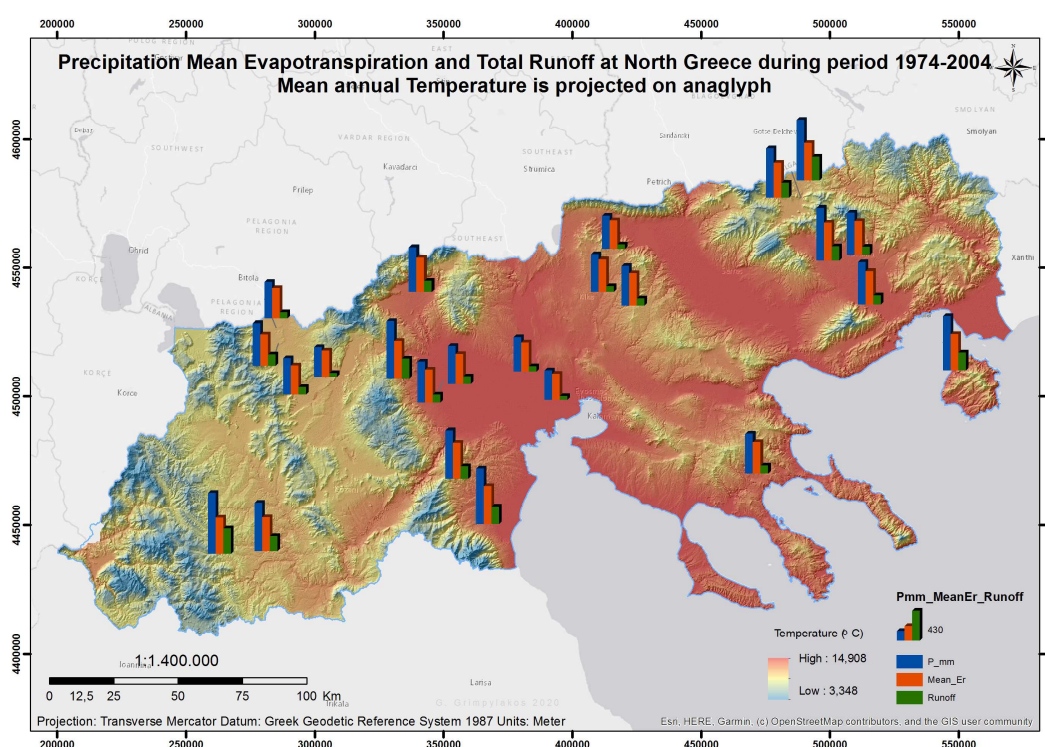
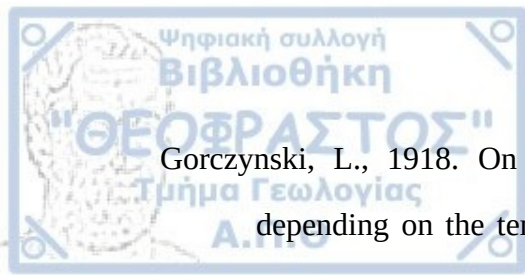


Figure 2.16. Distribution of Precipitation Evapotranspiration and runoff in each meteorological – climatological station at Macedonia Greece. On the background mean T and anaglyph is projected.

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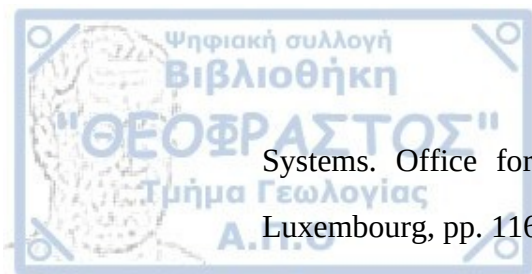
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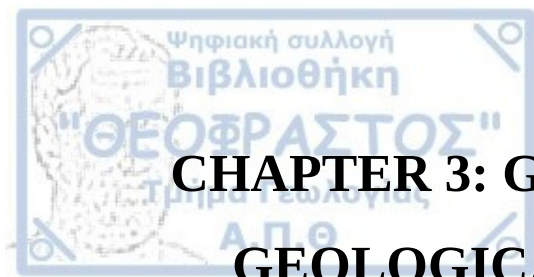
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CHAPTER 3: GEOLOGICAL PARAMETERS. GEOLOGICAL CLASSIFICATION IN SI AND CA BY SCALE

3.1 ABSTRACT

This chapter examines the correlation of geological mapping scale with the classification in siliceous, calcareous and organic rocks. The suggested geological classification (WFD 2000) and the suggested modified geological classification by Kanli 2009, is examined at North Greece, by digitising the geological maps of IGME at two different scales, 1:500.000 (Kanli 2009, Lazaridou et al. 2013) and 1:50.000 (scanned geological maps of IGME). At the scale 1:50.000, due to increase detail, the geology was firstly categorised in 28 main geological types and then in correlation to the mineralogical analysis it was reclassified in 6 categories. For the geological categorization, 14 different watersheds were chosen to be examined. Each one of them was digitized at the two different scales and sediment was sampled from each river bed, at three different flowing conditions and through a three year period, in order to check possible variances of geology to flowing conditions. The sediments were examined with XRD in order to check any relationship between the digitized geology and the river bed sediment.

The classification at scale 1:500.000, regarding siliceous and calcareous rocks, proved to be not exact in more than 55% of the examined watersheds, where river bed sediment was sampled and mineralogical analysed. On the contrary, the differences of the digitized geology, when the scale factor was increased by 10, were huge. Specifically, on the watersheds that the geology was digitised at scale 1:50.000, there was a significant correlation between geology and the mineralogical analysis of the river's bed sediment. Therefore a new geological categorization of 6 classes at scale 1:50.000 was created and applied at North Greece.

3.2 INTRODUCTION

In this chapter the suggested geological categorization in three types (WFD 2000, Kanli 2009, Lazaridou et al. 2013) and a more detailed one is examined by sampling the river bed sediment. The mineralogical distribution of a river's bed sediment depends on the river's watershed geology and its grade of erosion which is highly related with slope, precipitation and land use. In this study, fourteen (14) different torrents were chosen for sediment sampling in low, medium and high flow conditions during a three year period. River Habitat Survey (Raven et al. 1998) was applied at each torrent, alongside sampling, in order to check and prevent any possible changes that may have occurred due to human activities. In this way any possible variance of geology, land use, flow conditions and mineralogical characteristics of the sediment was examined and cross checked in time.

The geology of each watershed was digitized by the geological maps of IGME at two different scales, at 1:500.000 and at 1:50.000. The sediment samples from the fourteen (14) different watersheds were examined with XRD and the mineralogical results were cross checked with the digitized maps at two different scales. First aim is to check if the mineralogical composition of the river bed sediment is in correlation with the geology and if yes at which scale this correlation is captured.

3.3 PARAMETERS DATA AND METHODOLOGY

3.3.1 Studying area - Sampling sites

Macedonia is a district of North Greece as shown at figure 3.3. Studying area is a polygon that includes all the watersheds of Macedonia's torrents and rivers, resulting in a polygon the boundaries of which differ from the boundaries of Macedonia's political district. The boundaries were determined according to the WFD guidelines for water bodies and the available data. Studying area is 36.290 km², has a perimeter of 2.163 km and includes 77 different torrents, where the main rivers are divided according to WFD and the watersheds are of 2,9-4.775 km².

Sampling sites were chosen in such way in order to capture the diversity of climatological, geological and hydromorphological characteristics. As there was no funding for travel, sampling and lab analysis costs, sampling areas were sorted and chosen by best combination of highest diversity and low travel - analysis cost.

For this part of the project, fourteen (14) watersheds were chosen for river bed sediment sampling and XRD analysis as shown at figure 3.1 and figure 3.2. Specifically Nine (9) watersheds corresponding to reference sites of excellent ecological status, in collaboration with the department of Biology (Kanli 2009, Lazaridou et al. 2013), were chosen as shown at table 3.1. Five (5) watersheds of high geological interest and of little, medium and high anthropogenic interference were chosen for sampling stations as shown at table 3.2.

Table 3.1. Nine sediment sampling areas of excellent ecological status, with the sampling area coordination in EGSA (1987).

S/N	Reference site	Main river County	Longitude (EGSA87 - meters)	Latitude (EGSA87 - meters)
1	Diavolorema (DIA)	Nestos	538817,85	4585150,66
2	Arkoudorema (ARK)	Nestos	541989,11	4572592,76
3	Trikomo Venetikos (TRIK)	Aliakmonas	269438,70	4428955,96
4	Eleftherochori Venetikos (ELEF)	Aliakmonas	284948,38	4436196,37
5	Mavrolakas Olympiada (KAL)	Chalkidiki	478730,53	4494445,02
6	Kipouristra Varvares (OL)	Chalkidiki	476008,65	4492791,27
7	Karolakkas (KAR)	Chalkidiki	479527,23	4479478,24
8	Megali Panagia(MPB)	Chalkidiki	474873,69	4475311,59
9	Skouries (MPC)	Chalkidiki	472863,23	4477688,05

Table 3.2. Five sediment sampling areas of high geological interest and of little, medium and high anthropogenic interference, with the sampling area coordination in EGSA(1987).

S/N	Reference site	Main river County	Longitude (EGSA87 - meters)	Latitude (EGSA87 - meters)
10	Kokkinolakkas Ierissos (KOK)	Chalkidiki	483315,34	4478867,09
11	Ekklesiasikoi Myli Ierissos (EKM)	Chalkidiki	476008,65	4492791,27
12	Asprolakkas Ierissos (ASPR)	Chalkidiki	484169,54	4478631,18
13	Megali Panagia (MPA)	Chalkidiki	475456,53	4477117,98
14	Skouries (MPD)	Chalkidiki	473090,93	4477299,51

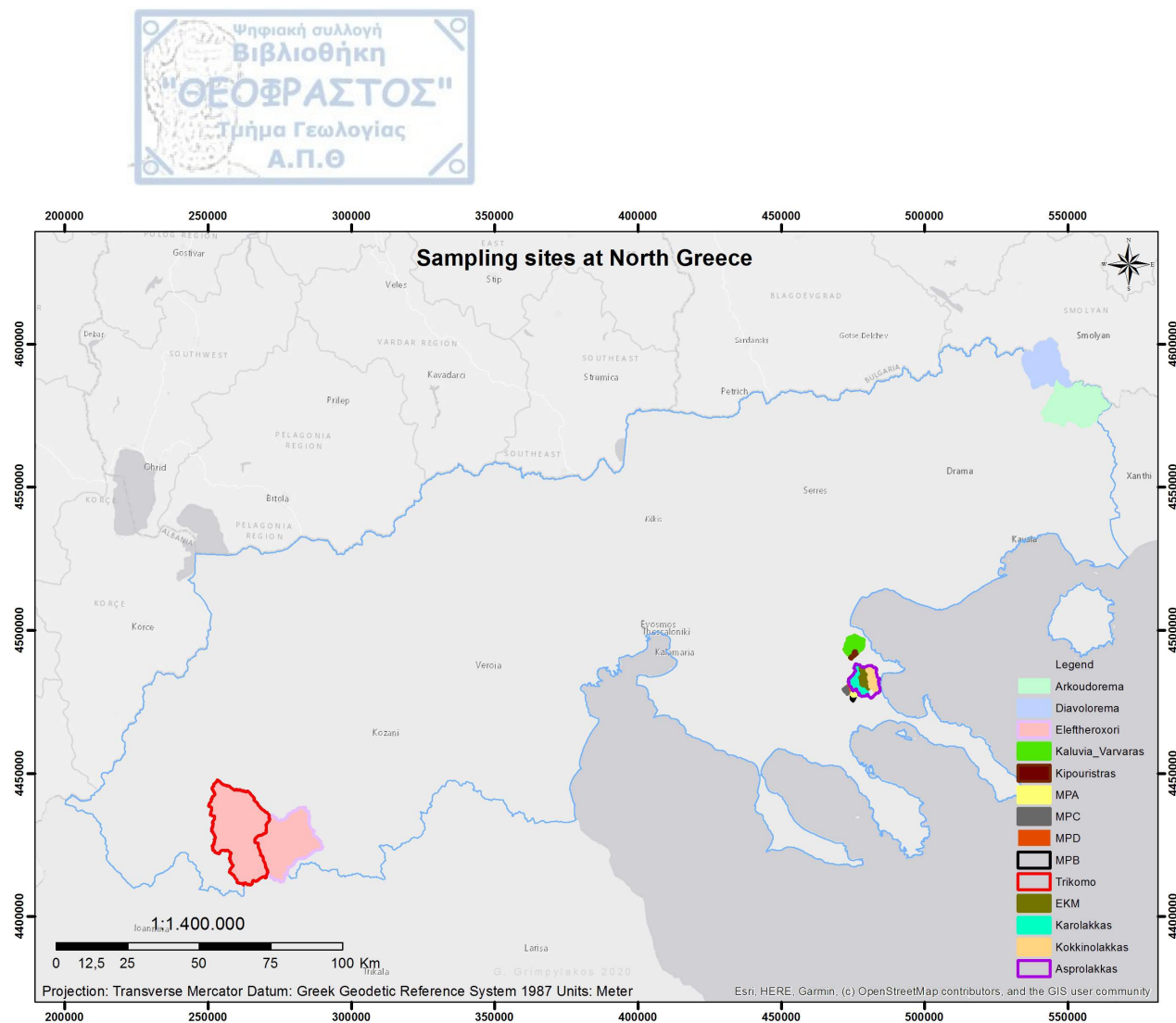


Figure 3.1. All 14 sampling sites at North Greece. As the scale is low and some of the sampling sites at Chalkidiki belong to the same catchment they are shown at a higher scale at figure 3.2.

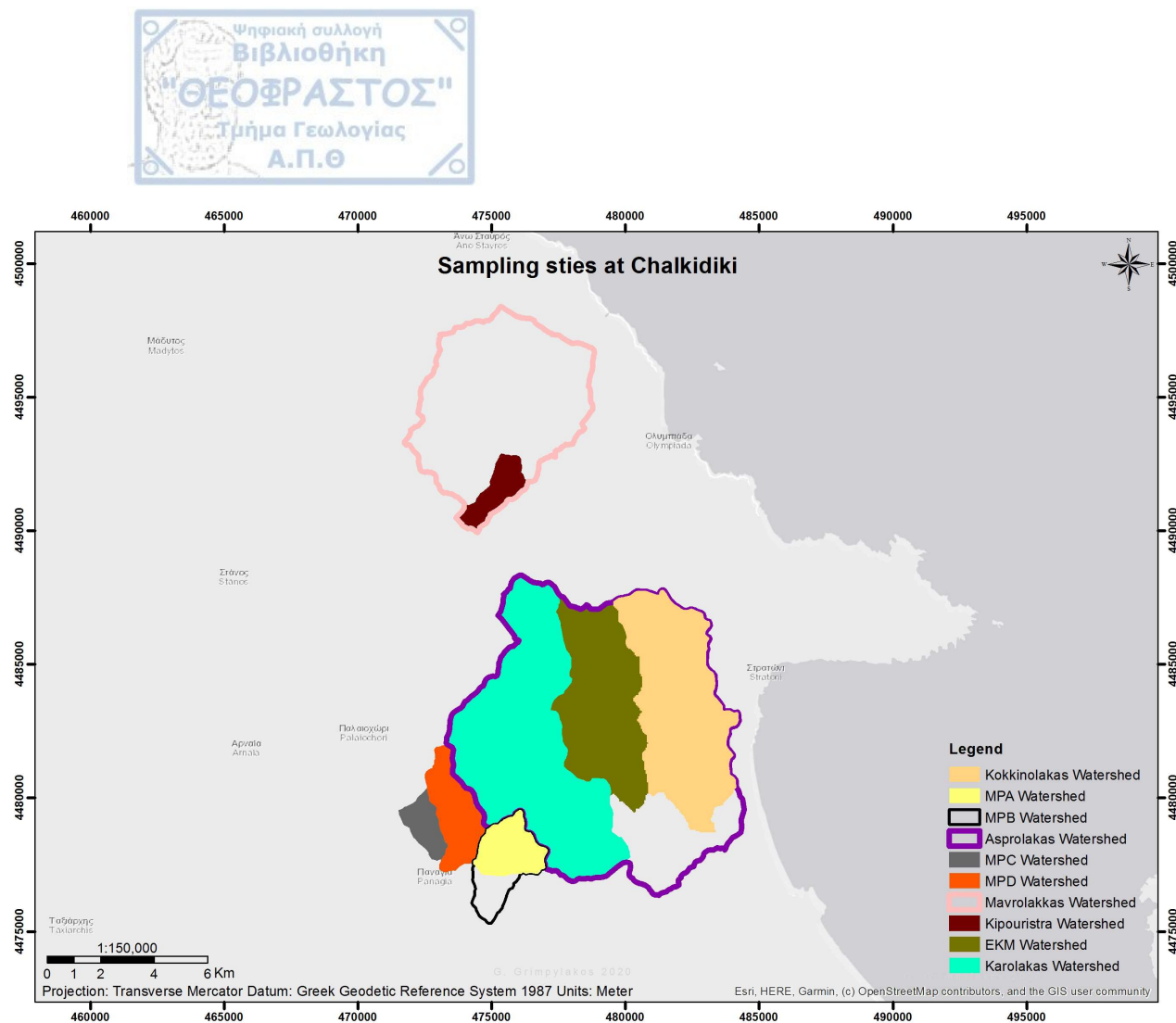


Figure 3.2. All 10 sampling sites at Chalkidiki. Asprolakas's catchment includes EKM, Kokkinolakas and Karolakkas catchments. Mavrolakkas catchment includes Kipouristras catchment. MPB catchment includes MPA catchment.

3.3.2 Spatial and temporal distribution of sampling areas

The intention was that all sites would be sampled in a 3 year period at low, medium and high flowing conditions and the river bed sediment would be sampled at left, center and right of the river flow. Spatial distribution of sampling areas was design in such way to ensure variances of geology, land use and slope in time. This procedure was chosen in order to check possible correlation between flowing conditions to sedimentological or mineralogical alterations of the river bed sediment, aiming to establish an easily applied procedure. In order to clear out, prevent or capture possible human interference Geomorphological River Habitat Survey (GeoRHS) (Environment Agency 2006) was applied during all sampling periods at each one of the sampling sites up to 500 meters before the site. Due to extreme weather conditions during winter, the RHS-GeoRHS and sampling could not be applied at Arkoudorema and Diavolorema, as they are positioned to Northeast of Greece and at high altitude, and there was no access to the sampling site.

3.3.3 Sampling methodology

The selection of the sampling methodology and device was contingent upon the depth of water at sampling location and the physical characteristics of the sediment to be sampled in accordance to the United States Environmental Protection Agency and the Scientific Engineering Response and Analytical Services (EPA 1994, SERAS 2016). The following procedures were used:

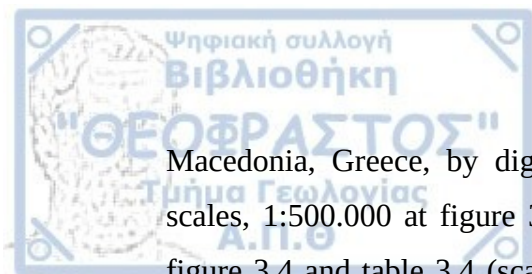
1. Surface sediment ranged from 0 to fifteen centimeters in depth and the shallow aqueous layer ranged from 0 to 30 cm in depth. Collection of surface sediment from beneath a shallow aqueous layer was accomplished with a stainless steel shovel. Specifically the following procedure was used:
 - A decontaminated sampling stainless shovel was used to remove the desired thickness and volume of sediment from the desired sampling area

- The sample was transferred into an appropriate sample container. Containers were adequately decontaminated.
 - Surface water was decanted from the sample container prior sealing and transferring; care was taken to retain the fine sediment fraction during this procedure
2. Surface sediment ranged from 0 to fifteen centimeters in depth and the shallow aqueous layer was above 30 cm in depth. Collection of surface sediment was accomplished with a system consisting of bucket auger and a series of extensions. Specifically the following procedure was used:
- The auger head was attached to the required length of the extension, then the “T” handle was attached to the upper extension
 - The area was cleared from any surface debris
 - The bucket auger was inserted into the sediment at 0° to 20° angle from vertical. This orientation was made to minimize spillage of the sample from the sampler upon extraction from the sediment and water.
 - Auger was rotated to cut a sample of sediment
 - Auger was slowly withdrawn
 - The sample was transferred into an appropriate sample container. Containers were adequately decontaminated

3.3.4 Geological digitation of sampling watersheds at scales 1:500.000 and 1:50.000

Scale is an important factor at geology, because the scale of the geological mapping determines which of the geological features, like structures, faults, folds, foliation, formations and rocks will be mapped. The digitized maps, which derive from the hard copies of the Greek Geological and Mining Research Institute (IGME), are the input regarding geology. The correlation between the geological features and the other abiotic parameters is possible only with those that have been mapped. Therefore scale determines which geological features can be examined.

For this reason the suggested geological classification (WFD 2000) and the suggested modified geological classification by Kanli 2009, is examined at



Macedonia, Greece, by digitizing the geological maps of IGME at two different scales, 1:500.000 at figure 3.3 (Kanli 2009, Lazaridou et al. 2013) and 1:50.000 at figure 3.4 and table 3.4 (scanned geological maps of IGME). At the scale 1:50.000, due to increase detail, the derived information is 10 times higher at each axis meaning 100 times more detailed at an area, lastly adding up to that the differences regarding altitude contour. Therefore the possible geological classification at scale 1:50.000 is higher and any possible correlation between the river bed sediment and the watersheds geology can be more thoroughly examined.

The thematic maps derived from the digitization of geological maps at scale 1:500.000 and 1:50.000 of Macedonia and of each sampling site's watershed are shown at Appendix I section 1 and 2 respectively. The geological coverage in two classes of Calcium and Siliceous, at scale 1:500.000, of each site is shown at table 3.3. The geological coverage, at scale 1:50.000, in up to 43 classes is shown at Appendix I section 2 while the derived coverage from the new classification at 6 classes (Table 3.10) is shown at table 3.11.

Table 3.3. All sites corresponding geological coverage in Calcium and Siliceous using geological maps at scale 1:500.000 in correspondence

S/N	Site Name	Sampling Code	Geological Category	
			Siliceous	Calcium
1	Diavolorema	DIA	75,57	24,09
2	Arkoudorema	ARK	96,12	3,30
3	Trikomo	TRIK	80,80	19,20
4	Eleftherochori	ELEF	70,42	29,57
5	Mavrolakas	KAL	100,00	0,00
6	Kipouristra	OL	100,00	0,00
7	Karolakkas	KAR	100,00	0,00
8	Megali Panagia	MPB	100,00	0,00
9	Skouries	MPC	100,00	0,00
10	Kokkinolakas Ierissos	KOK	100,00	0,00
11	Ekklesiastikoi Muli Ierissos	EKM	100,00	0,00
12	Asprolakas	ASP	100,00	0,00
13	Megali Panagia	MPB	100,00	0,00
14	Skouries	MPD	100,00	0,00

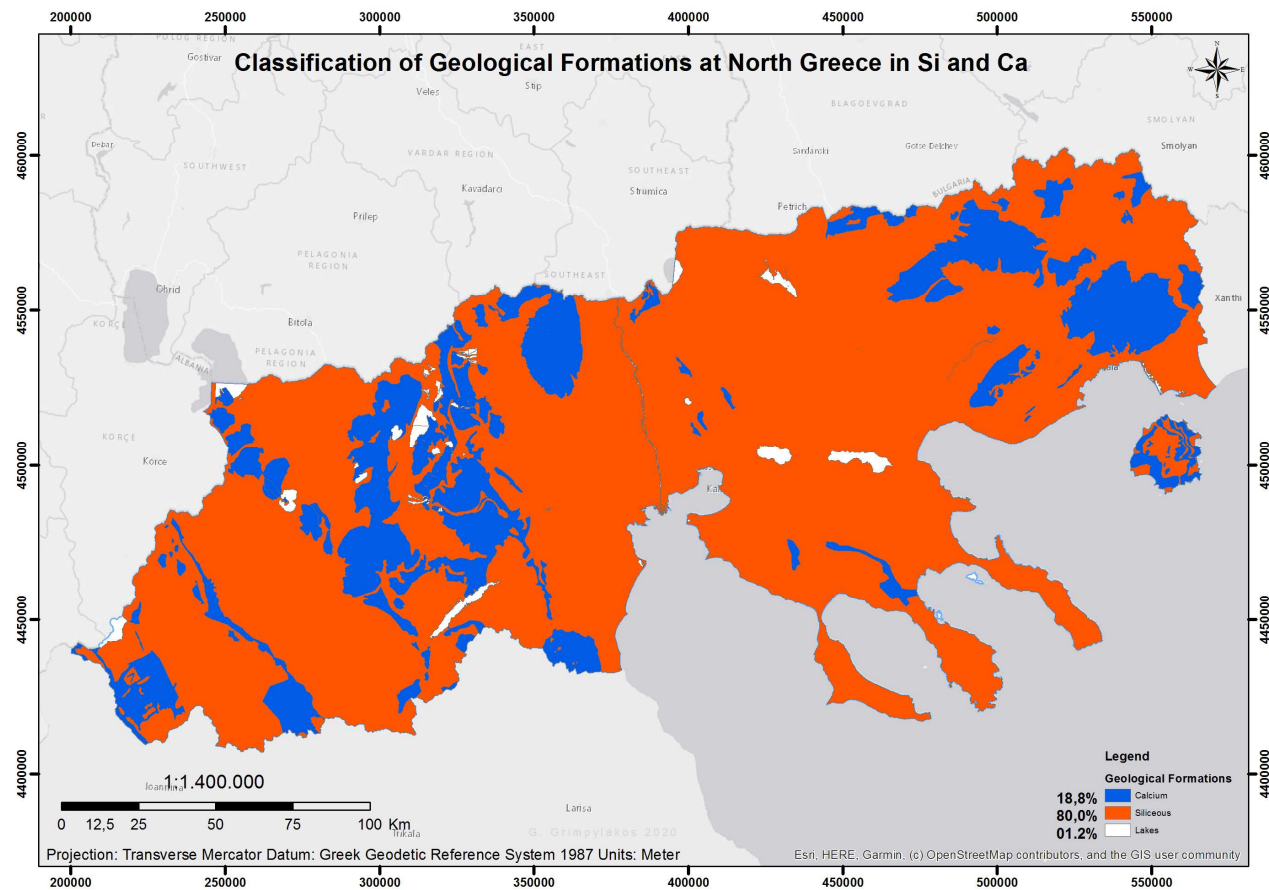


Figure 3.3. Classification of geology in two classes Calcium and Siliceous according to WFD with cell size approximately of 500 meters. North Greek coverage of each category is shown at legend (modified map of Kanli 2009).

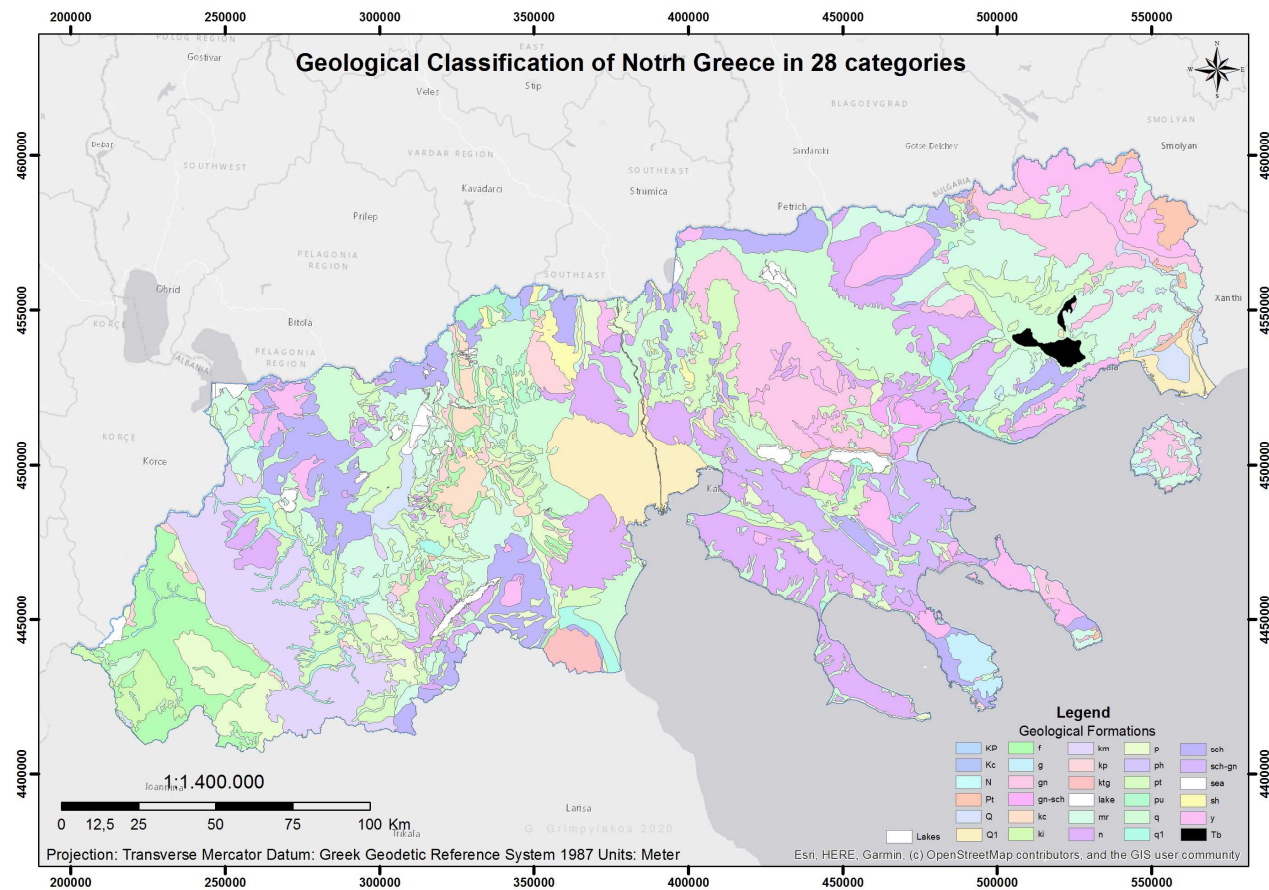
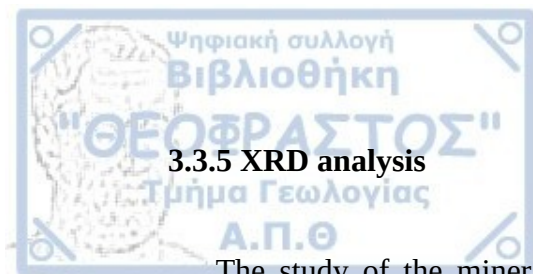


Figure 3.4. North Greece (MAC). Geological classification in twenty eight main categories according to Grimpylakos derived from digitizing IGME geological mapping at scale 1:50.000, cell size 50 meters. Legend is explained at table 3.4.

Table 3.4. Table with the geological classification in twenty eight main categories, according to IGME geological map and the corresponding area coverage.

There is difference to overall size of North Greece area and the captured geological classification due to cell size differences and gaps in the categorization.

Geological Coverage of Watershed in 28 main categories									Macedonia Area	36290,46	100,00
Formation	Area (km2)	%	Formation	Area (km2)	%	Formation	Area (km2)	%	Formation	Area (km2)	%
q alluvial deposits	5089,50	14,02	p ophiolite, Diabase, Peridotite	1572,97	4,33	ki Limestones Paleocene	288,98	0,80	KP Limestones of Upper Jurassic	41,49	0,11
Mr Marbles,	4093,00	11,28	fo Flysch Pindos	1504,77	4,15	Pt acidic volcanic rocks of Eocene- Oligocene	272,19	0,75	N Brackish shore deposits, marl, m3,mp	15,06	0,04
n Brackish shore deposits, marl, m3,mp	3995,51	11,01	Q1 Alluvial Neogene sediment deposits	1321,61	3,64	pu acidic volcanic rocks Pliocene - Pleistocene	243,05	0,67	Ph quartzite	6,64	0,02
pt acidic volcanic rocks	3125,56	8,61	Sch-gn Alternations of schist, marbles and gneiss	1258,50	3,47	Sh limestones Jurassic and Chlorite Schists	236,19	0,65	Kc Limestones Cretaceous	0,77	0,00
gn Gneiss	2829,99	7,80	q1 Old and new debris cones	634,22	1,75	g Igneous, Plutonic of Mesozoic, granite, granodiorite & Monzonite	218,44	0,60	lake	407,36	1,12
sch schist	2672,33	7,36	kp Limestones of Upper Jurassic	498,99	1,37	gn-sch Alternations of schist, marbles and gneiss	195,95	0,54	sea	149,16	0,41
y plutonic	2217,04	6,11	Q Alluvial continental sediments of modern valleys	450,38	1,24	ktg Limestones Upper Cretaceous	191,87	0,53			
km Mesohellene Trough, Molasse s sediments	2127,98	5,86	kc Limestones Cretaceous	364,62	1,00	Tb	139,81	0,39	Overall	36163,94	99,65



3.3.5 XRD analysis

The study of the mineral composition of the samples was done by the X-Ray Powder Diffraction method (XRPD). A PHILIPS PW1820/00 diffractometer of the Department of Mineralogy-Petrology-Economic Geology, AUTH, equipped with a microprocessor PW1710/00, Cu lamp and Ni filter to obtain $\text{CuK}\alpha$ radiation, while the angular values of the scanning area 2θ was $3\text{--}63^\circ$ for randomly oriented samples. The scanning speed of the angometer was $1.2^\circ/\text{min}$. Before the samples were radiographed, the sensitivity and accuracy of the diffractometer was calibrated and checked by a specific standard of pure silicon. The samplers and the preparation of all samples and the scanning conditions of each were exactly the same.

The semi-quantitative determination of the mineral phases was based on the counts of specific reflections from the diffractograms of the randomly oriented samples, which were not affected by any other reflection and taking into account the density and mass absorption coefficient ($\text{CuK}\alpha$) of the identified mineral phases, as well as the use of external standards.

The XRD analysis results (Appendix I, section 3) were used to determine the corresponding minerals and their percentage at each sample and the analyses were performed in the manner of Cook et al. (1975). The chemical and empirical formula of each mineral, their molecular weight and the chemical formula of CaCO_3 , SiO_2 and the corresponding Ca and S where used as shown at table 3.5.

A summary of the quantitative analysis of XRD analysis for all samples from each sampling site is shown at table 3.6 and 3.7. The average values for each sampling site is shown at table 3.8.

Table 3.5. Table with the name of minerals analysed at the river sediments using XRD, their mineral Code, Chemical and empirical formulas, molecular weight of the mineral and chemicals at search.

Name	Mineral Code	Chemical Formula	Empirical Formula	Molecular Weight	SiO ₂	CaO	Si	Ca
Quartz	Q	SiO ₂	SiO ₂	60,08	100,00	0,00	46,74	0,00
Plagioclase	A-Pl	(Na,Ca)(Si,Al) ₄ O ₈	Na _{0,5} Ca _{0,5} Si ₃ AlO ₈	270,78	66,57	10,36	31,12	7,40
Orthoclase	Kf	KAlSi ₃ O ₈	KAlSi ₃ O ₈	278,33	64,76	0,00	30,27	0,00
Calcite	C	CaCO ₃	CaCO ₃	100,09	0,00	56,03	0,00	40,04
Talc	T	Mg ₃ Si ₄ O ₁₀ (OH) ₂	Mg ₃ Si ₄ O ₁₀ (OH) ₂	379,27	63,37	0,00	29,62	0,00
Chlorite Tosudite	Cl	Na _{0,5} (Al,Mg) ₆ (Si,Al) ₈ O ₁₈ (OH) ₁₂ x ₅ (H ₂ O)	Na _{0,5} Al ₄ Mg ₂ Si ₇ AlO ₁₈ (OH) ₁₂ x ₅ (H ₂ O)	973,76	43,19	0,00	20,19	0,00
Biotite-Muscovite	Micas	X ₂ Y ₄ -6Z ₈ O ₂₀ (OH,F) ₄	Analyzed below *		43,40	0,00	20,29	0,00
Tremolite	Tr	[]Ca ₂ Mg ₅ Si ₈ O ₂₂ (OH) ₂	Ca ₂ Mg ₅ (Si ₈ O ₂₂)(OH) ₂	812,37	59,17	13,81	27,66	9,87
Dolomite	D	CaMg(CO ₃) ₂	CaMg(CO ₃) ₂	184,40	0,00	30,41	0,00	21,73
*Biotite	For Micas	K(Mg,Fe ⁺⁺) ₃ [AlSi ₃ O ₁₀ (OH,F) ₂]	KMg _{2,5} Fe ⁽⁺²⁾ _{0,5} AlSi ₃ O ₁₀ (OH) _{1,75} F _{0,25}		41,58	0	19,44	0
*Muscovite	For Micas	KAl ₂ (Si ₂ Al) ₂ O ₁₀ (OH,F) ₂	KAl ₃ Si ₁₀ O ₁₀ (OH) _{1,8} F _{0,2}		45,21	0	21,13	0
*Biotite-Muscovite	Micas			Average value	43,39	0	20,29	0

* For MiCas

* X is K,Na, Ca less Ba,Rb,Cs

* Y is Al,Mg or Fe less Mn, Cr, Ti, Li

* Z is chiefly Si or Al less Fe³⁺

Table 3.6. Table showing the mineral quantitative percentage according to XRD analysis at each sample. The SiO₂, CaO, Si and Ca percentage are derived from the XRD analysis results. The samples are from the studying areas of Skouries and Megali Panagia of Chavreas and Varvara during the three different periods of sampling.

Mineral Code	MPAA3	MPAD3	MPBA3	MPBD3	MPCA1	MPCK1	MPCD1	MPCA2	MPCK2	MPCD2	MPCD3	MPDK5	OLA1
Q	63	75	57	59	65	65	54	62	50	55	79	48	45
A-Pl	5	4	11	10	7	9	8	7	19	8	4	2	20
Kf	6	5	9	9	8	7	7	8	7	10	5	0	15
C	2	1	2	4	1	2	1	2	1	2	1	0	2
T	2	2	3	3	4	3	5	3	2	6	2	0	5
Cl	5	3	4	4	3	2	6	3	3	3	1	31	1
Micas	12	5	7	6	4	4	10	9	12	3	4	19	1
Tr	3	2	5	4	6	5	8	4	3	9	3	0	9
D	2	2	2	2	2	3	2	2	2	3	1	1	2
Sum	100	100	100	100	100	100	100	100	100	100	100	100	100
Theoretical Chemical composition according to mineralogical analysis													
SiO₂	80,39	86,96	79,32	79,09	83,47	82,93	76,98	80,36	77,14	78,46	89,57	66,82	77,59
CaO	2,42	2,14	3,40	4,40	2,87	3,57	3,30	3,04	3,58	4,21	1,83	0,34	4,98
Si	37,58	40,64	37,08	36,97	39,02	38,76	35,98	37,56	36,06	36,67	41,87	31,23	36,27
Ca	1,73	1,53	2,43	3,14	2,05	2,55	2,36	2,17	2,56	3,01	1,31	0,24	3,56

Table 3.7. Table showing the mineral quantitative percentage according to XRD analysis at each sample. The SiO₂, CaO, Si and Ca percentage are derived from the XRD analysis results. The samples are from the studying areas of Mavrolakas, Eklisiastikoi Muloi, Karolakas, Kokkinolakas, Asproalakas, Arkoudorema and Diavolorema of Nestos, Trikomo and Eleftherochori of Aliakmonas during the three different periods of sampling.

Mineral Code	KALA3	KALK3	KALA1	EKMK5	KARK5	KOKK5	ASPK5	ARKK1	ARKA1	ARKK3	DIAD1	DIAA3	TRIKA4	ELEFA4
Q	42	54	49	51	58	53	58	40	39	42	49	48	29	35
A-Pl	26	19	17	4	2	8	2	26	29	19	18	13	26	7
Kf	19	18	24	3	2	3	3	23	22	18	17	23	0	19
C	3	2	2	2	0	0	0	3	2	0	9	10	21	33
T	3	1	2	0	2	4	2	1	1	0	1	0	0	0
Cl	1	1	1	10	14	9	11	1	1	0	1	0	13	0
Micas	1	1	1	11	14	8	15	1	1	7	1	5	3	0
Tr	4	2	3	19	7	14	7	2	2	12	1	0	7	4
D	2	1	2	1	1	0	0	2	3	2	3	1	1	1
Sum	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Theoretical Chemical composition according to mineralogical analysis														
SiO₂	76,35	81,61	79,14	74,10	76,45	77,67	77,80	75,25	75,47	76,82	74,65	73,29	56,18	54,55
CaO	5,58	3,82	3,79	4,22	1,43	2,82	1,20	5,38	5,26	4,19	7,93	7,44	15,45	20,31
Si	35,69	38,15	36,99	34,64	35,73	36,30	36,37	35,18	35,28	35,91	34,89	34,25	26,26	25,50
Ca	3,99	2,73	2,71	3,01	1,02	2,01	0,86	3,84	3,76	2,99	5,66	5,32	11,04	14,52

Table 3.8. Table showing the mineral **mean** quantitative percentage, according to XRD analysis, from all samples of each sampling site. The SiO₂, CaO, Si and Ca percentage are the mean values. The studying areas are: Megali Panagia, Skouries , Kipouristra, Mavrolakas, Eklisiastikoi Muloi, Karolakas, Kokkinolakas, Asprolakas Arkoudorema and Diavolorema of Nestos, Trikomo and Eleftherochori of Aliakmonas.

Mineral Code	MPA	MPB	MPC	MPD	OL	KAL	EKMK	KARK	KOKK	ASPK	ARK	DIA	TRIK	ELEF
Q	69	58	61	48	45	48	51	58	53	58	41	49	29	35
A-Pl	5	10	9	2	20	21	4	2	8	2	25	15	26	7
Kf	6	9	7	0	15	20	3	2	3	3	21	20	0	19
C	2	3	2	0	2	2	2	0	0	0	2	10	21	33
T	2	3	3	0	5	2	0	2	4	2	1	0	0	0
Cl	4	4	3	31	1	1	10	14	9	11	0	0	13	0
Micas	8	6	7	19	1	1	11	14	8	15	3	3	3	0
Tr	3	5	5	0	9	3	19	7	14	7	6	1	7	4
D	2	2	2	1	2	2	1	1	0	0	2	2	1	1
Sum	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Theoretical Chemical composition according to mineralogical analysis														
SiO₂	83,68	79,21	81,27	66,82	77,59	79,04	74,10	76,45	77,67	77,80	75,85	73,97	56,18	54,55
CaO	2,28	3,90	3,20	0,34	4,98	4,40	4,22	1,43	2,82	1,20	4,94	7,68	15,45	20,31
Si	39,11	37,02	37,99	31,23	36,27	36,94	34,64	35,73	36,30	36,37	35,45	34,57	26,26	25,50
Ca	1,63	2,79	2,29	0,24	3,56	3,14	3,01	1,02	2,01	0,86	3,53	5,49	11,04	14,52

3.3.6 Correlation of river bed sediment mineralogy to watershed geology

The XRD analysis results (Appendix I, section 3) as shown at tables 3.6, 3.7 and 3.8 were correlated with the torrent's watershed geology at table 3.3, as defined by the IGME's geological maps of scale 1:500.000 (Appendix I, section 1), regarding the coverage area of each geological section at each one of the two categories. As shown at table 3.9 there is misinterpretation regarding the geological classification in two classes and the XRD analysis of the river bed sediment. At 10 sampling sites (S/N 5-14) there was no expectation for CaO however the values were 0,34 - 4,98 %. Furthermore regarding Calcium-Siliceous ratio, there was a significant overestimation that reached 307% at Diavolorema and a significant underestimation at Arkoudorema that reached 53%. On the contrary, the results regarding Calcium-Siliceous ratio were fair only at two sites, specifically at Triкомо (14% underestimated) and Eleftherochori (13% overestimated), which could be considered if 15% offset is acceptable. Therefore the classification in two categories at scale 1:500.000 is offset and is not acceptable for typology and any use of this parameter could be disorienting for other parameters and for the entirely typology. All regression analysis had $R^2 < 0,81$.

At second phase the XRD analysis results (Appendix I, section 3) as shown at tables 3.6, 3.7 and 3.8 were correlated with the torrent's watershed geology, as defined by the IGME's geological maps of scale 1:50.000 (Appendix I, section 2). An overall map of North Greece is shown at figure 3.4, where more than 50 different categories of geological formations have been spotted from which 28 main groups were created in order for the geological classification to be possible and the result visible. Regarding the studying areas, each watershed was consisted from two geological formations e.g. at Megali Panagia (Appendix I Figure 9G28, Figure 14G28,) to forty four geological formations e.g. at Eleftherochori (Appendix I Figure 4G28a, Figure 4G28b). As sampling sites were only 14 and of specific geological structure, all geological formations were grouped in 6 main classes according to their main origin as shown at table 3.10.

Table 3.9. Table showing the correlation of geological classification in two classes at scale 1:500.000 with the mineralogical analysis of the XRD at each one of the 14 sampling sites. Ratio is calculated when Calcium, CaO or Ca concentration is divided by Siliceous, SiO₂ or Si respectively.

Coverage of each watershed by the 3 geological categories (Kanli 2009)						Theoretical chemical composition from mineralogical analysis							
S/N	Site Name	Sampling Code	Geological Category			Oxides				Elements			
			Siliceous	Calcium	Ratio	SiO ₂	CaO	Ratio	Cal	Si	Ca	Ratio	Cal
1	Diavolorema	DIA	75,57	24,09	0,32	73,97	7,68	0,10	3,07	34,57	5,49	0,16	2,01
2	Arkoudorema	ARK	96,12	3,30	0,03	75,85	4,94	0,07	0,53	35,45	3,53	0,10	0,34
3	Trikomo	TRIK	80,80	19,20	0,24	56,18	15,45	0,28	0,86	26,26	11,04	0,42	0,57
4	Eleftherochori	ELEF	70,42	29,57	0,42	54,55	20,31	0,37	1,13	25,50	14,52	0,57	0,74
5	Mavrolakas	KAL	100,00	0,00	0,00	79,04	4,40	0,06		36,94	3,14	0,09	
6	Kipouristra	OL	100,00	0,00	0,00	77,59	4,98	0,06		36,27	3,56	0,10	
7	Karolakkas	KAR	100,00	0,00	0,00	76,45	1,43	0,02		35,73	1,02	0,03	
8	Megali Panagia	MPB	100,00	0,00	0,00	79,21	3,90	0,05		37,02	2,79	0,08	
9	Skouries	MPC	100,00	0,00	0,00	81,27	3,20	0,04		37,99	2,29	0,06	
10	Kokkinolakas Ierissos	KOK	100,00	0,00	0,00	77,67	2,82	0,04		36,30	2,01	0,06	
11	Ekklesiastikoi Muli Ierissos	EKM	100,00	0,00	0,00	74,10	4,22	0,06		34,64	3,01	0,09	
12	Asproalakas	ASP	100,00	0,00	0,00	77,80	1,20	0,02		36,37	0,86	0,02	
13	Megali Panagia	MPA	100,00	0,00	0,00	83,68	2,28	0,03		39,11	1,63	0,04	
14	Skouries	MPD	100,00	0,00	0,00	66,82	0,34	0,01		31,23	0,24	0,01	

Table 3.10. Table consisting of the 6 main geological categories with reference to the major geological formations that each category consists of the geological formations at North Greece

S/N	Label	Geological formations
1	Limestones	Mr: Marbles, Ki: Limestones Paleocene sh: limestones Jurassic and Chlorite Schists Kp-KP: Limestones of Upper Jurassic Kc-ktg: Limestones Cretaceous and Upper Cretaceous
2	Molasse	Km: Mesohellene Trough, Molasses sediments
3	Sediments	Q: Alluvial continental sediments of modern valleys pt-cq1-q: torrent – riverbed or alluvial deposits n: Brackish shore deposits, marl, m3,mp q-Q1: Alluvial Neogene sediment deposits. q1: Old and new debris cones
4	Metamorphic	Gn-gm: Amphibolite, gneiss with marble alternations gn-sch, sch-gn: Alternations of schist, marbles and gneiss Ti-ph: Schist, sandstones, marbles or quartzite p: ophiolite, Diabase, Peridotite fo: Flysch Pindos
5	Siliceous	Pt - tkπ: acidic volcanic rocks of Eocene- Oligocene Pu-T3: acidic volcanic rocks Pliocene - Pleistocene g: Igneous, Plutonic of Mesozoic, granite, granodiorite and Monzonite sch-gs: Augen Gneiss, schists, Amphibolite of Paleozoic-Triassic of Pelagonian Zone γ: Igneous, Plutonic
6	Organic	Tb: Peat of Philipous Kavalas and lake deposits with peat layers and possible organic deposits

The XRD analysis results (Appendix I, section 3) with the corresponding geological coverage of each of the sampling areas with the mean annual Surface Runoff Geological classification in 6 classes SRG6 classification (Table 3.10), as suggested by the author, and the morphological parameters of Stream order (Strahler) and watershed size were examined (Table 3.12). Sampling sites 5-14 are consisted either only by one class which is the metamorphic or by two classes, the metamorphic and the sediments, the second of which is derived by the erosion of the first. Therefore the expected values of SiO₂ were estimated firstly for the Metamorphic, then for the rest Geological formations and finally for the sediment; the suggested values of each geological formation are shown at table 3.11. As no sampling points with organic material at watersheds, the 6th class of Organic could not be estimated. The value range of categories 2 and 3 is small and very good, however there is no range for the categories 1 and 5. Subsequently the third category had a big range value. As a result a second categorization at table 3.13 with named values regarding SiO₂ and CaO or Si and Ca was created using these sampling sites and the XRD analysis.

Table 3.11. Table consisting of the 4 main geological categories, Intercept and the 4 corresponding equations for estimating Si, Ca and SiO₂ – CaO concentration. Corresponding R², Significant F, Observations and Residual for each equation.

S/N	Geological Formation	Concentration in %			
		Si	Ca	SiO ₂	CaO
	Intercept	39,09522116	2,792196	83,64631914	3,907859268
1	Limestones	-0,085289403	0,108047	-0,182500138	0,151175466
2	Molasse – Flysch	-0,215226866	0,171646	-0,46044959	0,24020488
4	Metamorphic	-0,030835797	-0,00784	-0,066035187	-0,010967419
5	Siliceous	-0,034476804	0,004798	-0,0738222	0,006722235
	R Square	0,834110543	0,944736	0,858261456	0,944727109
	Significant F	0,001466215	0,0000218621	0,004231663	0,000021876
	Observations	14	14	14	14
	Residual	40,07994108	11,27886	156,7098	22,09257

Table 3.12. Table with all parameters that were examined. Specifically the table shows, the sampling sites and the watershed coverage, in percentage, of each of the geological formations according to SG6G classification. Morphological parameters of watershed size and river stream order are also shown.

	Name	XRD Analysis				Geological Formations Watershed Coverage						Morphological Parameters	
S/N	Area	SiO2	CaO	Si	Ca	Limestones	Molasse-Flysch	Sediments	Metamorphic	Siliceous	Organic	Stream order (Strahler)	Catchment (km2)
1	DIA	73,97	7,68	34,57	5,49	21,71	0,00	0,00	4,55	73,74	0,00	6	165,65
2	ARK	75,85	4,94	35,45	3,53	4,72	0,00	0,00	15,70	79,58	0,00	6	274,58
3	TRIK	56,18	15,45	26,26	11,04	2,30	51,45	1,07	45,18	0,00	0,00	7	492,35
4	ELEF	54,55	20,31	25,50	14,52	1,36	64,64	3,11	30,89	0,00	0,00	8	828,9
5	KAL	79,04	4,40	36,94	3,14	0,00	0,00	5,56	94,44	0,00	0,00	5	36,38
6	OL	77,59	4,98	36,27	3,56	0,00	0,00	0,00	100,00	0,00	0,00	4	3,2
7	KAR	76,45	1,43	35,73	1,02	0,00	0,00	0,00	100,00	0,00	0,00	5	37,18
8	MPB	79,21	3,90	37,02	2,79	0,00	0,00	13,50	86,50	0,00	0,00	4	2,39
9	MPC	81,27	3,20	37,99	2,29	0,00	0,00	3,64	96,36	0,00	0,00	4	5,39
10	KOK	77,67	2,82	36,30	2,01	0,00	0,00	13,70	86,30	0,00	0,00	4	24,67
11	EKM	74,10	4,22	34,64	3,01	0,00	0,00	0,00	100,00	0,00	0,00	5	18,85
12	ASP	77,80	1,20	36,37	0,86	0,00	0,00	7,05	92,95	0,00	0,00	6	90,83
13	MPA	83,68	2,28	39,11	1,63	0,00	0,00	0,00	100,00	0,00	0,00	4	4,39
14	MPD	66,82	0,34	31,23	0,24	0,00	0,00	3,76	96,24	0,00	0,00	4	6,47

Table 3.13. Table consisting of the 6 main geological categories with reference to the major geological formations that each category consists of the geological formations at North Greece.

S/N	Label	Classification	Geological formations
1	Limestones	Very rich in Ca	Mr: Marbles, Ki: Limestones Paleocene sh: limestones Jurassic and Chlorite Schists Kp-KP: Limestones of Upper Jurassic Kc-ktg: Limestones Cretaceous and Upper Cretaceous
2	Molasse	Rich in Ca poor in Si	Km: Mesohellene Trough, Molasses sediments
3	Sediments	Sediments their categorization depends of the rest classes watershed coverage	Q: Alluvial continental sediments of modern valleys pt-cq1-q: torrent – riverbed or alluvial deposits n: Brackish shore deposits, marl, m3,mp q-Q1: Alluvial Neogene sediment deposits. q1: Old and new debris cones
4	Metamorphic	Rich in Si poor in Ca	Gn-gm: Amphibolite, gneiss with marble alternations gn-sch, sch-gn: Alternations of schist, marbles and gneiss Ti-ph: Schist, sandstones, marbles or quartzite p: ophiolite, Diabase, Peridotite fo: Flysch Pindos
5	Siliceous	Very rich in Si	Pt - tkπ: acidic volcanic rocks of Eocene- Oligocene Pu-T3: acidic volcanic rocks Pliocene - Pleistocene g: Igneous, Plutonic of Mesozoic, granite, granodiorite and Monzonite sch-gs: Augen Gneiss, schists, Amphibolite of Paleozoic-Triassic of Pelagonian Zone γ: gneiss
6	Organic	Organic	Tb: Peat of Philipous Kavalas and lake deposits with peat layers and possible organic deposits

3.4 RESULTS

The sampling size, the distribution of the data and the number of parameters that need to be examined determines the effectiveness of the statistical analysis.

Specifically regarding the sampling side of the river bed sediment; the mineralogical analysis shows differences up to 12,44% to the minerals which corresponds up to 22% of the mineral overall concentration (Table 3.14). The difference in concentration of Si and Ca between the samples that were collected from different side of the river bed, left centre or right site is around 3,07% that corresponds to 8,2% of measured values (Table 3.14). Therefore the effectiveness of the equation cannot be less than this range. Consequently sampling at any side of the river is possible regarding the geological characterization but leaves an 8,2% range error for any equation. Sampling at the centre of the river is suggested.

Regarding the three different flow conditions (low, medium and high) there is no significant difference between the samples during different sampling periods as shown at table 3.15. The measured values are, for SiO_2 0,16-2,47 which is less than 3,09% and for CaO 0,36-1,13 which is up to 22,82%. Due to very small CaO concentration even small changes have a huge effect at the %. Consequently as sampling at high flow can be dangerous and sometimes not even possible, while sampling during low flow conditions could be off due to no flow and anthropogenic interference, sampling at medium flow is suggested.

According to the range of values regarding the sampling site and the flowing conditions, the algorithm effectiveness as shown at table 3.15 is very good. Specifically, the evaluation regarding the ratio of CaO to SiO_2 and Ca to Si at the four large watersheds has values of 0,98-1,04 which is extremely high with effectiveness that have values of 98-104%. All equations are useful, the equation regarding the Ca estimation as shown at table 3.11 is the most accurate. Lastly the ratio of CaO to SiO_2 is excellent and useful for prediction.

The 3 class classification of geology, as suggested by the WFD, that derives from the geological mapping at scale 1:500.000 proved to be not accurate. As it has been shown at tables 3.9, 3.16 and chapter 3.3.6 the effectiveness of geological mapping at scale 1:500.000 regarding the theoretical composition of the river bed sediment at SiO_2 and CaO is quite off to a level of 53-307% for SiO_2 and 34-201% for CaO .

The geological mapping at scale 1:50.000 and the categorization of six classes as shown at table 3.11, can give an effective equation for the estimation of SiO₂, CaO, Si and Ca as shown at tables 3.11-3.15 and chapter 3.3.6. The ratio is extremely good for watersheds of 100-1000 km² but needs further investigation and analysis to capture the diversity of Greek Watershed geology of 0-100 km², as Magnesium was not used. Subsequently a new categorization with possible more classes is suggested for an effective equation for the estimation of the oxides and elements when precision and accurateness is required.

The categorization, by name, of six classes as shown at table 3.13, regarding the SiO₂ and CaO expected appearance, is effective when geological mapping is at scale 1:50.000 and it's suggested (Appendix I Section 4 Figure 15G6a).

Scale at geological mapping is very important and can be very disoriented and misinterpreted if very small scale is used as was proven at North Greece regarding the 1:50.000 scale to 1:500.000.

Table 3.14. Table showing the maximum differences of the mineralogical analysis, of SiO₂ and CaCO₃ concentration, of Si and Ca concentration, in coherence to the area where river bed sediment was sampled.

Code	MPA3	MPB3	MPC1	MPC2	KAL3	ARK1
Mineral	A-D	A-D	A-D-K	A-D-K	A-K	A-K-D
Q	12,44	1,59	11,74	11,15	12,38	2,66
A-Pl	1,30	1,24	1,63	12,54	6,93	9,19
Kf	1,09	0,46	1,15	2,77	1,01	5,43
C	0,16	2,45	0,58	0,86	1,33	3,10
T	0,39	0,36	1,55	3,75	1,17	1,49
Cl	2,56	0,33	3,76	0,20	0,47	0,67
Micas	6,23	1,44	6,31	8,24	0,02	5,54
Tr	0,97	0,57	2,47	5,97	1,65	10,72
D	0,26	0,56	1,22	1,72	0,22	1,03
SiO ₂	6,57	0,23	6,49	3,22	5,26	1,57
CaO	0,28	0,99	0,70	1,17	1,76	1,19
Si	3,07	0,11	3,03	1,50	2,46	0,73
Ca	0,20	0,71	0,50	0,84	1,26	0,85

Table 3.15. Table with the estimated (using authors algorithm) and measured (real values from the lab analysis) of the chemical compounds and the chemical elements with the ratio $\text{CaO}:\text{SiO}_2$. Column Evaluation is a number calculated by dividing the ratio of estimated values by the ratio of measured values of Oxides (green colour), and of Elements of measured values (blue colour). Therefore the value 1 means perfect estimation and closer to 1 it is more accurate. When values are >1 means overestimation and <1 means underestimation.

Sampling Code	Theoretical chemical composition from mineralogical analysis using geological mapping at scale 1:50.000													
	Oxides							Elements						
	Estimation using equation			Measured values			Evaluation of 6Classes	Estimation using equation			Measured values			Evaluation of 6Classes
	SiO ₂	CaO	Ratio	SiO ₂	CaO	Ratio		Si	Ca	Ratio	Si	Ca	Ratio	
MPC	77,28	2,85	0,04	81,27	3,20	0,04	0,94	36,12	2,04	0,04	37,9	2,29	0,06	0,94
KIP	77,04	2,81	0,04	77,59	4,98	0,04	0,57	36,01	2,01	0,04	36,2	3,56	0,10	0,57
MPA	77,04	2,81	0,04	83,68	2,28	0,04	1,34	36,01	2,01	0,04	39,1	1,63	0,04	1,34
MPD	77,29	2,85	0,04	66,82	0,34	0,04	7,25	36,13	2,04	0,04	31,2	0,24	0,01	7,35
MPB	77,93	2,96	0,04	79,21	3,90	0,04	0,77	36,43	2,11	0,04	37,0	2,79	0,08	0,77
EKM	77,04	2,81	0,04	74,10	4,22	0,04	0,64	36,01	2,01	0,04	34,6	3,01	0,09	0,64
KOK	77,95	2,96	0,04	77,67	2,82	0,04	1,05	36,43	2,12	0,04	36,3	2,01	0,06	1,05
MAV	77,41	2,87	0,04	79,04	4,40	0,04	0,67	36,18	2,05	0,04	36,9	3,14	0,09	0,67
KAR	77,04	2,81	0,04	76,45	1,43	0,04	1,95	36,01	2,01	0,04	35,7	1,02	0,03	1,96
ASP	77,51	2,89	0,04	77,80	1,20	0,04	2,42	36,23	2,06	0,04	36,3	0,86	0,02	2,40
DIA	73,94	7,64	0,10	73,97	7,68	0,10	1,00	34,56	5,46	0,16	34,5	5,49	0,16	0,99
ARK	75,87	4,98	0,07	75,85	4,94	0,07	1,01	35,46	3,56	0,10	35,4	3,53	0,10	1,01
TRI	56,55	16,12	0,29	56,18	15,45	0,29	1,04	26,43	11,5	0,44	26,2	11,0	0,42	1,04
ELE	51,60	19,30	0,37	51,89	19,83	0,37	0,98	24,11	13,7	0,57	24,2	14,1	0,58	0,98

Table 3.16. It shows the differences of estimating the concentration of SiO₂, CaO and Si, Ca by using geological mapping at scale 1:500.000 and 1:50.000. The evaluation value of 1 is equal to perfect estimation. When values are closer to 1 it is more accurate. When values are >1, it means overestimation and <1 means underestimation. It is very clear that the 6 categories methodology at scale 1:50.000 is more precise, while the 2 geological formation categorisation at scale 1:500.000 is not accurate.

Sampling Code	Evaluation of SiO ₂ -CaO		Evaluation of cal Si-Ca	
	6 Geological formations categorization using scale 1:50.000	2 Geological formations categorization using scale 1:500.000	6 Geological formations categorization using scale 1:50.000	2 Geological formations categorization using scale 1:500.000
DIA	1,00	3,07	0,99	2,01
ARK	1,01	0,53	1,01	0,34
TRI	1,04	0,86	1,04	0,57
ELE	0,98	1,13	0,98	0,74

3.5 DISCUSSION -SUGGESTIONS

Geological mapping at scale 1:500.000 may be fast but does not capture any correlation between the watershed's geology and the river bed sediment mineralogical analysis. Geological mapping at scale 1:50.000 is much more detailed and effective and captures the geological correlation between the watershed's geology and the mineralogical analysis of the river bed sediment.

There are small differences in the mineralogical analysis regarding sampling method which are acceptable. There are no significant differences between different flowing conditions regarding SiO₂ concentration. On the contrary there are significant differences regarding flowing conditions and CaO concentration that need further research.

The geological categorization by name in six classes SRG6 as shown at table 3.13 is correct and effective regarding geological categorization for typology purposes.

In order to create an effective equation for use regarding geological research, not for WFD purposes, each one of the different geological formations that was mapped must be sampled and analysed. There are more than 43 different geological formations (Appendix I section 2) and if no other factors are affecting the sediment mineralogical analysis then at least 43 different sites must be sampled, one for each different geological formation. The mineralogical and sedimentological analysis of the river bed sediment is highly correlated with the hydromorphological parameters, as it is examined and analysed in next chapter, ending in increased number of sampling sites, in order to capture all possible combinations of these factors.

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CHAPTER 4: HYDROMORPHOLOGY- CONTRIBUTION TO THE STUDY OF SPESIFIC HYDROMORPHOLOGICAL PARAMETERS

Hydromorphology, in general, stands between hydrology and geomorphology but at the implementation of Water Framework Directive (WFD) a more specific approach adopted and especially at subchapter 1.1.1 regarding rivers, of chapter 1, for surface water status of Annex V, it is clearly stated that within the quality elements for the classification of ecological status are those Hydromorphological elements that support the biological elements. Specifically:

1. Hydrological regime
 - 1.1 quantity and dynamics of water flow
 - 1.2 connection to groundwater bodies
2. River continuity
3. Morphological conditions
 - 3.1 river depth and width variation
 - 3.2 structure and substrate of the river bed
 - 3.3 structure of the riparian zone

Hydromorphology combines parts of the disciplines of hydrology and geomorphology that are crucial to support the varied flora and fauna of waters. The use of hydromorphology as a concept has grown since the advent of the European Commission's WFD (http://www.hrwallingford.com/news/Hydromorphology-the_forgotten_facet_of_the_WFD).

The WFD requires the assessment of the ecological status of water bodies, which is comprised of biological, physical - chemical and hydromorphological quality elements. The WFD sets an objective for all water bodies to achieve at least Good ecological status, however the majority of water bodies in Europe are currently at less than Good status (the status classes are High, Good, Moderate, Poor and Bad). Hydromorphology is a "supporting element", which means that for water bodies where ecological status is less than high, hydromorphological state is not taken into

account as a component of overall ecological status assessment. At high status, there are no, or only very minor, anthropogenic alterations to the values of the physical - chemical and hydromorphological quality elements for the surface water body type from those normally associated with that type under undisturbed conditions. The values of the biological quality elements for the surface water body reflect those normally associated with that type under undisturbed conditions, and show no, or only very minor evidence of distortion. These are the type-specific conditions and communities.

In recent years, 2009-2020, the classification of a river's hydromorphology is directly correlated with the classification and characterization of a river's morphology and hydrology which are recognized as fundamental intergrading components for studying, analysing and understanding of a river behaviour in order to adapt and suggest river management applications (e.g., Sear et al. 1995, Gilvear 1999, Kondolf et al. 2003, Downs and Gregory 2004, Brierley and Fryirs 2005, Brierley and Fryirs 2008; Meitzen et al. 2013, Tadaki et al. 2014, Belletti et al. 2015). The increased concern of quality regarding river water and its habitats combined with their correlation with the rivers degradation have become important elements of hydromorphological assessment (Kilinc & Kay 2018).

Overall numerous hydromorphological assessment methods have been assessed, modified and applied in different countries since the WFD, with many differences regarding their aims, specific the methods and the scale used. Belletti et al. (2015) on their paper reviewed 121 different hydromorphological assessment methods from 1983-2013 and summarizes the main outcomes of Rinaldi et al. (2013b). The methods were grouped in 4 main categories; there were 17 different types of information recorded features, general characteristics and covering river processes, with 90 different features. This was an extended review regarding the previous (Raven et al. 2002, McGinnity et al. 2005, Weiss et al. 2008, and Fernanderz et al. 2011) and was spread even outside European methods. Unfortunately, most river geomorphological survey methodologies are conducted using field-based methods, require extended time, resources and are mostly relied on experts scientists to do the fieldwork which in most of the authorities across Europe is not possible (Brierly and Fryirs 2005, Sear et al. 2009, Rinaldi et al. 2013a).

At this chapter, the approach regarding the abiotic aspects and their interactions with the abiotic hydromorphological parameters is examined. It is not possible to examine all hydromorphological parameters. In this research from the hydrological elements supporting the biological elements only those regarding the quantity and dynamics of water flow regarding the Hydrological regime and part of the structure and substrate of the river bed regarding morphological conditions, divided in 2 main axis hydrological and morphological parameters were chosen to be analysed.

Hydrological parameters:

- Stream power which is directly correlated with the Watershed runoff (Bizzi S. and Lerner D.N., 2015, Grimpylakos et al 2017).
- Catchment size as it defines the precipitation that contributes to the mean annual surface runoff and has been suggested by the Water Framework Directive 2000/60 and has been used by many researchers (WFD 2000, WFD 2003, Lazaridou et al. 2013).
- Stream's order by Strahler defines the dynamic of the hydrographic network (it's also a morphological parameter).
- Steam order by Shreve defines the dynamic of the hydrographic network (it's also a morphological parameter).
- Maximum flood by Giandotti formula (1934) is very difficult to calculate but it is the most important parameter as it is the main factor shaping the geomorphological characteristics of rivers as during flood events the highest proportion of the overall river's sediment is transferred.

Morphological and geomorphological parameters:

- Drainage density.
- Hypsometry index and curves.
- Relief ratio.

Sedimentological parameters

- By Folk's classification.
- Roundness and sphericity with the optical classification method suggested by Krumbein and Sloss (1963).

Hydromorphology has been defined numerous times by many scientists using a selection of hydrological and geomorphological characteristics (Raven et al. 2002,

Brierley and Fryirs 2005, Mc Ginnity et al. 2005, Weiss et al. 2008, Sear et al. 2009, Fernández et al. 2011, Rinaldi et al. 2013a, Rinaldi et al. 2013b, Bizzi et al. 2016). River hydrology and morphology provide a relationship between flowing water and the physical environment of rivers. The hydromorphological regime (C11) is one of the hydromorphological quality elements of the WFD and is defined by the water flow's characteristics regarding quantity and dynamics hence to each connection to ground waters (Rinaldi et al. 2013b, Belletti et al. 2015, and Kilinc & Kay 2018).

In the next chapters seventeen (17) hydromorphological parameters were examined to define any possible correlation between them and to determine their correlation with the maximum flood by Giandotti. This research has examined up to Landscape unit and omitted the higher scales of Segment and Reach (Figure 4.1). Therefore the hydromorphological excluded elements were:

1. Hydrological regime: connection to groundwater bodies
2. River continuity
3. Morphological conditions: a) River depth and width variations, b) Structure of the riparian zone

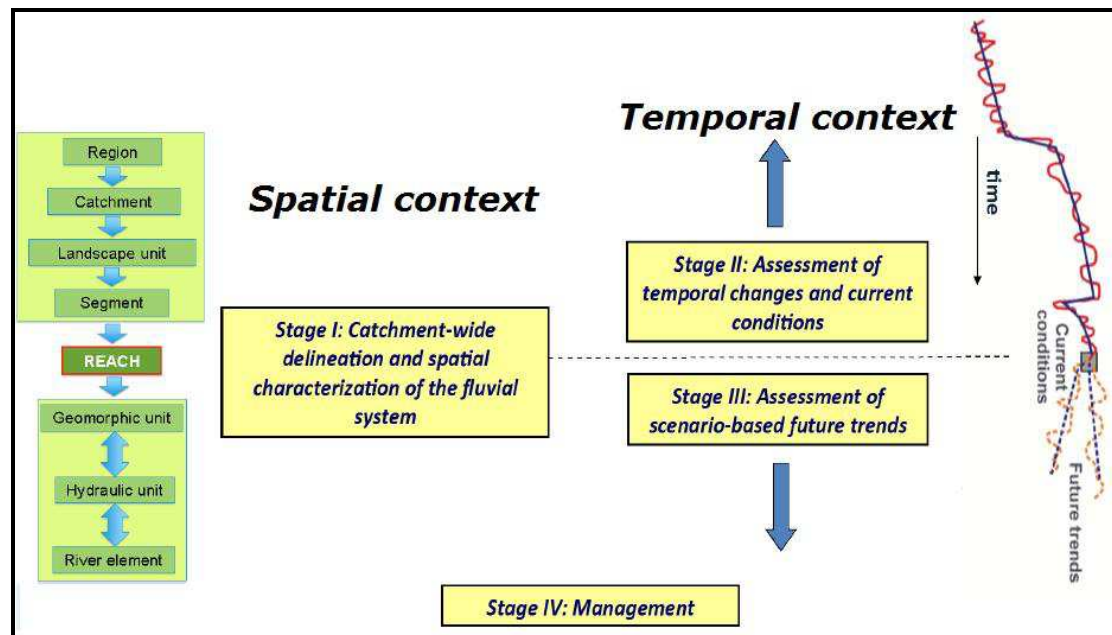


Figure 4.1. This figure is from the structure of the overall Restoring and FOR effective catchment Management (Rinaldi et al.2015). On the right side, it is emphasised that the present state of the river system represents a spot within a long trajectory of evolution that needs to be known to understand current conditions and possible future

trends (which is within the time continuity of monitoring). On the left side, the multiscale hierarchical framework is used for the delineation and characterization of the fluvial system (Gurnell et al. 2014).

4.1 RESULTS OF THE STATISTICAL CORRELATION OF THE 17 PARAMETERS

The seventeen (17) investigated hydromorphological parameters and their relation to the maximum flood by Giandotti (in the brackets is the number of person correlation) are the following:

1. **Mean annual surface runoff** Q_{mean} (**0,988**, as shown at Appendix III table 7 and Appendix IV)) as estimated by SR6G method (Grimpylakos et al. 2017) is highly correlated (0,988 while the equation has $R^2=0,976$) with the Maximum flood by Giandotti formula (1934), for 1, 10, 50 and 100 years. Maximum flood needs a lot of measurements and is highly consuming while the Q_{mean} estimation is very easily applied and so it is suggested as an alternative method for estimating the Potential maximum flood for rivers.
2. **Watershed size** (**0,836**, as shown at Appendix III table 5 and Appendix IV) as an alternative stand-alone parameter for mean annual surface runoff gives false information regarding the rivers waterpower, which is >55% of the occasions (Table 4.3).
3. **Stream's order by Strahler** (**0,857**, as shown at Appendix III table 6 and Appendix IV) was estimated using 3 different methods, using topographic maps at scale 1:50.000 and ArcMap 10.3 and Aster DEM (28,3mx28,3m) by extracting only 1 level streams and by extracting 1&2 level streams. Third method was estimating the same order as by using topographic method and so it is suggested for fast and easily applied method. Unfortunately stream order by Strahler, in cases when there are many watersheds of similar size value, it is found to be disorienting and it does not group the watersheds correctly regarding their maximum flood dynamic which is the main subject of this part of the research.

4. **Stream's order by Shreve (0,825**, as shown at Appendix III table 6 and Appendix IV) **defines** the dynamic of the hydrographic network more effectively than Strahler method when there are many watersheds of similar size value however it is less convenient than the Q_{mean} .
5. **Drainage density (-0,719**, as shown at Appendix III table 6 and Appendix IV) in most cases seems to decrease as size, maximum flood and Q_{mean} increases however it has no clear boundaries, it cannot be used as an hydromorphological parameter to group the watersheds and its less significant than Q_{mean} .
6. **Hypsometric Integral (-0,283**, as shown at Appendix III table 6 and Appendix IV) shows that a river's age is not correlated at all with the river's maximum flood, however this is due to the fact that in Greece most of the watersheds are consisted by many watersheds of different Hypsometric Integral corresponding to different river age.
7. **Total river length (0,836**, as shown at Appendix III table 5 and Appendix IV) is high correlated with the maximum flood but less correlated than Q_{mean} and cannot be effectively classified.
8. **Perimeter (0,901**, as shown at Appendix III table 5 and Appendix IV) is highly correlated with the flood and the Q_{mean} and is an easily measured parameter. It is more effective than the watershed's size but still it is disorienting in some occasions.
9. **Longest length (0,841**, as shown at Appendix III table 8 and Appendix IV) of a river's path is highly correlated with the size, perimeter, total river length, Strahler's and Shreve order. This was expected as this parameter is a geometric characteristic and is used at the equation of Giandotti. However it is not suggested for classification as it is less correlated than Q_{mean} and not so easily estimated.
10. **Relief ratio (-0,630**, as shown at Appendix III table 8 and Appendix IV) is negative correlated to maximum flood and less correlated than Q_{mean} . Its highest correlation is with river longest length and perimeter.
11. At all flow conditions there are differences at **sediment classification by Folk**, regarding area of sampling, left middle and right, in coherence to river flow. No correlation was detected with maximum flood by Giandotti.

12. The procedure for calculating **Hypsometric integral using Charts** and excel is very time-consuming, it shows a very small correlation (**-0,283**, as shown at Appendix III table 6 and Appendix IV) with maximum flood by Giandotti and is not recommended for classification. It is a very slow and highly time consuming procedure, though it will be interesting to consider with which parameter it can be highly correlated to be indirectly calculated but easier and faster.
13. The **sphericity** of 1mm quartz sands shows differences regarding the sampling sites and flowing conditions. In this research, no correlation was found between sphericity and maximum flood by Giandotti
14. The **roundness** of 1mm quartz sands shows differences between sampling sites and flowing conditions. In this research, no correlation was found between roundness and maximum flood by Giandotti.
15. **Min elevation (0,316**, as shown at Appendix III table 5 and Appendix IV) cannot be used for watershed classification. It is less correlated than Q_{mean} is with maximum flood by Giandotti.
16. **Mean elevation (0,820**, as shown at Appendix III table 5 and Appendix IV) cannot be used for watershed classification. It is less correlated than Q_{mean} is with maximum flood by Giandotti.
17. **Max elevation (0,935**, as shown at Appendix III table 5 and Appendix IV) may seem to be applicable but it is more confusing than useful. It is less correlated than Q_{mean} is with maximum flood by Giandotti.

Summarizing the most efficient parameter for estimating potential flood, as it is calculated by Giandotti (1934), is the mean annual surface runoff Q_{mean} as estimated by SR6G method (Grimpylakos et al. 2017). At the following chapters the methodology for estimating Q_{mean} at each watershed is presented and then it is calculated for each one of the main 86 watersheds of the studying area at Macedonia, North Greece.

4.2 MEAN ANNUAL SURFACE RUNOFF

The mean annual surface runoff of each river is the main factor shaping the surface waters and is directly related with the water cycle balance and the maximum flood. Furthermore precipitation, air temperature and evapotranspiration are directly related and interacted with the water cycle, thus indirectly with the surface water. Unfortunately, during the editing of the WFD, the quality and quantity of the aforementioned parameters, alongside their spatial - temporal distribution around Europe, could not be determined and so these factors could not be classified efficiently in order to capture the water cycle of the surface water at each river watershed. Conclusively it was decided that the most effective and objective parameter to capture the surface waters was the watershed size. In this chapter, the mean annual surface runoff is estimated at each one of the 86 watersheds. In addition the effectiveness of using the watershed size, as an alternative stand-alone parameter that substitutes the river's mean annual surface runoff (waterpower), is examined.

4.3 PARAMETERS DATA AND METHODOLOGY

4.3.1 Studying area

Studying area is a polygon that includes all the watersheds of Macedonia's political district at North Greece as was explained at chapter 2.4.2. The boundaries were determined according to the WFD guidelines for water bodies and the available data. Studying area is 36.290 km², has a perimeter of 2.163 km and includes 77 different torrents, where the main rivers are divided according to WFD and the watersheds are of 2,9-4775 km² (Figure 4.2).

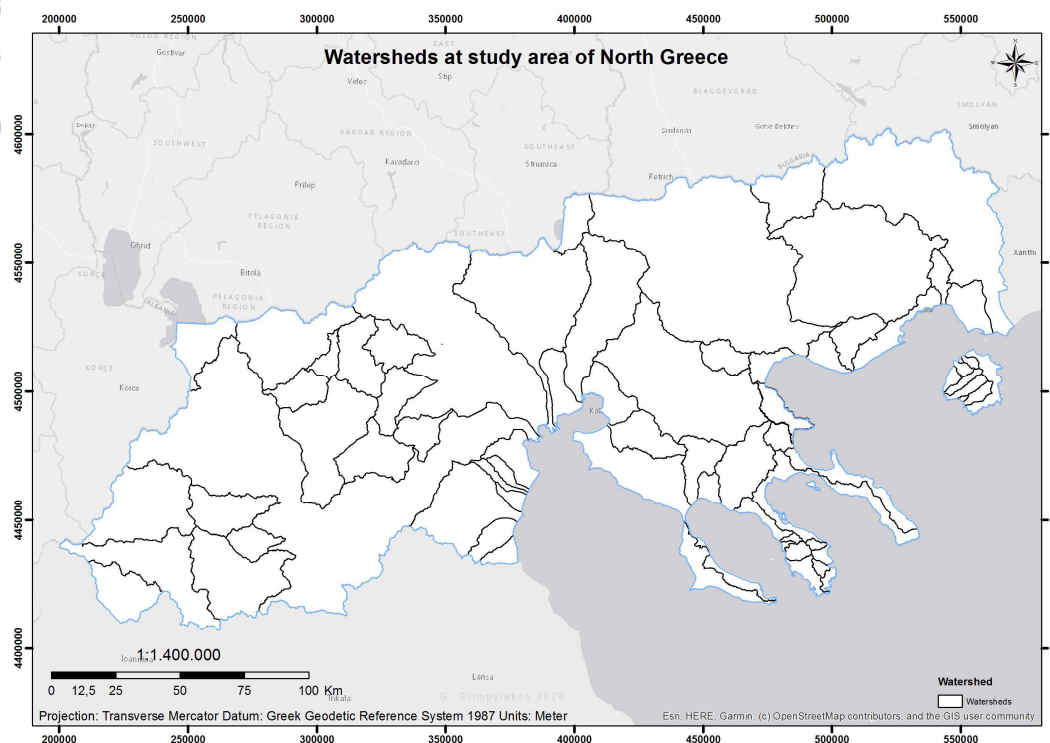


Figure 4.2. Map projecting the study area and the watersheds with in.

4.3.2 Watershed size Categorization

In order to test the hypothesis of this research 49 of the 77 torrents were chosen (Table 4.2), according to data availability. The watershed size classification, suggested by the typology system A, according to (WFD) Water Framework Directive 2000/60 is:

- Watershed size 10 - 100 km².
- Watershed size 100 – 1.000 km².
- Watershed size 1000- 10.000 km².
- Watershed size ≥ 10.000 km².

In the above categorization the category of the watershed size 0-10 km² was added since small but environmental important rivers exist in Greece (Kanli 2009, Lazaridou et al. 2013), while the ≥ 10.000 km² was extracted as there were no watershed of this size within Greek borders.

The corresponding watershed categorization for the study area is the following (Figure 4.3):

- Watershed size $< 10 \text{ km}^2$.
- Watershed size $10 - 100 \text{ km}^2$.
- Watershed size $100 - 1.000 \text{ km}^2$.
- Watershed size $1000 - 10.000 \text{ km}^2$.

4.3.3 Mathematical equation for mean annual surface runoff

To estimate the mean annual surface runoff of each watershed, the equation 4.1 (EMP 2008) that was suggested from the Greek Government was used. Each parameter value was estimated within the Macedonia area, aiming to its optimal spatial and temporal distribution. Furthermore scale factor was examined regarding runoff coefficient (a) by using the classification of geology in 6 classes at scale



1:50.000 and in 2 classes at scale 1:500.000. The results alongside differences and accuracy are shown at table 4.3.

Equation 4.1: $A = 1 (B - E) \alpha / 1000$

A = catchment size (Figure 4.2).

B = mean annual precipitation (Figures 2.9 & 4.5).

E = mean annual evapotranspiration (Figure 4.8)

$B - E$ = Runoff (Figure 4.9)

α = Parameter valued 0,60 - 0,90 depending on type of watershed geology and infiltration (Figures 4.10-4.11).

4.3.4 Estimation of the mean annual precipitation (B)

To estimate the mean annual precipitation, approximately 350.000 measurements of daily precipitation, obtained from 85 meteorological – climatological stations, during an eighty year period (1930-2010) were examined. The 30 year period 1974-2004, with excellent temporal distribution and continuous records was chosen as the most optimal. Specifically, 163.254 measurements belonging respectively to 40 stations (Figures 2.3 & 4.3) were used. Possible correlation with abiotic parameters was examined and four different interpolation techniques were used to determine the mean annual precipitation spatial distribution within Macedonia, Greece as explained at chapter 2 (Figures 2.9 & 4.4).

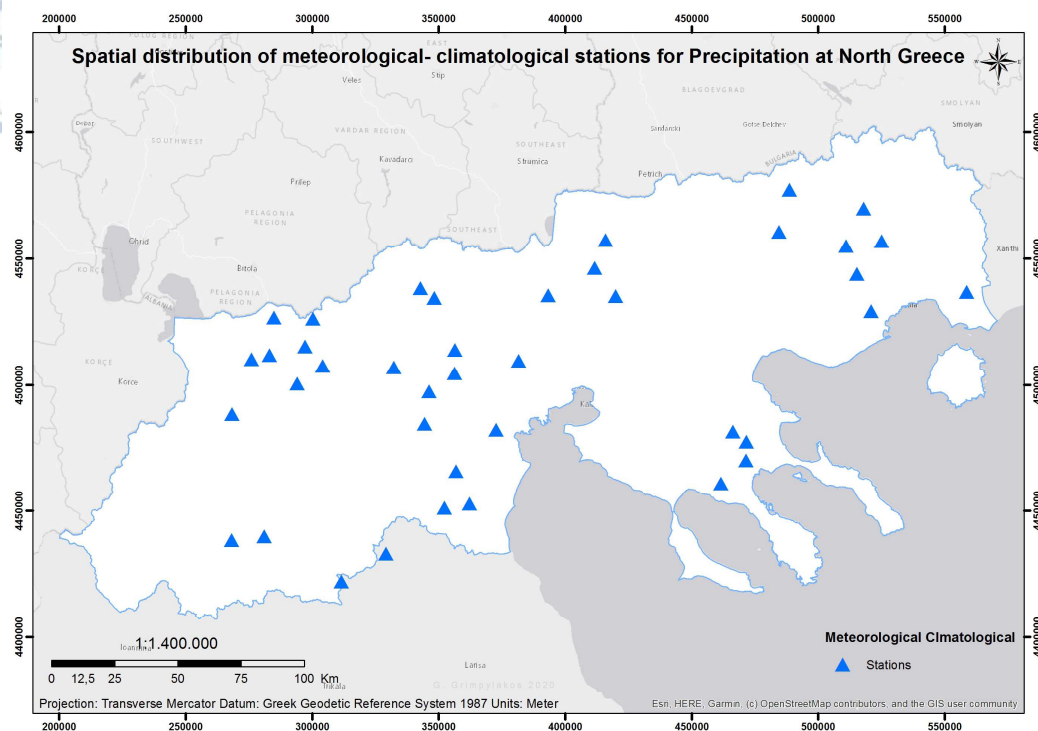


Figure 4.4. Map projecting the spatial distribution of the 40 meteorological – climatological stations with continuous precipitation data during period 1974-2004, at North Greece.

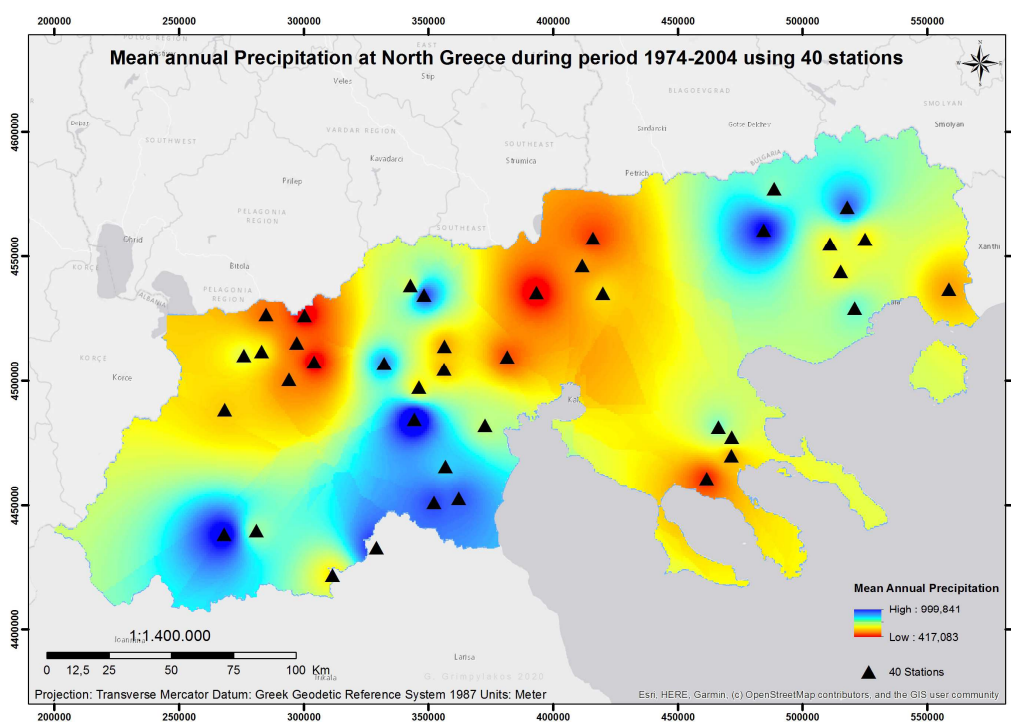


Figure 4.5. Thematic map projecting the spatial distribution of mean annual precipitation (mm) at Macedonia of North Greece. The data derived from 40 meteorological – climatological stations during period 1974-2004 and the cell size is 750m.

4.3.5 A suggested equation for estimation of mean annual Temperature in relation to elevation

To estimate the mean annual temperature, approximately 800.000 measurements of daily minimum and maximum temperature, obtained from 42 meteorological – climatological stations, during an eighty year period (1930-2010) were examined. The same thirty year period 1974-2004 with consistent daily data of 255.326 measurements, were used, belonging respectively to 20 stations (Figure 2.2). Firstly, the mean monthly temperature for each meteorological – climatological station was calculated and then, the mean of these values gave the mean annual temperature for each station. As examined in chapter 2, there is significant correlation between Mean annual Temperature and elevation, with $R^2 = 0,7364$ (Chart 2.2) and the corresponding equation 5 shows that the temperature declines as the elevation rises. This equation was applied using raster calculator of ArcMap, in order to estimate the temperature at the meteorological – climatological stations with no temperature data. Four different techniques, as analysed at chapter 2, were examined and the root mean square error was estimated for each technique (Table 4.1). Inverse Distance Heightening method was used as the most accurate and the corresponding map was created (Figure 4.7).

Equation 5 – Suggested equation for estimation of mean annual Temperature correlated to elevation applicable to research area

$$T = - 0,004 * E + 14,908 \text{ (T is mean annual temperature and E is elevation).}$$

Table 4.1. Root mean square error of each applied technique was calculated and IDW shows significant higher accuracy.

Interpolation techniques	IDW	Kriging	Spline	Polynomial
Root Mean Square Error	0,091	0,133	0,159	0,134

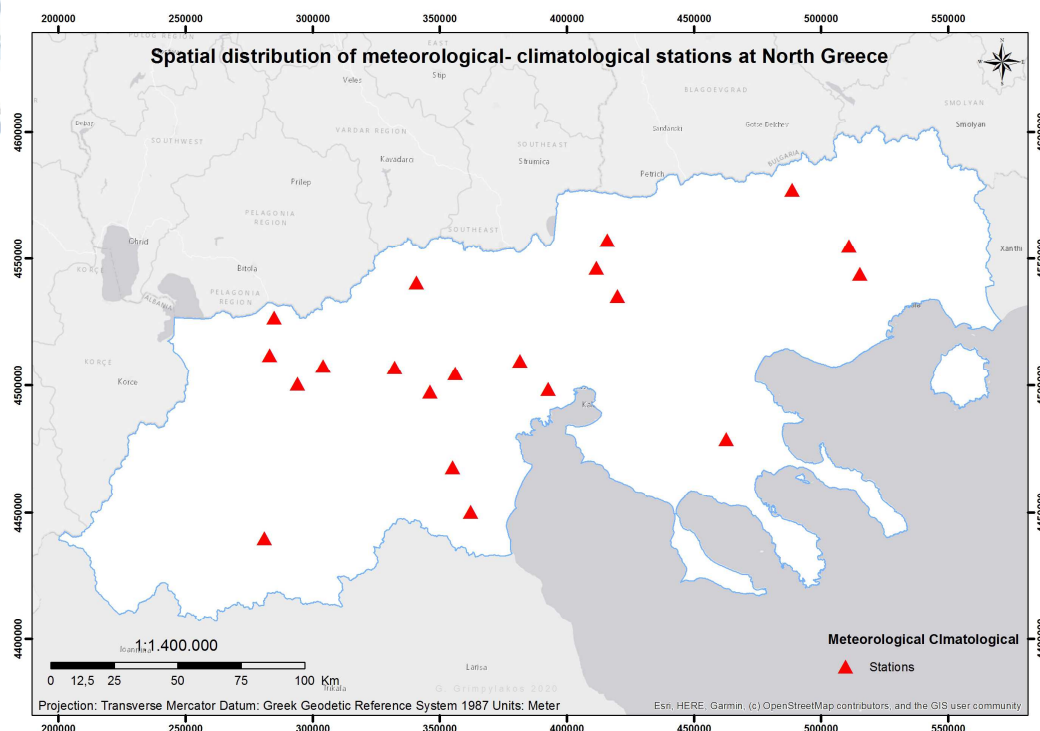


Figure 4.6. Map projecting the spatial distribution of the 20 meteorological – climatological stations with continuous temperature data during period 1974-2004, at North Greece.

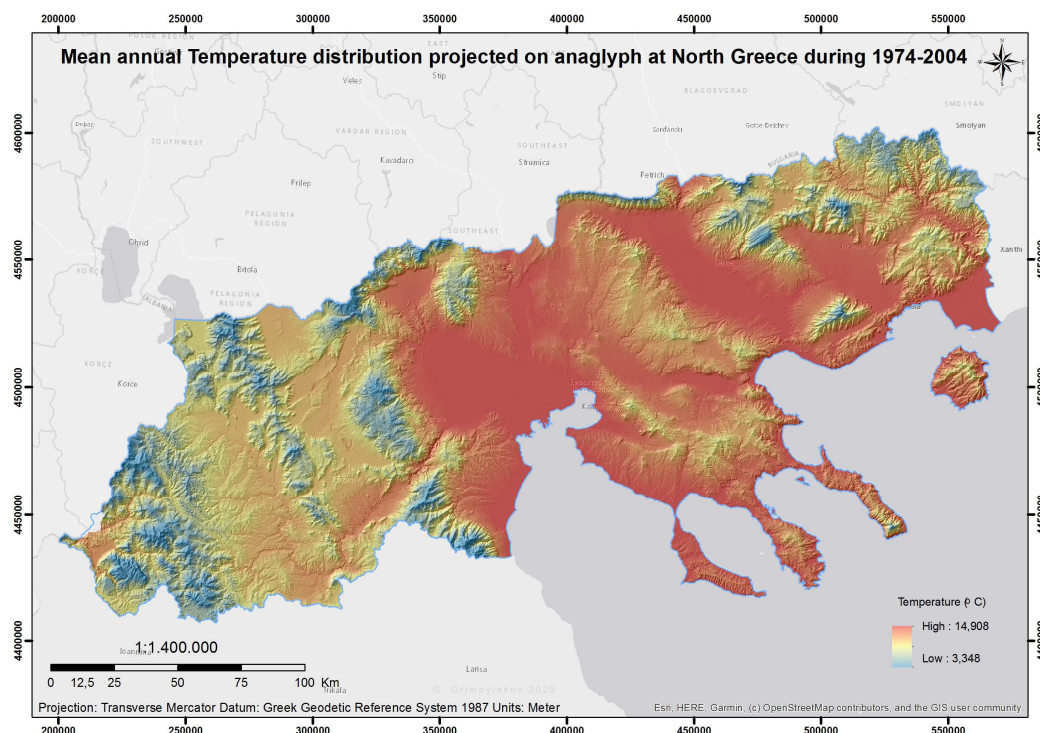


Figure 4.7. Mean annual temperature distribution at North Greece derived from 20 meteorological – climatological stations during period 1974-2004, projected on anaglyph.

4.3.5 Evapotranspiration (E)

Evapotranspiration was calculated with all three methods for each of the 20 stations as explained at chapter 2.4.4 (Figure 2.11). Evapotranspiration by Turc method is higher than Thornthwaite method at all stations and in 19 of 20 stations it is higher than Coutagne method, while Coutagne is higher than Thornthwaite method at 15 of 20 stations. On the other hand, Turc method is the most easily applied method of all, as Coutagne method is not always applicable and Thornthwaite's method uses parameters that differ according to elevation and the spatial distribution of each examined place, which makes it very difficult to apply this method at all stations. No significant correlation between elevation and evapotranspiration (Table 2.5). Lastly, Thornthwaite method is underestimating the evapotranspiration in comparison with the other two methods. Therefore Turc method was applied as the most accurate (Figure 4.8).

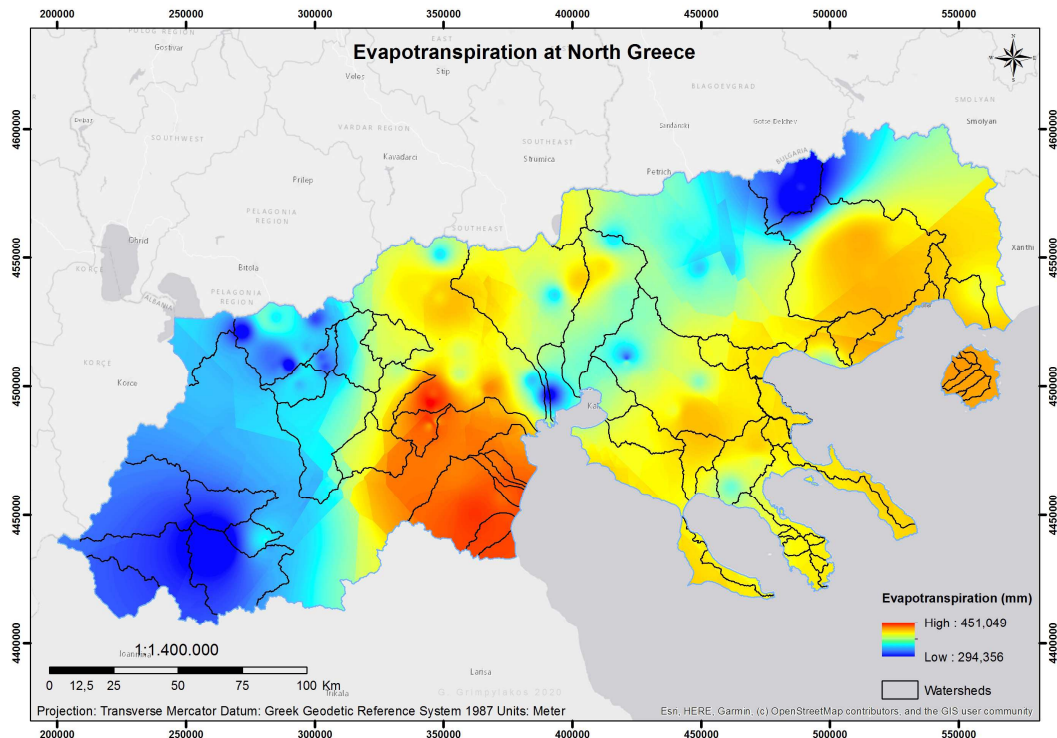


Figure 4.8. Thematic map of Evapotranspiration with cell size of 750m (Grimpylakos et al. 2017).

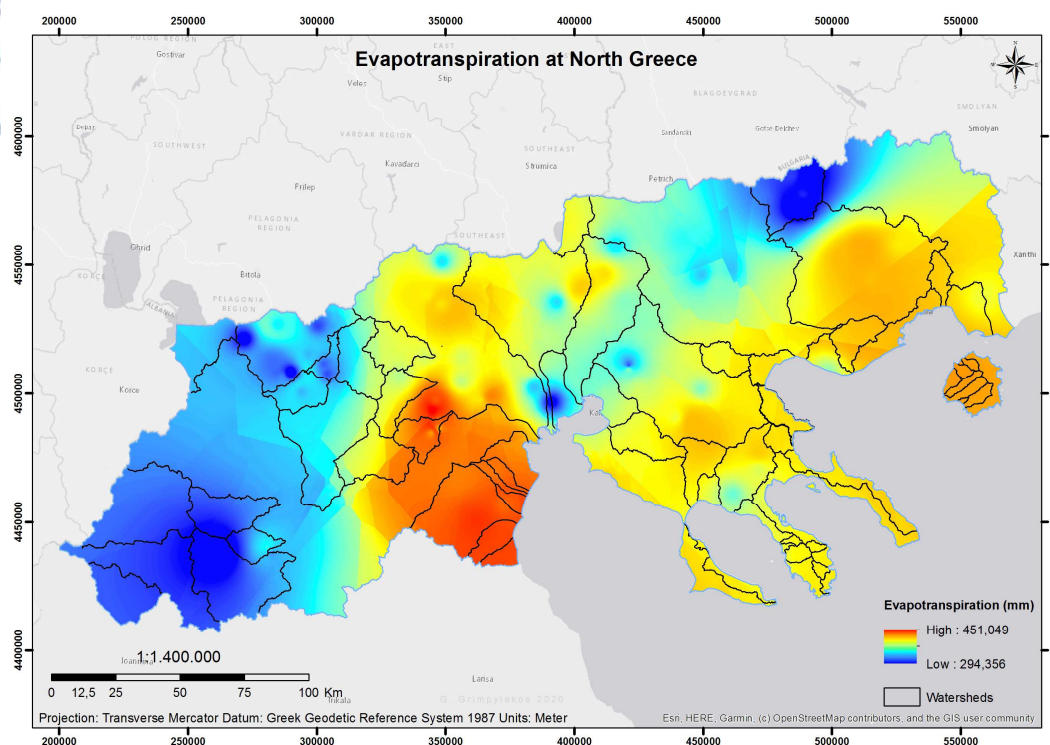


Figure 4.9. Thematic map of Runoff, estimated by Precipitation - Evapotranspiration, with cell size of 750m (Grimpylakos et al 2017).

4.3.6 Runoff Coefficient (α) in coherence with geology

Macedonia geology was used in two different scales, derived from the digitization of the IGME geological maps at scale 1:500.000 and 1:50.000. The data at scale 1:500.000 were from a previous research group (Kanli 2009; Lazaridou et al. 2013) and were categorized according to Kanli (2009), who applied it for entire Greece and at this research was applied only for North Greece (Figure 4.10). Macedonia's geology was also digitized at scale 1:50.000 and was categorised according to chapter 3 results in 6 classes (Figure 4.11).

The classification was designed according to the running coefficient of the corresponding geological sections and the available data as shown at table 4.2 (Voudouris 2013). The differences were cross-validate using GIS software. Forty nine (49) different watersheds were examined and categorized by size (table 4.3). For each one of them the possible Q_{mean} was estimated using the mentioned equation 4.1. The

surface runoff was estimated twice, corresponding to the two different approaches, regarding scale factor, of the mapped geology in order to check possible alterations to surface runoff due to increased detail in geological mapping that lead to more accurate classification.

Table 4.2. Runoff Coefficient in coherence to geology (Voudouris 2013, Grimpylakos et al 2017).

Geological Category	Runoff Coefficient	Scale
Limestones – Marbles	0.60	1:50.000
Molasse	0.80	1:50.000
Alluvial	0.83	1:50.000
Organic	0.87	1:50.000
Siliceous	0.92	1:50.000
Gneisses-Schists	0.95	1:50.000
Limestones – Marbles	0.60	1:500.000
Igneous-metamorphic rocks	0.85	1:500.000

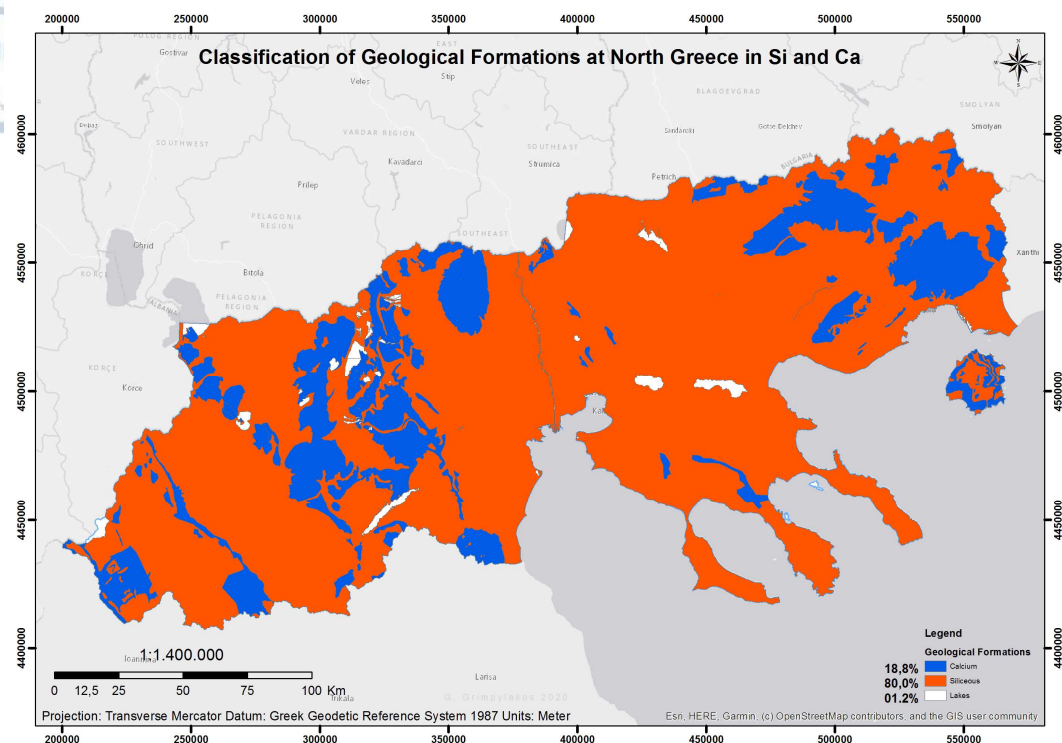


Figure 4.10. Classification of geology in two classes Ca and Si according to WFD with cell size approximately of 500 meters (modified map of Kanli 2009).

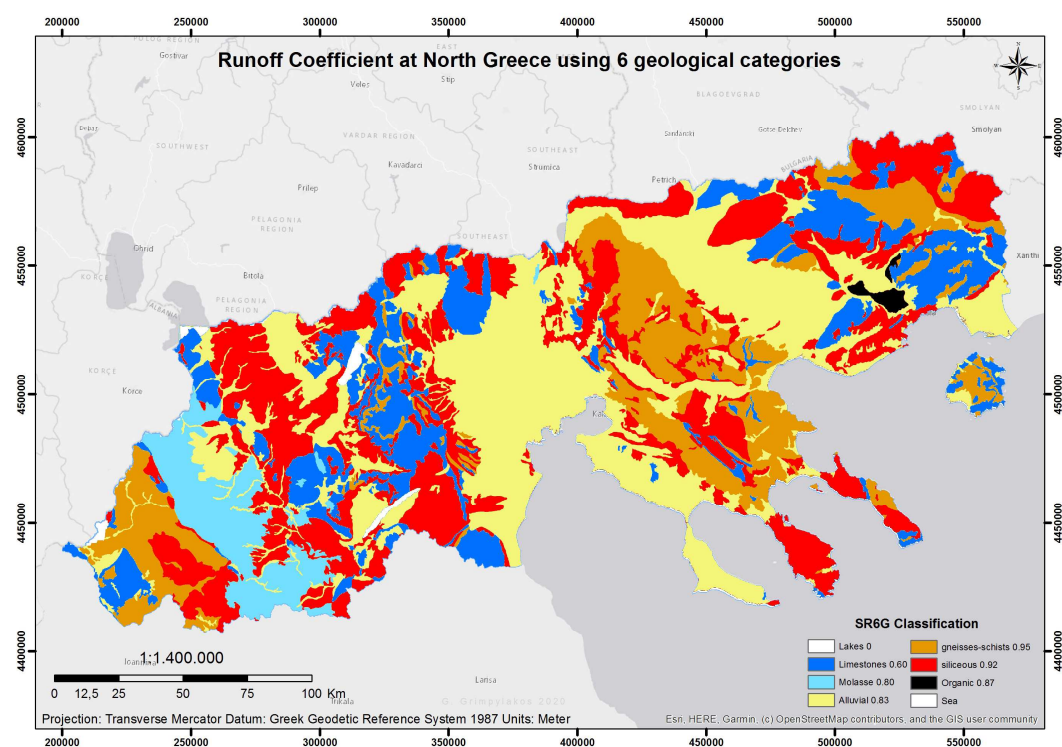


Figure 4.11. Classification of geology in six classes according to their composition with cell size approximately of 50 meters (Grimpylakos et al. 2017).

4.4 RESULTS FOR MEAN ANNUAL SURFACE RUNOFF

Forty nine watersheds of Macedonia's district at North Greece were categorized by their size, according to the modified WFD (Lazaridou et al. 2013) as shown below (Table 4.3):

- Watershed size $< 10 \text{ km}^2$, 5 cases.
- Watershed size $10 - 100 \text{ km}^2$, 16 cases.
- Watershed size $100 - 1.000 \text{ km}^2$, 21 cases.
- Watershed size $1000 - 10.000 \text{ km}^2$, 7 cases.

The mean annual surface runoff was estimated at each one of these watersheds by using the geological classification with 2 classes at scale 1:500.000 (SR2G) and with 6 classes at scale 1:50.000 (SR6G) as shown at table 4.2. Finally all catchments were classified according to their mean annual surface runoff by the SRG6G system in four classes, with hm^3 meaning million cubic meters:

1. small 0 to 10hm^3
2. medium 10 to 100hm^3
3. large 100 to 1000 hm^3
4. very large $> 1000\text{hm}^3$

Table 4.3. Watershed classification according to WFD and by Surface Runoff. Effectiveness of size in comparison to mean annual surface runoff (Q_{mean}) is shown with green color while disorientation of watershed size is shown with red color. Where hm^3 means million cubic meters.

SN	Watershed name	Size (km^2)	WFD	P-E (mm)	Mean annual Surface runoff		Deviation of SR6G to SR2G	SRGG
					SR6G (hm^3)	SR2G (hm^3)		
1	Megali Panagia C	2,39	1	253,56	0,57	0,52	9,62%	1
2	Kipouristras	3,21	1	221,68	0,68	0,61	11,48%	1
3	Megali Panagia A	4,40	1	234,74	0,98	0,88	11,36%	1
4	Megali Panagia D	5,92	1	246,24	1,38	1,24	11,29%	1

5	Megali Panagia B	6,47	1	233,02	1,36	1,28	6,25%	1
6	R. Mantrinas	18,72	2	177,39	3,05	2,82	8,16%	1
7	Ekklesiastikoi Muloi	18,86	2	219,55	3,93	3,52	11,65%	1
8	Rachoniou	21,80	2	279,51	5,22	4,86	7,41%	1
9	R. Smiksi	23,05	2	184,36	3,91	3,61	8,31%	1
10	Kokkinolakas	24,85	2	212,38	4,93	4,49	9,80%	1
11	R. Kalamodiano	28,00	2	186,23	4,70	4,43	6,09%	1
12	R. Prinou	30,22	2	284,81	7,61	6,99	8,87%	1
13	Mavrolakkas	33,18	2	221,25	6,92	6,24	10,90%	1
14	Karolakkas	36,90	2	227,05	7,96	7,12	11,80%	1
15	Marion Lakkos	44,77	2	276,31	10,86	10,11	7,42%	2
16	Dipotamos	49,48	2	266,15	10,81	10,04	7,67%	2
17	R. Mylou	56,60	2	179,88	9,37	8,65	8,32%	1
18	Platanorema	57,93	2	271,46	13,00	12,36	5,18%	2
19	R. Lygaria	60,50	2	308,39	15,52	15,83	-1,96%	2
20	R. Lakkos	69,46	2	290,93	16,75	17,15	-2,33%	2
21	Asprolakkas	90,95	2	219,31	18,73	16,95	10,50%	2
22	R. Nea Karvali	114,28	3	254,79	19,41	19,01	2,10%	2
23	Chelopotamos	159,43	3	387,17	44,48	44,82	-0,76%	2
24	Diavolorema	165,06	3	378,37	53,20	49,70	7,04%	2
25	Grevenetikos	180,23	3	453,03	68,55	69,34	-1,14%	2
26	Tripotamos	211,80	3	336,10	48,99	47,65	2,81%	2
27	Marmaras	234,22	3	257,82	51,45	49,65	3,63%	2
28	Olynthios	252,20	3	229,67	52,00	48,50	7,22%	2
29	Arkoudorema	272,98	3	333,05	82,70	76,21	8,52%	2
30	Arapitsa	297,29	3	289,67	61,27	59,19	3,51%	2
31	Edessaïos	306,54	3	243,19	55,41	53,65	3,28%	2
32	Anthemous	316,21	3	165,96	46,66	44,42	5,04%	2
33	Eleftherochori	336,50	3	470,95	129,03	134,70	-4,21%	3
34	Petrenia	379,97	3	189,78	59,74	55,76	7,14%	2
35	Voidomatis	388,77	3	456,41	135,37	128,50	5,35%	3
36	Promoritsa	411,89	3	449,06	150,30	157,22	-4,40%	3
37	Chavrias	472,59	3	177,32	74,97	69,17	8,39%	2
38	Trikomo	492,32	3	497,39	216,63	206,76	4,77%	3

39	Mavroneri	793,37	3	377,12	251,22	242,01	3,81%	3
40	Aoos	827,60	3	464,66	341,96	316,03	8,20%	3
41	Venetikos	855,09	3	486,61	356,13	352,33	1,08%	3
42	Sarantaporos	877,27	3	424,32	334,03	312,99	6,72%	3
43	Gallikos	1054,85	4	151,62	143,40	133,70	7,26%	3
44	Loudias	1250,45	4	153,96	156,75	159,95	-2,00%	3
45	Aksios	1631,09	4	153,78	208,26	206,47	0,87%	3
46	Aggitis	2234,15	4	332,75	578,56	566,20	2,18%	3
47	Nestos	2416,71	4	348,49	708,83	664,08	6,74%	3
48	Strymonas	3749,84	4	230,99	737,30	718,39	2,63%	3
49	Aliakmonas	4760,92	4	356,86	1398,37	1375,84	1,64%	4

4.5 DISCUSSION FOR MEAN ANNUAL SURFACE RUNOFF

The use of watershed size as an alternative stand-alone parameter for mean annual surface runoff is false. This research was focused on 49 different catchments of North Greece with good diversity of their size regarding the modified WFD classification (Figure 4.3). On 27 of these, the watershed size classification gave false information regarding the rivers mean annual surface runoff, which is >55% of the occasions (Table 4.3). The differences of the mean annual surface runoff regarding the increased detail in mapping and classes from scale 1:500.000 and 2 classes to scale 1:50.000 and 6 classes is -4,4% to 11,80% (Table 4.3). As not all possible geological coverage combinations were examined in this chapter, it is possible that the maximum deviation may increase to a higher number. Therefore it is recommended the use of 6 classes at scale 1:50.000.

Conclusively the following SRG6G is suggested (Table 4.4, Figure 4.12), with hm^3 meaning million cubic meters:

1. small 0 to 10hm^3
2. medium 10 to 100hm^3
3. large 100 to 1000hm^3
4. very large > 1000hm^3

Table 4.4. Effectiveness of size in comparison to mean annual runoff (Q_{mean}) in descending order of Q_{mean} and the suggested Runoff Classification.

Basin ID	Watershed Name	Area (km ²)	Mean Runoff per cell(mm)	Q_{mean} (hm ³)	Size Class	Runoff Class
6	Cl. L. Ochourou	3755,41	502,58	1887,39	4	4
4	Nestos	4774,85	348,485	1663,96	4	4
12	Strymon	1902,64	332,752	633,11	4	3
8	Strymon	2428,6	230,989	560,98	4	3
11	Cl. L. Doiranis	2234,15	242,741	542,32	4	3
19	R. New Karvalis	1054,88	254,793	268,78	4	3
18	Aliakmonas	1199,77	218,626	262,30	4	3
32	Axios (Florina part)	829,452	304,926	252,92	3	3
15	Gallikos	1635,83	151,624	248,03	4	3
26	Rest	921,903	262,44	241,94	3	3
35	Marmaras	793,478	257,822	204,58	3	3
25	Rest	966,382	200,613	193,87	3	3
17	Axios	1250,47	153,784	192,30	4	3
37	Cl.L Prespon	472,707	404,308	191,12	3	3
28	Lakes of Thessaloniki	862,484	187,291	161,54	3	3
36	Cl.L Ptolemaidas	673,759	206,476	139,12	3	3
29	Loudias	855,154	153,964	131,66	3	3
38	Aliakmonas	472,618	243,189	114,94	3	3
41	Lakes of Thessaloniki	398,992	253,157	101,01	3	3
43	Rest	388,885	240,051	93,35	3	2
45	Rest of Thasos	346,778	264,487	91,72	3	2
48	An (Rachoniou Community)	306,535	279,505	85,68	3	2
49	Rest of Thasos	297,285	286,008	85,03	3	2
50	R. Prinou	264,793	284,81	75,42	3	2
53	Aliakmonas	247,264	289,669	71,62	3	2
52	Rest of Thasos	248,926	280,932	69,93	3	2
47	Aliakmonas	314,95	220,054	69,31	3	2
40	Rest	411,893	167,976	69,19	3	2
57	Cl.L Ptolemaidas	234,222	286,035	67,00	3	2
55	Marion Lakkos	238,628	276,306	65,93	3	2

54	Cl.L Ptolemaidas	242,254	269,69	65,33	3	2
56	Platanorema	234,635	271,455	63,69	3	2
64	Aliakmonas	180,231	336,101	60,58	3	2
39	Cl.L Ptolemaidas	426,152	141,965	60,50	3	2
62	Aliakmonas	207,056	287,269	59,48	3	2
60	Dipotamos	219,855	266,146	58,51	3	2
46	Aoos	316,208	170,506	53,92	3	2
59	Aliakmonas	231,373	224,887	52,03	3	2
67	Cl.L Ptolemaidas	159,469	308,378	49,18	3	2
63	Rest of Thasos	181,098	268,859	48,69	3	2
61	Rest	211,8	215,954	45,74	3	2
79	Aoos	103,59	424,32	43,96	3	2
84	Aliakmonas	86,1187	449,059	38,67	2	2
83	Rest	87,9887	410,773	36,14	2	2
80	Mavroneri	95,2789	377,124	35,93	2	2
69	Asprolakkas	137,781	219,312	30,22	3	2
65	Anthemous	176,494	165,964	29,29	3	2
73	Olynthios (Vatonias)	122,982	229,67	28,25	3	2
68	Chavrias	157,627	177,321	27,95	3	2
51	Rest	252,202	104,46	26,35	3	2
44	Rest	380,361	67,4267	25,65	3	2
90	Aliakmonas	56,6096	453,034	25,65	2	2
92	Aliakmonas	49,4773	486,606	24,08	2	2
87	Chelopotamos	61,5121	387,172	23,82	2	2
76	Rest	114,288	205,546	23,49	3	2
70	Rest	134,962	158,98	21,46	3	2
78	Petrenia	111,375	189,783	21,14	3	2
94	Aoos	44,7712	464,656	20,80	2	2
82	Rest	90,9479	188,34	17,13	2	2
81	Rest	94,3394	159,379	15,04	2	2
96	Rest	35,3526	372,262	13,16	2	2
85	Rest	83,3881	152,063	12,68	2	2
86	Rest	69,4672	171,636	11,92	2	2
88	Rest	60,4994	173,047	10,47	2	2

89	Rest	57,9508	177,283	10,27	2	2
95	R. Mantrinas	36,0522	177,392	6,40	2	1
97	R. Smixi	30,7456	184,363	5,67	2	1
98	Rest	30,2223	175,339	5,30	2	1
99	R. Mylou	28,0045	179,884	5,04	2	1
105	Aoos	10,6969	456,41	4,88	2	1
102	Rest	23,0529	186,403	4,30	2	1
103	Rest	21,8165	183,688	4,01	2	1
104	R. Kalamodiano	18,7204	186,228	3,49	2	1
719	Aliakmonas	5,91035	356,861	2,11	1	1
109	Rest	7,08083	188,507	1,33	1	1
721	R. Lakkos	2,90768	290,933	0,85	1	1
720	Rest	3,12503	256,465	0,80	1	1
722	R. Lygaria (Ganochoras Community)	0,00	308,394	0,00		

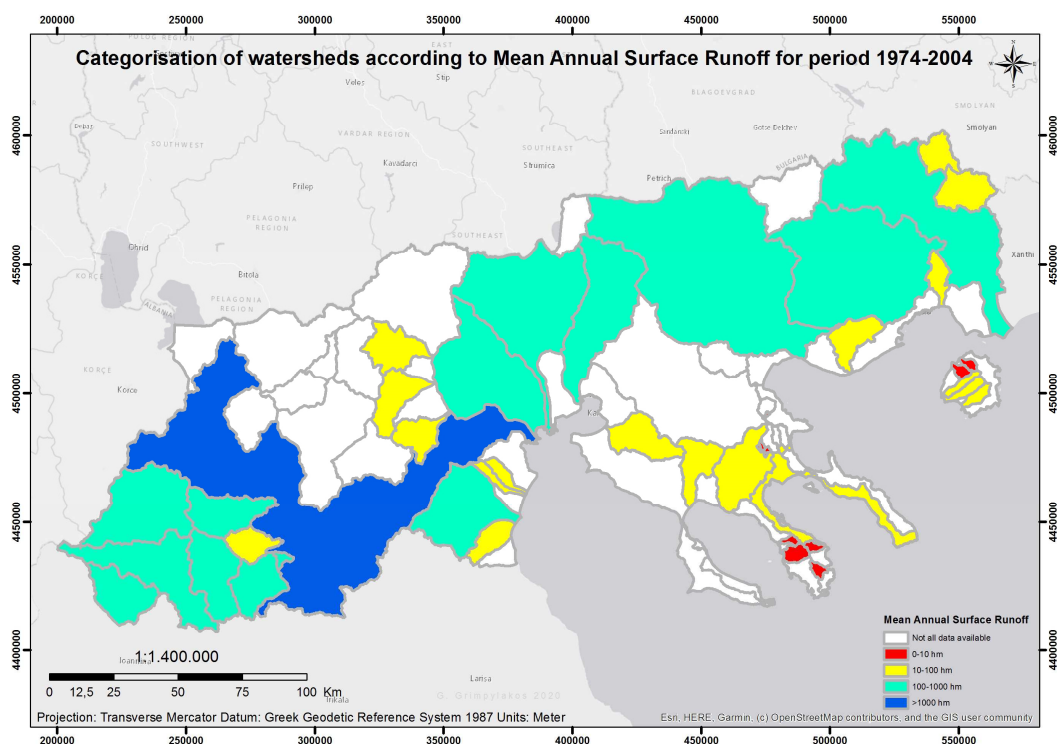


Figure 4.12. Classification of greek watersheds in four groups, at Macedonia of North Greece, according to mean annual surface runoff and the geology SRGG (Grimpylakos et al. 2017)

Macedonia was classified in 2 classes at scale 1:500.000 (Figure 4.10) and in 6 classes at scale 1:50.000 (Figure 4.11) as estimated at chapter 3. The corresponding mean annual surface runoff was estimated respectively to each geological classification (Figure 4.11). The results were compared with the suggested modified WFD watershed size classification (Figure 4.3) and all were evaluated respectively. Lastly at chapter 4.5 it is made cleared that the use of Watershed size as an alternative parameter for mean annual surface runoff is fair; specifically it is false in 55% of the occasions (Table 4.2).

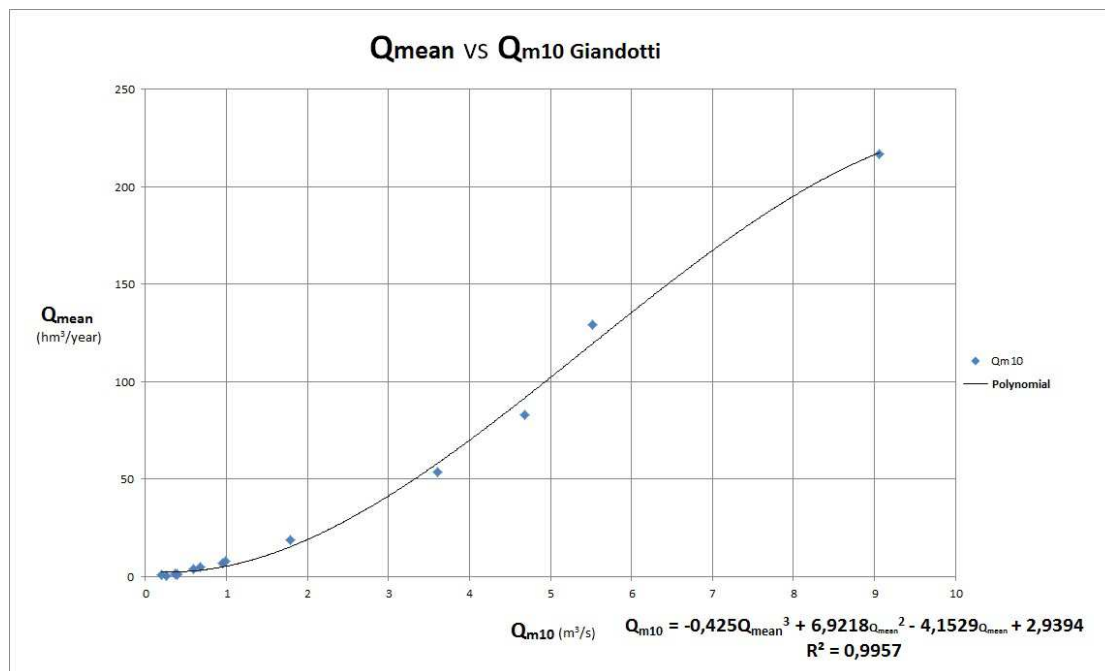


Chart 4.1. Correlation of Mean Annual Surface Runoff Q_{mean} with the Maximum Flood by Giandotti for 10 years Q_{M10} using third degree polynomial equation.

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- The Climatic type, according to A values, at studying area changed from period 1952-1974 to period 1974-2004.
- Entire studying area has one Continental climate type, according to GCI Gorczynski Continentality index (Gorczynski 1922), as shown at figure 2.7.
- If the examined period of 30 years, 1974-2004, is not the same, but expands to the overall operation of the meteorological – climatological stations 1952-2010 (that differ between stations), then a different classification of fair quality is estimated for A (by Supan) and CGI (by Gorczynski), dividing the studying area in two categories, as shown at figure 2.4 and 2.6 respectively.
- There is **no** significant correlation between GCI and elevation, the highest is only $R^2=0,2513$.
- The CGI at studying area changed from period 1952-1974 to period 1974-2004.
- There is significant correlation between Mean annual Temperature and elevation with a linear equation 5: ($T = - 0,004 * E + 14,908$) as shown at chart 2.2 where $R^2 = 0,7364$. Equation was adapted and implemented (Figure 2.8).
- The elevation distribution of the meteorological – climatological stations was not adequate to capture the possible correlation between Precipitation and Elevation. The statistical analysis and the possible correlation were checked with SPSS programme (Table 2.5). The highest possible correlation was not significant $R^2<0,29$ and so the mean annual precipitation for each cell of Macedonia could not be estimated.
- The increase in density of the meteorological – climatological stations resulted in many differences regarding the CCK at studying area.
- A new climatic type Cfb was estimated on the western part of Macedonia and at Nevrokopi North, Northeast of Macedonia (Figure 2.13).
- Entire Chalkidiki Thessaloniki and Serres have different climatic type, Cfa and not Csa (Figure 2.13).

- Climatic classification by Köppen (CCK) of studying area (Figure 2.14) due to low density of data, 1 meteorological – climatological station per 18.000 km², is disorienting comparing to CCK which uses a dense network of 1 station per 2.000 km². Therefore the current CCK of entire Greece, based on a sparse network of 17 stations, is disorienting.
- Mean annual precipitation, evapotranspiration and total runoff at each meteorological – climatological station was estimated and projected (Figure 2.16) alongside with the anaglyph.
- Total runoff is very strong correlated with high elevation and low temperature. Total runoff is higher at Southwest part of Macedonia west of Pindos mountain chain. The strong correlation with elevation is explained by the fact that at high elevation precipitation is higher while mean monthly and annual temperature is lower. This correlation is a proof that elevation distribution of each torrent watershed should be included in the classification of rivers typology; however in the elevation classification the relationship with the total runoff should be taken in consideration (Figure 2.16).

Summary of the findings regarding Chapter 3 Geological parameters follows:

- The number of sampling sites, the distribution of the data and the number of parameters that need to be examined determines the effectiveness of the statistical analysis.
- Regarding the sampling side of the river bed sediment, the mineralogical analysis shows differences up to 12,44% to the minerals which corresponds up to 22% of the mineral overall concentration (Table 3.14).
- The difference in concentration of Si and Ca between the samples that were collected from different side of the river bed, left centre or right site is around 3,07% that corresponds to 8,2% of measured values (Table 3.14).
- The differences could be due to turns of the river which can be avoided when sampling at the centre of the river. For this reason sampling at the middle of the river corridor is suggested to be applied.

- Regarding the three different flow conditions (low, medium and high) there is no significant difference between the mineralogical compositions of the samples during different sampling periods as shown at table 3.15.
- Consequently, regarding XRD and geochemical analysis of sediments for correlation with GIS geological maps, as sampling at high flow can be dangerous and sometimes not even possible, while sampling during low flow conditions could be off due to no flow and anthropogenic interference; sampling at medium flow is suggested.
- The algorithm effectiveness as shown at table 3.15 is very good. The evaluation regarding the ratio of CaO to SiO₂ and Ca to Si at the four large watersheds has values of 0,98-1,04 which is extremely high with effectiveness that have values of 98-104%. All equations are useful, the equation regarding the Ca estimation as shown at table 3.11 is the most accurate. Lastly the ratio of CaO to SiO₂ is excellent and useful for prediction.
- The 3 class classification of geology by the WFD that derived from the geological mapping at scale 1:500.000 **is not corresponding to the mineralogical analysis of the river bed sediment** as shown at table 3.9, 3.16 and chapter 3.3.6 and the effectiveness of the equation is quite off to a level of 53-307% for SiO₂ and 34-201% for CaO.
- The geological mapping at scale 1:50.000 and the categorization of six classes as shown at table 3.11, may give an effective equation for the estimation of SiO₂, CaO, Si and Ca as shown at tables 3.11-3.16 and chapter 3.3.6.
- The ratio is extremely good for large watersheds but needs further investigation and analysis to capture the diversity of Greek Watershed geology. Subsequently a new categorization with possible more classes is suggested for an effective equation for the estimation of the oxides and elements regarding geological research.
- The categorization, by name, of six classes as shown at table 3.13, regarding the SiO₂ and CaO expected appearance, is effective when geological mapping is at scale 1:50.000 and it's suggested.

- Scale at geological mapping is very important; it can be very disorienting and may lead to misinterpretation if very small scale is used as was proven at North Greece regarding the 1:500.000 scale to 1:50.000.

Summary of the findings regarding Chapter 4 Hydromorphological parameters follows:

- Stream's order by Strahler was estimated three times for the 14 research sites. Firstly by digitising the watershed network using topographic maps of scale 1:50.000. Then it was estimated twice by using the ArcMap features and the DEM (ASTER), by subtracting level 1 and 2 streams respectively (Appendix 3 table 1). At 13 of 14 watersheds the stream order by Strahler was calculated correctly and only on site it was miscalculated by the ArcMap method.
- Stream's order by Strahler is a fast and easily applied method that defines the dynamic of the hydrographic network. However when detail is needed and in cases when there are many watersheds of similar size value it is disorienting and it does not group the watersheds correctly regarding their maximum flood dynamic.
- Stream's order by **Shreve** defines the dynamic of the hydrographic network very effectively and gives a more detailed and trustworthy classification. Shreve order proved to be more trustworthy compared to Strahler when detail is needed and in cases when there are many watersheds of similar size value.
- Drainage density seems to decrease as size, maximum flood and Q_{mean} increases however it has no clear boundaries and cannot be used as a hydromorphological parameter to group the watersheds.
- Hypsometric Integral shows that a river's age is not correlated at all with the river's maximum flood and possible water quality characteristics.
- Min and mean elevation cannot be used for watershed classification, however Max elevation may seem to be applicable but it is more confusing than useful.
- River length is high correlated with the maximum flood but cannot be effectively classified.

- Perimeter is highly correlated with the flood and the Q_{mean} and is an easily measured parameter. It is more effective than the watershed's size but still, in some occasions it is disorienting.
- Longest length of a river's path is highly correlated with the size, perimeter, total river length, Strahler's and Shreve order. As was expected due to its geometric characteristics.
- Relief ratio is not highly correlated with any other parameter.
- At all flow conditions there are differences at sediment classification by Folk, regarding area of sampling, left middle and right. On the contrary when sampling area is the same, left centre or right side of the river bed, there are no significant differences regarding flowing conditions, low medium and high.
- The sphericity and roundness of sediments, of 1mm quartz sands, is different regarding the sampling site and flowing conditions.
- Maximum flood by Giandotti formula (1934), for 1, 10, 50 and 100 years, is highly correlated with the Q_{mean} SR6G (0,988 while the equation has $R^2 < 0,976$). Maximum flood needs a lot of measurements and is highly consuming while the Q_{mean} estimation is very easily applied.
- A mathematical equation for correlating Q_{m10} with Q_{mean} as mathematical parameters (without consideration of units) $Q_{m10} = -0,425Q_{\text{mean}}^3 + 6,9218Q_{\text{mean}}^2 - 4,1529Q_{\text{mean}} + 2,9394$ with the corresponding $R^2 = 0,9957$.
- Watershed size as an alternative stand-alone parameter for surface runoff gives false information regarding the rivers mean annual surface runoff, which is >55% of the occasions (Table 4.3).
- The following SRGG is suggested (Table 4.4, Figure 4.12) with hm^3 meaning million cubic meters:
 1. small 0 to 10hm^3
 2. medium 10 to 100hm^3
 3. large 100 to 1000hm^3
 4. very large > 1000hm^3

- The classification of studying area using 1:500.000 and 2 classes to scale 1:50.000 and 6 classes (Table 4.3) has little differences and to the aforementioned classification is the same. This is due the parameter “a” runoff coefficient that takes values between 0.6 and 0.95.
- When upgrading geological mapping from scale 1:500.000 to 1:50.000, 21 occasions had differences less than <5%, 22 had 5-10% and only 6 occasions had >10% (Table 4.3). The differences above >5% are at 28 of 49 occasions which is 57,14%. Therefore geological map at scale of 1:50.000 is essential for precise estimations regarding runoff coefficient, mean annual surface runoff and maximum flood.
- In cases where accuracy is needed, for example hydrogeological study, flood estimation, the high scale geological mapping of 1:50.000 with 6 classes is recommended.

5.2 A SUGGESTED TYPOLOGY FOR SCHOLAR USE

This research suggests a river typology that can be used in a scholar basis, not applicable for operational applications related to WFD. The limitations of resources oblige the author to exclude some hydromorphological parameter used in operational applications usually by large multidisciplinary research groups (chapter 4.1).

The suggested typology needs to be easily applied and effective and should be capturing all the possible combinations but without creating a high number of types.

Regarding the climatic classification, the Climatic Classification by Köppen (Köppen, W. 1884, Köppen, W. 1918, Köppen, W. 1930) that will be addressed as CCK was applied and the corresponding climatic types, at the study area, are:

- Csa: Mediterranean climate. Very hot and dry summers. Calm winters. $T_w \geq 22^\circ\text{C}$ and $r_\xi < 30$, $r_\xi < r_u/3$.
- Cfa: Humid subtropical climate of long hot summer. $T_w \geq 22^\circ\text{C}$.
- Cfb: Oceanic humid with hot summer and average temperature of 4 warmest months $T_w \geq 10^\circ\text{C}$ and of hottest month $T_w < 22^\circ\text{C}$.

Regarding the geological classification, there were three classes which have specific boundaries regarding to the SiO_2 and CaO concentrations, specifically:

- Siliceous when the concentration of SiO_2 (>42%) is very rich and the CaO poor (<25%).
- Mixed when SiO_2 (25-55%) and CaO (25-52%) concentrations are close to each other, specifically there is a difference <10%.
- Calcium when the concentration of CaO (>40%) is very rich and SiO_2 poor, more than 10% below the CaO percentage.

Regarding the hydromorphological classification, as flood events are considered the most important and due to the fact that it is a very difficult to estimate the maximum flood at each one of the watershed, the Q_{mean} which is very close correlated with the maximum flood of 1, 10 50 and 100 years, was estimated at all watersheds. All watersheds were classified according to their surface runoff by the SR6G system in four classes (hm^3 is million cubic meters):

- small 0 to 10hm^3
- medium 10 to 100hm^3
- large 100 to 1000hm^3
- very large > 1000hm^3

The typology is clearly defined at table 5.1 while the corresponding types at the studying area are shown at table 5.2 and figure 5.1. There are overall 36 possible combinations of types; however at the studying area only 16 of these are found in the 86 watersheds. These 16 have to be covered with reference biological elements in order to be able to be used and applied on estimating the ecological water quality.

In order to check if this typology can be applied to the rest of Greece, it must be combined with the ecological status of the corresponding watersheds and there must be at least 6 different sites to be applicable as was examined by Lazaridou et al. (2018).

Table 5.1. Suggested classification of studying area by using Climatic, Geological and Q_{mean} . The corresponding classification is a three digit number regarding **Q**(Mean Annual Surface Runoff) **G** (Geology by SiO₂ and CaO) **C** (Climate type by Köppen), (hm³ is million cubic meters).

Parameter	Classes – Codename			
Q Mean Annual Surface Runoff (for maximum flood)	0-10 hm ³	10-100 hm ³	100-1000 hm ³	>1000 hm ³
	100	200	300	400
Geology by SiO ₂ and CaO	Siliceous	Mixed	Calcium	
	10	20	30	
Climate type by Köppen	Csa	Cfa	Cfb	
	1	2	3	

Table 5.2. Suggested classification of studying area by using Q_{mean} , Geological and Climatic Classification (**QGC**) for each watershed of the study area. The corresponding classification is a three digit number regarding **Q** (Mean Annual Surface Runoff), **G** (Geology by SiO₂ and CaO) and **C** (Climate type by Köppen), with hm³ meaning million cubic meters.

S/N	Watershed Name	Q_{mean} hm ³ 6 classes	SR6G Class	Geology	CCK	Type
1	Megali Panagia B	1,36	1,00	Siliceous	Cfa	112
2	Megali Panagia C	0,57	1,00	Siliceous	Cfa	112
3	N.Fokea area	0,37	1,00	Siliceous	Cfa	112
4	Kipouristras	0,68	1,00	Siliceous	Cfa	112
5	Megali Panagia A	0,98	1,00	Siliceous	Cfa	112
6	Megali Panagia D	1,38	1,00	Siliceous	Cfa	112
7	Amouliani	0,85	1,00	Siliceous	Cfa	112
8	N.Marmaras area	1,61	1,00	Siliceous	Cfa	112
9	R. Mantrinas area	3,05	1,00	Siliceous	Cfa	112
10	Ekklesiastikoi Muloi	3,93	1,00	Siliceous	Cfa	112
11	Rachoniou	5,22	1,00	Siliceous	Cfa	112
12	R. Smiksi area	3,91	1,00	Siliceous	Cfa	112
13	Kokkinolakas	4,93	1,00	Siliceous	Cfa	112
14	R. Kalamodiano	4,70	1,00	Siliceous	Cfa	112
15	R. Prinou	7,61	1,00	Siliceous	Cfa	112
16	Kalamitsi area	5,08	1,00	Siliceous	Cfa	112

17	Mavrolakkas	6,92	1,00	Siliceous	Cfa	112
18	Sarti area	5,89	1,00	Siliceous	Cfa	112
19	Karolakkas	7,96	1,00	Siliceous	Cfa	112
20	Marion Lakkos area	10,86	2,00	Siliceous	Cfa	212
21	Dipotamos area	10,81	2,00	Siliceous	Cfa	212
22	R. Mylou	9,37	1,00	Siliceous	Cfa	112
23	Platanorema	13,00	2,00	Siliceous	Cfa	212
24	R. Lygaria	15,52	2,00	Siliceous	Csa	211
25	Katerini area	21,04	2,00	Siliceous	Csa	211
26	R. Lakkos	16,75	2,00	Siliceous	Csa	211
27	Rest of Aliakmonas	15,18	2,00	Siliceous	Csa	211
28	Ormulia area	11,85	2,00	Siliceous	Cfa	212
29	Platamonas area	24,58	2,00	Calcius	Cfa	232
30	Asprolakkas	18,73	2,00	Siliceous	Cfa	212
31	Nikiti area	12,08	2,00	Siliceous	Cfa	212
32	Toroni area	14,28	2,00	Siliceous	Cfa	212
33	Kalithea area	14,77	2,00	Siliceous	Cfa	212
34	Lake Petroni area	11,67	2,00	Calcius	Cfa	232
35	R. Nea Karvali	19,41	2,00	Calcius	Csa	231
36	Asprovalta area	25,46	2,00	Siliceous	Cfa	212
37	Orfanio area	18,12	2,00	Siliceous	Cfa	212
38	Chelopotamos	44,48	2,00	Calcius	Cfa	232
39	Stavros area	32,31	2,00	Siliceous	Cfa	212
40	Diavolorema	53,39	2,00	Siliceous	Cfa	212
41	Rest 2 of Aliakmonas	33,21	2,00	Siliceous	Csa	211
42	Rest of Thasos	32,90	2,00	Calcius	Cfa	232
43	Grevenetikos	68,55	2,00	Mixed	Csa	221
44	Lake Mavrovou	41,06	2,00	Siliceous	Cfa	212
45	Lake Doiranis	43,08	2,00	Siliceous	Cfa	212
46	Tripotamos	48,99	2,00	Calcius	Csa	231
47	Makrigialos area	46,74	2,00	Siliceous	Csa	211
48	Chalastra area	12,84	2,00	Siliceous	Cfa	212
49	Marmaras area	51,45	2,00	Siliceous	Csa	211
50	Keramoti area	36,48	2,00	Mixed	Csa	221
51	AgioOrosA area	44,18	2,00	Siliceous	Cfa	212
52	Lake Chimaditads are	57,11	2,00	Siliceous	Cfa	212
53	Kavala area	54,85	2,00	Siliceous	Csa	211
54	Siviri area	33,79	2,00	Siliceous	Cfa	212
55	Olynthios area	52,00	2,00	Siliceous	Cfa	212
56	Thessaloniki area	23,53	2,00	Siliceous	Cfa	212
57	Arkoudorema	82,70	2,00	Siliceous	Cfa	212

58	Arapitsa	61,27	2,00	Calcius	Csa	231
59	Edessaïos	55,41	2,00	Calcius	Csa	231
60	Lake Kastorias	76,88	2,00	Siliceous	Cfb	213
61	Anthemous	46,66	2,00	Siliceous	Cfa	212
62	Lake Prespes	97,14	2,00	Mixed	Cfb	223
63	Petrenia	59,74	2,00	Siliceous	Cfa	212
64	Voidomatis	135,37	3,00	Mixed	Cfa	322
65	Lake Vegoritidas	49,48	2,00	Calcius	Cfa	232
66	Promoritsa	150,30	3,00	Calcius	Cfa	332
67	Lake Sarigiol	99,22	2,00	Mixed	Csa	221
68	Lake Ochyou	191,94	3,00	Siliceous	Cfb	313
69	Chavrias	74,97	2,00	Siliceous	Cfa	212
70	Trikomo	216,63	3,00	Siliceous	Csa	311
71	Epanomi area	86,78	2,00	Siliceous	Cfa	212
72	Mavroneri	251,22	3,00	Siliceous	Cfa	312
73	Aoos	341,96	3,00	Siliceous	Cfa	312
74	Aksios Florina	223,15	3,00	Siliceous	Cfb	313
75	Venetikos-eleftherochori	327,87	3,00	Siliceous	Csa	311
76	Sarantaporos	334,03	3,00	Siliceous	Cfa	312
77	Rest of lake Ptolemaida	217,40	3,00	Mixed	Csa	321
78	Gallikos	143,40	3,00	Siliceous	Cfa	312
79	Periferiaki Tafros	207,05	3,00	Mixed	Csa	321
80	Loudias	156,75	3,00	Calcius	Csa	331
81	Aksios	208,26	3,00	Siliceous	Csa	311
82	Lake Lagkada - Volvis	322,71	3,00	Siliceous	Cfa	312
83	Aggitis	578,56	3,00	Mixed	Cfa	322
84	Nestos	708,83	3,00	Siliceous	Cfa	312
85	Strymonas	737,30	3,00	Siliceous	Cfa	312
86	Aliakmonas	1398,37	4,00	Siliceous	Csa	411

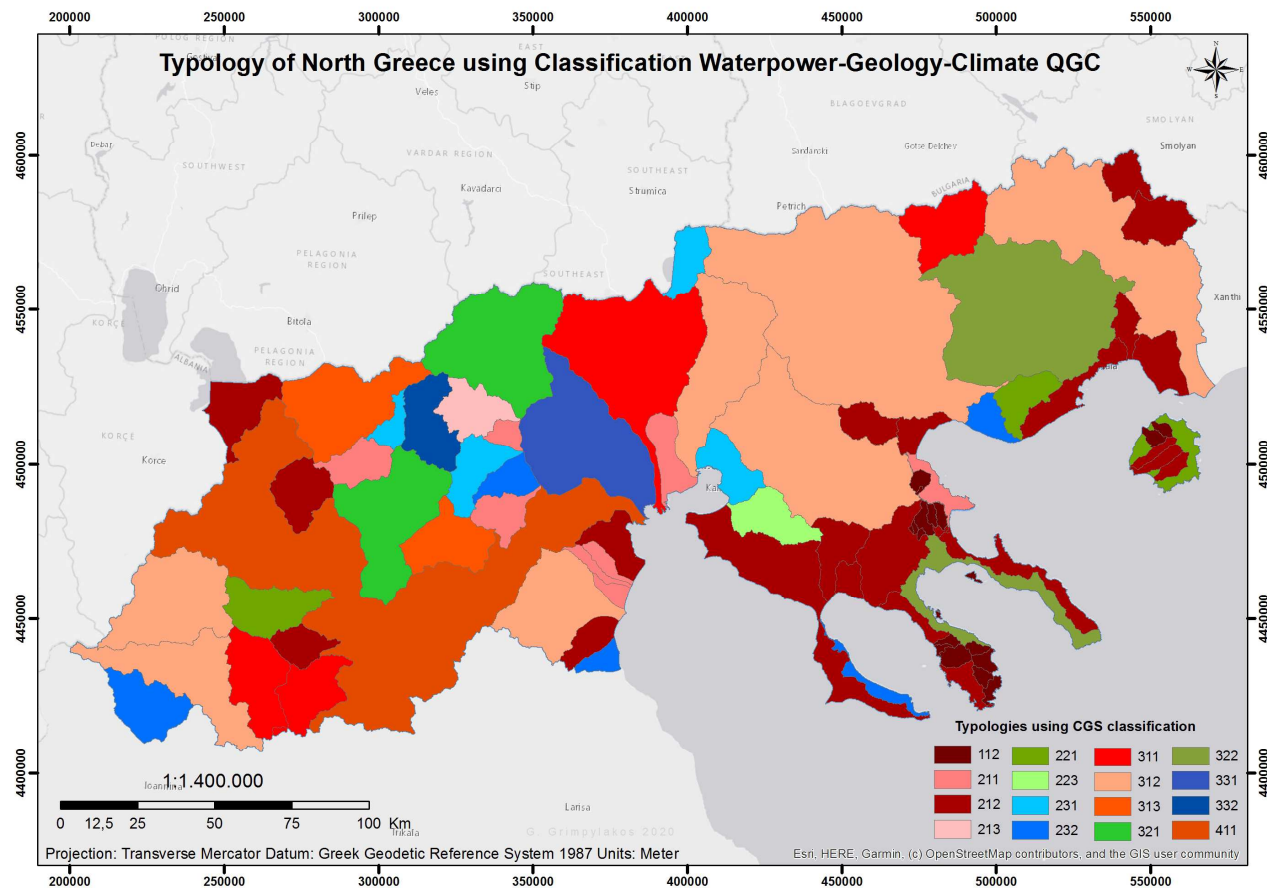


Figure 5.2. Map projecting the 16 different types corresponding to the typology system of table 5.2. Red coloration corresponds to siliceous geology, Green coloration to mix geology and blue coloration to calcium geology. First number refers to mean annual surface runoff, second to geology and third to Climatic Classification by Köppen.

Summarizing the most precise method for categorizing the geological, climatological and hydrological parameters effectively, at the studying area, is the **Q** (Mean Annual Surface Runoff) **G** (Geology by SiO₂ and CaO) **C** (Climate type by Köppen) as described at this chapter.

5.3 DISCUSSION

The **most important finding of this research** is that scale and data spatial – temporal distribution are the main factors responsible for the outcome of any research and can lead to fair quality classifications and disorienting conclusions if their distribution and scale is not adequate.

Specifically as it was noted at chapter 2.7 “There are significant differences between the map that was created in this research with a dense meteorological – climatological network of 1 station per 2.000km² (Figure 2.13) and a sparse network of 1 station per 18.000km² (Figure 2.14). The main difference is that a new climatic type was found, the climatic type Cfb found on the western part of Macedonia and at Nevrokopi North, Northeast of Macedonia. **Furthermore** entire Chalkidiki Thessaloniki and Serres have different climatic type, Cfa and not Csa. **The methodology used by the two researchers is exactly the same.** However **the density of the meteorological – climatological stations used is very different.** This high density of meteorological – climatological stations (20), to 3 that was used by previous researchers, is quite innovative for Greece leading to unquestionable conclusions; it replaces the existing climatic classification at the study area and strongly challenges the climatic classification of entire Greece.”

Both classifications, regarding Annual Temperature Range (Supan 1880) and CGI (Gorczynski 1922) classify entire North Greece to the Continental climate type.

There are strong indications that North Greece climatic type has been altered from 1950 -1974 to 1974-2004 from mixed type of transitional maritime climate and continental climate type to just continental climate type (Figures 2.4-2.5); as with Annual temperature range during the same period, CGI (Gorczynski 1922).

Annual temperature range value is increasing as the distance from sea is increasing and while moving to the North as noted also by Nastos et al., 1999.

The use of watershed size as an alternative stand-alone parameter for mean annual surface runoff is false and leads to fair categorisation and correlation between rivers regarding the rivers flood dynamics. However, it is used by WFD in typology and comparisons between and among European water bodies are based on this parameter. Mean annual surface runoff is suggested to be used for research purposes and as an alternative parameter for maximum flood of Giandotti.

There is a very high correlation between geological mapping at scale 1:50.000 and mineralogical analysis of river bed sediment that can be used for Catchment dynamics and management of rivers, streams, torrents and their lake, gulf and deltaic deposits.

There are no significant differences at the theoretical chemical composition from mineralogical analysis of the oxides and the elements with the different flowing conditions and river side sapling.

There are some differences at the theoretical chemical composition from mineralogical analysis of the oxides and the elements with the sampling area, which may be avoided if Magnesium was also included in the geological classification.

Sampling at high flow can be dangerous and sometimes not even possible, while sampling during low flow conditions could be off due to no flow and anthropogenic interference. Therefore sampling at medium flow is suggested and at the centre of the river bed corridor.

Summing up, for the study of hydromorphological, geological and climate parameters the following framework is suggested.

- For optimal climate classification, the minimum spatial distribution of stations is 1 per 2,000 km², all data should be of the same period with a minimum duration of 30 years and completeness >75%. The use of lower quality data is not acceptable.
- The geological maps for the river watershed geology and runoff coefficient should be of 1:50.000 scale and not less. If geology must be categorized only according to of SiO₂ – CaO concentration there should be an initial classification of 6 classes, as shown at chapter 3, which ends up to three types, siliceous, mixed and calcium as shown at chapter 3 and 5.2. It is strongly suggested magnesium to be included in classification.
- The mean annual surface runoff can be used alternatively for the maximum flood by Giandotti. If stream order is calculated by programs, as ArcMap, then stream

order by Shreve is more accurate than stream order by Strahler. If the researcher chooses to use stream order by Strahler then 1st and 2nd torrents should be removed to get better calculations.

If aforementioned scales or/and spatial - temporal distribution of data are not available then the researcher is obliged to specify the scale and spatial – temporal distribution of the data used. It is suggested that all data should be available but this is up to the researcher - author.

The author believes in free and open data for research purposes and therefore only the conclusions with accompanied data are written in this thesis.

5.4 SUGGESTIONS FOR FUTURE RESEARCH

There should be a thoroughly investigation during period 1950-2010 in order to define at which period the A value is $\leq 20^{\circ}\text{C}$ and the K value is $\leq 33^{\circ}\text{C}$.

The elevation distribution of the meteorological – climatological stations was not adequate to check the possible correlation between Precipitation and Elevation at Macedonia and to create an equation. New stations with better elevation distribution and with corresponding data of the same period are needed from entire Greece for further investigation.

As shown in this research, chapter 3, it is possible to use GIS and geological mapping at scale 1:50.000, to estimate the theoretical composition of the river bed sediment regarding the CaCO_3 and SiO_2 concentration and the corresponding elements of Si and Ca. However, in order to create an effective equation for the theoretical chemical composition, the Magnesium must be included in the analysis and each one of the different geological formations that was mapped must be sampled and analysed. There are more than 43 different geological formations (Appendix I section 2) and if no other factors are affecting the sediment mineralogical analysis then at least 43 different sites must be sampled, one for each different geological formation.

Regarding the Hydromorphological parameters, there is a great need for thorough research in this field for establishment of a framework for hydromorphological parameters. Specifically the Reach must be correlated with the water body in order to

exactly define the hydromorphological parameters that need to be examined and measured in such a way that the hydromorphological characteristics of the river habitat are captured. Furthermore this must be taken in consideration also by the research group responsible for flood risk assessment; as any measure taken to prevent floods must not alter or increase pressure to the ecological status and the habitat.

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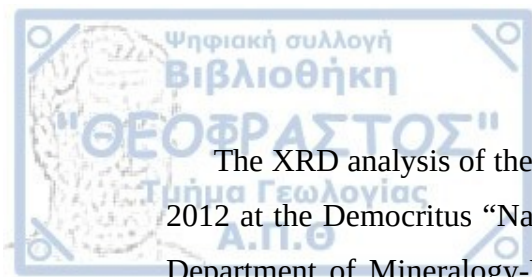
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The XRD analysis of the riverbed sediment of the studying sites was held in 2011-2012 at the Democritus “National Centre for Scientific Research” and in 2013 at the Department of Mineralogy-Economic Geology of Faculty of Science, at Aristotle’s University of Thessaloniki.

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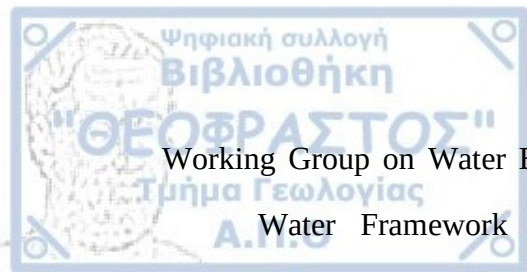
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ANNEX I

METEOROLOGICAL –CLIMATOLOGICAL DATA AT NORTHERN GREECE PROVIDED BY MINISTRY OF RURAL DEVELOPMENT AND FOOD



SECTION 1

DIGITIZED PRECIPITATION DATA OF HANDWRITTEN MEASUREMENTS FROM 40 METEOROLOGICAL STATIONS AT NORTH GREECE

Station 1: Ano Kalliniki

Station	ANO KALLINIKI	Longitude:	284.948,045
County:	Florina	Latitude:	4.526.799,972
Period:	1974-2004	Altitude (meters):	634,60

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974							3,7	91,4	92,8	72,2	0,7	41,4	-
2	1974- 75	87,0	60,2	101,4	3,0	0,0	4,0	33,2	65,3	97,9	107,8	48,9	13,6	622,3
3	1975- 76	46,9	85,2	56,3	31,4									-
4	1976- 77													-
5	1977- 78					45,1	24,5	78,9	48,5	35,2	3,8	1,3	3,4	-
6	1978- 79	50,9	61,8	14,3	45,0	36,5	39,0	26,8	91,4	88,9	6,3	11,3	98,6	570,8
7	1979- 80	72,6	42,0	305,7	26,4	28,0	51,5	46,2	38,9	178,4	53,0	0,0	43,0	885,7
8	1980- 81	22,0	142,0	23,8	76,0	39,0	20,0	63,0	47,0	16,0	15,5	22,0	39,0	525,3
9	1981- 82	29,5	106,0	0,0	46,0				85,0	57,1	114,5	23,7	9,4	-
10	1982- 83	48,0	71,0	88,0	65,0	37,0	20,0	60,1	18,0	57,5	114,5	23,7	9,4	612,2
11	1983- 84	57,6	21,0	54,0	36,0	53,0	46,0	27,1	51,7	4,2	8,0	7,0	61,1	426,7
12	1984- 85	15,5	2,0	35,0	4,0	59,5	1,2	34,0	50,0	40,0	14,0	3,5	9,0	267,7
13	1985- 86	10,0	33,0	102,0	15,0	23,5	6,7	19,0	8,0	6,0	33,0	41,0	14,0	311,2
14	1986- 87	6,0	31,5	11,2	0,0	15,5	24,2	51,1	51,3	35,4	1,5	19,5	4,5	251,7
15	1987- 88	5,5	73,0	62,0	4,0	4,5	10,2	20,5	34,5	4,0	17,0	20,0	0,0	255,2
16	1988- 89	29,5	16,0	51,1	14,0	0,0	34,5	26,0	26,4	53,0	42,2	37,6	52,0	382,3
17	1989- 90	67,6	41,9	28,9	21,9	0,0	4,0	11,3	33,2	41,1	1,2	18,5	38,0	307,6
18	1990- 91	19,8	9,7	41,5	89,0	77,0	99,0	25,0	82,9	61,7	14,0	19,7	43,6	582,9

19	1991- 92	84,5	20,4	91,6	14,6		1,8	11,0	94,0	72,8	61,1	32,5	5,0	-
20	1992- 93	8,5	66,5	24,4	61,5	13,0	54,5	23,2	27,0	59,0	35,5	9,0	8,5	390,6
21	1993- 94	9,3	75,5	52,0	20,5	90,0	21,5	15,0	79,7	3,7	22,3	69,0	25,5	484,0
22	1994-95	11,2	48,8	29,5	52,0	14,0	14,0	30,0	30,5	95,0	12,5	71,5	60,8	469,8
23	1995- 96	54,5	0,0	28,8	112,5	67,8	42,0	32,1	35,3	30,1	6,9	33,9	24,0	467,9
24	1996- 97	71,9	28,6	46,1	68,4	22,6	2,2	19,1	28,4	34,0	32,2	50,1	34,0	437,6
25	1997- 98	1,4	77,4	53,0	37,1	16,0	53,1	11,0	21,2	105,8	7,6	12,2	34,2	430,0
26	1998- 99	63,2	51,0	90,9	43,1									-
27	1999- 2000				47,0	0,0	74,0	1,0	4,0	48,0	5,0	20,0	0,0	-
28	2000- 01	9,0	72,0	32,0	44,0	16,0	8,0	11,0	90,0	79,0	6,0	17,0	21,0	405,0
29	2001- 02	9,0	0,0	26,0	97,0	40,0	88,0	140,0	105,0	145,5	7,8	86,3	90,7	835,3
30	2002- 03	235,7	151,8		290,0					61,0	95,8	8,8	27,8	-
31	2003- 04	23,6	121,2	37,2	23,6	24,8	1,4	9,8	48,6	35,0	105,4	0,0	0,0	430,6
32	2004- 05	50,0	50,6	42,4	24,2									-

Statistics and charts

Number of measurements	28	28	27	29	24	25	26	27	28	28	28	28	22
Highest value	235,70	151,80	305,70	290,00	90,00	99,00	140,00	105,00	178,40	114,50	86,30	98,60	885,70
Lowest value	1,40	0,00	0,00	0,00	0,00	1,20	1,00	4,00	3,70	1,20	0,00	0,00	251,70
Mean value	42,86	55,72	56,63	48,70	30,12	29,81	31,89	51,38	58,50	36,31	25,31	28,98	470,56
Years	27,17	Annual Precipitation from mean monthly of all years											496,21

Chart with the Mean monthly Precipitation during the station operation (mm)

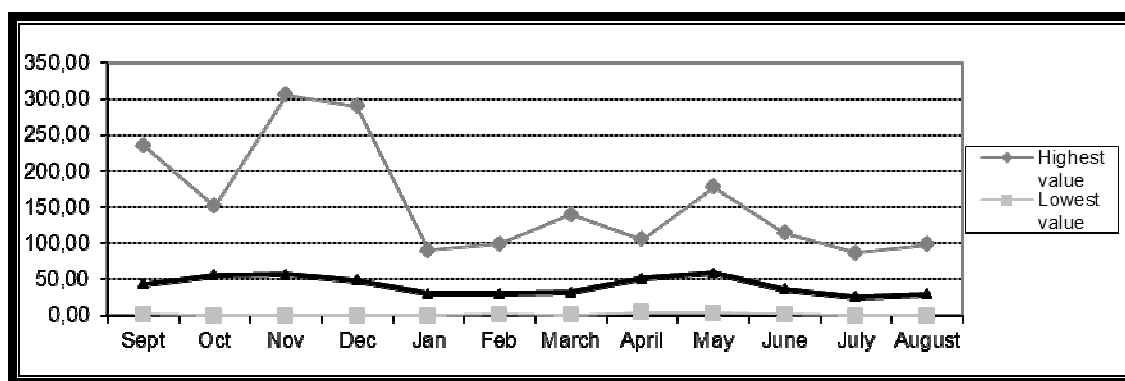
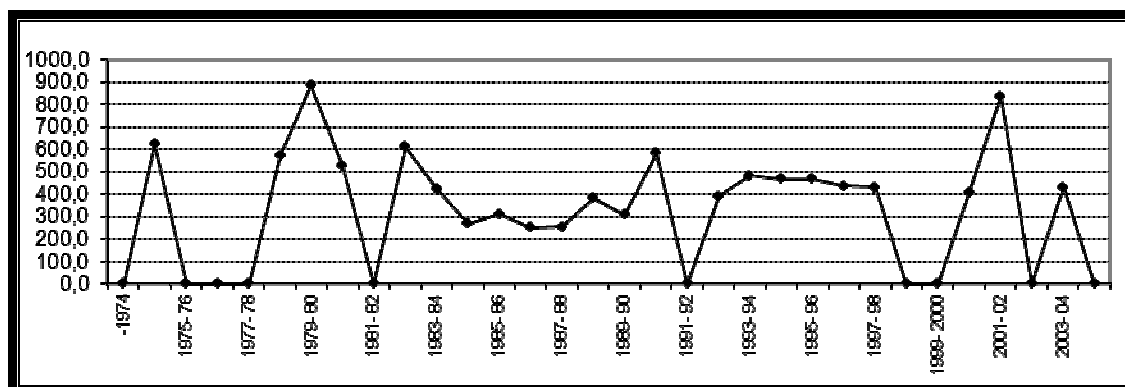


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 2: Limnochori

Station	Limnochori	Longitude:	294.062,520
County:	Florina	Latitude:	4.500.615,249
Period:	1974-2004	Altitude (meters):	598,90

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					23,5	54,0	28,6	44,9	50,0	38,2	3,0	55,3	-
2	1974- 75	27,6	46,3	76,4	3,2	2,0	18,2	41,6	52,0	54,8	74,2	54,8	8,5	459,6
3	1975- 76	32,5	47,0	63,6	0,0	1,3	3,8	43,4	37,8	81,3	61,6	39,1	41,9	453,3
4	1976- 77	10,2	81,7	52,8	46,0	32,3	21,9	26,3	15,8	37,6	19,4	11,7	69,1	424,8
5	1977- 78	46,2	18,0	86,8	22,3	58,0	45,0	34,7	97,6	27,0	13,3	9,7	3,2	461,8
6	1978- 79	32,1	28,6	23,8	28,8	56,4	16,5	23,0	65,9	56,0	1,2	23,5	77,9	433,7
7	1979- 80	56,0	58,0	186,9	55,5	79,0	28,5	83,3	21,8	110,0	44,8	3,5	8,5	735,8
8	1980- 81	27,5	158,2	46,8	98,8	12,7	34,5	51,7	48,5	18,1	23,0	39,0	25,0	583,8
9	1981- 82	23,0	107,5	40,0	139,3	10,3	51,0	93,7	84,5	47,7	2,0	36,5	84,6	720,1
10	1982- 83	44,6	84,0	178,0	122,0	4,0	19,0	33,7	20,5	46,0	63,4	65,0	16,6	696,8
11	1983- 84	24,4	20,0	72,5	23,5	84,5	74,0	53,5	108,0	16,5	22,4	3,0	37,5	539,8
12	1984- 85	18,0	26,0	79,0	15,0	70,8	23,2	69,5	48,0	105,5	7,0	0,5	2,0	464,5
13	1985- 86	6,5	27,5	175,8	19,1	46,1	115,6	56,3	10,6	99,3	12,6	15,5	18,5	603,4
14	1986- 87	15,5	44,7	50,3	18,5	63,5	55,8	94,0	33,0	51,7	16,5	17,0	7,0	467,5
15	1987- 88	23,5	57,5	111,5	40,5	33,0	34,0	21,1	38,0	10,8	4,5	1,0	21,5	396,9
16	1988- 89	5,0	31,0	128,5	24,0	0,0	29,0	22,0	16,8	70,8	41,6	29,2	12,6	410,5
17	1989- 90	21,4	24,3	38,4	52,6	26,6	10,0	6,6	22,6	61,9	0,0	0,0	47,3	311,7

18	1990- 91	12,8	22,0	48,0	142,0	3,0	62,0	48,0	86,0	32,0	26,0	21,0	24,0	526,8
19	1991- 92	25,0	13,0	68,0	8,0	12,0	Equipment Failure			40,3	67,0	51,5	0,0	-
20	1992- 93	0,0	69,5	36,0	50,0	58,0	38,0	17,0	0,0	53,5	15,0	0,0	16,5	353,5
21	1993- 94	12,0	60,0	63,5	24,0	66,0	44,0	0,0	67,3	14,1	2,2	24,5	11,8	389,4
22	1994-95	5,3	34,3	37,7	83,5	55,1	24,5	34,3	30,5	48,2	12,0	70,1	22,3	457,8
23	1995- 96	45,3	0,0	25,6	131,2	60,0	52,7	70,0	39,0	35,2	12,8	38,0	44,0	553,8
24	1996- 97	46,0	47,3	60,5	72,0	21,3	5,0	26,0	37,0	11,0	27,5	18,7	37,3	409,6
25	1997- 98	19,5	89,8	62,0	59,1	13,0	27,5	0,0	26,5	94,1	13,5	14,0	23,5	442,5
26	1998- 99	62,5	48,0	165,5	68,5									-
27	1999- 2000				43,0	18,0	44,5	29,0	18,5	41,5	28,0	15,0	27,0	-
28	2000- 01	11,0	96,0	27,0	10,0	30,0	13,0	8,0	66,0	43,0	7,0	13,0	17,0	341,0
29	2001- 02	6,0	5,0	22,0	131,0	29,0	27,0	75,0	88,0	91,0	1,0	46,0	26,0	547,0
30	2002- 03	180,0	108,0	14,0	188,0				24,0	63,0	112,0	36,0	22,0	-
31	2003- 04	30,0	155,0	32,0	40,0			60,0	96,0	72,0	96,0	16,0	22,0	-
32	2004- 05	53,0	85,0	55,0	38,0									-

Statistics and charts

Number of measurements	30	30	30	31	28	27	28	29	30	30	30	30	25
Highest value	180,0	158,2	186,9	188,0	84,5	115,6	94,0	108,0	110,0	112,0	70,1	84,6	735,8
Lowest value	0,0	0,0	14,0	0,0	0,0	3,8	0,0	0,0	10,8	0,0	0,0	0,0	311,7
Mean value	30,75	56,44	70,93	57,98	34,62	36,01	41,08	46,38	52,80	28,86	23,86	27,68	487,42
Years	29,42	Annual Precipitation from mean monthly of all years											507,38

Chart with the Mean monthly Precipitation during the station operation (mm)

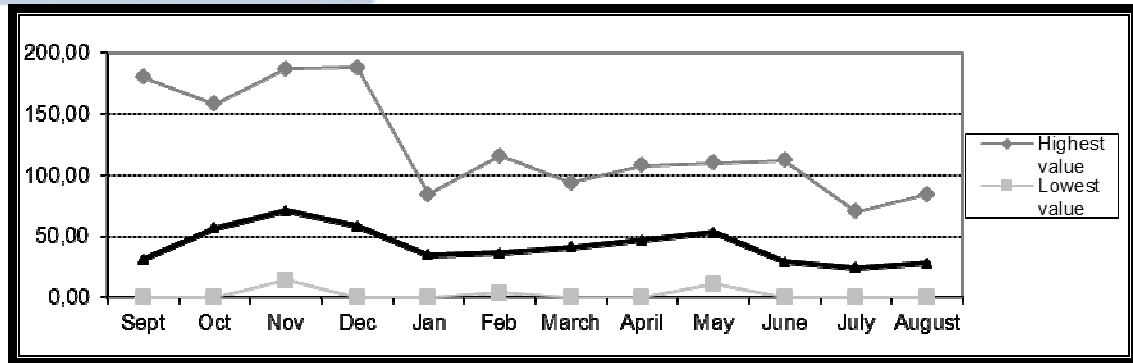
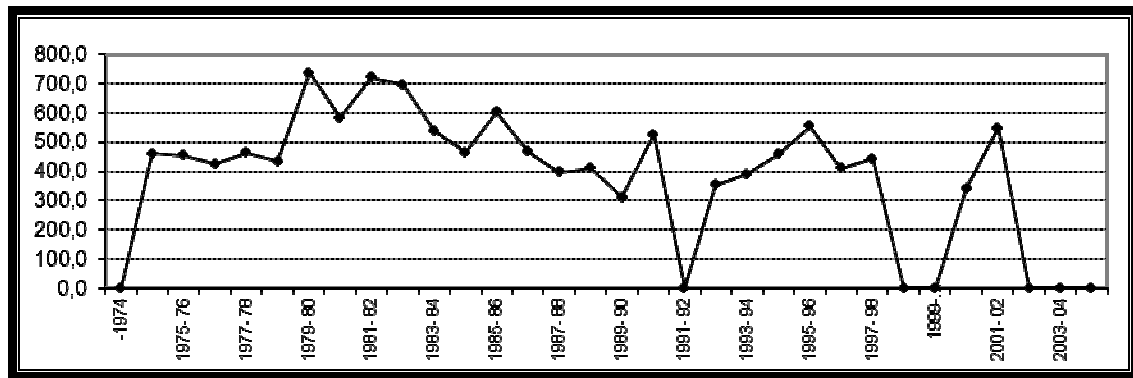


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 3: Amuntaio

Station	Amuntaio		Longitude:	304.125,020
County:	Florina		Latitude:	4.507.749,929
Period:	1974-2004		Altitude (meters):	579,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					7,0	19,0	12,0	76,0	84,0	49,5	0,0	8,5	-
2	1974- 75	43,0	52,0	15,0	66,0	6,0	7,0	17,0	42,5	68,0	71,5	41,0	11,0	440,0
3	1975- 76	20,0	52,0	92,0	18,0	1,0	13,7	23,5	73,0	63,0	19,0	40,0	18,5	433,7
4	1976- 77	7,5	44,0	92,0	0,4	7,0	21,5	25,0	0,0	47,5	20,5	20,0	18,0	303,4
5	1977- 78	38,5	16,0	21,0	17,0	27,0	11,0	12,0	55,0	39,0	9,0	19,0	0,0	264,5
6	1978- 79	12,0	32,0	0,0	13,0	47,0	26,0	20,0	49,0	80,0	25,0	10,0	39,0	353,0
7	1979- 80	13,0	28,0	119,0	53,8	25,0	19,5	26,2	22,8	88,9	42,3	3,6	24,3	466,4
8	1980- 81	12,3	120,2	56,8	76,2	19,2	0,0	39,2	48,0	36,9	23,2	17,9	47,1	497,0
9	1981- 82	27,4	121,0	0,0	44,2	4,1	7,5	24,7	73,4	53,4	6,3	17,3	56,9	436,2
10	1982- 83	68,2	62,7	78,7	47,8	0,7	12,9	11,1	14,4	45,9	77,8	53,5	26,1	499,8
11	1983- 84	72,2	17,8	63,6	0,0	0,0	38,8	25,1	55,5	18,0	43,6	0,0		-
12	1984- 85		7,9	58,5	21,5	7,0	5,3	22,6	26,9	92,3	43,3	0,8	0,4	-
13	1985- 86	4,7	15,0	137,0	13,0	33,8	41,1	22,5	3,3	51,0	29,6	26,1	7,7	384,8
14	1986- 87	6,6	32,4	27,0	5,2	0,3	11,2	29,2	47,6	62,5	20,1	3,7	0,2	246,0
15	1987- 88	0,0	25,4	69,1	17,2	12,1	4,8	4,3	22,4	62,5	8,5	43,0	6,0	275,3
16	1988- 89	13,0	14,0	89,0	0,0	9,0	15,0	24,0	56,0	116,0	44,0	51,2	3,0	434,2
17	1989- 90	0,0	40,0	59,1	59,9	0,0	23,9	8,0	24,0	45,7	0,0	0,0	51,9	312,5

18	1990- 91	20,8	25,5	63,2	141,6	70,0	111,0	43,2	84,8	42,6	35,2	37,1	43,1	718,1
19	1991- 92	46,2	30,8	59,9	12,0		2,0	6,3	104,2	42,4	73,2	34,0	0,0	-
20	1992- 93	8,0	72,5	50,6	46,0	65,0	40,0		16,2	64,9	2,0	0,0	10,5	-
21	1993- 94	10,4	78,8	59,3	23,0	71,3	10,7	14,7	25,1	11,8	10,2	25,1	47,8	388,2
22	1994-95	8,9	39,8	19,5	67,9	42,6	21,4	44,5	33,2	71,8	6,2	68,2	26,6	450,6
23	1995- 96	54,4	0,0	13,2	130,7	42,6	40,8	30,9	38,5	19,0	15,1	22,7	35,4	443,3
24	1996- 97	64,9	37,9	61,5	36,1	14,7	7,1	37,5	19,1	6,9	23,3	30,7	23,7	363,4
25	1997- 98	15,7	74,4	66,5	52,3	7,5	44,4	15,8	9,1	94,0	28,1	11,1	30,6	449,5
26	1998- 99	52,5	49,8	122,9	23,4									-
27	1999- 2000													-
28	2000- 01													-
29	2001- 02													-
30	2002- 03		49,6	19,4	72,8	49,4	15,2	7,0	0,0			13,0	34,8	-
31	2003- 04	28,4	151,4	44,8	43,2	101,6	3,8	28,8	89,8	76,4	105,6	15,0	1,6	690,4
32	2004- 05	47,0	53,2	63,6	34,6									-

Statistics and charts

Number of measurements	26	28	28	28	26	27	26	27	26	26	27	26	21
Highest value	72,2	151,4	137,0	141,6	101,6	111,0	44,5	104,2	116,0	105,6	68,2	56,9	718,1
Lowest value	0,0	0,0	0,0	0,0	0,0	0,0	4,3	0,0	6,9	0,0	0,0	0,0	246,0
Mean value	26,75	48,00	57,94	40,60	25,80	21,28	22,12	41,10	57,09	32,00	22,37	22,03	421,44
Years	26,75	Annual Precipitation from mean monthly of all years											417,09

Chart with the Mean monthly Precipitation during the station operation (mm)

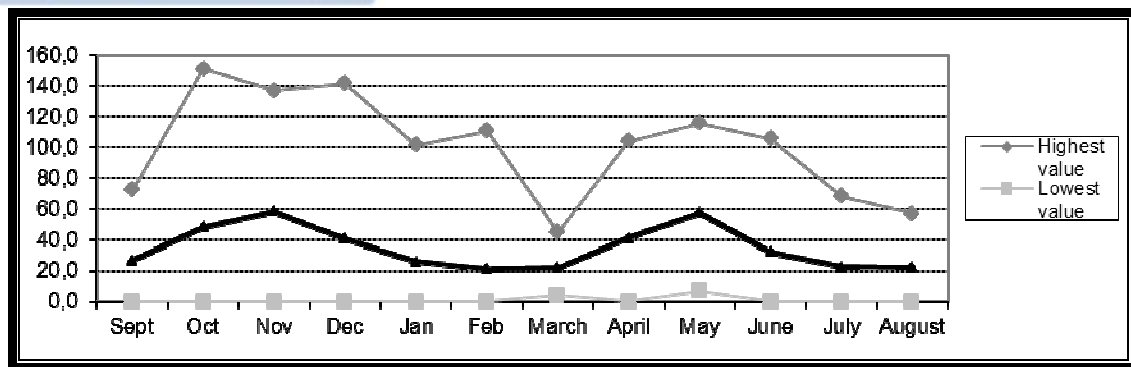
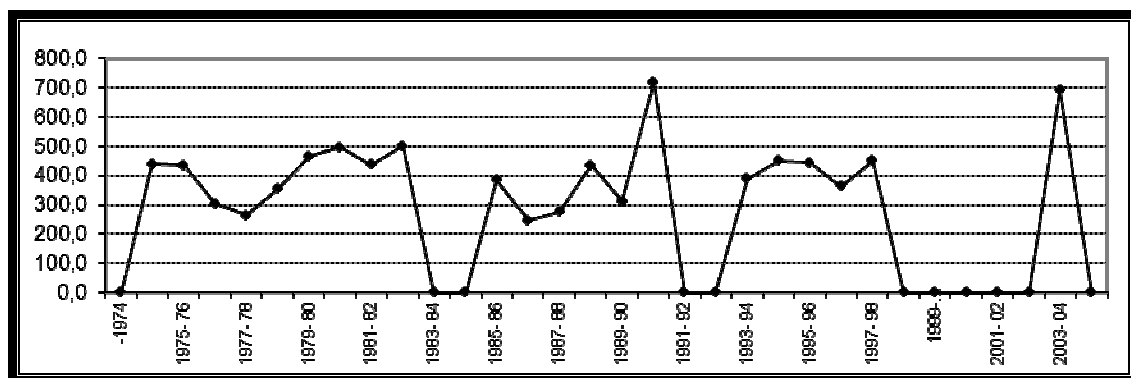


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 4: Polupotamos

Station	Polupotamos		Longitude:	276.016,096
County:	Florina		Latitude:	4.510.396,803
Period:	1974-2004		Altitude (meters):	1000,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					42,5	132,0	43,0	89,3	73,8	46,3	5,3	38,6	-
2	1974- 75	43,1	126,5	71,9	18,0	1,6	33,5	54,3	33,5	22,7	33,0	36,3	19,9	494,3
3	1975- 76	26,0	50,4	28,2	28,2	18,4	41,6	33,3	41,6	97,9	84,0	45,2	37,0	531,8
4	1976- 77	15,5	40,1	63,2	87,3	30,0	21,1	25,9	29,2	24,6	19,3	9,7	36,4	402,3
5	1977- 78	38,3	2,3	67,1	24,0	22,5	22,3	85,8	107,4	57,7	7,4	0,4	15,3	450,5
6	1978- 79	93,8	8,0	12,1	78,4	137,0	67,3	9,3	86,6	130,2	14,7	4,3	46,1	687,8
7	1979- 80	60,0	93,7	224,6	109,0	80,3	46,5	50,9	47,2	131,3	84,8	3,8	12,7	944,8
8	1980- 81	10,8	194,1	90,6	88,7		81,0	73,4	82,1	33,2	29,0	40,1	42,4	-
9	1981- 82	28,7	93,5	21,6	149,6				98,4	73,8	18,2	21,7	66,3	-
10	1982- 83	76,4	70,0	146,9	124,8	20,4	69,8	23,7	43,8	95,6	135,2	63,2	23,5	893,3
11	1983- 84	79,5	40,3	108,0					117,6	23,0	69,3	7,5	73,5	-
12	1984- 85	25,0	12,4	64,7	23,4	178,0	19,1	64,1				3,3	2,7	-
13	1985- 86	10,0				82,6	76,1	36,9	17,7	208,5	64,4	46,1	16,8	-
14	1986- 87	15,1	56,4	83,9	27,3	75,8	98,7	27,8	21,3	51,4	44,9			-
15	1987- 88					19,0	16,5	26,0	61,8	5,2	29,8	3,5	2,3	-
16	1988- 89	31,7	31,0	97,6	40,2	0,0	66,0	53,2	23,3	106,3	43,5	66,0	14,8	573,6
17	1989- 90	45,8	100,6	106,0	76,0	0,5	17,0	23,7	56,5	76,1	14,8	13,4	33,0	563,4

18	1990- 91	22,5	20,7	72,3	66,3	16,0	54,7	53,5	183,9	123,5	46,0	47,5	32,7	739,6
19	1991- 92	60,0	37,3	154,6	10,5	10,0	20,0	20,3	182,0	87,0	104,2	31,9	2,7	720,5
20	1992- 93	4,5	96,6	83,2	118,0	65,0	72,0	81,0	28,5	55,1	47,0	0,8	7,4	659,1
21	1993- 94	20,4	82,8	97,5	48,5	124,5	61,5	25,6	91,0	33,3	23,5	16,3	20,5	645,4
22	1994-95	15,6	96,0	58,3	40,5	150,2	49,0	83,5	42,5	112,5	17,0	54,3	72,3	791,7
23	1995- 96	53,8	0,0	37,5	166,0	61,7	129,8	89,0	61,7	43,5	37,1	5,3	10,2	695,6
24	1996- 97	Equipment Failure				0,0	56,0	200,0		37,5	4,2	16,4	22,4	-
25	1997- 98	7,3	88,2		63,0	53,0	104,0	85,0	22,3	129,2		0,0	12,1	-
26	1998- 99	Equipment Failure												-
27	1999- 2000				89,9	20,0	101,8	63,0	51,0	28,7	15,7	21,4	15,5	-
28	2000- 01	17,7	98,1	38,9	38,1	18,9	27,2	15,2	34,7	27,0	13,8	13,2	11,5	354,3
29	2001- 02	10,5	18,2	41,5	181,9	2,6	14,0	37,9	44,7	81,1	23,2	2,0	4,3	461,9
30	2002- 03	2,0	11,4	35,2	31,1							1,1	7,0	-
31	2003- 04	2,3	10,5	37,5	26,0									-
32	2004- 05													-

Statistics and charts

Number of measurements	26	25	24	25	25	26	26	26	27	26	28	28	17
Highest value	93,8	194,1	224,6	181,9	178,0	132,0	200,0	183,9	208,5	135,2	66,0	73,5	944,8
Lowest value	2,0	0,0	12,1	10,5	0,0	14,0	9,3	17,7	5,2	4,2	0,0	2,3	354,3
Mean value	31,40	59,16	76,79	70,19	49,22	57,63	53,28	65,37	72,95	41,17	20,71	25,00	624,11
Years	26,00	Annual Precipitation from mean monthly of all years											622,87

Chart with the Mean monthly Precipitation during the station operation (mm)

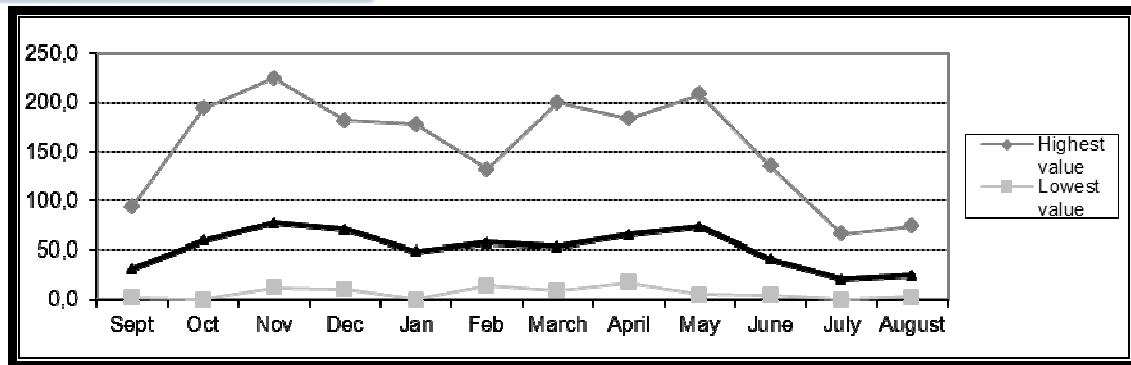
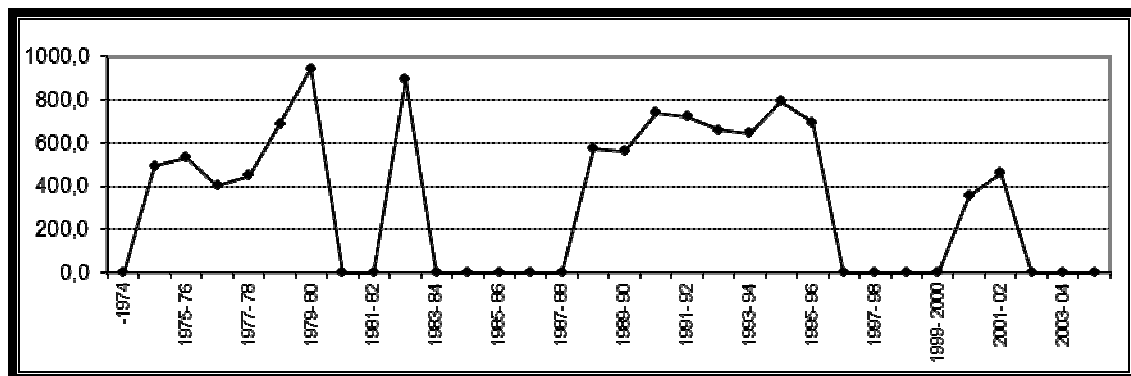


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 5: Skopos

Station	Skopos		Longitude:	300.399,873
County:	Florina		Latitude:	4.526.365,940
Period:	1974-2004		Altitude (meters):	775,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974							9,5	22,7	57,0	60,7	0,6	48,3	-
2	1974- 75	23,7	68,3	53,2	11,2	0,0	7,3	36,0	60,0	49,5	89,5	51,2	0,0	449,9
3	1975- 76	2,3	31,8	16,7	7,9									-
4	1976- 77													-
5	1977- 78					19,0	28,8	80,4	81,0	76,3	20,5	9,2	15,0	-
6	1978- 79	63,6	42,1	16,0	69,5	105,3	30,9	21,4	55,3	116,3	32,2	16,7	96,8	666,1
7	1979- 80	8,7	68,1	304,9	31,0	11,8	7,9		38,3	48,7	24,5	0,0	0,0	-
8	1980- 81	0,0	93,6	10,9	26,9	25,5	20,6	57,4	67,0	31,5	25,3	18,2	38,9	415,8
9	1981- 82	8,8	79,0	54,7	33,7	17,0	8,0	24,0	38,0	27,0	35,0	20,0	18,7	363,9
10	1982- 83	44,9	57,0	104,0	18,0				15,1	64,5	97,0	82,6	13,3	-
11	1983- 84	67,0	34,1	30,4	22,0	58,0	98,7	34,0	84,0	2,3	18,0	0,0	42,0	490,5
12	1984- 85	5,0	4,0	33,0	2,0	30,0	4,0	24,0	75,6	38,0	16,0	0,0	8,0	239,6
13	1985- 86	3,0	0,0	40,0	4,0	8,0	15,0	3,0	5,0	19,0	3,0	30,0	3,0	133,0
14	1986- 87	8,0	12,0	12,0	8,7	10,6	51,0	48,0	33,0	80,0	9,0	17,0	0,0	289,3
15	1987- 88	75,0	54,0	73,0	30,0	0,0	13,0	42,0	41,0	34,0	122,0	50,0	10,0	544,0
16	1988- 89	38,0	5,0	54,0	4,0	0,0	18,0	27,0	69,0	11,8	7,9	131,0	48,0	413,7
17	1989- 90	25,0	15,2	15,9	9,0	0,0	12,0	13,3	49,8	33,2	0,0	12,0	44,0	229,4
18	1990- 91	13,0	28,0	52,0	146,0	70,0	109,0	18,0	71,5	77,0	40,0	37,7	32,3	694,5

19	1991- 92	86,3	18,7	63,1	14,0		8,0	15,6	78,5	32,6	47,3	24,9	6,8	-
20	1992- 93	14,5	55,5	39,0	94,6	43,2	0,0	16,0	25,4	67,2	0,0	2,3	5,2	362,9
21	1993- 94	15,3	30,3	39,2	36,2	91,5	39,6	0,0	70,6	11,0	16,0	68,3	24,7	442,7
22	1994-95	6,0	19,9	30,5	35,0	6,3	19,4	17,0	29,3	57,0	22,0	86,0	59,6	388,0
23	1995- 96	32,3	0,0	27,2	77,1	14,3	27,6	64,8	48,0	46,5	4,0	28,0	44,3	414,1
24	1996- 97	45,0	24,7	29,0	50,3	22,0	0,0	0,0	25,0	6,0	35,0	13,0	22,0	272,0
25	1997- 98	4,0	35,7	35,3	7,5	10,0	22,0	15,0	16,0	167,0	25,0	11,0	102,0	450,5
26	1998- 99	27,4	35,5	6,0	17,0									-
27	1999- 2000				2,4	0,0	21,0	18,3	69,0	30,5	20,5	7,0	6,0	-
28	2000- 01	25,0	61,3	12,4	33,2	29,3	20,0	16,0	19,0	45,6	31,0	7,0	41,0	340,8
29	2001- 02	8,0	4,0	14,0	142,0	17,0	13,0	46,0	71,0	55,5	5,0	14,0	28,0	417,5
30	2002- 03	54,5	75,9	45,9	141,0				48,0			14,0	27,8	-
31	2003- 04	22,5	85,5	57,0	80,0					32,2	42,0	35,0	31,0	-
32	2004- 05													-

Statistics and charts

Number of measurements	27	27	27	28	23	24	24	27	27	27	28	28	20
Highest value	86,3	93,6	304,9	146,0	105,3	109,0	80,4	84,0	167,0	122,0	131,0	102,0	694,5
Lowest value	0,0	0,0	6,0	2,0	0,0	0,0	0,0	5,0	2,3	0,0	0,0	0,0	133,0
Mean value	26,92	38,49	47,01	41,22	25,60	24,78	26,95	48,37	48,79	31,42	28,10	29,17	400,91
Years	26,42	Annual Precipitation from mean monthly of all years											416,82

Chart with the Mean monthly Precipitation during the station operation (mm)

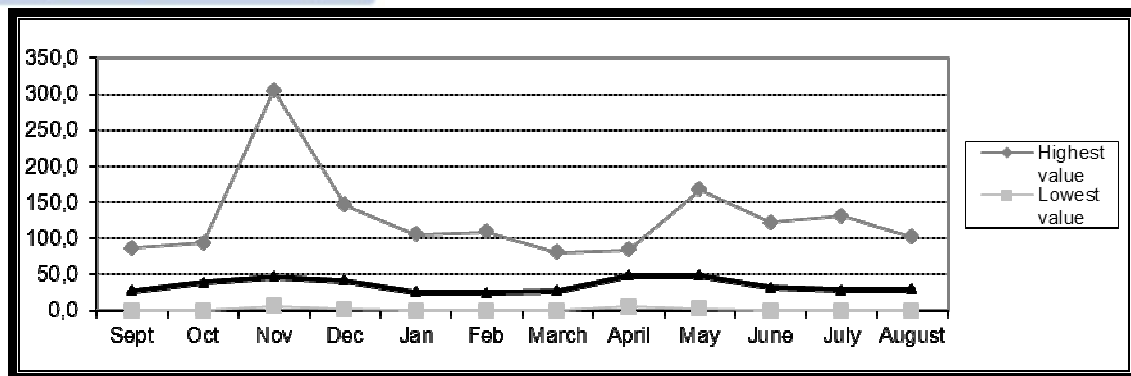
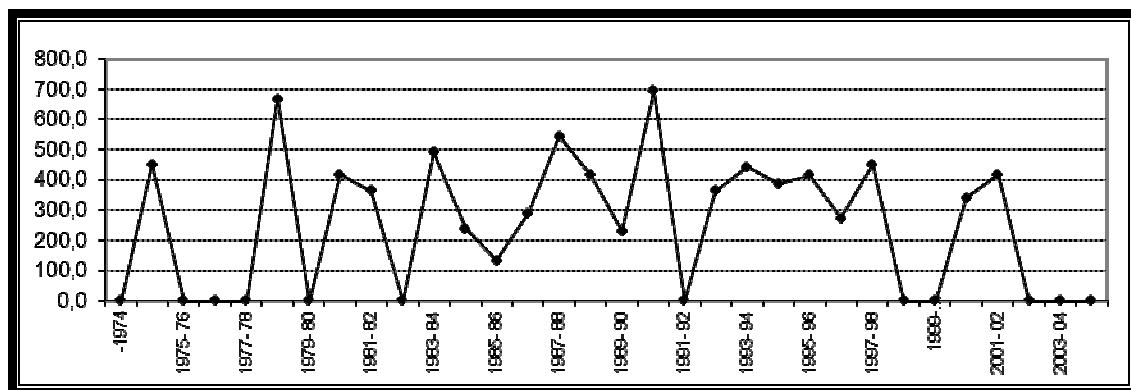


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 6: Tropaiouchos

Station	Tropaiouchos	Longitude:	283.109,746
County:	Florina	Latitude:	4.512.037,983
Period:	1974-2004	Altitude (meters):	695,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					30,5	144,5	50,5	50,0	61,5	39,5	0,0	26,5	-
2	1974- 75	19,5	70,0	84,0	72,0	18,0	13,0	53,5	75,0	68,5	65,5	61,5	12,0	612,5
3	1975- 76	13,8	80,5	49,0	26,0	15,0	57,0	21,5	75,0	116,0	58,0	48,5	37,5	597,8
4	1976- 77	6,5	60,0	82,0	41,5	39,0	30,0	31,0	32,0	45,0	37,0	14,5	56,0	474,5
5	1977- 78	55,5	8,0	55,0	15,0	60,5	27,7	51,5	83,0	28,0	6,0	0,0	9,6	399,8
6	1978- 79	114,5	16,5	82,0	95,5	80,5	38,0	16,0	87,0	106,0	0,0	18,5	67,0	721,5
7	1979- 80	62,0	69,5	219,0	58,0	124,0	8,0	75,0	65,5	98,5	40,0	2,5	8,0	830,0
8	1980- 81	13,0	226,0	58,1	101,5	27,0	17,6	63,0	57,0	53,0	8,5	53,0	30,0	707,7
9	1981- 82	14,0	148,0	50,0	102,0	12,0	19,0	63,0	136,5	64,3	9,0	16,0	93,0	726,8
10	1982- 83	104,0	71,0	103,0	79,0	7,0	64,0	62,0	24,0	30,6	106,0	68,0	12,0	730,6
11	1983- 84	68,3	20,9	74,3	50,0	58,5	69,0	58,0	96,5	9,0	46,0	5,0		-
12	1984- 85	16,5	2,5	44,5	15,0	81,5	25,0	48,0	76,0	79,0	14,6	8,0	0,0	410,6
13	1985- 86	10,0	31,1	179,5	16,3	53,0	86,0	33,0	8,0	134,0	31,6	35,5	11,0	629,0
14	1986- 87	24,0	58,0	60,0	22,0	33,0	43,8	107,0	55,5	57,3	9,5	34,0	4,0	508,1
15	1987- 88	1,5	70,5	126,0	25,5	21,0	31,0	64,0	36,5	6,5	19,5	3,0	4,0	409,0
16	1988- 89	21,5	19,5	135,0	35,5	0,0	50,0	52,0	21,0	71,0	35,5	37,1	1,1	479,2
17	1989- 90	9,0	98,0	34,2	45,9	0,0	7,3	6,0	37,9	43,3	2,0	6,5	41,0	331,1

18	1990- 91	22,0	14,0	44,5	116,0	14,0	103,0	46,0	149,0	89,5	33,0	67,5	44,0	742,5
19	1991- 92	56,0	37,0	106,1	21,5	6,0	3,0	14,0	179,5	62,5	109,5	49,0	0,0	644,1
20	1992- 93	0,0	78,5	47,0	97,0	95,0	55,0	50,0	22,0	52,0	30,0	0,0	6,0	532,5
21	1993- 94	12,5	86,0	83,0	46,0	115,0	73,0	27,5	78,0	12,0	6,5	32,5	41,5	613,5
22	1994-95	5,0	62,5	33,5	74,0	60,0	40,0	44,0	55,5	101,5	6,0	92,0	60,5	634,5
23	1995- 96	58,0	0,0	31,5	148,5	55,0	88,5	45,0	52,5	52,0	10,5	21,5	65,0	628,0
24	1996- 97	86,0	44,5	59,0	86,0	26,0	0,0	64,0	52,6	65,0	25,5	18,0	41,0	567,6
25	1997- 98	3,0	126,3	57,0	75,0	48,0	56,5	30,0	33,0	132,0	10,5	16,5	49,0	636,8
26	1998- 99	90,5	51,8	139,0	59,5									-
27	1999- 2000				28,0	15,0	31,0	11,0	44,6	20,4	0,0	2,4	1,3	-
28	2000- 01	2,6	56,4	5,5	33,1	4,6	18,8	13,1	22,7	53,8	13,9	10,2	11,0	245,7
29	2001- 02	2,2	86,3	38,0	149,0	14,0	27,0	147,5	76,0	77,4	4,3	85,5	19,5	726,7
30	2002- 03	153,4	104,9							66,4	85,8	6,6	23,6	-
31	2003- 04	23,0	163,0	48,0	45,4	25,0	52,8	36,2	103,2	114,2	199,0	34,2	12,4	856,4
32	2004- 05	33,0	80,6	102,2	13,4									-

Statistics and charts

Number of measurements	30	30	29	30	29	29	29	29	30	30	30	29	26
Highest value	153,4	226,0	219,0	149,0	124,0	144,5	147,5	179,5	134,0	199,0	92,0	93,0	856,4
Lowest value	0,0	0,0	5,5	13,4	0,0	0,0	6,0	8,0	6,5	0,0	0,0	0,0	245,7
Mean value	36,69	68,06	76,89	59,77	39,24	44,12	47,70	65,00	65,67	35,42	28,25	27,16	592,17
Years	29,50	Annual Precipitation from mean monthly of all years											593,98

Chart with the Mean monthly Precipitation during the station operation (mm)

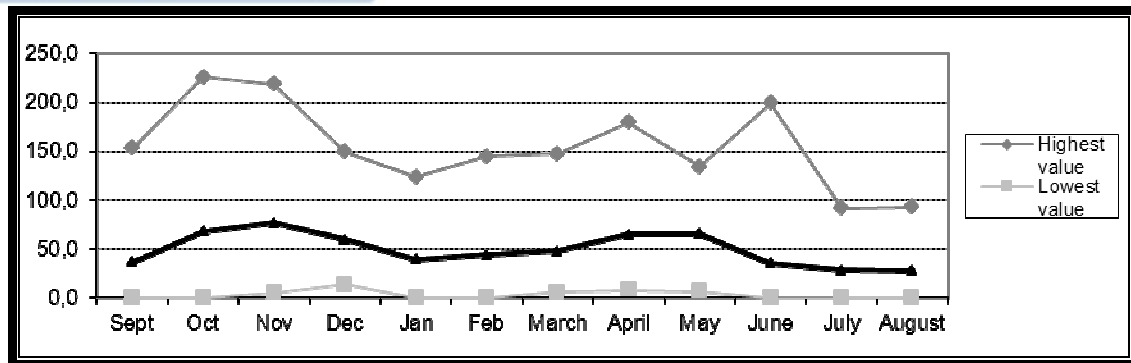
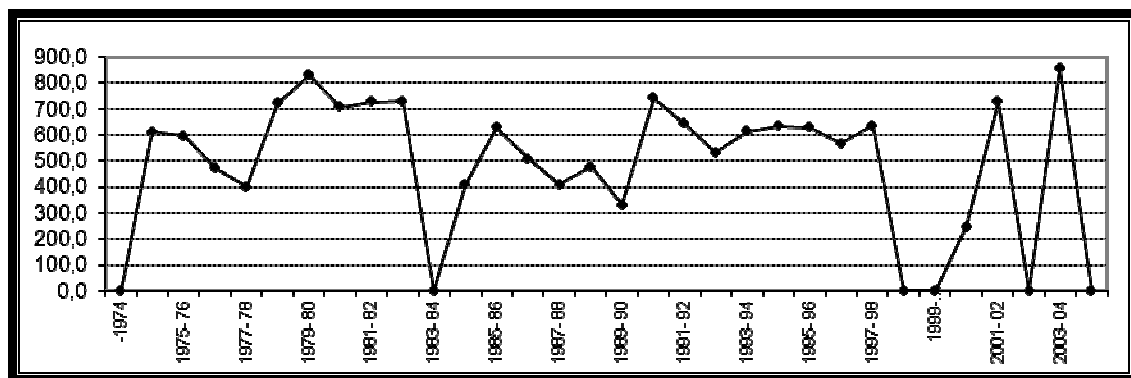


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 7: Vevi

Station	Vevi		Longitude:	297.286,337
County:	Florina		Latitude:	4.515.340,333
Period:	1974-2004		Altitude (meters):	734,70

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974							63,2	93,2	96,5	51,0	0,0	26,1	-
2	1974- 75	27,8	50,9	99,5	4,6	10,2	31,4	49,1	60,0	67,0	117,6	88,7	35,2	642,0
3	1975- 76	0,0	78,8	63,2	30,4	28,2	44,7	37,3	87,7	115,4	58,9	29,5	61,0	635,1
4	1976- 77	10,1	92,3	116,3	38,7	43,8	40,8	40,8	18,9	53,7	34,9	4,5	59,0	553,8
5	1977- 78	71,0	7,9	74,7	15,0	61,0	57,1	54,3	67,0	91,0	9,8	0,0	1,1	509,9
6	1978- 79	118,5	55,7	43,3	57,2	102,3	37,6	29,2	56,9	112,5	13,7	11,2	73,0	711,1
7	1979- 80	30,3	67,2	275,6	68,0	81,2	9,5	43,3	53,6	92,2	51,0	14,5	7,0	793,4
8	1980- 81	10,8	115,2	50,3	99,0	61,0	16,0	45,0	77,6	25,1	21,0	13,5	47,5	582,0
9	1981- 82	11,1	143,2	46,8	99,9	18,4	25,0	36,0	100,0	43,2	31,1	23,5	97,1	675,3
10	1982- 83	79,4	70,3	97,8	42,7	23,5	25,0	17,5	20,0	44,0	90,4	86,4	12,0	609,0
11	1983- 84	72,5	23,7	54,8	41,5	33,0	52,5	30,3	75,0	16,7	28,4	7,5	63,2	499,1
12	1984- 85	30,8	6,3	52,3	7,8	98,4	0,0	60,4	36,2	77,0	16,6	0,0	0,0	385,8
13	1985- 86	4,5	16,2	165,8	9,8	28,0	91,7	50,0	4,5	67,3	26,1	27,2	34,5	525,6
14	1986- 87	15,5	48,0	45,7	17,5	65,0	39,5	99,9	42,2	46,8	12,3	3,5	16,5	452,4
15	1987- 88	0,0	77,3	78,6	18,4	17,7	17,0	27,2	36,0	0,0	43,8	18,0	21,0	355,0
16	1988- 89	33,4	36,9	75,2	15,4	15,4	30,5	15,4	28,0	66,8	15,8	40,5	12,6	385,9
17	1989- 90	10,0	49,5	18,9	16,5	0,8	13,8	9,0	34,2	40,3	0,0	26,5	44,0	263,5

18	1990- 91	14,9	25,3	62,7	85,6	65,0	104,5	39,5	87,3	55,1	25,5	25,3	36,6	627,3
19	1991- 92	50,0	13,2	86,4	5,2		10,0	12,2	99,3	30,9	29,5	98,0	10,2	-
20	1992- 93	0,0	57,1	32,6	87,7	43,4	7,2	17,0		70,6	23,5	1,9	5,2	-
21	1993- 94	10,2	80,6	95,1	51,1	85,8	31,2	22,6	73,0	8,9	16,0	39,0	44,5	558,0
22	1994-95	11,1	52,7	39,5	95,0	43,0	25,0	54,0	51,5	86,0	8,5	91,0	89,0	646,3
23	1995- 96	69,0	0,0	39,5	109,5	37,0	50,0	61,5	18,4	22,1	6,1	15,1	14,9	443,1
24	1996- 97	79,7	37,4	19,3	56,8	22,2	8,5	17,8	18,2	8,5	5,1	6,9	1,8	282,2
25	1997- 98	3,0	34,2	50,0	7,2	3,0	2,6	1,4	2,6	11,8	1,3	11,0	4,4	132,5
26	1998- 99	20,6	3,7	4,1	3,8									-
27	1999- 2000				27,0	0,0	24,0	22,5	59,0	26,5	22,4	5,9	8,0	-
28	2000- 01	19,0	62,1	18,9	36,0	29,0	21,0	17,8	23,0	41,7	23,0	6,0	43,0	340,5
29	2001- 02	8,0	6,0	16,0	170,0	0,0	24,0	22,5	59,0	28,0	22,7	6,0	45,0	407,2
30	2002- 03	17,0	29,0	44,0	72,0							6,0	43,0	-
31	2003- 04	32,7	130,1	43,0	65,0									-
32	2004- 05				105,0									-

Statistics and charts

Number of measurements	29	29	29	31	26	27	28	27	28	28	29	29	24
Highest value	118,5	143,2	275,6	170,0	102,3	104,5	99,9	100,0	115,4	117,6	98,0	97,1	793,4
Lowest value	0,0	0,0	4,1	3,8	0,0	0,0	1,4	2,6	0,0	0,0	0,0	0,0	132,5
Mean value	29,69	50,72	65,86	50,30	39,09	31,11	35,60	51,20	51,63	28,79	24,38	32,98	500,67
Years	28,33	Annual Precipitation from mean monthly of all years											491,33

Chart with the Mean monthly Precipitation during the station operation (mm)

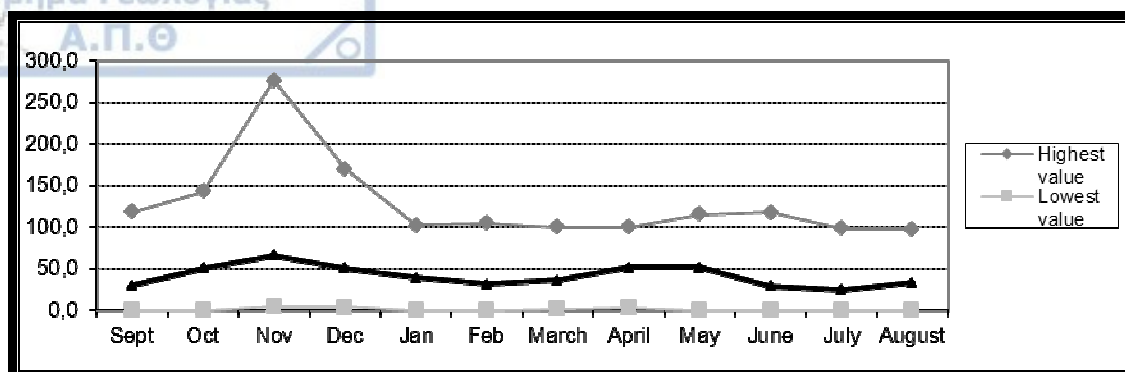
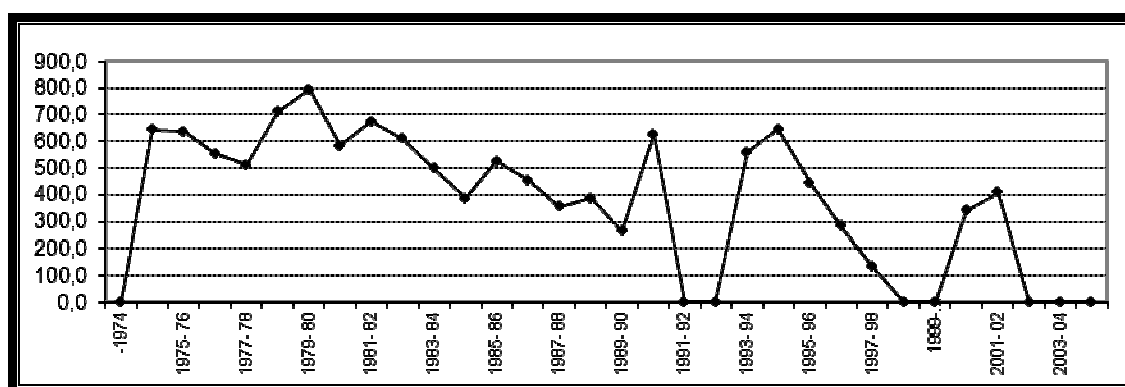


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 8: Monospita

Station	Monospita		Longitude:	346.179,189
County:	Imathia		Latitude:	4.497.504,857
Period:	1974-2004		Altitude (meters):	47,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974													-
2	1974- 75													-
3	1975- 76													-
4	1976- 77													-
5	1977- 78					58,2	51,5	38,1	156,0	47,0	2,5	1,3	24,0	-
6	1978- 79	90,0	132,0	11,0	86,0	32,5	40,0	21,0	70,5	50,0	5,2	36,9	40,5	615,6
7	1979- 80	37,0	130,0	266,0	92,0	49,0	16,0	66,0	45,0	119,0	17,0	36,0	8,0	881,0
8	1980- 81	46,0	124,0	42,0	74,0	84,0	56,0	46,5	39,0	33,0	15,0	21,0	40,0	620,5
9	1981- 82	6,0	88,0	58,0	58,0	9,0	31,0	84,5	149,0	67,0	6,0	14,0	89,0	659,5
10	1982- 83	52,0	155,0	107,0	77,0	9,0	10,0	43,5	22,0	68,0	134,0	64,0	17,0	758,5
11	1983- 84	40,0	12,0	47,0	203,0	42,0	79,0	58,0	157,0	11,0	19,0	9,0	31,0	708,0
12	1984- 85	24,0	12,0	61,0	54,0	54,0	10,0	69,0	34,0	51,0	24,0			-
13	1985- 86		49,0	233,0	39,6	37,0	102,7	60,8	8,4	101,5	48,8	8,9	6,4	-
14	1986- 87	18,2	73,3	17,8	28,8	70,4	144,2	152,1	75,7	38,3	4,0	2,3	21,5	646,6
15	1987- 88	0,0	61,4	75,4	20,6									-
16	1988- 89					1,3	6,6	36,0	21,5	44,6	34,3	34,5	1,1	-
17	1989- 90	0,0	55,6	15,8	41,8	1,5	8,5	0,0	50,0	40,9	17,9	13,5	73,8	319,3

18	1990- 91	23,6	19,1	42,0	91,0	35,4		53,3	118,4	65,2	38,1	82,1	50,3	-
19	1991- 92	44,1	22,9	57,6	4,9	23,2	6,8	10,7	176,4	52,6	72,7	29,9	0,0	501,8
20	1992- 93	1,0	81,8	32,6	47,4	36,2	6,4	41,3	15,3	56,5	16,5	14,0	7,1	356,1
21	1993- 94	7,7	49,0	128,0	27,0	134,5	141,5	14,5	61,5	39,5	0,0	30,5	11,5	645,2
22	1994-95	0,5	62,5	40,5	58,5	95,5	20,5	73,0	27,5	66,0	45,0	81,5	34,5	605,5
23	1995- 96	43,0	5,5	17,0	188,5	128,0	70,5	84,0	46,0	42,5	2,5	5,0	26,5	659,0
24	1996- 97	48,5	55,5	26,0	62,0	51,0	30,5	49,5	18,8	27,5	43,5	13,0	24,0	449,8
25	1997- 98	8,5	88,0	54,5	112,5	40,0	58,0	9,5	9,0	101,5	9,0	6,0	25,6	522,1
26	1998- 99	38,0	33,0	258,0	90,0	43,5			22,5	20,5	21,8	16,5	34,5	-
27	1999- 2000	17,5	44,0	163,5	49,5	18,0	44,0	23,5	25,5	33,5	4,8	1,5	16,0	441,3
28	2000- 01	5,5	118,3	29,5	12,5	51,5	35,5	21,5	92,5	99,5	14,0	48,5	14,0	542,8
29	2001- 02	7,5	10,5	6,5	156,0	20,0	25,0	89,0	88,0	21,5	10,0	60,0	25,5	519,5
30	2002- 03	90,0	40,5	14,5	163,0	81,0	25,5	12,5	7,5	65,0	22,0			-
31	2003- 04		69,7	20,5	87,0	114,0	7,0	42,5	89,5	57,5	81,0	14,0	31,5	-
32	2004- 05	22,5	86,0	51,1	41,8									-

Statistics and charts

Number of measurements	24	26	26	26	26	24	25	26	26	26	24	24	18
Highest value	90,0	155,0	266,0	203,0	134,5	144,2	152,1	176,4	119,0	134,0	82,1	89,0	881,0
Lowest value	0,0	5,5	6,5	4,9	1,3	6,4	0,0	7,5	11,0	0,0	1,3	0,0	319,3
Mean value	27,96	64,56	72,15	75,63	50,76	42,78	48,01	62,56	54,62	27,25	26,83	27,22	580,67
Years	25,25	Annual Precipitation from mean monthly of all years											580,33

Chart with the Mean monthly Precipitation during the station operation (mm)

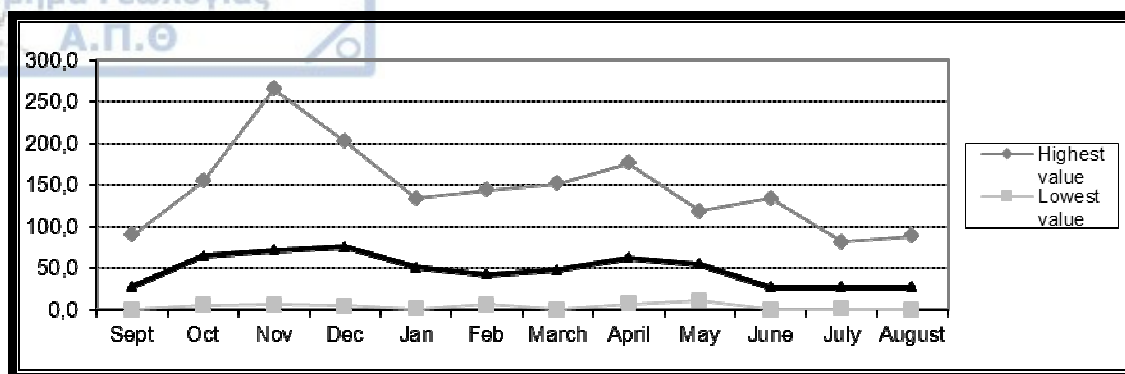
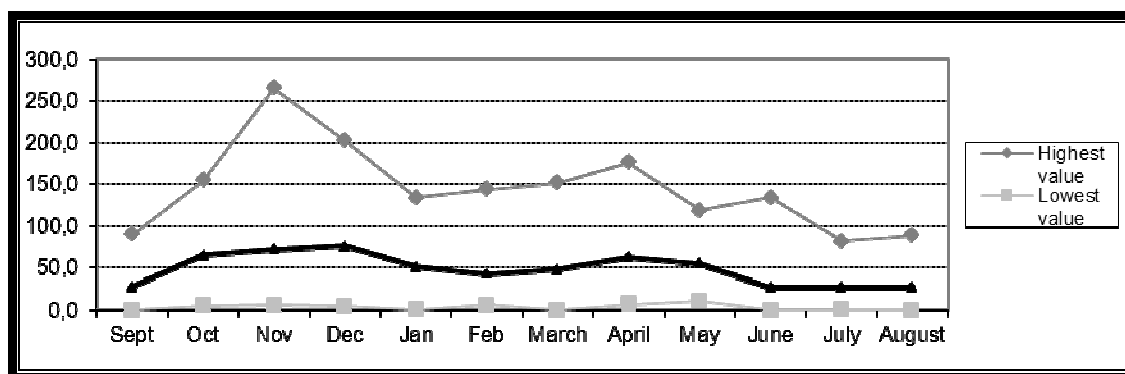


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 9: Koumaria

Station	Koumaria		Longitude:	344.499,751
County:	Imathia		Latitude:	4.484.582,860
Period:	1974-2004		Altitude (meters):	700,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974						213,5	79,0	94,0	98,0	60,0	0,0	26,0	-
2	1974- 75	57,5	75,0	171,0	58,0	30,0	140,0	74,0	76,0	129,0	169,0	67,0	90,0	1136,5
3	1975- 76	60,0	65,0	116,0	86,0	44,0	165,0	79,0	149,0	244,0	56,0	112,0	95,0	1271,0
4	1976- 77	16,5	122,0	113,0	92,0	34,0	21,0	57,0	56,0	87,0	69,0	58,5	36,0	762,0
5	1977- 78	67,0	43,0	93,0	88,5	123,5	91,3	91,3	142,0	74,0	4,0	34,0	17,0	868,6
6	1978- 79	291,0	99,0	12,0	144,0	164,0	106,0	83,0	127,0	132,0	13,0	65,0	55,0	1291,0
7	1979- 80	49,0	229,0	338,0	189,0	120,0	70,0	127,0	100,0	139,0	63,0	30,0	56,0	1510,0
8	1980- 81	106,0	184,0	59,0	87,0	193,0	86,0	105,0	53,0	52,0	33,0	49,5	48,0	1055,5
9	1981- 82	23,0	143,0	74,0	95,0	16,0	62,0	107,0	168,0	96,0	50,0	21,0	162,0	1017,0
10	1982- 83	47,0	179,0	153,0	83,0	23,0	47,0	70,0	43,0	51,0	220,0	128,0	19,0	1063,0
11	1983- 84	63,0	28,0	78,0	199,0	84,0	101,0	92,0	179,0	25,0	40,0	11,0	78,0	978,0
12	1984- 85	35,0	12,0	101,0	75,0	140,0	27,0	115,0	90,0	120,0	45,0			-
13	1985- 86	0,0	72,0	209,0	44,0	74,0	138,0	84,0	14,0	133,0	56,0	58,0	15,0	897,0
14	1986- 87	28,0	100,0	115,0	113,0	140,0	166,0	179,0	101,0	63,0	20,0	3,0	29,0	1057,0
15	1987- 88	0,0	125,0	131,0	52,0									-
16	1988- 89					10,0	61,0	104,0	39,0	87,0	33,0	75,0	8,0	-
17	1989- 90	62,0	100,0	54,0	51,0				92,0	86,0	46,0	43,0	104,0	-

18	1990- 91	36,0	38,0	102,0	220,0	55,0	85,0	73,0				136,0	122,0	-
19	1991- 92	57,0	53,0	88,0	37,0	25,0	16,0	36,0	289,0	77,0	158,0	62,0	0,0	898,0
20	1992- 93	12,0	158,0	103,0	87,0	81,0	66,0	101,0	40,0	141,0	17,0	1,0	25,0	832,0
21	1993- 94	27,0	62,0	189,0	33,0	197,0	240,0	30,0	96,0	130,0	16,0	81,0	55,0	1156,0
22	1994-95	32,0	104,0	61,0	71,0	126,0	21,0	104,0	62,0	138,0	50,0	166,0	114,0	1049,0
23	1995- 96	77,0	46,0	34,0	260,0	108,0	173,0	107,0	84,0	83,0	72,0	54,0	101,0	1199,0
24	1996- 97	115,0	69,0	80,0	64,0	88,0	20,0	89,0	82,0	58,0	61,0	34,0	100,0	860,0
25	1997- 98	17,0	138,0	61,0	112,0	60,0	50,0	42,0	34,0	219,0	55,0	11,0	46,0	845,0
26	1998- 99	64,0	53,0	302,0	82,0	77,0	72,0	73,0	37,0	42,0	39,0	50,0	37,0	928,0
27	1999- 2000	112,0	67,0	286,0	80,0	31,0		38,0	43,0	86,0	16,0	7,0	57,0	-
28	2000- 01	11,0	248,0	37,0	46,0	58,0	57,0	35,0	137,0	84,0	39,0	70,0	54,0	876,0
29	2001- 02	14,0	20,0	41,0	109,0	8,0	18,0	169,0	121,0	81,0	7,0	150,0	50,0	788,0
30	2002- 03	221,0	90,0	28,0	399,0	179,0						27,0	38,0	-
31	2003- 04	19,0	203,0	44,0	94,0	143,0	15,0	35,0	135,0	78,0	130,0			-
32	2004- 05					27,0	10,3	8,6	14,8	74,0	59,0	75,0	52,5	-

Statistics and charts

Number of measurements	29	29	29	29	29	28	29	29	29	29	29	29	22
Highest value	291,0	248,0	338,0	399,0	197,0	240,0	179,0	289,0	244,0	220,0	166,0	162,0	1510,0
Lowest value	0,0	12,0	12,0	33,0	8,0	10,3	8,6	14,0	25,0	4,0	0,0	0,0	762,0
Mean value	59,28	100,86	112,86	108,64	84,78	83,50	82,31	93,03	100,24	58,48	57,90	58,26	1015,35
Years	28,92	Annual Precipitation from mean monthly of all years											1000,13

Chart with the Mean monthly Precipitation during the station operation (mm)

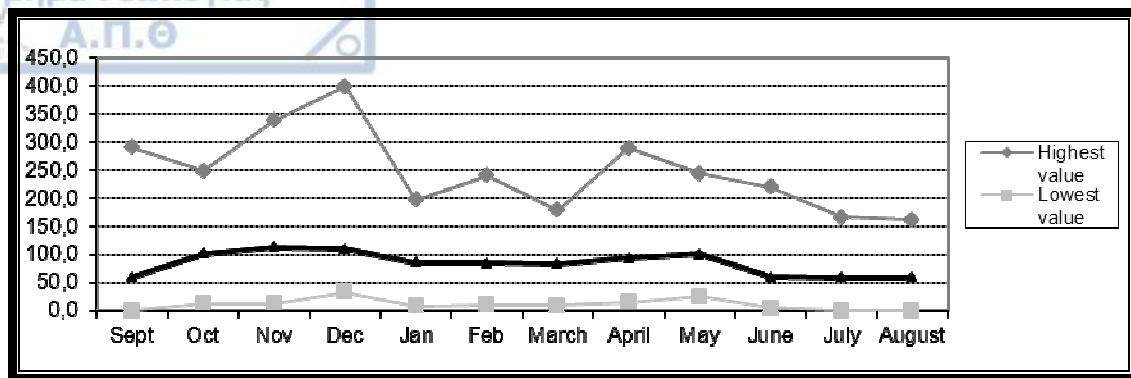
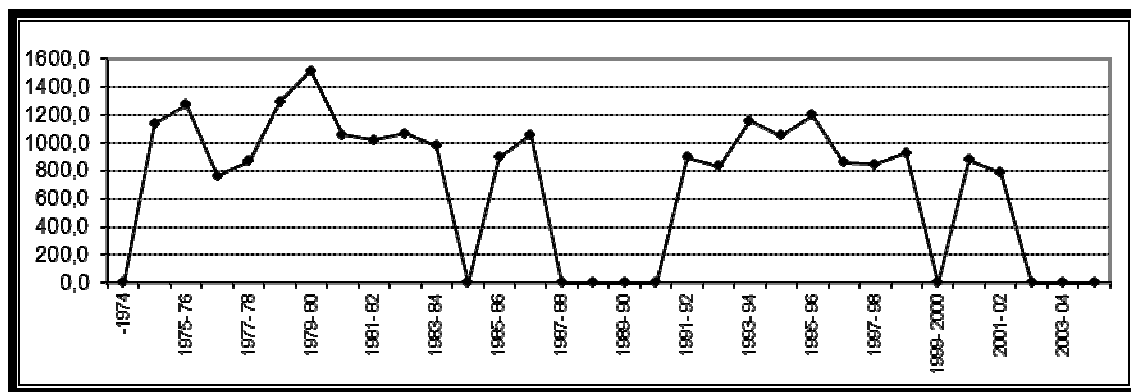


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 10: Rodochori

Station	Rodochori		Longitude:	332.288,798
County:	Imathia		Latitude:	4.507.060,477
Period:	1974-2004		Altitude (meters):	545,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974						167,6	225,6	121,4	52,1	46,9	4,0	2,3	-
2	1974- 75	80,4	44,6	158,7	69,0	14,0	47,5	75,0	55,0	44,0	91,5	31,5	100,0	811,2
3	1975- 76	40,0	80,5	79,3	40,5	10,5	202,0	81,0	72,5	160,0	24,5	95,0	48,8	934,6
4	1976- 77	15,5	192,5	86,5	53,5	17,5	49,0	45,5	43,5	53,0	48,6	27,0	18,5	650,6
5	1977- 78	46,0	13,5	43,8	28,3	99,0	65,7	38,2	257,5	42,8	2,5	4,5	20,2	662,0
6	1978- 79	55,2	36,0	11,0	130,0	48,5	27,5	30,0	67,2	84,5	8,0	16,7	16,5	531,1
7	1979- 80	38,2	117,0	444,0	203,0	77,0	27,0	121,0	71,0	187,5	53,0	8,0	4,0	1350,7
8	1980- 81	57,5	147,0	49,0	96,0	65,0	41,0	47,5	72,0	52,0	6,0	26,0	46,0	705,0
9	1981- 82	37,0	92,0	62,0	89,0	16,5	50,0	118,0	195,0	85,0	14,5	30,0	92,5	881,5
10	1982- 83	41,0	319,0	129,0	103,0	7,0	20,5	75,0	48,0	80,0	110,1	90,0	35,0	1057,6
11	1983- 84	42,0	18,0	76,0	123,0	50,0	106,0	52,5	195,0	22,0	13,0	0,0	25,0	722,5
12	1984- 85	19,0	7,0	74,0	31,5	82,0	10,5	113,0	75,0	106,0	54,0	0,0	0,0	572,0
13	1985- 86	0,0	76,0	308,0	46,0	53,0	118,5	65,0	2,0	149,0	31,0	16,0	11,0	875,5
14	1986- 87	19,0	109,0	111,0	29,0	46,0	161,1	146,7	97,0	64,0	13,0	9,4	0,0	805,2
15	1987- 88	0,0	123,0	120,0	26,0									-
16	1988- 89					1,0	19,0	49,0	29,0	96,0	47,0	74,0	11,0	-
17	1989- 90	60,0	95,0	30,0	46,0	0,0	14,1	23,1	55,0	68,0	12,0	13,0	84,0	500,2

18	1990- 91	13,0	41,0	64,0	190,5	65,0	78,0	68,0	149,0	78,0	75,0	58,0	63,0	942,5
19	1991- 92	57,0	38,0	80,0	2,0	61,0	3,0	0,5	262,0	64,0	75,5	35,0	0,0	678,0
20	1992- 93	8,0	110,0	38,0	99,0	50,0	51,5	50,0	20,0	116,0	7,0	25,0	4,0	578,5
21	1993- 94	5,0	92,0	89,0	48,0	141,0	260,0	15,0	76,0	63,0	58,0	22,0	12,0	881,0
22	1994-95	1,0	130,0	40,0	67,0	109,0	25,0	89,0	47,0	70,0	25,0	57,0	28,0	688,0
23	1995- 96	56,0	9,0	18,0	340,0	111,0	126,0	160,0	51,0	36,0	7,0	63,0	85,0	1062,0
24	1996- 97	48,0	83,0	77,0	47,0	96,0	11,0	78,7	31,0	52,0	53,0	8,0	49,0	633,7
25	1997- 98	15,0	76,0	162,0	121,0	51,0	31,0	20,5	10,0	155,0	9,0	4,0	22,0	676,5
26	1998- 99	59,0	49,0	314,0	77,0	81,0	49,0	74,0				25,0	0,0	-
27	1999- 2000	0,0	49,0	334,0	67,0	46,0	51,0	36,0	17,0	54,0	28,0	3,0	27,0	712,0
28	2000- 01	15,0	244,0	28,0	36,0	69,0	23,0	36,0	169,0	59,0	11,0	46,0	29,0	765,0
29	2001- 02	11,0	30,0	13,0	143,0	23,0	32,0	123,0	134,0	71,0	35,0	93,0	59,0	767,0
30	2002- 03	172,0	76,0	33,0	336,0	142,0	67,0	26,0	26,5	101,0	57,0	15,0	135,0	1186,5
31	2003- 04	38,0	118,0	89,0	85,0	142,0	8,0	66,0	117,0	58,0	109,0	0,0	44,0	874,0
32	2004- 05	26,0	114,0	87,0	41,0									-

Statistics and charts

Number of measurements	30	30	30	30	29	30	30	29	29	29	30	30	27
Highest value	172,0	319,0	444,0	340,0	142,0	260,0	225,6	262,0	187,5	110,1	95,0	135,0	1350,7
Lowest value	0,0	7,0	11,0	2,0	0,0	3,0	0,5	2,0	22,0	2,5	0,0	0,0	500,2
Mean value	35,83	90,97	108,28	93,78	61,17	64,75	71,63	88,47	80,10	38,80	29,97	35,73	796,46
Years	29,67	Annual Precipitation from mean monthly of all years											799,46

Chart with the Mean monthly Precipitation during the station operation (mm)

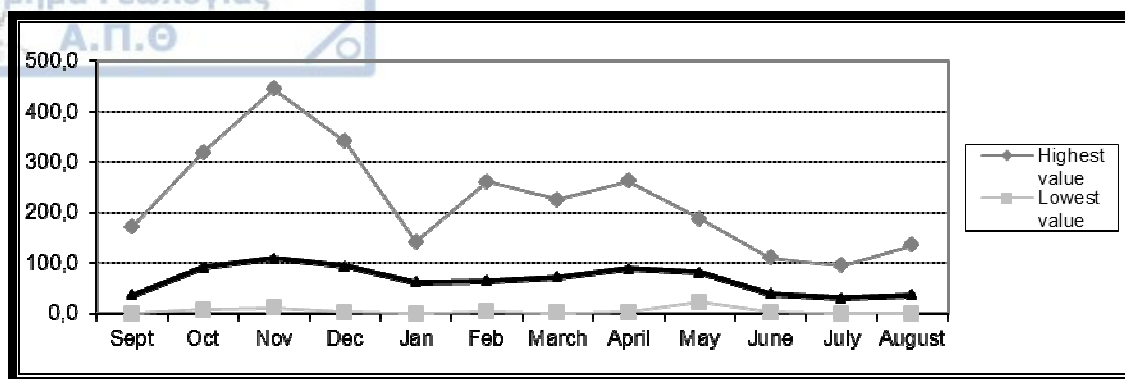
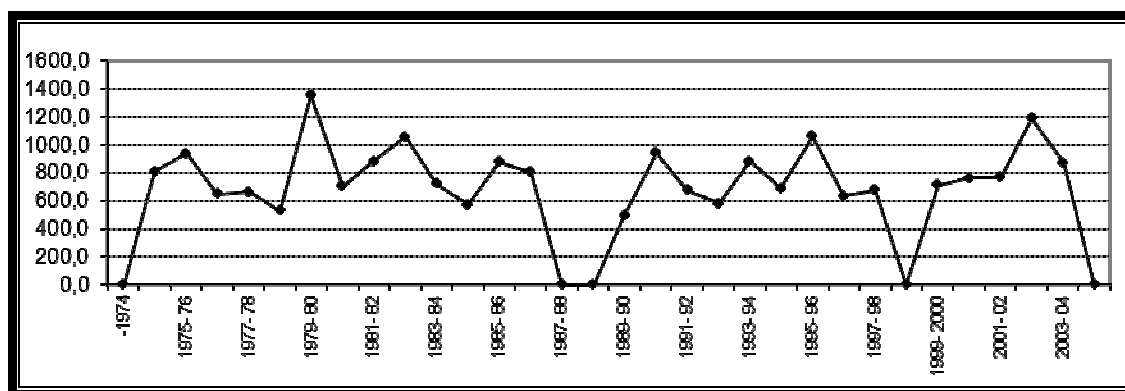


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 11: Exaplatanos

Station	Exaplatanos		Longitude:	342.816,284
County:	Pella		Latitude:	4.538.298,946
Period:	1974-2004		Altitude (meters):	635,60

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974													
2	1974- 75													
3	1975- 76													
4	1976- 77													
5	1977- 78					40,0	45,0	30,5	105,5	65,2	5,0	1,0	14,0	-
6	1978- 79	50,5	73,0	5,0	55,5	9,0	8,0	18,5	67,5	106,0	32,0	16,0	93,5	534,5
7	1979- 80	21,0	99,0	276,0	64,0	65,0	13,0	42,0	30,5	160,5	21,5	26,0	69,0	887,5
8	1980- 81	35,5	107,0	61,0	116,0	29,0	45,5	45,0	25,0	14,0	43,5	11,0	57,5	590,0
9	1981- 82	9,0	100,0	83,0	105,0	12,0	76,0	93,0	114,0	45,0	16,0	21,0	143,5	817,5
10	1982- 83	15,5	149,0	194,0	75,0	9,0	10,5	26,0	55,0	97,0	141,5	45,0	25,0	842,5
11	1983- 84	53,5	10,0	72,0	144,0	58,0	144,0	43,0	44,0	5,0	24,0	10,0	97,6	705,1
12	1984- 85	38,2	8,5	85,5	56,0	63,0	11,0	107,0	33,5	117,5	11,0	0,0	19,0	550,2
13	1985- 86	9,5	26,5	295,0	13,5	58,0	183,1	79,5	3,0	119,0	65,0	12,0	14,0	878,1
14	1986- 87	10,0	65,0	39,0	8,5	54,0	169,0	119,0	36,0	44,0	93,0	0,0	6,0	643,5
15	1987- 88	3,0	124,0	72,0	27,0	24,0	0,0	20,0	39,0	21,0	18,0	34,0	0,0	382,0
16	1988- 89	6,0	35,0	0,0	21,5	0,0	6,0	20,0	57,0	47,0	61,0	39,0	3,0	295,5
17	1989- 90	13,0	64,0	39,0	35,0	0,0	8,0	0,0	60,0	45,0	11,0	15,0	42,0	332,0

18	1990- 91	7,0	50,0	62,0	154,0	19,8	70,0	43,0	89,2	44,1	20,0	46,0	30,0	635,1
19	1991- 92	0,0	31,0	59,0	0,0	17,0	0,0	42,0	109,0	46,0	174,0	32,0	0,0	510,0
20	1992- 93	11,0	83,5	44,0	64,0	0,0	5,0	48,0	3,0	71,0	12,0	0,0	7,0	348,5
21	1993- 94	39,0	74,0	128,0	54,0	117,5	39,0	9,5	51,0	46,5	4,0	43,5	0,0	606,0
22	1994-95	6,0	51,0	0,0	80,5	39,5	0,0	59,5	28,0	62,0	0,0	79,0	55,0	460,5
23	1995- 96	41,0	0,0	47,0	215,0	147,5	69,0	90,0		27,0	0,0	11,0	14,0	-
24	1996- 97	137,0				62,0	60,0	14,0	19,0	18,5	22,0	36,0	10,0	-
25	1997- 98	3,0	124,0	71,0	160,0	25,0	70,0	10,0		127,0	12,0	14,0	30,0	-
26	1998- 99	50,0	73,0	203,0	92,0	70,0	17,0	66,0	24,0	22,0	86,0	41,0	21,0	765,0
27	1999- 2000	39,5	105,0	214,0	40,0	0,0	41,0	25,0	27,0	20,0	8,5	14,0	35,0	569,0
28	2000- 01	0,0	112,0	45,0	21,0									-
29	2001- 02					32,5	25,0		123,5	38,1	4,0	90,5	23,5	-
30	2002- 03	164,0	129,0	28,5	362,5	84,5		0,0	54,0	38,1	4,0	90,5	23,5	-
31	2003- 04	33,5	152,0	47,0	77,0	33,0	8,5	46,0	66,0	34,0	185,0	13,5	7,0	702,5
32	2004- 05	43,5	101,0	130,0	48,0									-

Statistics and charts

Number of measurements	26	25	25	25	27	26	26	25	27	27	27	27	21
Highest value	164,0	152,0	295,0	362,5	147,5	183,1	119,0	123,5	160,5	185,0	90,5	143,5	887,5
Lowest value	0,0	0,0	0,0	0,0	0,0	0,0	0,0	3,0	5,0	0,0	0,0	0,0	295,5
Mean value	32,28	77,86	92,00	83,56	41,13	44,94	43,86	52,65	56,94	41,31	28,50	32,31	602,75
Years	26,08	Annual Precipitation from mean monthly of all years											627,34

Chart with the Mean monthly Precipitation during the station operation (mm)

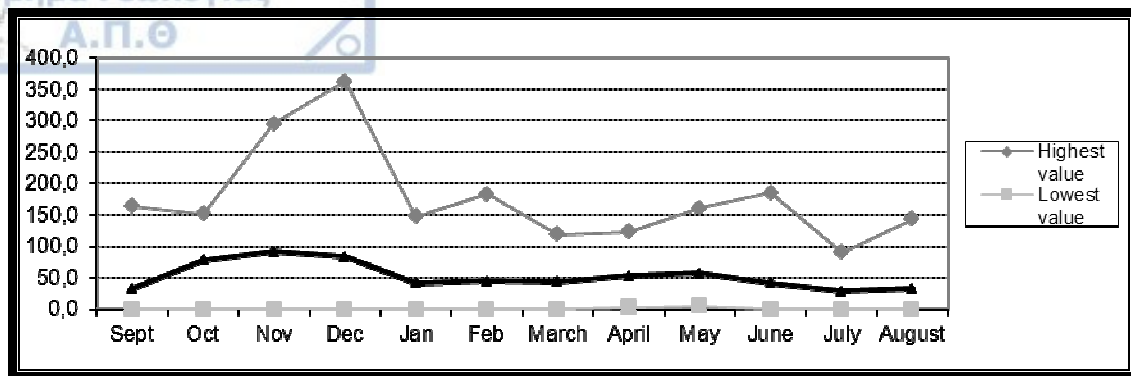
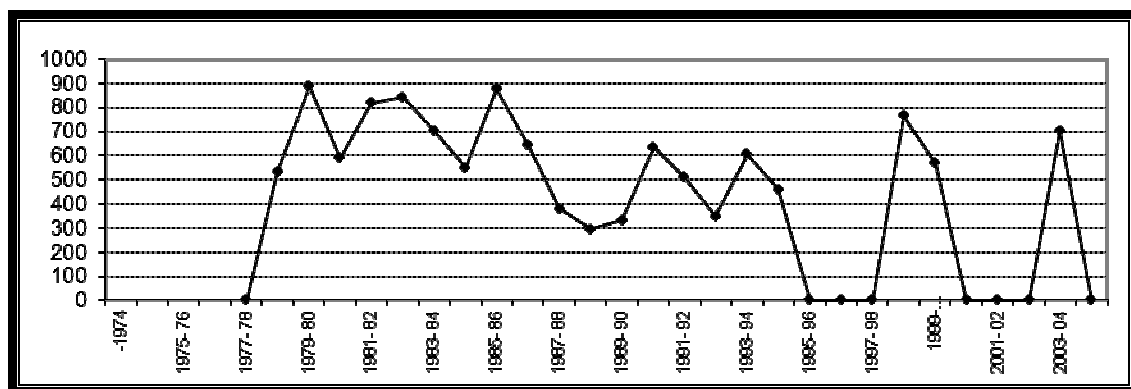


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 12: Theodoraki

Station	Theodoraki		Longitude:	348.348,671
County:	Pella		Latitude:	4.534.480,631
Period:	1974-2004		Altitude (meters):	424,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974							89,0	86,0	70,0	39,0	21,0	20,0	-
2	1974- 75	34,6	50,8	76,0	64,0	26,0	52,0	78,2	31,0	68,0	130,6	21,0	73,0	705,2
3	1975- 76	21,0	87,0	68,0	31,5	33,0	140,0	73,0	54,0	120,0	77,0	68,0	65,0	837,5
4	1976- 77	7,0	109,0	145,0	24,0	46,0	32,0	44,0	26,0	64,0	78,0	42,0	36,0	653,0
5	1977- 78	69,0	54,0	68,0	40,0	75,0	84,0	54,0	130,0	88,0	40,0	4,0	28,0	734,0
6	1978- 79	91,0	123,0	22,0	112,0	91,0	58,0	28,0	130,0	83,0	46,0	26,0	122,0	932,0
7	1979- 80	20,0	154,0	332,0	60,0	130,0	42,0	113,0	56,0	186,0	37,0	29,0	31,0	1190,0
8	1980- 81	42,0	179,0	82,0	86,0	54,0	77,0	86,0	51,0	42,0	33,0	27,0	74,0	833,0
9	1981- 82	11,0	105,0	88,0	128,0	20,0	78,0	123,0	164,0	53,0	0,0	36,0	127,0	933,0
10	1982- 83	27,0	163,0	103,0	107,0	15,0	34,0	65,0	20,0	124,0	200,5	51,5	40,5	950,5
11	1983- 84	61,5	58,0	67,0	144,0	61,0	164,0	113,5	79,0	12,0	38,5	18,0	114,5	931,0
12	1984- 85	25,0	0,0	25,0	55,0	57,0	41,0	167,0	45,0	107,0	12,0	3,5	6,0	543,5
13	1985- 86	11,0	25,0	279,0	17,0	65,0	255,0	122,0	10,0	104,0	90,0	51,0	41,0	1070,0
14	1986- 87	31,0	78,0	42,0	37,0	115,0	129,0	161,0	38,0	70,0	92,0	0,0	7,0	800,0
15	1987- 88	24,0	131,0	84,0	57,0	34,0	54,0	39,0	55,0	21,0	46,0	72,0	7,0	624,0
16	1988- 89	12,0	49,0	106,0	66,0	4,0	13,0	32,0	72,0	82,0	98,0	94,0	12,0	640,0
17	1989- 90	54,0	71,0	56,0	64,0	0,0	10,0	13,0	109,0	68,0	20,0	29,0	62,0	556,0

18	1990- 91	8,0	69,0	72,0	174,0	46,0	128,0	104,0	131,0	55,0	20,0	49,0	51,0	907,0
19	1991- 92	82,0	45,0	69,0	3,0	19,0	8,0	45,0	138,0	70,0	168,0	42,0	0,0	689,0
20	1992- 93	5,0	99,0	49,0	53,0	40,0	72,0	93,0	15,0	111,0	16,0	0,0	5,6	558,6
21	1993- 94	10,2	71,0	180,8	23,6	88,7	150,1	13,0	76,5	48,7	3,6	60,0	19,3	745,5
22	1994-95	2,3	77,0	28,8	94,3	112,8	11,0	78,0	33,2	63,7	69,5	74,0	36,4	681,0
23	1995- 96	54,8	2,0	45,5	206,6	172,4	93,5	133,1	45,3	41,9	16,5	23,7	85,6	920,9
24	1996- 97	108,0				70,4	66,0	19,6	24,7	26,6	33,2	44,3	44,0	-
25	1997- 98	6,3	112,3	132,0	82,8	41,0	70,7	11,0	16,0	114,8	41,9	12,0	46,0	686,8
26	1998- 99	66,8	58,5	232,1	128,7	59,5	26,0	86,0	32,0	30,0	100,0	20,0	60,0	899,6
27	1999- 2000	85,0	95,0	190,0	153,0	15,0	85,0	36,0	63,0	94,0	48,0	25,0	54,0	943,0
28	2000- 01	5,0	154,0	56,0	58,0	127,0	29,0							-
29	2001- 02					41,0	24,0	112,0	112,1	89,0	7,0	91,0	34,0	-
30	2002- 03	242,0	151,0	92,0	424,0									-
31	2003- 04	45,0	368,0	171,0	331,0	137,0	33,0	75,0	224,0	259,0	256,0			-
32	2004- 05													

Statistics and charts

Number of measurements	29	28	28	28	29	29	29	29	29	29	28	28	25
Highest value	242,0	368,0	332,0	424,0	172,4	255,0	167,0	224,0	259,0	256,0	94,0	127,0	1190,0
Lowest value	2,3	0,0	22,0	3,0	0,0	8,0	11,0	10,0	12,0	0,0	0,0	0,0	543,5
Mean value	43,50	97,81	105,76	100,88	61,92	71,01	76,08	71,27	81,58	64,04	36,93	46,50	798,56
Years	28,58	Annual Precipitation from mean monthly of all years											857,27

Chart with the Mean monthly Precipitation during the station operation (mm)

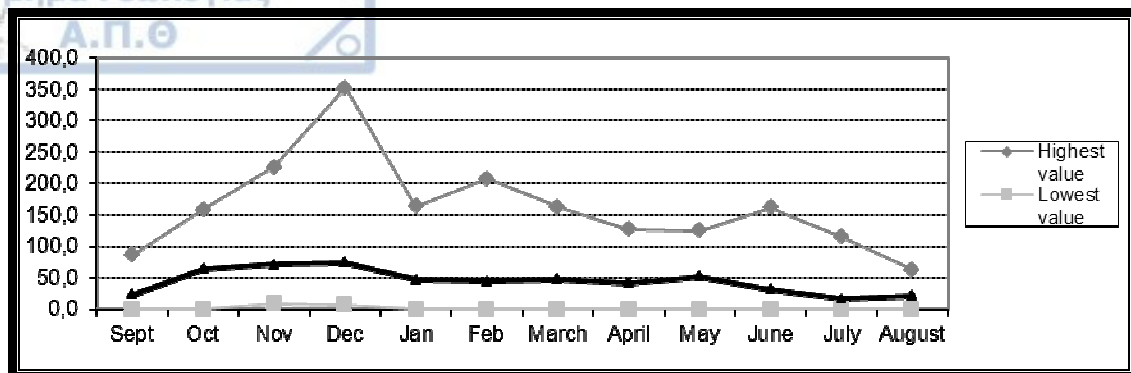
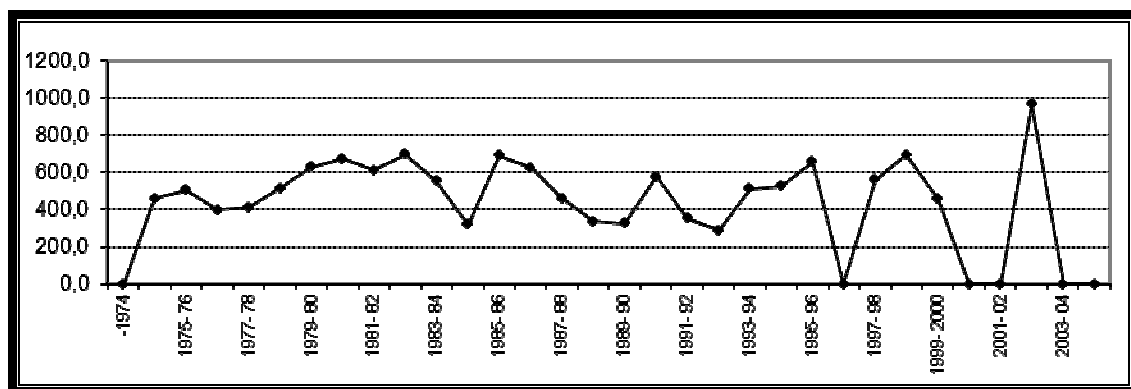


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 13: Promachonas

Station	Promachonas		Longitude:	329.206,902
County:	Pella		Latitude:	4.433.086,364
Period:	1974-2004		Altitude (meters):	250,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974							139,0	108,0	46,0	51,2	9,3	15,5	-
2	1974- 75	91,9	78,6	73,0	37,2	22,5	29,0	107,3	45,0	73,5	109,7	46,5	1,5	715,7
3	1975- 76	18,5	143,0	92,0	35,0	22,5	135,5	76,0	66,5	185,5	145,0	57,0	27,5	1004,0
4	1976- 77	6,5	209,5	206,5	31,5	55,0	35,5	51,5	55,0	80,5	78,5	35,0	12,5	857,5
5	1977- 78	53,0	113,0	64,4	23,0	63,5	33,5	37,5	224,0	84,0	7,0	20,5	22,5	745,9
6	1978- 79	75,0	74,0	21,0	66,0	63,5	37,5	26,0	65,5	71,5	9,0	2,0	51,5	562,5
7	1979- 80	52,0	85,5	322,5	94,5	65,5	16,0	74,0	57,5	225,0	23,0	12,5	84,0	1112,0
8	1980- 81	60,0	222,5	66,0	117,5	47,0	31,5	60,0	70,5	29,0	14,5	8,0	39,0	765,5
9	1981- 82	9,0	164,0	111,0	90,5	9,0	51,0	130,5	176,0	97,0	34,5	32,0	143,5	1048,0
10	1982- 83	35,5	208,5	225,5	153,0	5,0	25,0	49,0	74,5	110,5	175,5	65,0	60,0	1187,0
11	1983- 84	70,5	37,0	89,0	170,5	61,5	193,0	85,0	85,5	8,5	30,0	10,0	135,5	976,0
12	1984- 85	24,0	4,5	128,5	67,5	86,3	30,5	132,0	65,0	119,5	59,0	0,0	25,5	742,3
13	1985- 86	7,9	32,5	369,0	21,0	72,0	243,0	154,5	10,0	158,0	54,0	22,0	25,0	1168,9
14	1986- 87	16,0	72,0	51,0	28,0	107,0	225,0	168,0	102,0	69,0	17,0	0,0	14,0	869,0
15	1987- 88	13,0	94,0	158,0	24,0	31,0	61,0	33,0	81,0	18,0	50,0	39,0	0,0	602,0
16	1988- 89	35,0	114,0	93,0	44,0	0,0	21,0	49,0	78,0	66,0	78,0	89,0	2,0	669,0
17	1989- 90	36,0	81,0	61,0	33,0	1,0	35,0	5,0	112,0	90,0	9,0	11,0	56,0	530,0

18	1990- 91	3,0	94,0	63,0	252,0	19,0	126,0	146,0	163,0	71,0	38,0	57,0	40,0	1072,0
19	1991- 92	96,0	55,5	169,5	4,5	32,0	3,5	38,5	189,0	75,0	95,0	75,0	1,0	834,5
20	1992- 93	5,0	154,0	52,0	103,5	40,0	31,0	61,5	11,5	85,5	14,0	6,0	2,5	566,5
21	1993- 94	23,0	76,0	142,0	60,0	135,5	124,0	13,0	86,0	14,0	25,0	30,0	11,0	739,5
22	1994-95	9,0	44,0	21,0	107,0	74,0	9,0	97,0	74,0	90,0	17,0	51,0	52,0	645,0
23	1995- 96	99,0	1,0	78,0	298,0	184,0	86,0	158,0	72,0	35,0	0,0	33,0	31,0	1075,0
24	1996- 97	185,0				77,0	110,0	46,0	31,0	36,0	34,0	11,0	73,0	-
25	1997- 98	34,0	154,0	115,0	182,0	96,0	84,0	15,0	39,0	90,0	58,0	2,0	33,0	902,0
26	1998- 99	122,0	69,0	250,0	128,0	84,0	44,0	142,0	46,0	49,0	58,0	19,0	12,0	1023,0
27	1999- 2000	32,0	143,0	226,0	35,0	17,0	78,0	40,0	25,0	53,0	10,0	7,0	15,0	681,0
28	2000- 01	5,0	142,0	83,0	27,0	91,0	10,0							-
29	2001- 02						57,0	172,0	176,0	70,0	17,0	86,0	32,0	-
30	2002- 03	169,0	256,0	29,0	384,0	139,0	50,0	11,0	74,0	200,0	93,0	13,0	63,0	1481,0
31	2003- 04	40,0	205,0	34,0	110,0	82,0	15,0	76,0	104,0	74,0	208,0		19,0	-
32	2004- 05													-

Statistics and charts

Number of measurements	29	28	28	28	29	30	30	30	30	30	29	30	26
Highest value	185,0	256,0	369,0	384,0	184,0	243,0	172,0	224,0	225,0	208,0	89,0	143,5	1481,0
Lowest value	3,0	1,0	21,0	4,5	0,0	3,5	5,0	10,0	8,5	0,0	0,0	0,0	530,0
Mean value	49,17	111,68	121,21	97,40	61,48	67,68	79,78	85,55	82,47	53,73	29,27	36,67	868,26
Years	29,25	Annual Precipitation from mean monthly of all years											876,08

Chart with the Mean monthly Precipitation during the station operation (mm)

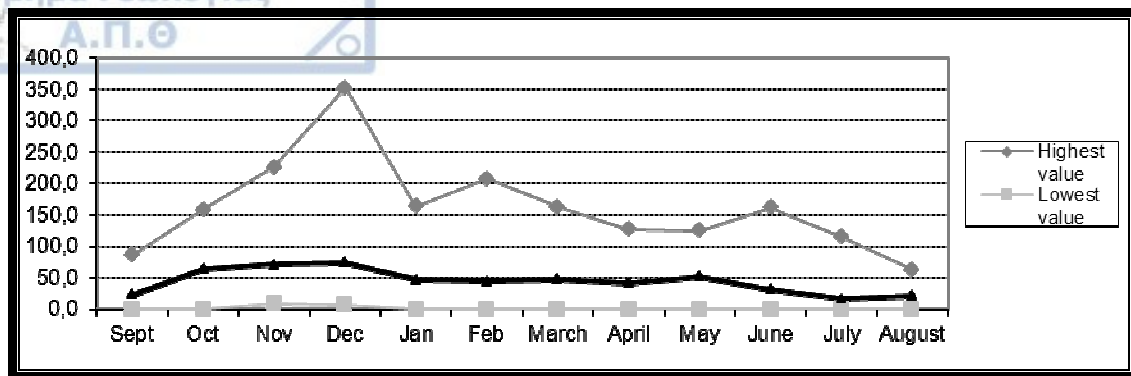
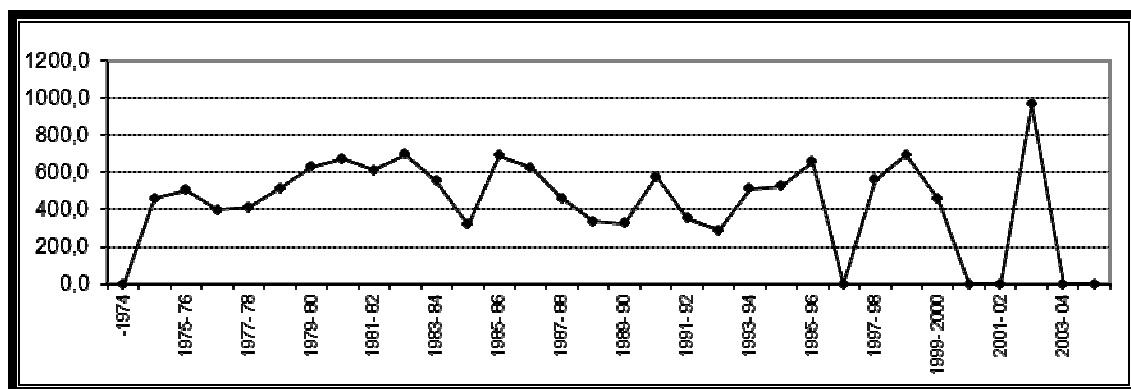


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 14: Kariotissa

Station	Kariotissa		Longitude:	356.483,832
County:	Pella		Latitude:	4.514.111,447
Period:	1974-2004		Altitude (meters):	9,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					73,0	82,0	59,0	41,0	41,0	21,0	6,0	0,0	-
2	1974- 75	18,0	45,0	43,0	90,0	19,0	24,0	52,0	11,0	33,0	60,0	21,0	45,0	461,0
3	1975- 76	9,0	18,0	35,0	15,0	13,0	97,0	33,0	31,0	125,0	24,0	40,0	63,0	503,0
4	1976- 77	3,0	83,0	84,0	8,0	14,0	30,0	28,0	22,0	46,0	48,0	13,0	18,0	397,0
5	1977- 78	31,0	9,0	48,0	27,0	36,0	36,0	24,0	127,0	54,0	7,0	0,0	14,0	413,0
6	1978- 79	79,0	99,0	9,0	66,0	35,0	38,0	21,0	53,0	68,0	4,0	0,0	41,0	513,0
7	1979- 80	9,0	97,0	156,0	68,0	64,0	18,0	54,0	30,0	92,0	12,0	27,0	0,0	627,0
8	1980- 81	31,0	159,0	38,0	117,0	67,0	42,0	59,0	25,0	39,0	38,0	11,0	47,0	673,0
9	1981- 82	0,0	82,0	72,0	64,0	0,0	71,0	81,0	120,0	36,0	23,0	0,0	63,0	612,0
10	1982- 83	32,0	144,0	148,0	66,0	9,0	13,0	47,0	14,0	64,0	94,0	51,0	15,0	697,0
11	1983- 84	25,0	15,0	71,0	166,0	40,0	66,0	51,0	62,0	12,0	19,0	0,0	27,0	554,0
12	1984- 85	18,0	11,0	53,0	54,0	39,0	14,0	58,0	20,0	26,0	24,0	0,0	0,0	317,0
13	1985- 86	3,0	30,0	191,0	13,0	25,0	208,0	49,0	7,0	71,0	63,0	0,0	30,0	690,0
14	1986- 87	14,0	50,0	33,0	16,0	70,0	116,0	163,0	53,0	60,0	45,0	0,0	5,0	625,0
15	1987- 88	0,0	136,0	87,0	26,0	24,0	31,0	38,0	17,0	17,0	56,0	0,0	27,0	459,0
16	1988- 89	33,0	20,0	89,0	55,0	0,0	0,0	40,0	39,0	36,0	19,0	5,0	0,0	336,0
17	1989- 90	28,0	51,0	25,0	55,0	0,0	0,0	16,0	29,0	45,0	0,0	36,0	42,0	327,0

18	1990- 91	12,0	30,0	55,0	143,0	22,0	59,0	55,0	56,0	28,0	30,0	30,0	56,0	576,0
19	1991- 92	42,0	21,0	18,0	7,0	18,0	0,0	25,0	97,0	60,0	58,0	6,0	0,0	352,0
20	1992- 93	0,0	62,0	36,0	32,0	25,0	11,0	45,0	2,0	73,0	0,0	0,0	0,0	286,0
21	1993- 94	0,0	35,0	139,0	29,0	102,0	67,0	8,0	54,0	29,0	0,0	47,0	0,0	510,0
22	1994-95	0,0	72,0	42,0	79,0	86,0	22,0	55,0	16,0	90,0	10,0	14,0	40,0	526,0
23	1995- 96	41,0	0,0	32,0	182,0	164,0	82,0	67,0	27,0	40,0	0,0	0,0	19,0	654,0
24	1996- 97					59,0	34,0	36,0	44,0	0,0	0,0	0,0	0,0	-
25	1997- 98	0,0	116,0	35,0	159,0	43,0	57,0	12,0	25,0	97,0	0,0	0,0	14,0	558,0
26	1998- 99	36,0	49,0	226,0	68,0	59,0	37,0	74,0	0,0	51,0	48,0	17,0	27,0	692,0
27	1999- 2000	34,0	62,0	112,0	56,0	51,0	28,0	38,0	44,0	31,0	0,0	0,0	0,0	456,0
28	2000- 01		84,0	56,0	48,0		18,0							-
29	2001- 02					22,0	31,0	115,0	79,0	42,0	12,0	115,0	0,0	-
30	2002- 03	86,0	75,0	31,0	352,0	124,0	41,0	0,0	51,0	73,0	74,0	41,0	16,0	964,0
31	2003- 04	49,0	146,0	49,0	57,0	103,0	0,0	32,0	50,0	62,0	162,0		19,0	-
32	2004- 05	14,0	51,0	59,0	44,0									-

Statistics and charts

Number of measurements	28	29	29	29	30	31	30	30	30	30	29	30	26
Highest value	86,0	159,0	226,0	352,0	164,0	208,0	163,0	127,0	125,0	162,0	115,0	63,0	964,0
Lowest value	0,0	0,0	9,0	7,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	286,0
Mean value	23,11	63,86	71,45	74,55	46,87	44,29	47,83	41,53	51,37	31,70	16,55	20,93	529,92
Years	29,58	Annual Precipitation from mean monthly of all years											534,04

Chart with the Mean monthly Precipitation during the station operation (mm)

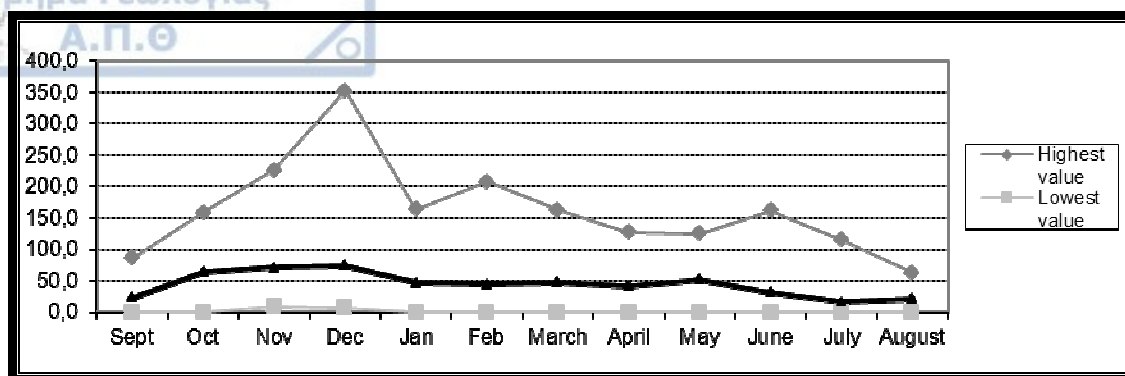
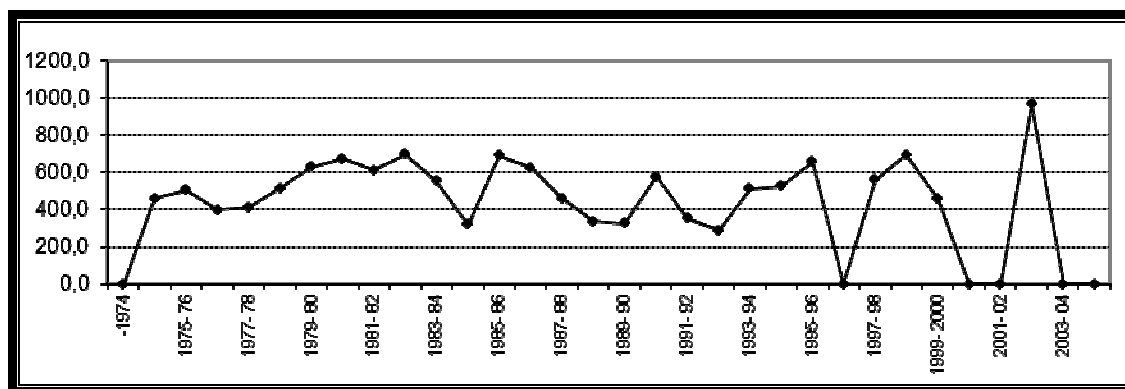


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 15: Kria Vrusi

Station	Kria Vrusi		Longitude:	356.302,515
County:	Pella		Latitude:	4.504.740,156
Period:	1974-2004		Altitude (meters):	8,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					31,5	92,5	46,5	29,5	36,0	24,0	0,0	11,0	-
2	1974- 75	20,5	15,0	41,5	93,0	20,0	19,0	51,0	13,0	28,5	71,0	7,0	16,5	396,0
3	1975- 76	15,5	17,0	29,0	8,5	16,0	141,5	34,0	38,5	114,5	7,5	61,0	32,0	515,0
4	1976- 77	3,5	123,0	79,5	7,0	12,0	21,0	33,5	23,0	47,0	86,0	29,7	26,0	491,2
5	1977- 78	31,5	1,5	38,0	34,2	43,5	29,5	45,0	113,5	33,5	28,0	0,0	46,0	444,2
6	1978- 79	80,5	129,5	8,5	76,5	31,0	37,0	28,0	57,0	52,5	6,5	24,5	75,0	606,5
7	1979- 80	22,5	85,5	161,5	73,0	49,0	17,0	35,5	20,0	124,5	10,0	18,0	3,0	619,5
8	1980- 81	27,0	134,0	41,0	80,0	72,0	38,5	45,5	26,0	23,0	26,0	17,0	35,0	565,0
9	1981- 82	7,0	74,0	45,0	29,0	5,0	57,5	63,5	144,0	51,0	28,0	21,5	90,0	615,5
10	1982- 83	27,0	124,0	144,0	75,0	2,0	4,5	35,5	1,5	82,0	92,0	42,0	15,5	645,0
11	1983- 84	39,5	28,0	40,0	215,0	33,0	59,0	52,5	65,0	22,5	18,5	5,0	32,5	610,5
12	1984- 85	17,0				38,0	22,0	54,5	24,5	27,0	25,0	0,0	6,0	-
13	1985- 86	6,0	28,5	192,0	18,0									-
14	1986- 87					74,0	129,5	162,0	59,5	49,5	6,0	0,0	7,5	-
15	1987- 88	15,0	93,5	86,5	34,5	30,0	30,5	46,5	21,0	7,0	31,0	7,0	14,0	416,5
16	1988- 89	17,0	20,5	103,0	103,0	0,0	3,5	45,0	29,0	41,0	20,5	46,0	2,0	430,5
17	1989- 90	31,0	44,0	19,0	42,5	0,0	7,0	10,0	29,5	39,5	10,5	4,5	35,0	272,5

18	1990- 91	15,0	23,2	57,0	99,5	30,0	47,0	41,0	73,5	35,5	46,0	43,0	27,0	537,7
19	1991- 92	37,5	20,0	38,3	3,2	19,0	3,0	9,5	146,0	63,5	70,5	14,5	2,3	427,3
20	1992- 93	7,2	78,0	38,5	36,9	14,0	8,5	37,0	4,0	69,0	23,0	2,0	3,0	321,1
21	1993- 94	6,0	32,0	129,0	27,0	139,5	157,5	12,0	64,0	43,0	0,0	8,0	6,2	624,2
22	1994-95	0,0	57,0	49,5	65,5	74,3	22,0	59,5	19,0	82,0	19,0	20,5	25,0	493,3
23	1995- 96	37,5	1,0	27,0	184,0	142,0	68,0	70,5	43,0	23,4	5,0	10,0	50,0	661,4
24	1996- 97					62,5	36,0	47,0	23,5	18,0	19,0	20,0	13,0	-
25	1997- 98	5,0	91,0	32,5	172,0	44,0	54,0	17,0	80,5	85,5	19,5	2,5	54,5	658,0
26	1998- 99	32,0	34,0	231,5	78,0	70,0	17,0	66,0	24,0	22,0	86,0	41,0	21,0	722,5
27	1999- 2000	39,5	105,0	214,0	40,0	0,0	41,0	25,0	27,0	20,0	8,5	14,0	35,0	569,0
28	2000- 01	0,0	112,0	45,0	21,0									-
29	2001- 02					25,0	23,0	96,0	84,0	12,5	6,0	73,5	22,0	-
30	2002- 03	114,5	62,0	37,0	291,0	114,0	33,0	11,0	30,0	83,0	50,5	5,5	26,5	858,0
31	2003- 04	28,5	145,0	18,0	74,0	94,0	7,0	27,0	59,5	44,5	113,0	16,0	56,0	682,5
32	2004- 05	33,5	56,0	63,0	40,5									-

Statistics and charts

Number of measurements	28	27	27	27	29	29	29	29	29	29	29	29	24
Highest value	114,5	145,0	231,5	291,0	142,0	157,5	162,0	146,0	124,5	113,0	73,5	90,0	858,0
Lowest value	0,0	1,0	8,5	3,2	0,0	3,0	9,5	1,5	7,0	0,0	0,0	2,0	272,5
Mean value	25,60	64,23	74,40	74,88	44,32	42,29	45,07	47,33	47,62	32,98	19,09	27,19	549,29
Years	28,42	Annual Precipitation from mean monthly of all years											545,00

Chart with the Mean monthly Precipitation during the station operation (mm)

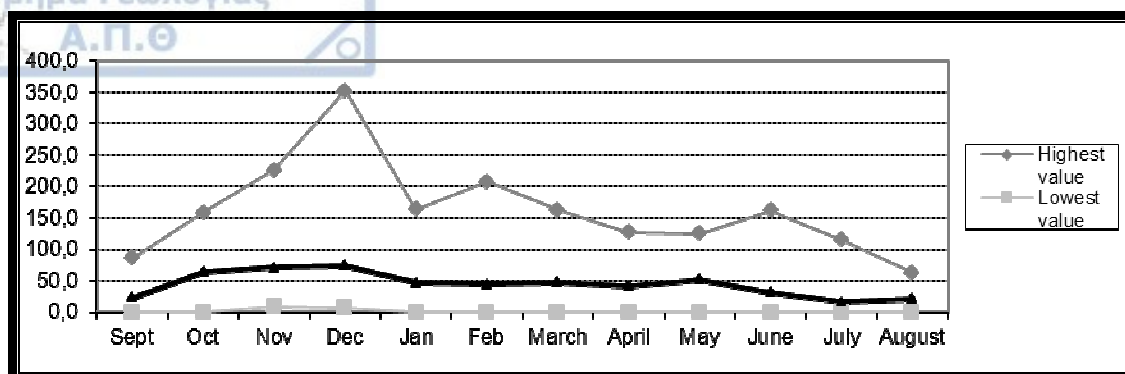
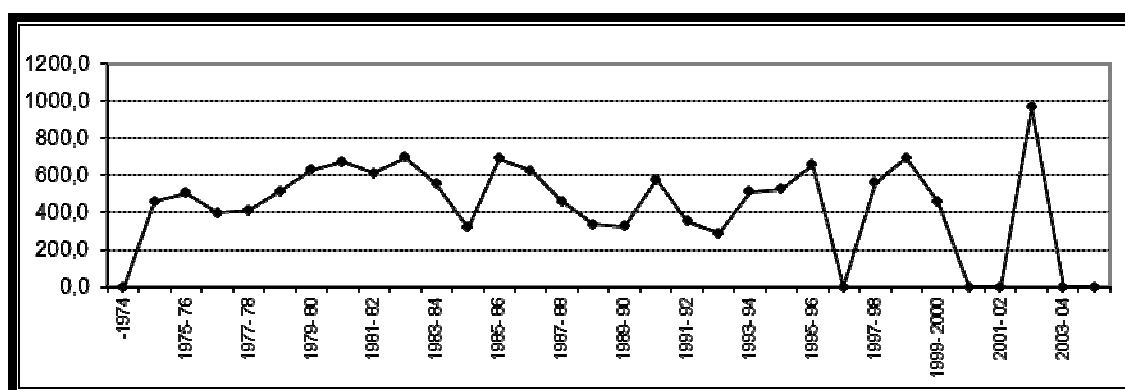


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 16: Ktima Kastorias

Station	Ktima Kastorias	Longitude:	268.286,411
County:	Kastoria	Latitude:	4.488.408,209
Period:	1974-2004	Altitude (meters):	690,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974													-
2	1974- 75													-
3	1975- 76													-
4	1976- 77													-
5	1977- 78													-
6	1978- 79													-
7	1979- 80													-
8	1980- 81					18,6	36,7	40,5	---	36,9	14,0	14,4	58,7	-
9	1981- 82	11,8	125,5	34,9	94,8	13,3	8,2	54,0	82,7	34,3	2,9	18,3	99,2	579,9
10	1982- 83	69,0	129,3	110,4	91,7	4,3	10,0	25,7	15,5	51,5	91,3	50,0	44,3	693,0
11	1983- 84	47,3	20,0	33,0	8,8	53,7	92,1	47,3	56,7	11,0	17,0	1,5	21,9	410,3
12	1984- 85	16,0	25,3	76,3	32,0	---	---	--	43,4	60,6	10,0	4,8	0,4	-
13	1985- 86	6,0	25,8	195,9	27,9	72,4	130,5	63,8	14,9	92,3	78,0	41,9	1,0	750,4
14	1986- 87	9,4	28,9	39,9	11,7	50,4	43,9	64,8	46,7	95,6	17,9	6,1	20,5	435,8
15	1987- 88	0,2	111,4	84,4	35,4	37,7	27,3	23,6	36,2	43,6	20,6	0,0	9,3	429,7
16	1988- 89	12,7	17,0	104,9	27,8	0,0	31,7	32,3	11,2	49,3	21,4	55,9	6,2	370,4
17	1989- 90	14,0	63,7	78,2	49,2	0,0	14,1	9,1	46,3	71,9	6,4	26,1	23,5	402,5

18	1990- 91	14,7	26,7	69,6	158,0	4,6	104,5	39,5	137,3	74,7	9,4	25,7	31,7	696,4
19	1991- 92	26,9	30,1	77,0	6,7	4,7	6,2	12,9	77,3	40,1	75,5	51,4	0,0	408,8
20	1992- 93	4,3	100,1	46,1	50,8	27,2	39,0	55,0	19,0	41,6	22,2	1,4	14,1	420,8
21	1993- 94	19,2	40,9	154,5	72,0	107,6	135,9	25,7	77,4	30,9	7,9	49,3	21,4	742,7
22	1994-95	16,9	46,5	66,4	80,1	30,4	43,1	49,4	49,6	101,0	10,8	53,3	61,6	609,1
23	1995- 96	83,7	0,0	38,6	146,5	69,0	78,3	65,4	32,8	46,9	19,9	35,5	51,1	667,7
24	1996- 97	59,8	54,7	76,0	62,1	19,8	11,7	28,2	43,0	6,8	8,1	20,1	66,6	456,9
25	1997- 98	4,7	124,1	50,7	78,1	17,1	43,0	19,6	12,2	94,6	43,1	9,7	13,2	510,1
26	1998- 99	93,8	62,6	150,0	61,4	50,4	48,2	38,2	37,5	14,1	52,9	51,4	35,5	696,0
27	1999- 2000	51,9	35,9	109,5	73,0	33,5	67,3	30,7	14,8	66,3	80,0	12,4	25,4	600,7
28	2000- 01	8,4	50,2	37,9	20,8	39,4	30,0	17,4	58,3	46,3	25,4	28,1	12,3	374,5
29	2001- 02	11,0	12,6	40,5	155,0	28,0	21,9	65,7	93,3	56,9	6,8	84,7	25,0	601,4
30	2002- 03	193,9	81,6	21,8	167,1	91,4	27,7	11,7	31,6	83,9	129,3	27,2	12,0	879,2
31	2003- 04	31,0	134,9	30,9	41,1	134,3	15,9	65,5	76,2	61,4	133,2	18,9	3,1	746,4
32	2004- 05	123,6	79,5	73,7	37,8									-

Statistics and charts

Number of measurements	24	24	24	24	23	23	23	23	24	24	24	24	22
Highest value	193,9	134,9	195,9	167,1	134,3	135,9	65,7	137,3	101,0	133,2	84,7	99,2	879,2
Lowest value	0,2	0,0	21,8	6,7	0,0	6,2	9,1	11,2	6,8	2,9	0,0	0,0	370,4
Mean value	38,76	59,47	75,05	66,24	39,47	46,40	38,52	48,43	54,69	37,67	28,67	27,42	567,39
Years	23,67	Annual Precipitation from mean monthly of all years											560,78

Chart with the Mean monthly Precipitation during the station operation (mm)

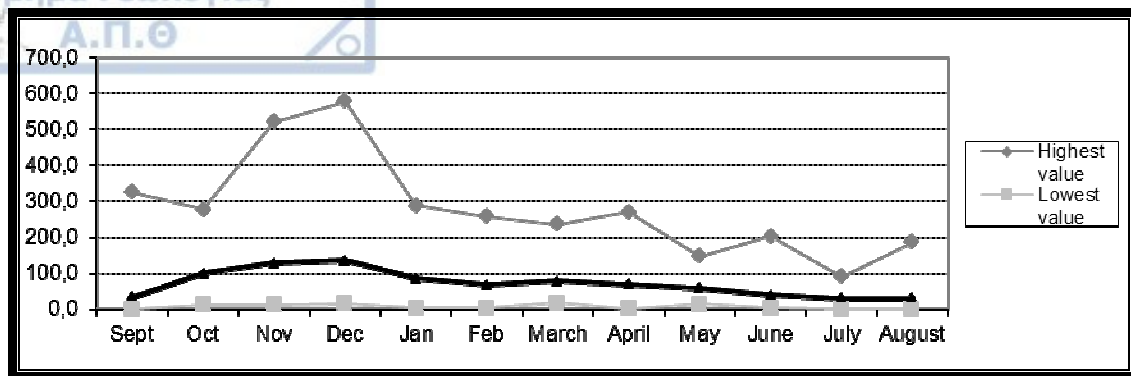
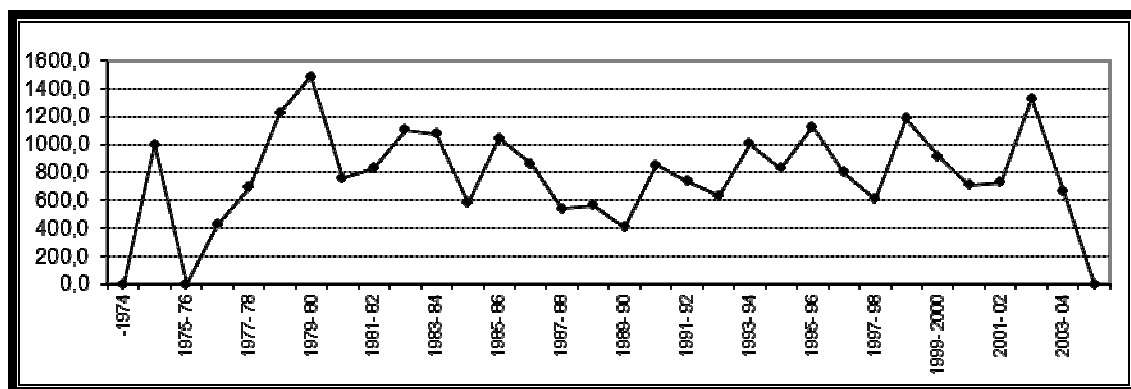


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 17: Vrontou

Station	Vrontou		Longitude:	352.321,397
County:	Pieria		Latitude:	4.451.109,708
Period:	1974-2004		Altitude (meters):	180,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974						166,7	236,9	68,9	46,8	13,0	2,2	2,6	-
2	1974- 75	37,9	26,4	207,8	45,2	88,0	128,5	42,5	29,8	39,7	122,2	45,6	186,1	999,7
3	1975- 76	34,0	39,3	111,8	74,8				74,0	147,0	40,3	86,5	57,0	-
4	1976- 77	4,3	112,6	84,5	16,2	11,5	19,5	39,0	45,8	37,3	19,7	21,6	14,0	426,0
5	1977- 78	45,5	17,5	36,5	179,2	130,0	49,9	41,5	109,0	32,6	12,0	19,0	16,5	689,2
6	1978- 79	326,1	144,5	12,3	336,0	44,3	101,0	32,8	91,3	83,3	14,5	21,3	20,3	1227,7
7	1979- 80	7,3	277,3	454,6	241,8	35,5	40,5	189,0	60,8	84,3	29,5	17,0	46,5	1484,1
8	1980- 81	17,5	149,6	55,3	83,5	145,0	113,0	33,0	46,0	20,5	9,0	41,5	44,0	757,9
9	1981- 82	25,0	67,5	73,1	81,5	19,5	99,5	140,5	166,0	65,5	14,0	32,0	46,0	830,1
10	1982- 83	19,0	278,5	308,5	56,5	16,0	25,0	93,0	31,2	24,9	157,3	83,0	10,3	1103,2
11	1983- 84	15,0	22,8	40,2	277,5	52,5	162,5	127,5	271,0	14,8	37,5	6,5	46,8	1074,6
12	1984- 85	10,5	12,3	95,5	128,8	105,5	13,5	79,7	72,0	33,7	19,5	1,0	8,5	580,5
13	1985- 86	6,0	113,0	317,5	45,0	64,5	257,5	89,8	1,0	47,0	38,5	28,5	33,5	1041,8
14	1986- 87	23,0	139,5	242,5	46,5	45,1	42,4	119,3	87,3	62,5	6,5	24,0	20,0	858,6
15	1987- 88	33,9	69,4	98,5	42,0	87,5	30,5	75,0	24,0	24,0	48,0	3,0	1,5	537,3
16	1988- 89	15,5	83,5	115,5	69,0	3,0	7,5	102,5	6,0	57,5	53,5	31,7	15,0	560,2
17	1989- 90	26,0	23,5	26,0	71,0	3,5	19,0	18,0	32,8	64,0	40,3	9,5	71,0	404,6

18	1990- 91	26,5	92,9	94,0	96,5	77,5	31,5	69,8	147,8	81,5	18,9	78,9	33,0	848,8
19	1991- 92	35,9	34,9	60,9	29,7	72,7	20,0	22,5	139,5	55,9	202,5	60,9	0,0	735,4
20	1992- 93	0,0	193,7	35,5	70,0	61,0	86,0	33,0	28,0	91,5	13,0	13,0	6,0	630,7
21	1993- 94	4,0	40,0	224,1	55,5	289,0	157,7	28,0	73,5	71,0	2,5	48,4	8,0	1001,7
22	1994-95	1,0	192,5	64,4	116,7	192,8	22,5	87,0	16,9	31,1	28,4	58,0	16,7	828,0
23	1995- 96	49,7	31,0	19,5	497,5	178,0	110,7	118,3	24,0	30,0	3,5	10,7	51,5	1124,4
24	1996- 97	87,7	113,0	13,6	90,9	119,5	80,3	39,8	72,1	71,9	18,3	48,8	43,5	799,4
25	1997- 98	9,8	93,8	103,9	114,7	47,1	38,5	18,9	12,5	137,2	18,2	0,0	13,0	607,6
26	1998- 99	25,9	30,9	377,7	335,2	82,8	19,3	137,0	22,4	29,0	78,8	26,2	20,6	1185,8
27	1999- 2000	27,2	56,7	521,6	63,6	23,0	78,5	16,8	38,9	75,8	6,7	1,0	6,0	915,8
28	2000- 01	21,0	253,7	44,4	24,3	52,0	34,5	23,1	106,3	94,1	6,5	25,8	24,7	710,4
29	2001- 02	0,0	78,4	26,3	88,9	37,2	16,9	197,7	139,6	17,8	8,9	91,1	23,3	726,1
30	2002- 03	83,1	50,1	31,3	579,5	207,3	69,5	47,3	26,7	92,4	81,4	14,7	45,4	1328,7
31	2003- 04	11,3	100,9	39,5	128,1	159,7	3,9	21,5	54,8	54,7	56,8	5,4	27,0	663,6
32	2004- 05	11,5	130,1	36,4	93,6									-

Statistics and charts

Number of measurements	31	31	31	31	29	30	30	31	31	31	31	31	29
Highest value	326,1	278,5	521,6	579,5	289,0	257,5	236,9	271,0	147,0	202,5	91,1	186,1	1484,1
Lowest value	0,0	12,3	12,3	16,2	3,0	3,9	16,8	1,0	14,8	2,5	0,0	0,0	404,6
Mean value	33,58	99,03	128,17	134,81	84,52	68,21	77,36	68,38	58,69	39,35	30,86	30,91	851,10
Years	30,67	Annual Precipitation from mean monthly of all years											853,87

Chart with the Mean monthly Precipitation during the station operation (mm)

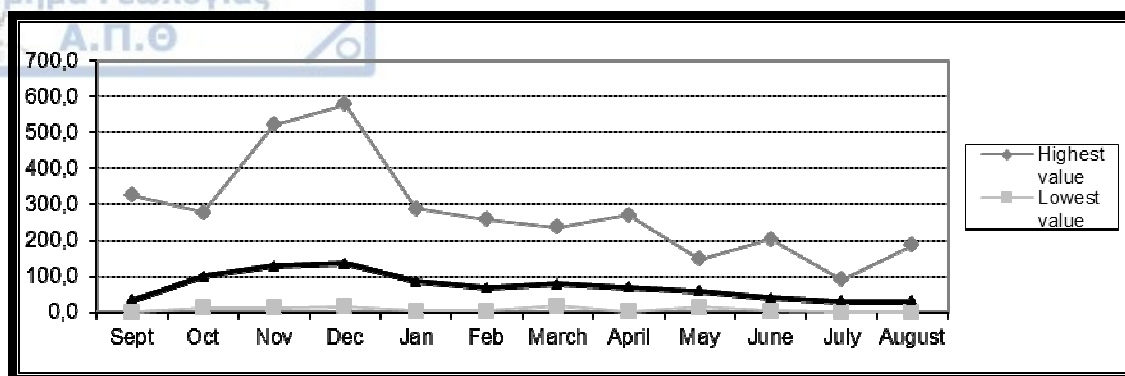
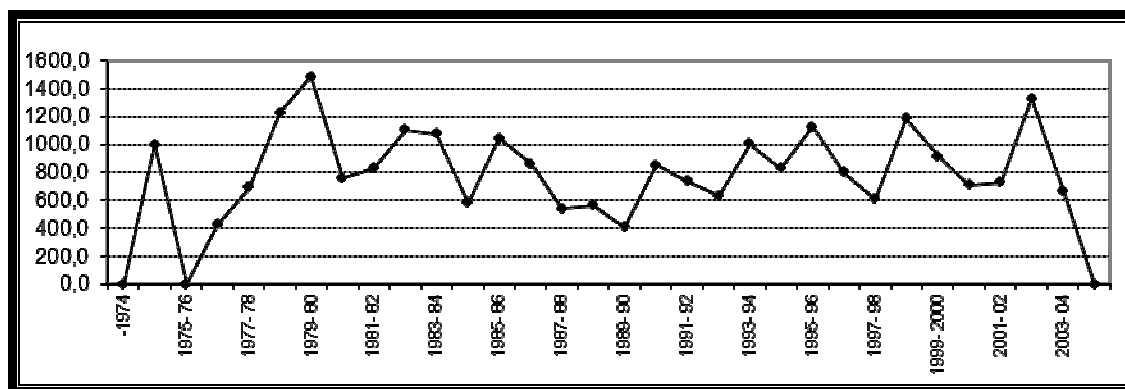


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 18: Kolundros

Station	Kolundros	Longitude:	372.715,011
County:	Pieria	Latitude:	4.482.198,998
Period:	1974-2004	Altitude (meters):	300,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					133,0	143,0	114,0	77,0	69,0	33,5	11,0	4,0	-
2	1974- 75	38,0	35,0	81,1	23,0	41,0	92,0	88,0	7,7	24,0	118,0	55,0	11,0	613,8
3	1975- 76	25,0	45,0	56,5	21,5	14,5	133,2	64,0	60,5	130,5	27,0	33,5	61,5	672,7
4	1976- 77	3,3	181,5	101,0	5,5	17,0	37,0	43,5	31,5	29,5	31,0	25,5	28,5	534,8
5	1977- 78	66,2	14,0	90,0	48,5	65,0	64,0	38,5	109,8	44,5	18,0	0,0	23,0	581,5
6	1978- 79	102,0	144,8	11,5	75,0	15,9	46,0	27,0	59,0	35,5	7,8	31,0	40,0	595,5
7	1979- 80	16,0	194,0	206,9	112,3	48,0	48,0	126,0	42,0	90,0	22,0	24,0	4,0	933,2
8	1980- 81	33,0	98,0	59,0	108,0	95,0	46,0	39,0	25,0	22,0	25,0	14,0	38,0	602,0
9	1981- 82	0,0	51,0	29,5	51,0	14,0	34,0	101,5	105,5	59,0	12,5	17,0	16,0	491,0
10	1982- 83	16,5	140,0	157,5	50,0	26,0	17,0	49,5	6,0	71,0	107,0	23,0	15,0	678,5
11	1983- 84	38,0	26,0	69,0	184,0	25,0	53,0	56,0	77,0	7,0	8,0	4,0	35,5	582,5
12	1984- 85	10,6	11,6	54,0	51,0	36,0	25,0	81,0	47,0	97,0	166,0	5,0	13,0	597,2
13	1985- 86	13,3	82,5	340,0	43,5	60,2	216,0	86,0	3,0	85,7	57,6	11,8	8,8	1008,4
14	1986- 87	21,6	66,6	75,7	37,2	49,5	105,6	166,0	89,0	30,5	83,0	12,0	5,0	741,7
15	1987- 88	0,0	201,0	145,0	44,0	92,0	45,0	120,0	51,0	3,5	29,9	0,0	9,0	740,4
16	1988- 89	46,5	20,5	92,0	91,5	0,0	4,0	67,0	15,0	77,0	51,0	14,5	9,0	488,0
17	1989- 90	27,0	9,0	27,5	75,0	0,0	18,5	5,6	49,5	97,5	5,5	23,5	71,5	410,1

18	1990- 91	22,0	46,5	60,5	72,0	31,4	61,5	52,5	69,0	77,5	30,0	52,5	64,0	639,4
19	1991- 92	27,5	18,5	27,0	15,0	14,5	7,5	10,0	129,7	69,1	91,0	64,9	4,0	478,7
20	1992- 93	0,0	96,0	43,0	56,0	22,0	32,0	36,0	19,9	68,0	0,0	25,5	8,0	406,4
21	1993- 94	19,0	60,5	144,5	5,5	106,5	103,0	16,0	100,0	60,0	0,0	21,5	7,5	644,0
22	1994-95	0,7	112,0	63,0	78,5	134,0	25,0	100,0	42,0	59,5	24,5	28,0	38,5	705,7
23	1995- 96	41,2	15,5	32,0	197,5	140,0	107,0	97,5	22,5	26,0	14,0	13,5	21,5	728,2
24	1996- 97	65,0	49,9	16,5	54,7	35,3	49,8	20,0	51,4	4,0	26,8	15,4	12,6	401,4
25	1997- 98	13,0	80,9	60,0	60,0	39,2	43,6	18,6	11,4	80,8	39,0	2,3	28,5	477,3
26	1998- 99	33,1	29,3	273,2	91,8	86,1	35,0	124,6	43,9	24,8	21,0	14,9	81,0	858,7
27	1999- 2000	39,5	49,5	229,8	62,5	30,0	51,0	9,9	32,5	39,6	12,0	5,5	4,1	565,9
28	2000- 01	11,6	191,7	110,3	5,0	97,2	14,0	23,4	96,8	52,2	13,0	51,0	38,0	704,2
29	2001- 02	5,0	27,0	6,5	146,5	17,5	17,0	140,5	103,9	18,0	14,0	99,1	33,6	628,6
30	2002- 03	113,0	113,2	38,3	394,1	158,0	62,0	25,0	34,0	63,4	66,5	8,0	26,7	1102,2
31	2003- 04	31,5	282,5	26,0	78,3	154,0	19,0	54,1	73,1	45,0	80,0	10,5	44,3	898,3
32	2004- 05	28,8	114,0	85,4	52,0									-

Statistics and charts

Number of measurements	31	31	31	31	31	31	31	31	31	31	31	31	30
Highest value	113,0	282,5	340,0	394,1	158,0	216,0	166,0	129,7	130,5	166,0	99,1	81,0	1102,2
Lowest value	0,0	9,0	6,5	5,0	0,0	4,0	5,6	3,0	3,5	0,0	0,0	4,0	401,4
Mean value	29,29	84,11	90,72	77,11	57,99	56,60	64,54	54,37	53,58	39,83	23,14	25,97	650,34
Years	31,00	Annual Precipitation from mean monthly of all years											657,26

Chart with the Mean monthly Precipitation during the station operation (mm)

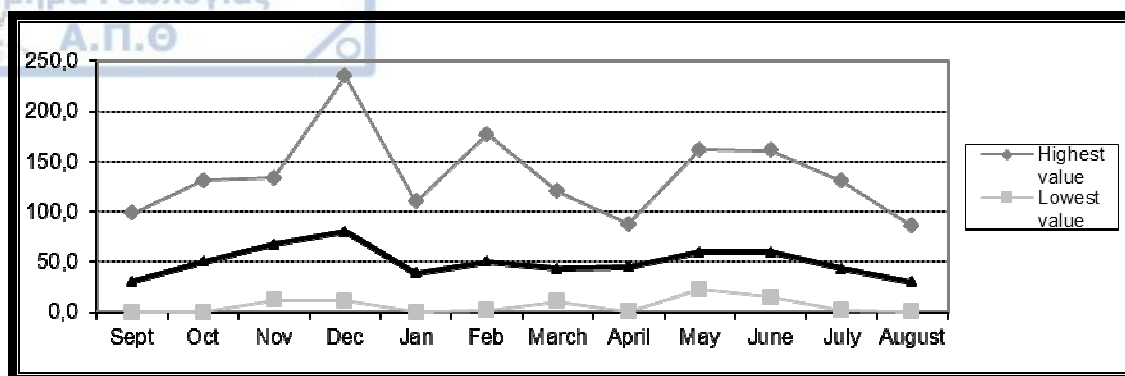
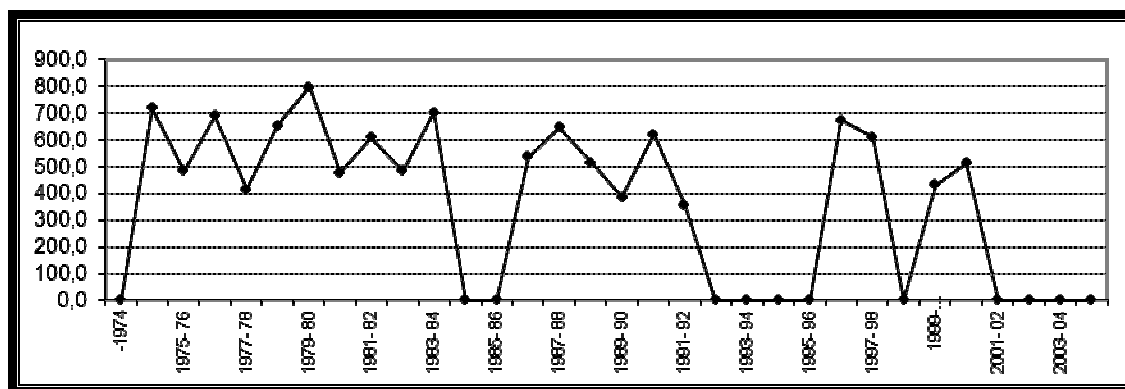


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 19: Lofos

Station	Lofos		Longitude:	362.285,404
County:	Pierias		Latitude:	4.452.772,325
Period:	1974-2004		Altitude (meters):	250,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974						179,5	160,5	82,0	63,0	58,0	0,0	5,3	-
2	1974- 75	71,0	48,0	192,0	48,0	57,0	98,0	35,0	27,0	32,5	124,5	39,5	58,5	831,0
3	1975- 76	20,0	38,0	93,0	67,5	34,5	176,0	84,5	85,0	96,8	37,9	49,4	88,5	871,1
4	1976- 77	6,8	152,9	77,4	27,6	15,8	32,3	37,5	46,2	68,6	34,2	19,0	19,0	537,3
5	1977- 78	28,0	21,0	31,7	118,0	168,5	71,0	50,0	117,1	25,2	20,5	8,0	12,0	671,0
6	1978- 79	216,0	144,8	12,0	185,5	56,3	82,5	38,5	108,3	104,5	19,2	27,0	55,5	1050,1
7	1979- 80	20,2	240,0	419,0	34,3	76,0	48,0	155,5	72,8	98,9	94,0	61,0	12,0	1331,7
8	1980- 81	39,5	146,0	55,0	77,0	126,0	65,5	56,0	58,5	26,0	3,0	30,5	45,5	728,5
9	1981- 82	18,0	75,0	66,0	66,0	23,0	89,0	121,0	174,0	60,0	8,0	23,5	67,0	790,5
10	1982- 83	49,0	254,0	244,0	59,0	20,0	28,0	110,0	35,0	76,5	145,2	59,5	47,6	1127,8
11	1983- 84	21,0	36,5	48,5	208,0	55,8	125,5	132,0	209,0	17,5	14,5	1,5	39,0	908,8
12	1984- 85	10,0	11,5	55,0	91,5	84,5	2,5	101,0	63,5	59,0	45,0	0,0	0,0	523,5
13	1985- 86	10,0	83,0	300,0	37,0	78,5	267,0	56,5	0,0	89,5	99,0	42,9	17,0	1080,4
14	1986- 87	0,0	154,5	233,0	65,0	94,0	234,5	231,0	152,5	70,5	12,5	9,0	27,0	1283,5
15	1987- 88	59,0	76,5	103,5	31,0	69,0	34,5	105,0	33,5	14,0	39,5	2,3	0,0	567,8
16	1988- 89	14,5	87,5	117,5	168,5	4,5	18,0	102,5	4,0	77,5	47,5	25,0	13,0	680,0
17	1989- 90	44,5	25,0	31,5	68,5	8,0	21,5	46,5	42,0	81,0	32,5	13,5	69,5	484,0

18	1990- 91	41,5	64,5	91,0	166,0	74,0	49,0	93,0	142,0	72,0	18,5	107,5	48,5	967,5
19	1991- 92	51,5	27,0	55,0	26,0	61,0	14,0	24,5		76,5	201,0	77,5	9,0	-
20	1992- 93	0,0	117,0	42,5	50,0	98,5	92,0	72,0	20,0	108,0				-
21	1993- 94	14,0	29,5	226,5	15,5	221,5	259,5	19,0	83,5	101,5	0,0	53,0	7,0	1030,5
22	1994-95	4,0	154,0	61,5	75,5	193,0	10,0	112,5	19,5	83,0	57,0	54,5	44,8	869,3
23	1995- 96	45,0	27,0	17,0	362,0	154,7	112,0	131,5	47,0	44,5	22,5	12,5	27,0	1002,7
24	1996- 97	55,0	80,5	17,5	107,5	100,0	71,0	48,5	34,5	98,5	21,0	21,5	53,0	708,5
25	1997- 98	10,0	98,0	72,5	110,0	54,0	50,4	12,2	4,4	177,5	9,5	0,0	15,0	613,5
26	1998- 99	36,5	24,0	398,0	135,0	96,5	6,5	144,5	28,5	17,0	41,0	11,0	51,0	989,5
27	1999- 2000	15,5	15,5	398,0	53,5	5,0	79,0	12,5	44,0	78,0	0,0	0,0	7,0	708,0
28	2000- 01	2,0	184,0	32,0	48,0	59,0	23,0	15,0	89,0	58,5	18,0	25,0	27,5	581,0
29	2001- 02	0,0	46,0	23,5	255,5	25,0	1,5	166,8	115,8	7,5	1,2	95,0	4,5	742,3
30	2002- 03	95,5	58,5	28,3	676,0	164,0	96,0	48,5	48,0	46,0	98,0	20,0	46,6	1425,4
31	2003- 04	19,1	85,7	38,2	97,5	143,0	3,0	24,2	63,9	45,5	41,9	9,8	23,7	595,5
32	2004- 05	65,2	123,3	27,5	74,2									-

Statistics and charts

Number of measurements	31	31	31	31	30	31	31	30	31	30	30	30	28
Highest value	216,0	254,0	419,0	676,0	221,5	267,0	231,0	209,0	177,5	201,0	107,5	88,5	1425,4
Lowest value	0,0	11,5	12,0	15,5	4,5	1,5	12,2	0,0	7,5	0,0	0,0	0,0	484,0
Mean value	34,91	88,02	116,39	116,28	80,69	78,72	82,18	68,35	66,94	45,49	29,96	31,37	846,45
Years	30,58	Annual Precipitation from mean monthly of all years											839,29

Chart with the Mean monthly Precipitation during the station operation (mm)

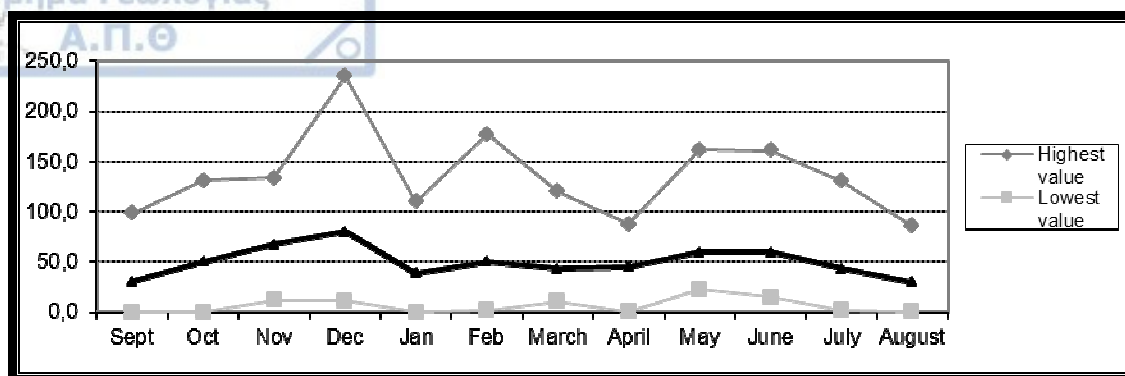
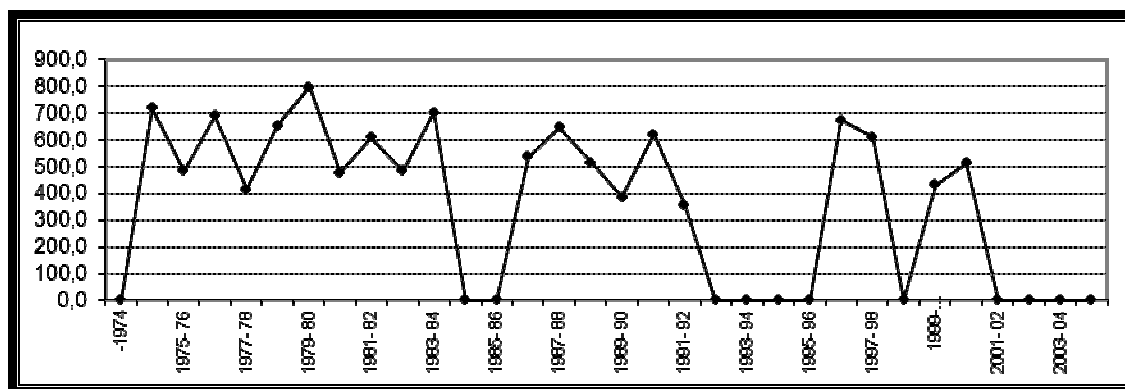


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 20: Moschopotamos

Station	Moschopotamos	Longitude:	356.858,373
County:	Pieria	Latitude:	4.465.828,328
Period:	1974-2004	Altitude (meters):	516,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					64,1	49,2	91,2	91,1	60,1	31,0	0,0	0,0	-
2	1974- 75	64,3	25,5	145,7	30,8	53,4	61,9	57,5	9,4	37,2	128,9	19,3	87,1	721,0
3	1975- 76	28,8	48,1	91,6	29,0	18,2	140,5	57,9	66,5	138,5	85,9	53,5	78,0	836,5
4	1976- 77	11,4	97,6	70,8	19,5	5,5	19,4	42,2	31,5	27,7	51,0	30,6	28,0	435,2
5	1977- 78	35,3	23,0	23,8	69,3	161,5	51,2	41,4	120,0	32,9	27,6	0,4	5,8	592,2
6	1978- 79	152,6	33,4	9,3	125,8	27,2	74,0	30,0	102,5	106,0	18,0	28,5	55,2	762,5
7	1979- 80	38,0	139,2	368,4	127,5	57,2	40,3	75,8	44,9	61,9	8,2	13,9	41,2	1016,5
8	1980- 81	53,8	126,8	42,0	60,5	106,5	77,0	48,5	71,0	34,0	6,0	19,6	48,1	693,8
9	1981- 82	26,5	88,5	35,0	41,0	20,0	61,5	101,5	189,8	72,0	12,0	12,0	49,5	709,3
10	1982- 83	67,0	191,5	146,6	69,0	8,5	9,5	69,0	25,5	68,8	137,1	70,9	24,8	888,2
11	1983- 84	31,5	21,9	48,7	77,0	33,9	51,8	110,1	201,9	15,8	38,3	3,4	25,9	660,2
12	1984- 85	19,1	23,6	85,3	62,1	80,2	3,9	132,0	64,7	65,5	16,5	5,6	27,2	585,7
13	1985- 86	9,2	78,8	347,5	44,5	54,1	191,1	106,0	3,3	89,9	32,4	57,8	51,6	1066,2
14	1986- 87	18,4	114,3	138,6	63,6	94,4	174,4	250,0	116,8	64,1	11,0	8,6	34,0	-
15	1987- 88	20,6	124,3	84,0	49,5	58,7	27,1	71,1	39,1	15,0	64,9	9,7	3,3	567,3
16	1988- 89	49,1	80,0	133,3	192,1	31,7	9,0	57,6	9,1	52,1	88,4	38,2	10,2	750,8
17	1989- 90	70,4	24,6	25,0	59,7	6,8	16,0	20,6	66,2	95,9	12,5	6,8	72,0	476,5

18	1990- 91	38,9	106,0	69,0	136,7	69,0	61,7	136,3	185,5	108,8	18,4	90,0	39,7	1060,0
19	1991- 92	72,1	25,4	42,0	28,2	37,8	15,7	26,8	188,5	100,2	125,6	83,3	2,5	748,1
20	1992- 93	9,1	165,1	31,6	63,2	47,4	79,5	88,4	16,1	157,0	6,1	1,0	2,4	666,9
21	1993- 94	17,9	39,0	193,7	6,2	176,2	125,5	25,4	67,2	67,7	2,9	33,0	9,0	763,7
22	1994-95	1,0	68,2	58,5	56,1	183,9	18,9	70,3	28,1	90,5	27,5	38,9	17,4	659,3
23	1995- 96	56,1	19,4	20,4	346,7	116,3	94,8	155,9	37,6	31,0	7,3	16,3	20,3	922,1
24	1996- 97	57,6	37,4	31,0	61,3	74,5	35,0	31,5	44,5	25,8	22,0	28,4	65,7	514,7
25	1997- 98	10,5	82,2	98,0	112,0	26,0	60,3	14,2	7,7	119,6	30,8	5,0	12,5	578,8
26	1998- 99	50,4	31,5	277,6	175,7	54,9	40,2	108,0	42,4	41,7	34,9	31,3	29,3	917,9
27	1999- 2000	42,9	58,5	421,6	75,4	16,5	63,2	14,3	43,0	54,7	15,0	2,3	31,8	839,2
28	2000- 01	33,2	210,3	42,9	50,2	69,8	31,3	61,4	77,8	91,9	8,7	51,5	13,2	742,2
29	2001- 02	1,0	90,9	19,5	133,2	20,5	30,0	180,6	132,4	27,2	18,0	109,7	31,8	794,8
30	2002- 03	103,9	94,3	33,8	556,8	185,3	77,3	50,0	37,0	81,9	71,2	7,8	57,7	1357,0
31	2003- 04	30,8	129,9	21,9	98,7	100,7	7,7	55,9	98,0	98,0	69,6	16,0	44,2	771,4
32	2004- 05	10,2	136,0	38,0	67,1									-

Statistics and charts

Number of measurements	31	31	31	31	31	31	31	30	31	31	31	31	29
Highest value	152,6	210,3	421,6	556,8	185,3	191,1	250,0	201,9	157,0	137,1	109,7	87,1	1357,0
Lowest value	1,0	19,4	9,3	6,2	5,5	3,9	14,2	3,3	15,0	2,9	0,0	0,0	435,2
Mean value	39,73	81,78	103,07	99,63	66,47	58,03	76,82	71,41	68,82	39,60	28,82	32,88	762,00
Years	30,92	Annual Precipitation from mean monthly of all years											767,06

Chart with the Mean monthly Precipitation during the station operation (mm)

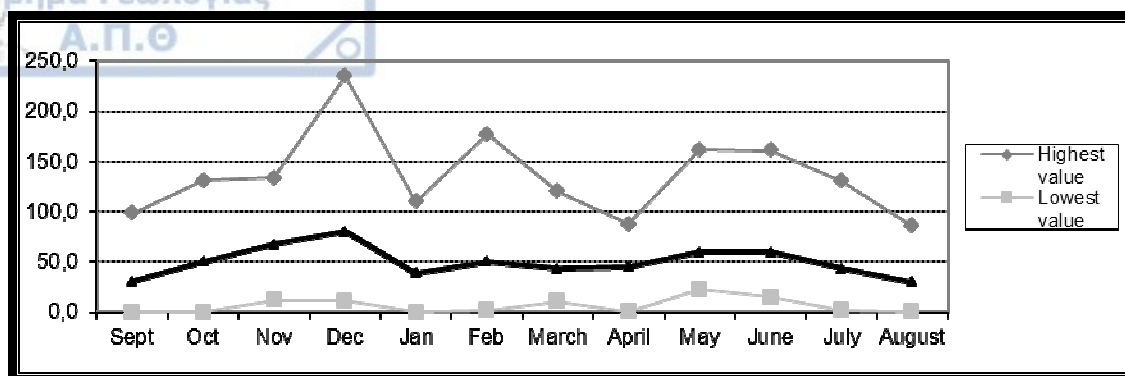
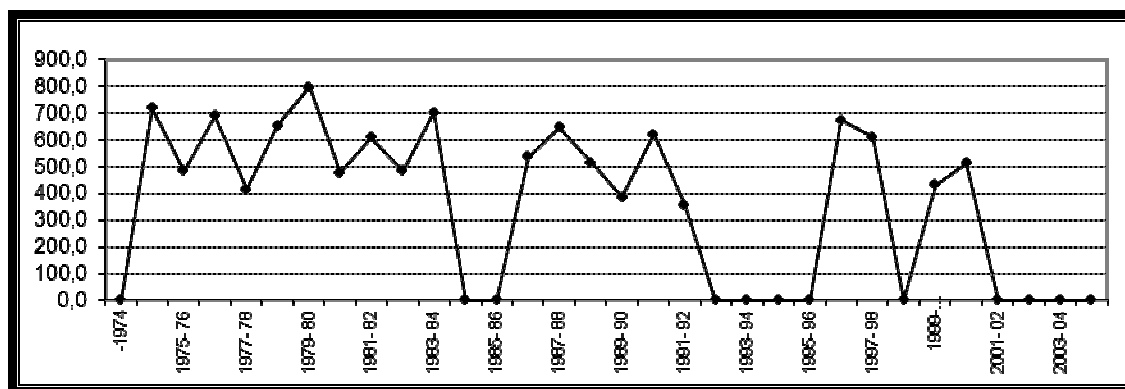


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 21: Deskati

Station	Deskati	Longitude:	311.867,150
County:	Grevena	Latitude:	4.422.388,357
Period:	1974-2004	Altitude (meters):	850,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					76,5	191,0	60,5	92,0	34,0	52,5	8,0	8,5	-
2	1974- 75	55,5	74,5	27,5	42,5	32,0	42,6	36,0	16,0	60,0	67,0	14,5	55,0	523,1
3	1975- 76	21,5	53,9	71,5	51,0		88,3	37,0	51,0	67,0	46,0	2,0	34,0	-
4	1976- 77	5,0	37,5	36,0	79,3	34,2	22,5	27,0	21,0	17,5	33,5	28,0	15,5	357,0
5	1977- 78	38,5	0,0	12,5	77,0	84,0	32,5	39,0	13,5	13,0	13,5	0,0	24,5	348,0
6	1978- 79	131,5	22,0	0,0	29,0	29,0	31,5	14,5	61,0	92,0	28,5	12,5	10,5	462,0
7	1979- 80	6,5	111,5	137,5	31,5	25,0	20,0	38,5	40,0	102,5	33,0	0,0	31,0	577,0
8	1980- 81	4,5	167,0	49,0	80,0	36,5	8,0	37,3	49,5	50,0	39,0	36,0	48,5	605,3
9	1981- 82	8,5	117,5	14,0	10,0	2,0	2,0	12,6	25,0			2,5	33,9	-
10	1982- 83	0,0	0,0	65,0	29,5	16,0	34,0		0,0	0,0	0,0		15,0	-
11	1983- 84	18,0	48,0		0,0	8,0	4,5	5,0			8,0	2,0	8,0	-
12	1984- 85	14,0		10,0	4,0				52,0	28,0	12,0	1,0	0,0	-
13	1985- 86	7,0	36,0	190,0	32,1	67,7	199,7	61,4	31,4	104,8	63,1	23,4	25,0	841,6
14	1986- 87	15,0	56,3	66,5	5,0	46,2	37,2	192,1	97,8	78,4	10,4	34,5	99,5	738,9
15	1987- 88	48,0	98,8	90,9	46,4	55,1	28,4	60,4	55,8	5,6	18,3	54,5	15,5	577,7
16	1988- 89	17,4	14,0	85,2	15,8	8,7	9,3	28,1	1,5	24,4			27,8	-
17	1989- 90	47,0	46,0	35,0	47,5	0,0	11,0	37,0	20,3	90,5	10,7	19,5	68,5	433,0

18	1990- 91	6,8	41,0	87,5	130,1	31,0	56,0	56,4	106,7	83,7	24,3	43,5	55,5	722,5
19	1991- 92	42,9	39,2	59,0	24,1	15,7	7,2	25,2	107,8	82,9	97,5	42,2	3,5	547,2
20	1992- 93	5,2	49,2	74,3	43,4	69,0	72,0	9,3	30,1	150,2	12,4	0,0	7,9	523,0
21	1993- 94	13,7	14,0	216,1	39,8	123,6	157,0	37,3	79,2	23,5	2,0	44,7	75,0	825,9
22	1994-95	0,9	76,4	83,0	58,5	154,3	20,0	56,2	45,1	103,1	26,5	41,1	43,9	709,0
23	1995- 96	56,1	6,0	68,2	15,3	84,7	142,8	105,5	36,3	37,0	5,3	29,6	40,6	627,4
24	1996- 97	82,6	92,2	70,3	90,8	46,1	32,2	23,9	61,7	5,1	20,5	7,6	90,3	623,3
25	1997- 98	21,3	101,5	61,6	99,2	27,8	11,5	13,0	6,0	148,8	3,1	0,0	11,7	505,5
26	1998- 99	39,5	35,5	244,6	79,0									-
27	1999- 2000													-
28	2000- 01													-
29	2001- 02								61,5	18,0	33,0	151,8	57,5	-
30	2002- 03	164,3	60,5	68,2	290,6	190,1	141,8	43,8	107,5	86,0	43,5	44,5	86,0	1326,8
31	2003- 04	67,0	142,0	19,5	86,5	152,5	39,0	57,5	85,5	82,5	22,5	17,0	14,5	786,0
32	2004- 05	52,0	80,5	66,5	64,5									-

Statistics and charts

Number of measurements	28	27	27	28	25	26	25	27	26	26	26	28	20
Highest value	164,3	167,0	244,6	290,6	190,1	199,7	192,1	107,8	150,2	97,5	151,8	99,5	1326,8
Lowest value	0,0	0,0	0,0	0,0	0,0	2,0	5,0	0,0	0,0	0,0	0,0	0,0	348,0
Mean value	35,36	60,04	74,42	57,23	56,63	55,46	44,58	50,19	61,10	27,93	25,40	35,97	633,01
Years	26,58	Annual Precipitation from mean monthly of all years											584,31

Chart with the Mean monthly Precipitation during the station operation (mm)

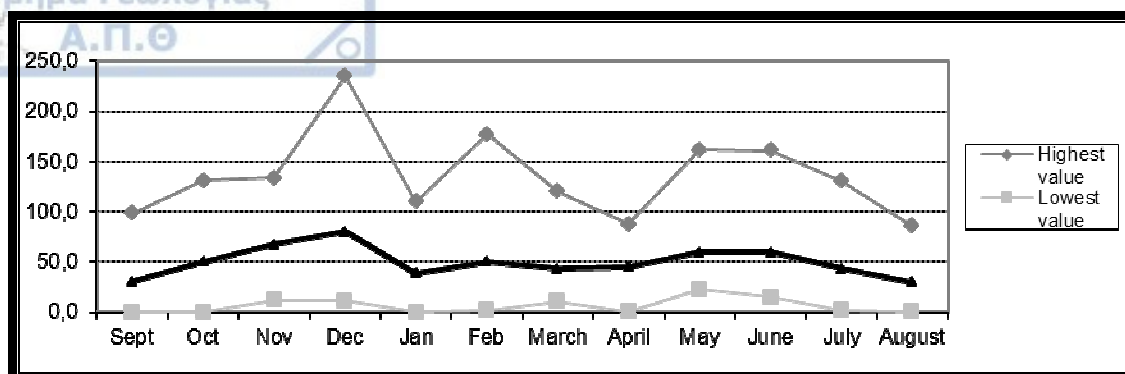
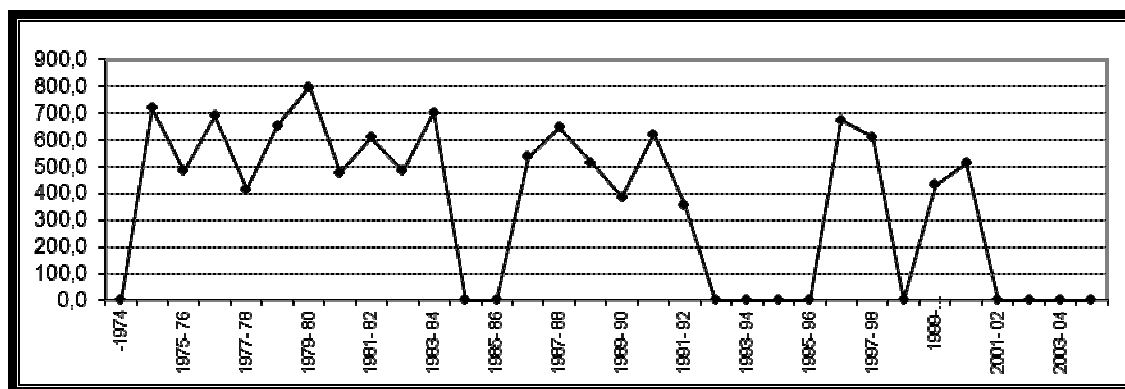


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 22:Agia Paraskevi

Station	Agia Paraskevi		Longitude:	281.013,000
County:	Grevena		Latitude:	4.439.877,045
Period:	1974-2004		Altitude (meters):	615,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974													-
2	1974- 75													-
3	1975- 76													-
4	1976- 77													-
5	1977- 78							42,3	97,1	20,2	2,4	4,6	2,0	-
6	1978- 79	85,0	59,7	24,0	93,0	138,5	73,0	38,0	108,7	75,0	42,0	19,8	30,6	787,3
7	1979- 80	59,5	100,4	218,7	61,0	87,0	20,5	50,5	28,8	101,5	25,2	1,7	15,0	769,8
8	1980- 81	5,9	132,4	114,7	132,3	9,4	34,5	34,0	71,6	57,3	23,1	33,5	70,5	719,2
9	1981- 82	34,0	96,8	23,0	73,0	23,0	52,0	44,0	126,0	80,0	5,0	10,9	31,5	599,2
10	1982- 83	44,3	107,0	191,0	68,5	20,0	38,0	43,0	28,3	38,3	55,2	67,2	15,3	716,1
11	1983- 84	58,8	51,8	66,5	34,0	92,0	95,5	71,0	68,0	14,2	9,5	1,2	39,7	602,2
12	1984- 85	22,3	13,8	65,5	35,3	92,0	20,0	72,5	78,3	55,2	30,1	29,5	0,5	515,0
13	1985- 86	10,4	32,1	145,5	14,9	65,2	136,6	37,4	8,5	135,8	48,6	31,9	17,0	683,9
14	1986- 87	7,7	70,4	104,1	16,7	94,8	70,7	76,8	72,1	70,8	28,5	23,7	29,8	666,1
15	1987- 88	0,0	227,0	115,0	31,5	34,0	30,5	43,5	54,0	13,7	15,5	0,0	3,3	568,0
16	1988- 89	14,3	21,0	185,0	38,4	20,3	77,8	50,7	13,4	49,0	30,1	101,3	9,3	610,6
17	1989- 90	11,6	63,5	60,0	30,8	0,0	21,8	19,2	39,9	71,4	10,9	26,5	43,6	399,2

18	1990- 91	19,8	33,1	79,0	168,9	32,2	74,6	56,8	162,9	71,3	24,9	17,7	73,9	815,1
19	1991- 92	9,7	29,6	68,7	16,0	22,0	6,4	30,2	116,3	69,5	78,3	27,2	0,0	473,9
20	1992- 93	10,6	81,8	53,4	82,5	58,0	39,0	42,9	21,2	67,6	20,0	0,0	12,0	489,0
21	1993- 94	11,4	40,4	97,4	65,6	77,1	105,0	29,0	56,4	50,0	1,1	45,0	39,7	618,1
22	1994-95	6,9	68,2	83,1	113,1	141,9	38,5	111,2	36,5	59,5	4,5	62,2	37,4	763,0
23	1995- 96	57,1	6,3	35,8	140,1	80,7	86,4	65,0	48,0	20,3	1,1	67,5	33,6	641,9
24	1996- 97	56,6	101,4	95,2	120,6	34,1	33,5	43,9	50,7	14,0	17,1	13,8	12,1	593,0
25	1997- 98	23,0	126,1	90,6	134,4	30,5	79,0	21,6	7,5	146,9	34,5	0,0	13,2	707,3
26	1998- 99	124,4	45,4	287,0	104,7									-
27	1999- 2000													-
28	2000- 01													-
29	2001- 02							103,0	89,7	29,7	27,7	118,2	66,6	-
30	2002- 03	114,8	45,8	21,7	270,0	146,9	94,9	32,9				77,4	61,3	-
31	2003- 04	52,1	200,1	33,6	108,3	147,8	33,6	75,5	89,2	88,5	15,6			-
32	2004- 05													-

Statistics and charts

Number of measurements	23	23	23	23	22	22	24	23	23	23	23	23	20
Highest value	124,4	227,0	287,0	270,0	147,8	136,6	111,2	162,9	146,9	78,3	118,2	73,9	815,1
Lowest value	0,0	6,3	21,7	14,9	0,0	6,4	19,2	7,5	13,7	1,1	0,0	0,0	399,2
Mean value	36,53	76,27	98,20	84,94	65,79	57,35	51,45	64,05	60,86	23,95	33,95	28,60	636,90
Years	22,92	Annual Precipitation from mean monthly of all years											681,94

Chart with the Mean monthly Precipitation during the station operation (mm)

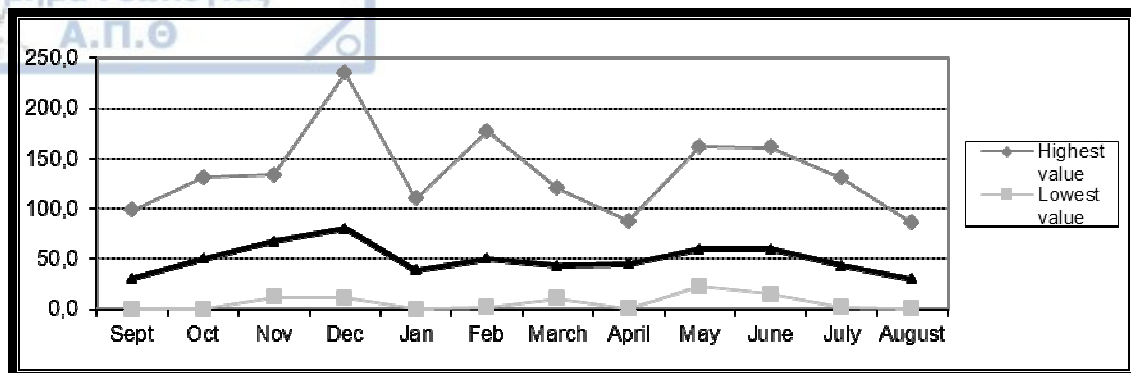
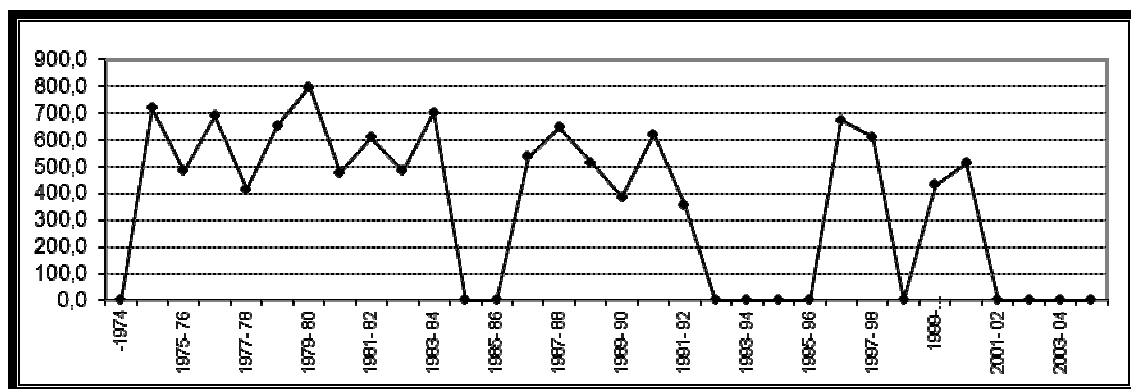


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 23: Anavruta

Station	Anavruta		Longitude:	282.381,140
County:	Grevena		Latitude:	4.437.985,969
Period:	1974-2004		Altitude (meters):	860,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974													-
2	1974- 75													-
3	1975- 76													-
4	1976- 77													-
5	1977- 78						105,5	94,5	170,6	28,6	30,0	0,0	4,6	-
6	1978- 79	136,5	103,3	79,2	176,0	298,5	133,9	71,8	203,7	145,9	11,9	12,4	56,7	1429,8
7	1979- 80	120,6	167,2	379,3	190,1	137,3	55,0	95,4	60,2	171,6	40,8	0,0	7,6	1425,1
8	1980- 81	25,0	152,0	191,0	160,0	88,0	66,0	31,0	66,0	54,5	27,0	0,0	94,5	955,0
9	1981- 82	27,0	160,5	50,0	154,0	17,0	51,0	113,0	128,0	111,0	18,0	3,0	49,0	881,5
10	1982- 83	66,0	103,0	158,0	131,0	36,0	50,0	37,0	22,0	38,0	87,0	45,0	10,0	783,0
11	1983- 84	85,0	59,0	101,0	171,0	132,0	119,0	83,0	106,0	13,0	17,0	3,0	36,0	925,0
12	1984- 85	22,0	21,0	74,0	54,0	140,0	31,0	93,0	120,0	74,0	15,0	4,0	0,0	648,0
13	1985- 86	13,0	51,0	225,0	31,0	111,0	173,0	75,0	9,0	118,5	76,0	32,0	48,0	962,5
14	1986- 87	10,0	93,0	124,0	55,0	142,0	105,0	136,0	61,0	61,0	24,5	18,5	42,5	872,5
15	1987- 88	0,0	140,0	133,0	51,0	46,0	58,0	61,0	50,0	22,0	8,0	0,0	17,0	586,0
16	1988- 89	18,0	50,0	133,4	127,1	7,0	77,0	71,0	20,0	80,0	47,0	104,0	4,0	738,5
17	1989- 90	29,0	86,0		78,0	4,0	34,0	12,0	46,0	82,0	8,0	11,0	49,0	-

18	1990- 91	10,0	38,0	147,0	269,0	95,0	185,0	75,0	146,0	85,0	23,0	44,0	68,0	1185,0
19	1991- 92	15,0	67,0	105,0	20,0	29,0	11,0	16,0	141,0	76,0	55,0	29,0	8,0	572,0
20	1992- 93	20,0	130,0	54,0	123,0	114,0	105,0	97,0	30,0	75,0	35,0	0,0		-
21	1993- 94					165,0	244,0	11,0	81,0	44,0	8,0	62,0	66,0	-
22	1994-95	10,0	102,0	114,0	84,0	237,0	42,0	133,0	45,0	73,0	39,0	65,0	57,0	1001,0
23	1995- 96	51,0	6,0	46,0	171,0	115,0	122,0	84,0	25,0	32,0	17,0	110,0	42,0	821,0
24	1996- 97	57,0	128,0	116,0	180,0	72,0	44,0	31,0	74,0	10,0	18,0	6,0	35,0	771,0
25	1997- 98	9,0	123,0	114,0	135,0	39,0	97,0	37,0	22,0	142,0	32,0		31,0	-
26	1998- 99	121,0	46,0	357,0	142,0									-
27	1999- 2000													-
28	2000- 01													-
29	2001- 02								41,0	53,3	0,0	110,1	42,9	-
30	2002- 03	127,8	39,0	33,0	326,7	201,6	107,0	32,0	85,5	58,4	15,3	78,4	47,7	1152,4
31	2003- 04	70,0	198,6	70,6	127,7	188,0	40,3	67,5	83,0	116,0	53,8	17,7	14,7	1047,9
32	2004- 05	45,4	153,0	76,1	79,0									-

Statistics and charts

Number of measurements	23	23	22	23	22	23	23	24	24	24	23	23	18
Highest value	136,5	198,6	379,3	326,7	298,5	244,0	136,0	203,7	171,6	87,0	110,1	94,5	1429,8
Lowest value	0,0	6,0	33,0	20,0	4,0	11,0	11,0	9,0	10,0	0,0	0,0	0,0	572,0
Mean value	47,32	96,37	130,94	131,98	109,75	89,38	67,70	76,50	73,53	29,43	32,83	36,14	930,96
Years	23,08	Annual Precipitation from mean monthly of all years											921,87

Chart with the Mean monthly Precipitation during the station operation (mm)

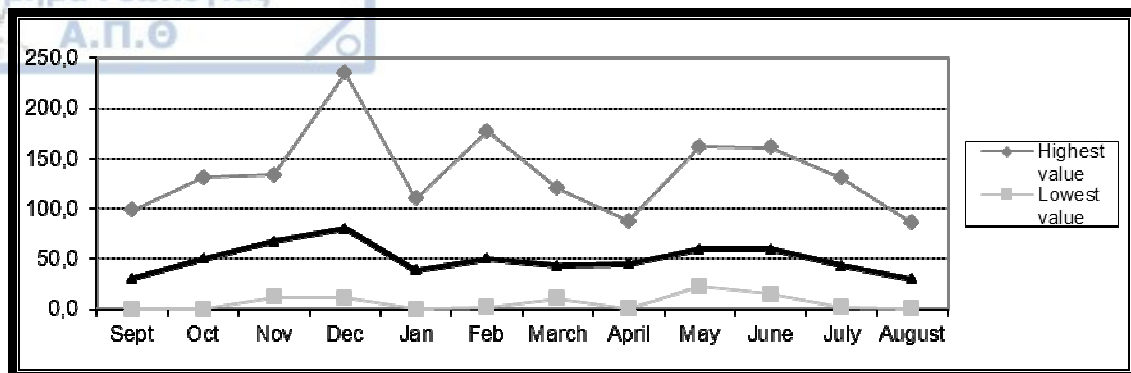
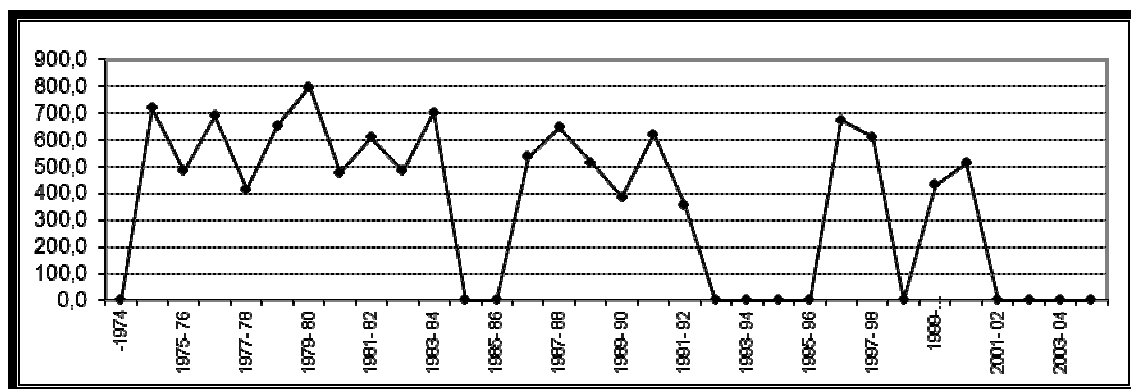


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 24: Megali Panagia

Station	Megali Panagia	Longitude:	471.584,641
County:	Chalkidiki	Latitude:	4.477.471,821
Period:	1974-2004	Altitude (meters):	440,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974													-
2	1974- 75													-
3	1975- 76				27,1	28,0	161,2	32,4	74,3	98,2	16,8	28,2	135,6	-
4	1976- 77	5,0	112,0	75,4	16,3	24,1	27,3	29,1	24,4	59,7	53,8	20,6	17,7	465,4
5	1977- 78	20,4	0,6	63,4	43,0	50,2	73,5	40,2	100,8	151,7	21,1	9,6	28,5	603,0
6	1978- 79	156,1	158,3	15,8	70,5	45,7	56,4	17,4	53,0	97,6	2,1	59,0	58,9	790,8
7	1979- 80	54,2	151,6	145,6	71,6	83,2	9,8	84,5	40,7	40,1	28,3	81,3	49,4	840,3
8	1980- 81	19,5	54,1	34,7	163,2	215,9	87,4	19,9	16,5	32,5	20,6	12,3	54,4	731,0
9	1981- 82	7,3	61,6	101,3	39,4	30,3	92,0	43,2	135,8	28,5	6,8	41,6	35,6	623,4
10	1982- 83	35,5	64,0	69,2	20,0	11,3	20,3	32,3	14,3	6,7	110,9	49,9	43,0	477,4
11	1983- 84	16,6	22,1	43,6	296,8	14,9	84,8	112,5	77,8	28,7	21,0	5,8	76,3	800,9
12	1984- 85	1,5	14,7	46,6	136,8	36,1	5,9	38,1	5,8	11,2	49,0	9,9	16,8	372,4
13	1985- 86	10,3	20,9	202,8	34,2	73,9	265,4	8,6	17,4	21,8	58,9	62,7	12,3	789,2
14	1986- 87	5,6	27,1	50,8	9,9	60,8	99,6	182,3	124,6	33,3	56,8	12,3	25,1	688,2
15	1987- 88	2,9	118,2	160,0	45,8	25,6	82,2	151,2	30,5	26,6	39,5	20,7	19,8	723,0
16	1988- 89	2,8	29,0	104,1	41,2	0,3	0,0	45,2	18,0	61,0	57,1	45,9	16,0	420,6
17	1989- 90	53,4	30,8	49,1	79,6	0,0	5,8	5,6	27,1	32,1	26,5	31,8	7,2	349,0

18	1990- 91	25,3	51,3	50,2	399,2	21,4	110,0	42,7	87,6	76,2	31,0	59,5	46,7	1001,1
19	1991- 92	3,6	28,3	64,1	9,2	10,1	22,9	29,9	22,9	35,6	12,9	20,0	5,4	264,9
20	1992- 93	0,2	26,6	60,4	36,0	4,6	2,5	45,9		146,0	9,5	0,0	12,2	-
21	1993- 94	6,8	2,6	122,8	8,5	126,5	111,0	20,3	76,0	80,9	1,5	63,5	18,5	638,9
22	1994-95	1,3	107,3	106,2	88,0	77,7	6,4	29,3			88,0	36,1	84,6	-
23	1995- 96	35,3	45,8	58,6	190,3	93,2		74,0	31,0					-
24	1996- 97													-
25	1997- 98			31,2	81,5	73,7	19,3	52,3	2,2	121,6	6,6	5,9		-
26	1998- 99												0,5	-
27	1999- 2000	54,5	49,0	74,3	61,3	42,4	57,3	6,3	60,7	12,3	7,6	15,3	0,0	441,0
28	2000- 01	4,4	332,1	25,7	12,4	119,3	27,4	18,6	60,0	88,9	7,6	15,9	19,5	731,8
29	2001- 02				124,9	25,0	2,1	20,2	59,6	26,0	13,2	165,5	19,0	-
30	2002- 03	81,2	105,6	113,0	415,8							34,7	11,8	-
31	2003- 04	60,2	92,0	27,9	363,8	270,0	33,2	31,2	66,6	59,8	104,7			-
32	2004- 05			82,2	101,1									-

Statistics and charts

Number of measurements	156,1	332,1	202,8	415,8	270,0	265,4	182,3	135,8	151,7	110,9	165,5	135,6	1001,1
Highest value	0,2	0,6	15,8	8,5	0,0	0,0	5,6	2,2	6,7	1,5	0,0	0,0	264,9
Lowest value	27,66	71,07	76,12	106,69	60,16	58,55	46,66	51,15	57,38	34,07	36,32	32,59	618,54
Mean value	156,1	332,1	202,8	415,8	270,0	265,4	182,3	135,8	151,7	110,9	165,5	135,6	1001,1
Years	25,17	Annual Precipitation from mean monthly of all years											658,42

Chart with the Mean monthly Precipitation during the station operation (mm)

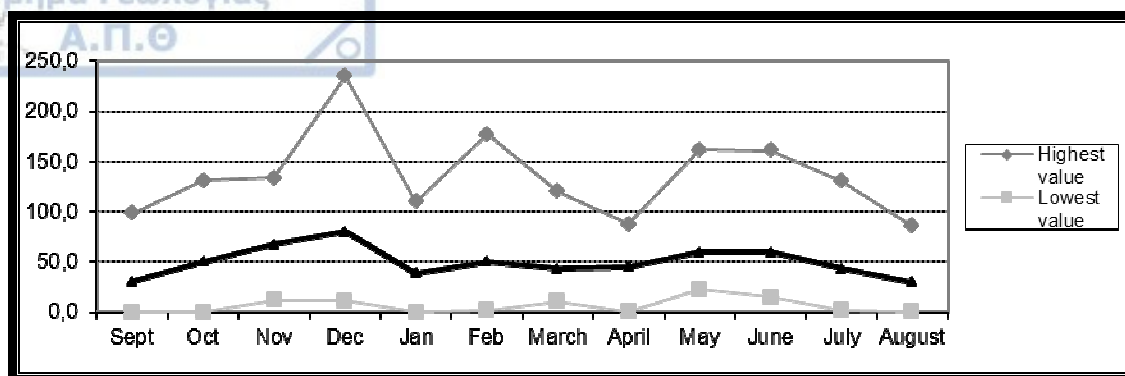
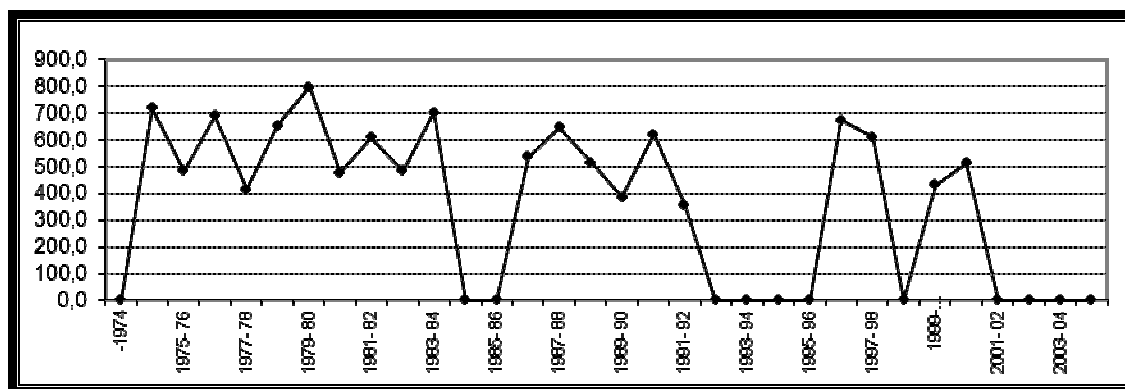


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 25: Plana

Station	Plana	Longitude:	471.556,731
County:	Chalkidiki	Latitude:	4.470.071,868
Period:	1974-2004	Altitude (meters):	11,50

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974													-
2	1974- 75													-
3	1975- 76				27,3	17,0	81,2	34,1	47,2	80,2	19,4	38,0	88,8	-
4	1976- 77	2,8	113,8	62,0	16,1	20,0	17,3	30,9	14,1	50,7	38,0	10,9	21,8	398,4
5	1977- 78	14,1	0,7	82,9	28,6	53,3	50,4	22,5	75,3	97,2	13,1	2,7	9,5	450,3
6	1978- 79	109,9	81,7	10,7	61,9	33,8	36,8	18,0	33,1	51,8	9,2	63,0	60,2	570,1
7	1979- 80	32,2	119,9	95,3	75,3	89,5	15,8	62,6	40,6	48,4	34,7	41,7	56,2	712,2
8	1980- 81	16,4	65,5	48,5	172,7	86,3	35,8	15,4	8,7	23,3	13,4	29,4	15,5	530,9
9	1981- 82	0,0	99,8	69,7	80,4	16,5	78,9	57,0	85,3	19,5	8,7	29,7	22,3	567,8
10	1982- 83	28,5	74,0	60,3	42,7	14,4	28,3	39,6	12,5	18,9	113,4	38,2	57,9	528,7
11	1983- 84	13,3	13,8	72,8	190,4	35,6	67,0	88,2	64,7	23,1	30,5	9,6	71,3	680,3
12	1984- 85	8,1	6,8	44,2	75,3	22,5	19,9	33,9	3,4	7,7	28,1	6,2	58,7	314,8
13	1985- 86	6,8	14,6	185,9	22,3	38,1	234,2	8,3	1,2	52,8	137,7	23,7	1,6	727,2
14	1986- 87	6,0	15,4	39,0	18,9	51,5	72,5	114,9	73,4	19,1	67,4	14,5	33,6	526,2
15	1987- 88	0,0	172,6	153,0	36,4	25,5	56,0	90,6	28,8	12,5	59,5	7,0	0,0	641,9
16	1988- 89	5,7	7,6	111,5	167,8	1,9	0,0	32,6	15,7	48,7	32,9	46,0	1,1	471,5
17	1989- 90	103,3	19,8	42,1	78,4	0,0	4,2	4,3	27,3	21,5	15,7	32,8	18,1	367,5

18	1990- 91	22,5	42,5	28,7	174,7	22,8	80,7	27,0	82,6	39,8	20,4	64,3	60,0	666,0
19	1991- 92	12,4	28,6	86,7	12,5	17,2	16,4	16,8	65,1	64,1	30,7	45,1	0,5	396,1
20	1992- 93	0,4	20,4	55,3	25,2	18,9	11,2	48,5	16,9	61,2	67,4	11,8	31,2	368,4
21	1993- 94	12,5	12,7	106,9	38,6	113,7	65,3	11,2	86,7	36,6	12,3	42,0	4,9	543,4
22	1994-95	7,2	48,9	69,1	67,6	77,6	3,3	34,0	13,1	6,1	22,2	64,1	45,0	458,2
23	1995- 96	39,5	24,4	45,8	190,8	94,6	63,6	33,4	38,6	38,7	0,0	0,0	26,1	595,5
24	1996- 97	37,9	29,5	63,0	97,9	37,1	48,2	54,7						-
25	1997- 98	1,5	78,5	26,9	59,2	55,1	77,2	28,0	1,2	71,5	7,5	0,0	0,0	406,6
26	1998- 99												6,0	-
27	1999- 2000	63,8	78,2	75,0	61,8	50,9	58,6	5,0	22,7	19,8	10,6	14,8	0,0	461,2
28	2000- 01	6,6	214,7	31,2	11,2	140,3	28,0	0,8	64,8	46,1	0,0	12,4	32,6	588,7
29	2001- 02	0,0	0,0	15,0	26,8	17,4	12,1	87,8	48,7	19,0	21,6	103,9	19,1	371,4
30	2002- 03	108,3	52,4	90,3	328,8	Stopped						22,5	9,6	-
31	2003- 04	63,6	92,2	5,9	183,3	173,6	12,7	29,5	38,5	46,3	48,9			-
32	2004- 05			43,8	57,3	31,8	70,4	22,2	1,0	35,6	32,7	40,5	45,4	-

Statistics and charts

Number of measurements	27	27	28	29	27	27	27	26	26	26	26	27	24
Highest value	109,9	214,7	185,9	328,8	173,6	234,2	114,9	86,7	97,2	137,7	103,9	88,8	727,2
Lowest value	0,0	0,0	5,9	11,2	0,0	0,0	0,8	1,2	6,1	0,0	0,0	0,0	314,8
Mean value	26,79	56,63	65,05	83,80	49,08	47,24	38,13	38,85	39,41	33,20	29,78	27,84	514,31
Years	26,92	Annual Precipitation from mean monthly of all years											535,81

Chart with the Mean monthly Precipitation during the station operation (mm)

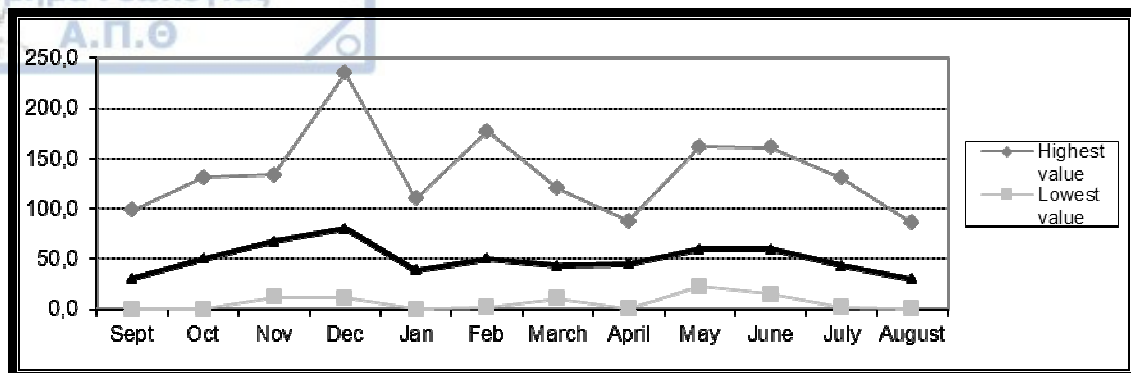
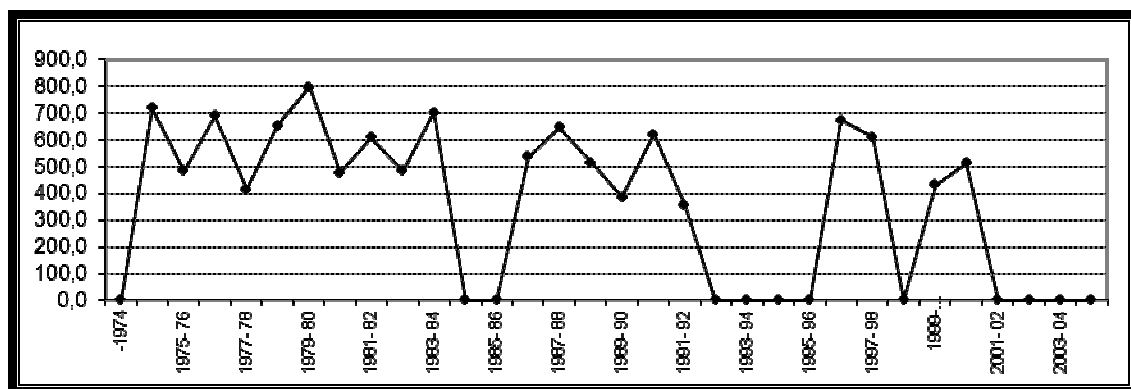


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 26: Ormulia

Station	Ormulia		Longitude:	461.606,877
County:	Chalkidiki		Latitude:	4.460.865,882
Period:	1974-2004		Altitude (meters):	40,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974													
2	1974- 75													
3	1975- 76				21,7	17,5	77,9	22,8	36,4	36,7	5,5	57,8	96,0	
4	1976- 77	14,5	83,9	44,1	10,4	19,4	16,4	27,8	6,3	44,0	31,6	13,3	2,4	14,5
5	1977- 78	17,6	0,0	65,0	28,2	45,5	53,5	39,6	85,3	59,5	10,9	0,0	0,0	17,6
6	1978- 79	89,4	76,6	10,0	58,0	23,6	48,0	22,0	11,4	69,7	3,9	61,4	17,0	89,4
7	1979- 80	19,1	129,5	65,2	60,2	51,3	12,5	35,8	30,5	42,9	18,0	31,0	13,6	19,1
8	1980- 81	2,7	80,3	41,0	111,4	61,3	29,3	48,2	15,0	13,0	5,2	0,0	16,3	2,7
9	1981- 82	0,0	50,0	61,3	41,1	2,4	44,7	34,0	81,5	11,6	3,5	7,9	35,3	0,0
10	1982- 83	7,2	51,7	33,3	21,5	15,0	27,3	8,4	17,1	23,3	72,9	0,0	19,0	7,2
11	1983- 84	8,7	15,0	66,5	240,2	39,5	58,4	74,1	40,7	31,3	15,9	0,0	158,1	8,7
12	1984- 85	3,1	7,1	34,8	91,8	9,4	5,1	25,1	6,0	4,1	6,7	0,0	27,4	3,1
13	1985- 86	11,5	19,6	105,3	16,8	29,5	215,4	4,3	0,0	44,5	67,3	34,2	3,5	11,5
14	1986- 87	40,4	16,8	19,3	7,5	59,4	55,2	110,7	60,4	13,7	73,5	48,5	102,7	40,4
15	1987- 88	57,0	84,1	132,9	21,2	9,8	39,7	72,3	0,0	9,9	26,5	0,0	3,2	57,0
16	1988- 89	15,7	8,1	108,2	92,5	0,0	2,3	32,2	22,3	71,7	3,2	29,9	0,0	15,7
17	1989- 90	23,5	3,2	29,1	46,7	0,0	3,5	8,4	8,3	----	----	3,5	2,8	23,5

18	1990- 91	9,5	39,7	23,6	131,6	5,4	60,2	21,8	64,6	12,1	27,5	26,8	53,2	9,5
19	1991- 92	22,9	16,9	41,6	10,9	16,1	10,0	24,4	52,3	44,2	23,6	48,1	0,0	22,9
20	1992- 93	1,7	9,8	47,9	45,5	27,1	10,1	60,4	16,3	59,8	35,3	12,9	18,4	1,7
21	1993- 94	12,7	10,7	108,1	47,2	85,3	92,8	14,5	49,6	22,2	0,3	30,9	17,1	12,7
22	1994-95	0,0	72,0	72,4	58,5	133,2	1,0	68,6	19,3	11,3	15,5	45,4	9,6	0,0
23	1995- 96	35,3		40,5	194,2	90,0	80,3	26,5	32,7	45,8	0,6	0,6	25,2	35,3
24	1996- 97	29,0	45,9	58,8	55,2	37,3	50,4	29,8	37,0					29,0
25	1997- 98			23,6	72,1	48,1	55,0	30,8	2,9	89,7	8,2	0,0	0,0	
26	1998- 99													
27	1999- 2000													
28	2000- 01													
29	2001- 02												9,8	
30	2002- 03	135,2	50,0	75,7	120,7	STOPPED						0,3	46,0	135,2
31	2003- 04	59,7	46,7	34,0	158,0	180,0	10,0	38,0	26,6	29,0	16,7	STOPPED		59,7
32	2004- 05	STOPPED			58,5									0

Statistics and charts

Number of measurements	23	22	24	26	25	25	25	25	23	23	24	25	18
Highest value	135,2	129,5	132,9	240,2	180,0	215,4	110,7	85,3	89,7	73,5	61,4	158,1	748,4
Lowest value	0,0	0,0	10,0	7,5	0,0	1,0	4,3	0,0	4,1	0,3	0,0	0,0	220,6
Mean value	26,80	41,71	55,93	70,06	40,28	45,76	36,20	28,90	37,87	20,87	20,06	28,90	439,76
Years	24,17	Annual Precipitation from mean monthly of all years											453,35

Chart with the Mean monthly Precipitation during the station operation (mm)

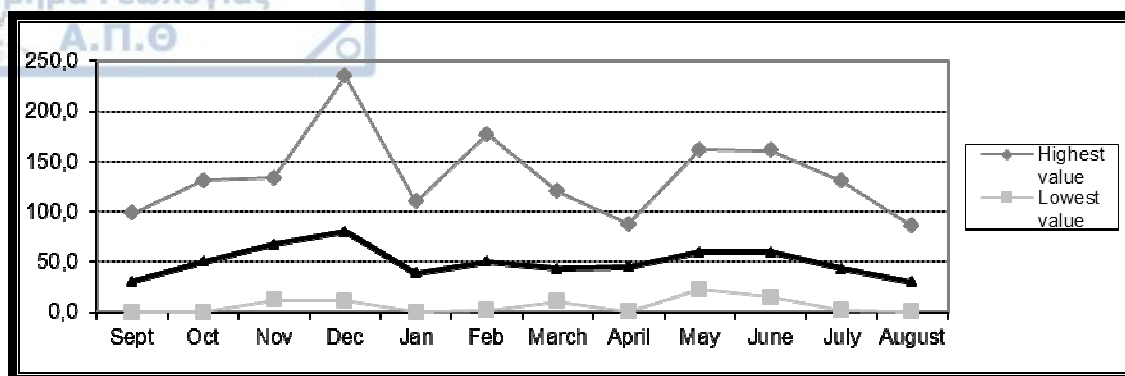
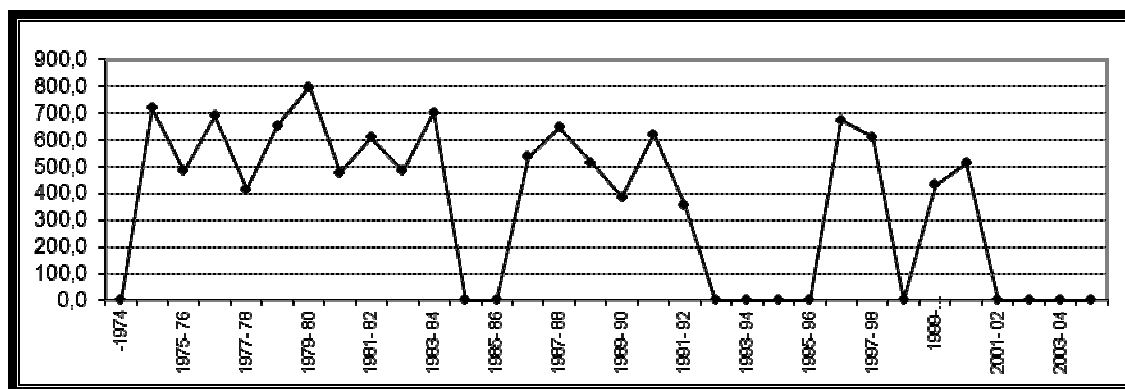


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 27: Arnaia

Station	Ano Theodoraki		Longitude:	466.373,529
County:	Chalkidiki		Latitude:	4.481.532,566
Period:	1974-2004		Altitude (meters):	585,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974	41,0	70,2	38,3	32,8	92,7	94,0	53,0	69,2	64,5	152,3	0,5	32,0	740,5
2	1974- 75	31,9	40,3	84,8	71,9	100,1	49,2	33,9	16,3	67,6	80,5	63,2	53,0	692,7
3	1975- 76	34,3	82,1	51,2	25,5	27,7	82,4	75,2	39,5	41,5	36,1	21,6	159,8	676,9
4	1976- 77	8,5	133,8	69,0	28,3	48,9	24,3	66,3	9,6	62,6	32,3	63,5	9,0	556,1
5	1977- 78	15,3	3,8	83,2	36,6	137,4	45,5	27,9	81,0	112,4	13,0	10,5	10,0	576,6
6	1978- 79	113,7	162,8	28,7	78,5	47,0	53,5	23,1	57,5	79,3	22,0	98,0	44,8	808,9
7	1979- 80	71,3	126,0	151,3	113,5	121,0	14,3	101,8	77,7	91,7	27,5	68,5	55,6	1020,2
8	1980- 81	16,5	71,2	50,6	184,8	254,0	84,5	17,7	15,5	37,0	26,9	2,5	71,0	832,2
9	1981- 82	0,7	58,0	121,0	88,2	53,3	96,0	84,8	103,2	23,2	18,5	35,0	31,3	713,2
10	1982- 83	63,3	98,0	110,6	74,0	47,5	61,6	26,0	14,6	19,9	116,9	75,9	83,5	791,8
11	1983- 84	13,8	26,0	62,5	140,3	45,2	116,5	121,3	58,0	24,0	40,0	4,9	73,3	725,8
12	1984- 85	14,5	6,5	55,3								0,0	9,5	-
13	1985- 86	13,0	16,5	194,8	21,7	46,5	229,2	4,5	24,5	80,7	165,5	63,0	55,0	914,9
14	1986- 87	6,5	26,0	29,0	20,0	89,5	103,8	158,0	112,5	28,5	77,0	30,5	33,5	714,8
15	1987- 88	0,0	177,0	163,0	37,0	29,0	80,5	96,5	27,5	41,0	44,7	28,0	7,5	731,7
16	1988- 89	2,5	14,0	111,5	163,0	3,0	2,0	54,5	21,5	49,0	45,0	94,5	23,8	584,3
17	1989- 90	91,5	39,3	55,5	78,5	0,0	1,0	18,5	34,0	57,8	33,0	75,5	8,5	493,1

18	1990- 91	35,0	45,5	37,0	306,5	27,0	96,5	16,5	81,5	63,5	26,0	136,0	53,0	924,0
19	1991- 92	0,0	30,0	59,3	54,0	15,5	35,0	27,5	94,0	31,0	23,5	68,0	0,0	437,8
20	1992- 93	1,5	23,5	44,0	52,0	34,0	30,5	65,5	21,5	69,0	33,5	0,0	12,0	387,0
21	1993- 94	15,0	12,0	99,5	44,0	133,5	94,5	25,0	71,0	44,0	2,5	58,0	10,0	609,0
22	1994-95	0,0	79,0	37,5	72,5		13,0	44,5	12,5	17,5	18,8	101,0	84,5	-
23	1995- 96	76,5	18,0	53,5	158,5	136,0	75,5	37,5	45,5	55,0	5,5	0,0	47,0	708,5
24	1996- 97	34,5	31,5	70,5	129,5	34,0	36,0	92,5	61,5	16,5	8,5	51,5	59,0	625,5
25	1997- 98	9,5	103,0	43,0	131,0	83,0	74,0	43,0	1,5	159,5	19,5	6,0	1,5	674,5
26	1998- 99	48,0	44,0	173,5	96,0	72,5	87,5	75,5	42,0	31,0	11,0	33,5	7,0	721,5
27	1999- 2000	52,5	50,0	100,0	94,0	53,0	66,5	15,0	44,5	8,5	6,5	18,5	0,0	509,0
28	2000- 01	9,0	212,5	67,5	8,5	96,5	14,5	2,5	58,5	177,0	0,5	17,5	28,0	692,5
29	2001- 02	7,0	3,5	10,0	160,0	19,5	9,0	128,5	71,0	41,0	37,0	154,0	20,5	661,0
30	2002- 03	150,5	102,5	103,0	311,0	84,5	60,5	5,5	54,5	149,0	58,0	13,5	57,5	1150,0
31	2003- 04	40,5	88,0	16,0	306,0	178,5	23,0	33,0	55,0	52,5	36,5	17,0	2,5	848,5
32	2004- 05	58,0	39,0	64,5	112,2	65,5	171,0	51,5	0,0	83,0	73,0	76,0	69,5	863,2

Statistics and charts

Number of measurements	32	32	32	31	30	31	31	31	31	31	32	32	30
Highest value	150,5	212,5	194,8	311,0	254,0	229,2	158,0	112,5	177,0	165,5	154,0	159,8	1150,0
Lowest value	0,0	3,5	10,0	8,5	0,0	1,0	2,5	0,0	8,5	0,5	0,0	0,0	387,0
Mean value	33,62	63,55	76,22	104,2	72,53	65,33	52,47	47,63	60,60	41,66	46,44	37,91	712,86
Years	31,33	Annual Precipitation from mean monthly of all years											702,16

Chart with the Mean monthly Precipitation during the station operation (mm)

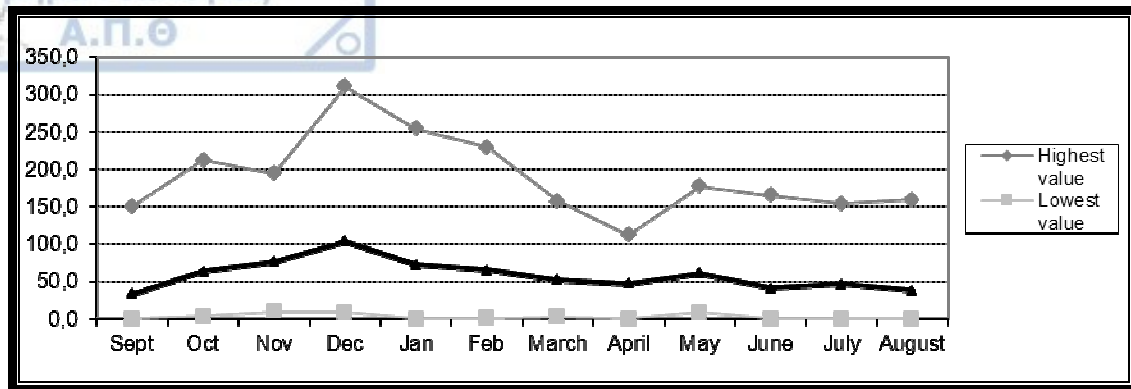
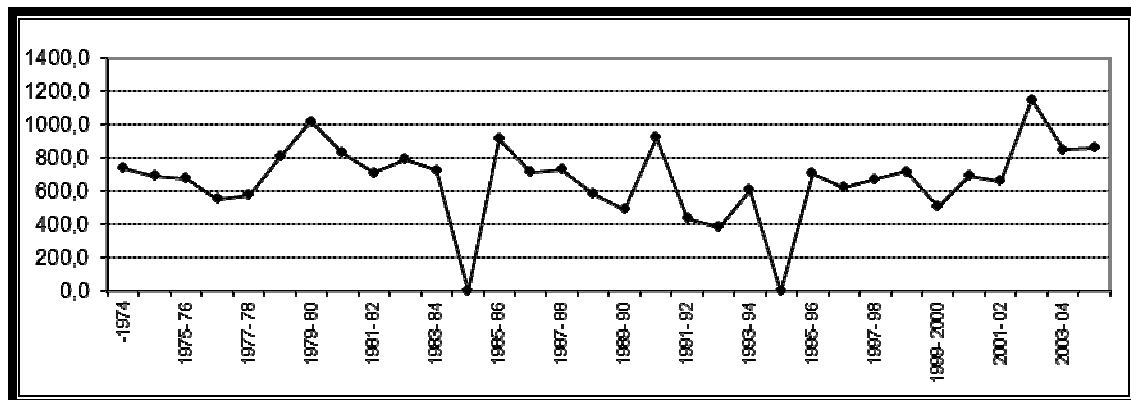


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 28: Ano Theodoraki

Station	Ano Theodoraki	Longitude:	415.959,912
County:	Kilkis	Latitude:	4.557.455,098
Period:	1974-2004	Altitude (meters):	480,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					52,8	57,5	87,5	40,7	62,4	39,0	0,0	17,0	-
2	1974- 75	22,8	21,8	20,4	23,8	16,8	33,1	28,2	5,8	75,0	54,8	14,6	13,1	330,2
3	1975- 76	6,5	30,6	40,3	23,8	19,3	47,2	25,2	32,1	71,0	33,9	66,5	53,9	450,3
4	1976- 77	0,0	64,3	65,1	26,4	27,4	16,6	8,6	16,5	57,2	169,7	25,8	32,2	509,8
5	1977- 78	9,4	17,1	17,1	10,4	25,4	5,3	21,6	59,5	92,4	10,3	0,0	53,9	322,4
6	1978- 79	40,6	37,3	24,4	63,9	39,2	60,2	14,8	80,2	49,1	12,6	46,8	98,2	567,3
7	1979- 80	80,6	108,0	45,6	26,8	53,2	2,6	48,9	23,8	87,2	18,4	17,6	17,3	530,0
8	1980- 81	32,5	113,3	32,8	42,6	43,1	49,1	7,7	15,3	43,3	4,1	22,5	75,2	481,5
9	1981- 82	9,0	47,6	106,8	63,1	13,4	40,4	33,2	69,1	13,0	0,0	46,5	42,9	485,0
10	1982- 83	24,6	83,0	93,9	53,7	14,0	28,5	10,0	17,6	50,5	164,1	35,0	60,1	635,0
11	1983- 84	33,5	16,6	49,8	46,0	18,0	51,6	47,5	29,2	0,0	46,7	5,4	52,8	397,1
12	1984- 85	42,9	3,0	23,0	24,1	13,7	18,0	58,3	11,3	50,0	11,8	12,9	28,0	297,0
13	1985- 86	7,6	10,5	127,6	3,0	25,2	89,7	25,1	12,5	50,7	64,4	13,4	14,8	444,5
14	1986- 87	29,2	13,0	21,5	15,3	61,3	43,8	64,3	33,7	28,4	24,4	0,5	29,8	365,2
15	1987- 88	12,4	28,4	64,8	19,0	7,0	32,2	38,1	22,0	25,6	35,9	33,2	2,4	321,0
16	1988- 89	1,5	5,0	87,5	59,4	0,0	4,8	44,3	36,2	28,8	85,9	34,6	2,9	390,9
17	1989- 90	32,5	26,0	30,8	28,6	0,0	12,6	0,0	74,2	44,0	21,6	24,9	18,5	313,7

18	1990- 91	20,9	28,4	9,6	76,5	40,0	50,5	7,3	44,6	40,7	6,6	38,6	30,4	394,1
19	1991- 92	16,0	28,2	21,8	12,0	4,6	0,0	16,6	99,6	64,8	64,8	21,0	0,0	349,4
20	1992- 93	19,0	70,9	67,4	18,0	33,5	23,0	43,5	10,4	58,8	29,5	0,0	2,2	376,2
21	1993- 94	0,0	16,0	57,0	34,2						0,0	28,8	27,0	-
22	1994-95	0,0	68,0	20,3	83,0	99,0	14,4	30,1	12,2	49,4	121,5	68,9	82,2	649,0
23	1995- 96	40,5	0,0	33,7	129,9	42,6	90,6	50,9	24,0	34,5	2,5	20,4	28,5	498,1
24	1996- 97	93,8	32,0	10,0	57,0	32,0	26,4	25,0	37,0		26,0	39,0	89,0	-
25	1997- 98	13,0	86,0	36,0	81,0	24,0	66,0	23,0	15,0	69,0	29,5	2,0	73,0	517,5
26	1998- 99	45,0	47,0	101,0										-
27	1999- 2000		54,0	95,0	123,0	4,0	40,0	23,0	15,0	41,0	23,0	5,0	6,0	-
28	2000- 01	47,0	58,0	6,0	12,0	53,0	18,0	31,0	89,0	138,0	19,0	16,0	30,0	517,0
29	2001- 02	29,0	7,0	16,0	180,0	14,0	17,0	72,0	57,0	40,0	43,0	50,0	38,0	563,0
30	2002- 03	111,0	58,0	54,0	136,0	83,0	32,0	0,0	47,0	160,0	67,0	14,0	5,0	767,0
31	2003- 04	42,0	57,0	27,0	39,0	48,0	14,0	27,0	50,0	41,0	100,0	57,0	25,0	527,0
32	2004- 05	78,0	14,0	18,0	52,0									-

Statistics and charts

Number of measurements	30	31	31	30	29	29	29	29	28	30	30	30	26
Highest value	111,0	113,3	127,6	180,0	99,0	90,6	87,5	99,6	160,0	169,7	68,9	98,2	767,0
Lowest value	0,0	0,0	6,0	3,0	0,0	0,0	0,0	5,8	0,0	0,0	0,0	0,0	297,0
Mean value	31,36	40,32	45,94	52,12	31,29	33,97	31,47	37,26	55,92	44,33	25,36	34,98	461,51
Years	29,67	Annual Precipitation from mean monthly of all years											464,33

Chart with the Mean monthly Precipitation during the station operation (mm)

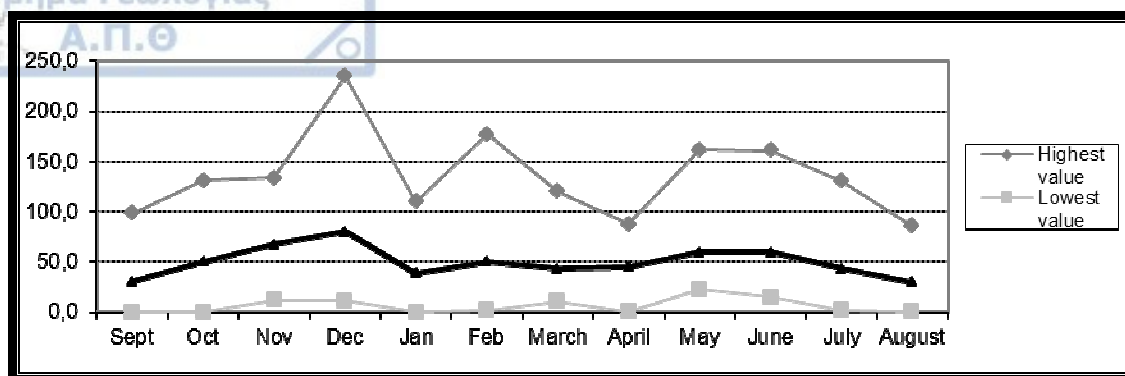
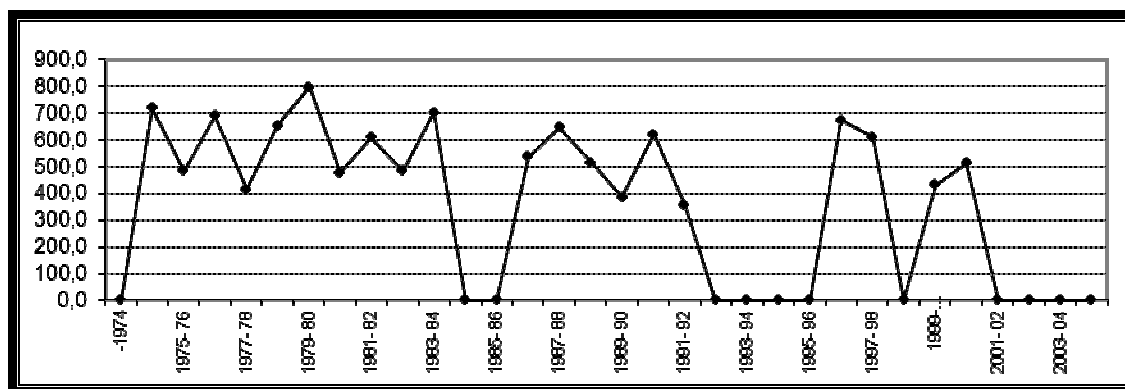


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 29: Metaxochori

Station	Metaxochori		Longitude:	411.631,530
County:	Kilkis		Latitude:	4.546.402,983
Period:	1974-2004		Altitude (meters):	63,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					92,1	63,1	93,8	42,4	95,5	21,7	27,0	40,0	-
2	1974- 75	71,5	48,0	5,4	55,9	18,4	29,7	23,9	16,9	86,8	59,1	26,6	85,4	527,6
3	1975- 76	31,6	26,9	46,9	37,8	15,3	102,6	29,1	25,5	38,5	30,3	89,9	47,0	521,4
4	1976- 77	6,0	55,7	166,9	41,8	25,2	36,9	33,3	26,5	40,0	117,9	79,7	42,2	672,1
5	1977- 78	29,3	0,0	54,5	15,5	30,5	43,9	47,9	99,6	106,6	24,8	2,3	28,3	483,2
6	1978- 79	60,3	53,7	15,5	65,0	43,5	48,5	12,5	92,0	64,5	27,5	80,0	64,2	627,2
7	1979- 80	83,9	223,0	79,5	62,0	55,0	12,0	86,0	57,5	44,0	112,5	15,0	33,0	863,4
8	1980- 81	40,7	122,7	72,0	55,8	57,8	64,8	23,2	21,0	35,2	19,5	36,5	109,0	658,2
9	1981- 82	5,3	46,0	98,7	50,0	31,2	44,8	77,8	106,0	36,0	13,0	26,7	110,7	646,2
10	1982- 83	38,5	23,7	42,3	50,4	20,0	14,6	9,7	11,4	42,6	262,6	95,0	70,5	681,3
11	1983- 84	32,7	15,5	72,1	86,9	47,1	59,0	74,6	50,5	12,4	45,7	9,8	30,0	536,3
12	1984- 85	24,0	0,0	48,5	34,0	24,0	2,0	87,0	27,0	53,0	21,0	3,0	22,0	345,5
13	1985- 86	17,0	14,0	218,0	7,0	40,0	124,0	38,0	22,0	54,0	68,0	7,0	29,0	638,0
14	1986- 87	5,0	17,0	22,0	11,0	75,0	69,0	72,0	97,0	75,0	27,0	20,0	12,0	502,0
15	1987- 88	4,0	91,0	91,0	45,0	18,0	59,0	47,0	37,0	20,0	59,0	42,0	36,0	549,0
16	1988- 89	0,0	18,0	107,0	22,0	0,0	32,0	57,0	30,0	43,0	87,0	102,0	0,0	498,0
17	1989- 90	29,0	30,0	39,0	37,0	0,0	3,0	8,0	36,0	75,0	5,0	25,0	31,0	318,0

18	1990- 91	13,0	99,0	39,0	104,0	30,4	44,0	37,0	70,0	20,0	20,0	97,0	35,0	608,4
19	1991- 92	22,0	30,0	39,0	0,0	0,0	5,0	17,0	55,0	61,0	86,0	21,0	27,0	363,0
20	1992- 93	25,0	39,0	40,0	18,0	0,0	18,0	26,0	8,0	57,0	19,0	0,0	10,0	260,0
21	1993- 94	4,0	19,0	63,0	3,0	42,0	36,0	12,0	55,0	31,0	2,0	21,0	6,0	294,0
22	1994-95	0,0	74,0	41,0	68,0	46,0		24,0	11,0	59,0	25,0	68,0	113,0	-
23	1995- 96					34,0	76,0	45,0	22,0	34,0	34,0	7,0	70,0	-
24	1996- 97	68,0	21,0	29,0	41,0	25,0	22,0	17,0	38,0	4,0	23,0	31,0	51,0	370,0
25	1997- 98	13,0	76,0	25,0	69,0	31,0	30,0	17,0	17,0	93,0	39,0	8,0	19,0	437,0
26	1998- 99	41,0	40,0	96,0										-
27	1999- 2000									27,0	27,0	0,0	11,0	-
28	2000- 01	38,0	43,0	9,0	9,0	43,0	16,0	34,0	68,0	62,0	18,0	40,0	63,0	443,0
29	2001- 02	24,0	4,0	19,0	14,0	16,0	12,0	60,0	66,0	12,0	68,0	88,0	42,0	425,0
30	2002- 03	157,0	49,0	52,0	98,0	91,0	8,0	4,0	40,0	152,0	45,0	50,0	21,0	767,0
31	2003- 04	65,0	99,0	23,0	23,0	36,0	11,0	28,0	40,0	44,0	159,0	49,0	0,0	577,0
32	2004- 05	36,0	26,0	31,0	48,0									-

Statistics and charts

Number of measurements	29	29	29	28	29	28	29	29	30	30	30	30	26
Highest value	157,0	223,0	218,0	104,0	92,1	124,0	93,8	106,0	152,0	262,6	102,0	113,0	863,4
Lowest value	0,0	0,0	5,4	0,0	0,0	2,0	4,0	8,0	4,0	2,0	0,0	0,0	260,0
Mean value	33,96	48,42	58,11	41,86	34,05	38,82	39,37	44,42	52,60	52,22	38,92	41,94	523,53
Years	29,17	Annual Precipitation from mean monthly of all years											524,70

Chart with the Mean monthly Precipitation during the station operation (mm)

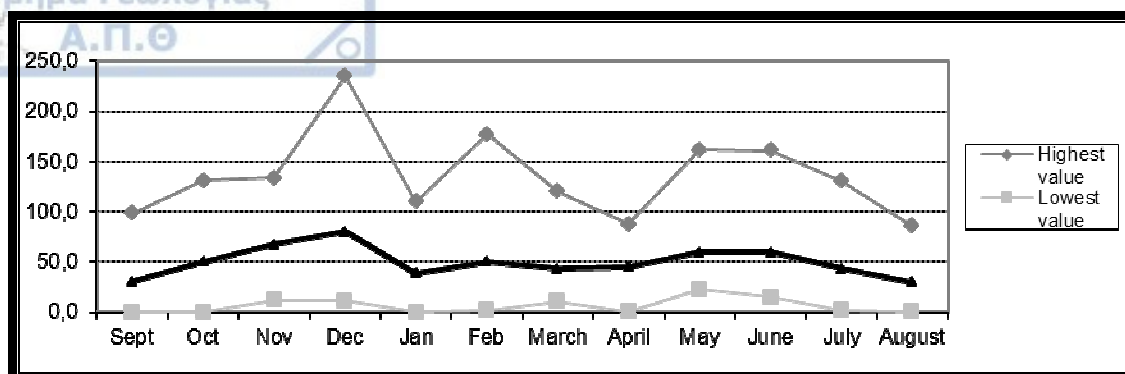
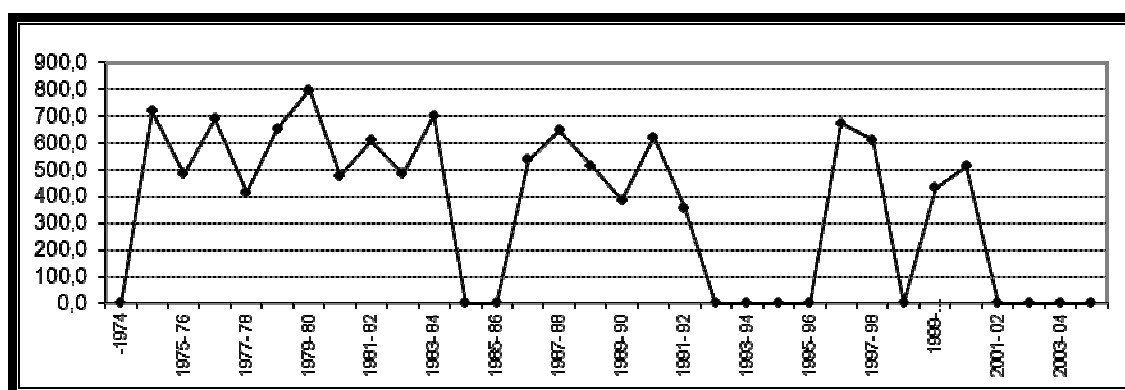


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 30: Melanthio

Station	Melanthio		Longitude:	419.912,640
County:	Chalkidiki		Latitude:	4.535.205,366
Period:	1974-2004		Altitude (meters):	490,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					51,0	40,0	56,0	37,0	27,0	42,0	10,0	0,0	-
2	1974- 75	46,0	30,0	35,0	36,0	30,0	25,0	25,0	21,0	51,0	91,0	23,0	118,0	531,0
3	1975- 76	10,0	55,0	42,0	28,0	23,0	36,0	35,0	40,0	65,0	50,0	83,0	45,0	512,0
4	1976- 77	0,0	45,0	70,0	35,0	41,0	60,0	35,0	20,0	58,0	75,0	48,0	36,0	523,0
5	1977- 78	15,0	3,0	52,0	23,0	53,0	56,0	41,0	105,0	75,0	10,0	0,0	23,0	456,0
6	1978- 79	85,0	80,0	30,0	60,0	60,0	55,0	25,0	71,0	85,0	16,0	75,0	161,0	803,0
7	1979- 80	59,0	118,0	85,0	50,0	65,0	5,0	53,0	39,0	96,0	39,0	12,0	30,0	651,0
8	1980- 81	40,0	103,0	44,0	88,0	59,0	48,0	25,0	21,0	37,0	16,0	34,0	44,0	559,0
9	1981- 82	0,0	32,0	88,0	71,0	20,0	37,0	68,0	95,0	35,0	18,0	45,0	75,0	584,0
10	1982- 83	16,0	48,0	123,0	47,0	20,0	20,0	14,0	23,0	43,0	225,0	51,0	58,0	688,0
11	1983- 84	13,0	11,0	58,0	79,0	39,0	59,0	63,0	48,0	15,0	46,0	10,0	36,0	477,0
12	1984- 85	4,0	4,0	27,0	33,0	15,0	38,0	62,0	7,0	64,0	7,0	3,0	19,0	283,0
13	1985- 86	18,0	9,0	132,0	9,0	43,0	136,0	26,0	20,0	43,0	96,0	18,0	23,0	573,0
14	1986- 87	8,0	18,0	26,0	11,0	62,0	42,0	75,0	99,0	72,0	27,0	24,0	12,0	476,0
15	1987- 88	15,0	59,0	60,0	35,0	8,0	41,0	62,0	40,0	53,0	59,0	21,0	30,0	483,0
16	1988- 89	4,0	8,0	105,0	63,0	0,0	0,0	43,0	25,0	81,0	112,0	169,0	0,0	610,0
17	1989- 90	37,0	33,0	65,0	43,0	0,0	6,0	0,0	144,0	101,0	40,0	59,0	47,0	575,0

18	1990- 91	15,0	35,0	27,0	83,0	60,0	34,0	33,0	46,0	33,0	18,0	104,0	61,0	549,0
19	1991- 92	35,0	19,0	49,0	12,0	3,0	0,0	12,0	69,0	67,0	105,0	35,0	11,0	417,0
20	1992- 93	44,0	36,0	44,0	29,0	25,0	21,0	31,0	11,0	144,0	45,0	0,0	0,0	430,0
21	1993- 94	3,0	10,0	68,0	23,0	74,0	59,0	20,0	92,0	36,0	0,0	41,0	34,0	460,0
22	1994-95	0,0	66,0	38,0	55,0	31,0		33,0	7,0	45,0	64,0	62,0	28,0	-
23	1995- 96	43,0	0,0	27,0	101,0	55,0	68,0	34,0	29,0	38,0	26,0	3,0	60,0	484,0
24	1996- 97	66,0	34,0	42,0		21,0	45,0	30,0	32,0	5,0	20,0	69,0	64,0	-
25	1997- 98	9,0	93,0	20,0	66,0	25,0	50,0	24,0	11,0	87,0	69,0	8,0	64,0	526,0
26	1998- 99	49,0	39,0	121,0										-
27	1999- 2000			61,0	67,0	18,0	25,0	15,0	16,0	34,0	24,0	0,0	20,0	-
28	2000- 01	28,0	60,0	21,0	0,0	72,0	12,0	21,0	72,0	95,0	18,0	82,0	58,0	539,0
29	2001- 02	15,0	15,0	20,0	153,0	11,0	12,0	51,0	62,0	22,0	167,0	179,0	52,0	759,0
30	2002- 03	310,0	100,0	88,0	179,0	109,0	65,0	6,0	52,0	264,0	76,0	55,0	85,0	1389,0
31	2003- 04	53,0	117,0	41,0	109,0	74,0	0,0	42,0	63,0	113,0	133,0	62,0	44,0	851,0
32	2004- 05	69,0	40,0	78,0	102,0									-

Statistics and charts

Number of measurements	30	30	31	29	30	29	30	30	30	30	30	30	26
Highest value	310,0	118,0	132,0	179,0	109,0	136,0	75,0	144,0	264,0	225,0	179,0	161,0	1389,0
Lowest value	0,0	0,0	20,0	0,0	0,0	0,0	0,0	7,0	5,0	0,0	0,0	0,0	283,0
Mean value	36,97	44,00	57,65	58,28	38,90	37,76	35,33	47,23	66,13	57,80	46,17	44,60	584,15
Years	29,92	Annual Precipitation from mean monthly of all years											570,81

Chart with the Mean monthly Precipitation during the station operation (mm)

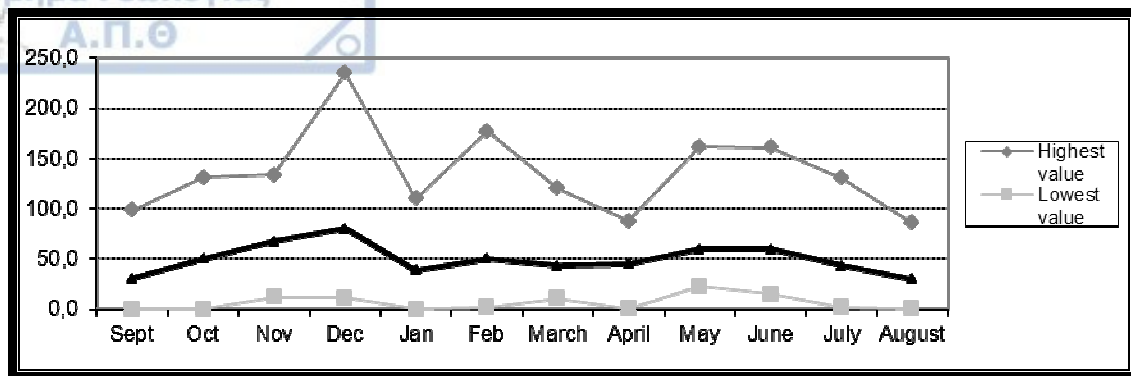
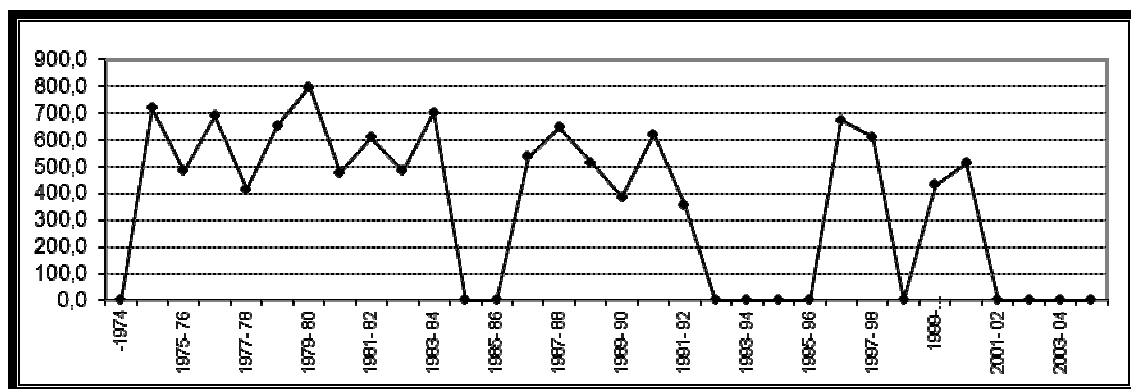


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 31: Nea Chalkidona

Station	Nea Chalkidona		Longitude:	381.632,419
County:	Thessaloniki		Latitude:	4.509.811,675
Period:	1974-2004		Altitude (meters):	29,50

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					86,2	105,0	75,5	40,5	43,0	24,5	2,5	4,0	-
2	1974- 75	22,5	72,0	56,5	49,0	40,2	37,5	41,7	13,0	42,0	73,7	28,2	16,0	492,3
3	1975- 76	6,0	19,7	38,5	13,5	6,5	79,8	34,5	35,4	100,7	30,2	75,5	40,5	480,8
4	1976- 77	1,0	127,0	79,0	10,5	25,5	16,6	29,5	20,0	43,5	47,8	22,8	23,3	446,5
5	1977- 78	22,0	43,3	46,3	24,8	36,7	45,8	18,8	146,7	85,0	22,8	2,0	37,0	531,2
6	1978- 79	97,5	100,5	10,0	61,8	22,5	34,6	24,0	68,0	37,7	15,5	32,0	56,7	560,8
7	1979- 80	13,5	83,3	109,8	53,5	65,0	9,4	83,0	23,8	61,4	20,5	12,0	2,7	537,9
8	1980- 81	18,5	138,5	49,0	81,5	55,6	28,0	47,0	34,4	19,3	5,0	29,0	46,0	551,8
9	1981- 82	15,2	62,3	91,7	57,1	12,0	54,5	55,3	131,3	31,5	6,7	23,5	64,0	605,1
10	1982- 83	6,5	125,3	101,2	48,7	5,0	15,1	48,5	11,2	33,7	120,8	33,2	2,0	551,2
11	1983- 84	35,9	11,0	51,0	170,3	29,0	53,6	28,3	52,1	7,5	20,0	6,5	70,3	535,5
12	1984- 85	12,0	0,0	60,0	42,5	24,0	11,5	60,0	17,0	21,3	23,1	0,0	11,0	282,4
13	1985- 86	2,0	19,0	134,0	9,6	41,1	197,5	38,0	0,0	98,2	59,0	7,6	7,5	613,5
14	1986- 87	7,5	31,0	49,1	8,3	63,6	49,0	133,7	53,5	49,3	19,5	0,0	22,0	486,5
15	1987- 88	0,0	104,5	92,0	31,0	16,0	33,3	59,5	19,0	17,5	21,7	3,0	0,0	397,5
16	1988- 89	3,3	16,2	96,2	48,0	0,0	1,5	43,8	15,0	34,8	34,5	5,5	0,0	298,8
17	1989- 90	15,7	49,8	32,7	43,5	0,0	4,5	2,0	20,8	53,5	12,5	0,0	25,5	260,5

18	1990- 91	14,8	29,0	68,0	162,7	9,5	63,8	59,3	67,6	39,5	22,5	92,0	30,0	658,7
19	1991- 92	25,7	15,5	29,3	0,0	5,5	3,0	12,0	111,5	59,5	38,0	36,0	5,5	341,5
20	1992- 93	0,5	75,0	43,0	28,0	9,0	2,0	25,5	7,0	78,0	9,0	3,0	3,0	283,0
21	1993- 94	3,7	124,0	128,0	26,0	81,3	70,1	4,5	53,8	53,5	9,3	4,0	20,5	578,7
22	1994-95	0,0	52,0	46,0	95,5	106,5	15,5	48,0	13,5	75,5	15,0	14,0	24,7	506,2
23	1995- 96	22,0	2,5	27,0	144,5	153,0	91,0	50,0	45,0	28,0	2,5	5,0	6,0	576,5
24	1996- 97	45,5		19,5	39,1	39,5	35,0	41,0	14,0	13,0	4,8	21,5	5,0	-
25	1997- 98													-
26	1998- 99													-
27	1999- 2000	23,1	44,8	110,2	63,0	26,0	25,5	15,5	24,8	21,0	2,0	5,0	8,0	368,9
28	2000- 01	12,0	54,5	54,0	6,0	67,0	10,5	8,1	94,3	60,5	31,5	13,5	21,7	433,6
29	2001- 02	5,5	15,5	10,5	81,0	13,0	19,8	115,0	70,0	4,4	1,7	89,0	3,0	428,4
30	2002- 03	73,5	20,0								28,0	24,5	11,0	-
31	2003- 04	21,1	182,7	53,5	56,5	84,7	11,3	28,2	60,0	41,5	41,0	5,0	16,5	602,0
32	2004- 05	5,5	62,8	80,8	41,2									-

Statistics and charts

Number of measurements	29	28	28	28	28	28	28	28	28	29	29	29	26
Highest value	97,5	182,7	134,0	170,3	153,0	197,5	133,7	146,7	100,7	120,8	92,0	70,3	658,7
Lowest value	0,0	0,0	10,0	0,0	0,0	1,5	2,0	0,0	4,4	1,7	0,0	0,0	260,5
Mean value	18,34	60,06	63,10	53,47	40,14	40,17	43,94	45,11	44,80	26,31	20,54	20,12	477,30
Years	28,33	Annual Precipitation from mean monthly of all years											476,10

Chart with the Mean monthly Precipitation during the station operation (mm)

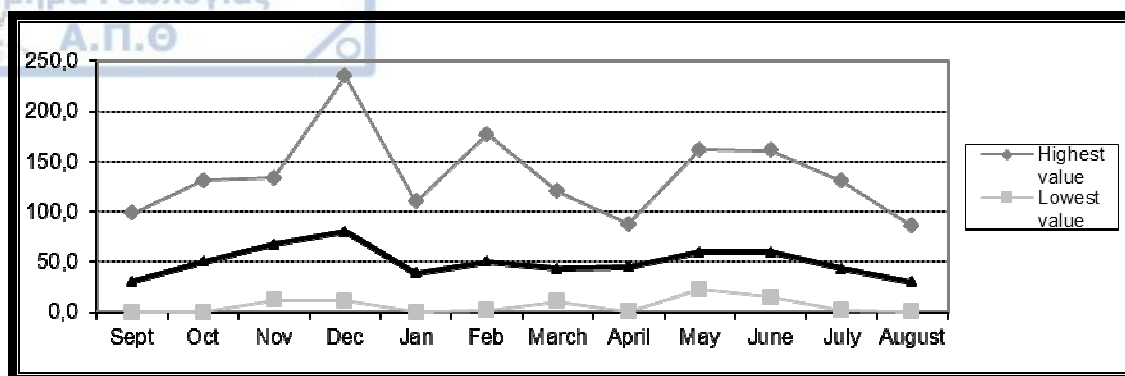
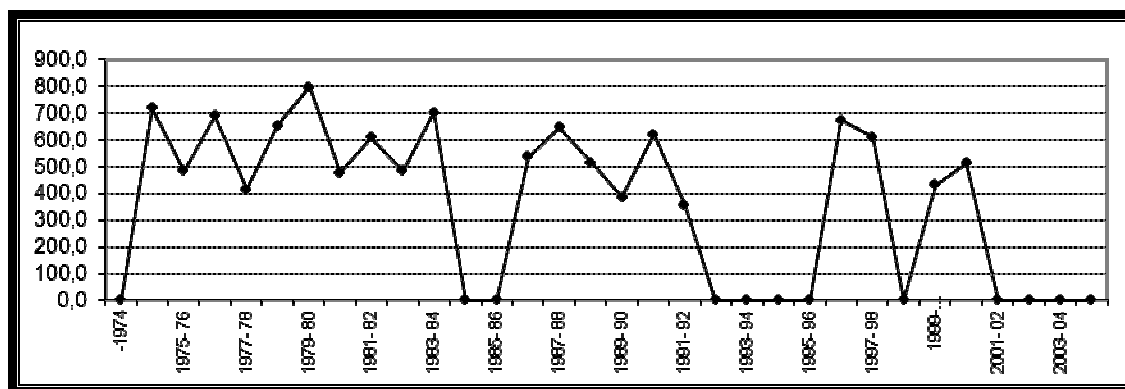


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 32: Chalastra

Station	Chalastra		Longitude:	393.266,166
County:	Thessaloniki		Latitude:	4.535.543,332
Period:	1974-2004		Altitude (meters):	4,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974													-
2	1974- 75													-
3	1975- 76							20,4	33,0	121,8	16,0	134,0	38,5	-
4	1976- 77	1,5	40,9	80,2	9,5	17,5	8,8	30,6	15,0	95,8	28,7	11,7	7,1	347,3
5	1977- 78	23,3	13,5	33,0	22,8	13,2	12,7	28,3	37,5	52,2	6,5	5,0	108,3	356,3
6	1978- 79	101,8	63,8	16,6	67,8	7,0	37,0	19,0	69,7	24,5	8,5	25,0	63,5	504,2
7	1979- 80	32,0	57,8	20,4	36,6	24,5	13,6	80,9	25,3	70,4	12,0	14,0	8,5	396,0
8	1980- 81	16,0	105,0	31,2	74,5	44,8	22,9	39,0	20,8	15,0	20,5	8,0	28,5	426,2
9	1981- 82	7,5	54,2	43,0	34,0	19,7	43,9	48,8	119,5	26,8	5,5	18,1	17,0	438,0
10	1982- 83	4,5	82,5	91,6	41,0	4,6	18,4	32,4	8,2	17,9	84,0	16,4	2,5	404,0
11	1983- 84	34,6	19,8	38,4	75,8	35,0	47,4	38,3	64,6	8,0	16,2	4,0	12,2	394,3
12	1984- 85	3,5	4,2	53,3	46,2	10,6	1,2	56,1	6,3	34,0	11,3	0,0	5,3	232,0
13	1985- 86	11,5	14,4	145,5	14,0	52,5	168,0	25,8	1,3	77,8	62,0	10,1	9,6	592,5
14	1986- 87	36,3	17,2	40,0	8,8	36,7	20,3	128,0	71,0	29,2	25,2	2,2	23,0	437,9
15	1987- 88	0,0	116,1	83,9	35,9	21,5	22,7	74,0	14,9	8,9	9,6	15,0	0,0	402,5
16	1988- 89	3,8	26,5	94,5	47,0	0,0	0,0	60,0	17,4	57,5	15,5	49,0	0,0	371,2
17	1989- 90	23,0	32,0	31,0	30,0	0,0	2,0	0,0	10,0	28,5	8,0	11,0	13,0	188,5

18	1990- 91	9,0	27,5	57,4	107,2	14,6	102,1	49,5	47,5	35,8	44,9	48,0	59,3	602,8
19	1991- 92	33,3	20,1	28,9	4,6	5,2	4,2	21,2	115,6	69,2	67,8	57,6	4,5	432,2
20	1992- 93	0,4	85,9	27,0	25,2	9,1	9,0	34,3	4,2	87,0	9,3	0,4	0,0	291,8
21	1993- 94	7,3	11,5	107,3	9,5	70,8	53,1	4,8	58,8	41,1	1,4			-
22	1994-95													-
23	1995- 96													-
24	1996- 97													-
25	1997- 98					30,4	65,4	3,8	6,3	54,0	4,7	0,0	2,6	-
26	1998- 99	16,5	33,3	178,9	39,3	38,8	Equipment Failure			20,7	17,4	11,7	17,8	-
27	1999- 2000	88,5	47,9	91,4	59,2	28,6	32,7	5,9	34,5	60,5	2,0	2,0	0,7	453,9
28	2000- 01	24,9	62,3	43,3	4,3	55,1	9,2	20,5	88,4	51,2	7,5	18,4	6,5	391,6
29	2001- 02	3,7	14,3	3,7	55,2	3,0	9,1	108,1	60,4	5,3	23,9	54,8	3,4	344,9
30	2002- 03	83,3	101,6	25,2	109,0	71,3	12,6	STOPPED				6,5	61,6	-
31	2003- 04	16,8	114,2	35,8	57,3	78,1	9,6	14,1	48,1	31,4	STOPPED			-
32	2004- 05				34,8									-

Statistics and charts

Number of measurements	24	24	24	25	25	24	24	24	25	24	24	24	20
Highest value	101,8	116,1	178,9	109,0	78,1	168,0	128,0	119,5	121,8	84,0	134,0	108,3	602,8
Lowest value	0,0	4,2	3,7	4,3	0,0	0,0	0,0	1,3	5,3	1,4	0,0	0,0	188,5
Mean value	24,29	48,60	58,40	41,98	27,70	30,25	39,33	40,76	44,98	21,18	21,79	20,56	400,41
Years	24,25	Annual Precipitation from mean monthly of all years											419,82

Chart with the Mean monthly Precipitation during the station operation (mm)

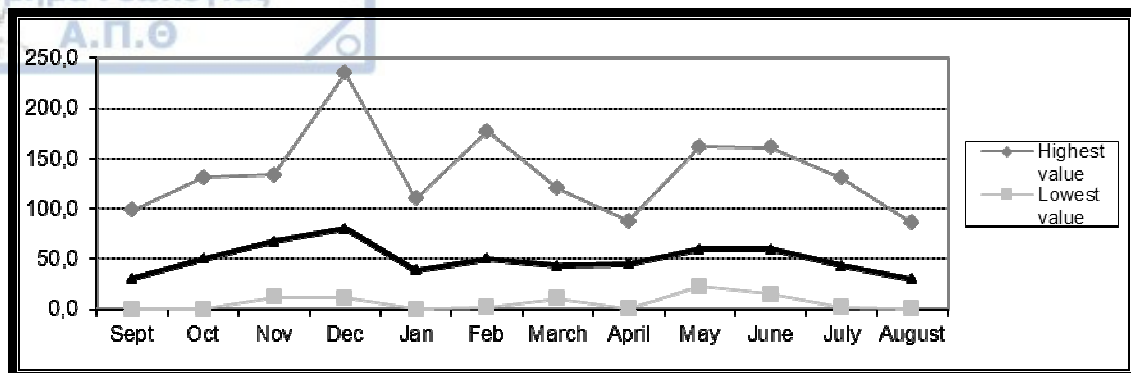
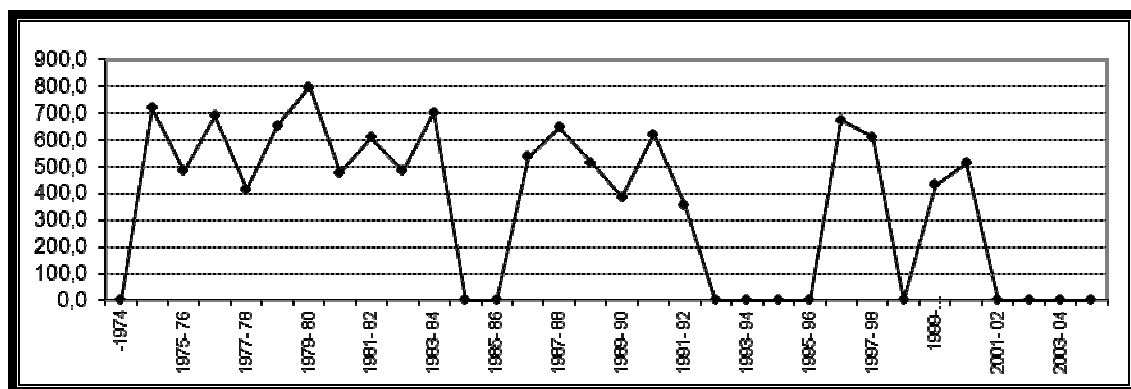


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 33: Drama

Station	Drama		Longitude:	511.038,602
County:	Drama		Latitude:	4.555.131,545
Period:	1974-2004		Altitude (meters):	101,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					52,2	26,5	54,2	73,4	52,7	61,0	9,2	15,1	-
2	1974- 75	16,5	31,2	52,0	88,6	42,5	9,9	50,9	36,7	76,4	161,0	67,1	85,5	718,3
3	1975- 76	6,2	82,6	57,0	24,8	18,1	22,4	39,7	23,4	54,9	37,9	81,8	35,5	484,3
4	1976- 77	22,6	118,4	121,5	56,3	47,4	51,5	26,4	8,8	73,8	129,4	23,5	8,8	688,4
5	1977- 78	24,4	5,5	62,2	12,8	21,3	40,8	27,9	71,0	93,2	18,0	17,0	19,4	413,5
6	1978- 79	89,6	56,4	25,8	42,3	32,7	49,7	12,5	87,7	86,3	60,4	48,0	60,5	651,9
7	1979- 80	29,2	116,5	119,1	50,9	68,4	26,3	32,0	61,4	161,4	56,7	45,5	30,0	797,4
8	1980- 81	27,0	42,8	38,1	39,5	73,7	46,2	15,4	6,0	60,5	37,5	42,7	46,6	476,0
9	1981- 82	0,0	55,5	87,8	144,5	30,1	56,4	55,5	52,1	38,0	15,2	55,5	16,9	607,5
10	1982- 83	7,7	21,1	74,1	56,4	14,0	39,5	15,0	28,7	46,1	78,8	69,1	32,0	482,5
11	1983- 84	25,9	7,2	66,0	134,1	67,5	104,9	92,4	71,5	23,1	29,5	30,5	47,1	699,7
12	1984- 85	16,7	0,7	49,4	48,2	25,7	56,4	71,8						-
13	1985- 86					37,9	177,1	10,8	5,5	57,8	144,6	21,0	19,4	-
14	1986- 87	0,0	21,9	34,8	18,6	66,2	134,5	45,3	61,0	37,5	45,1	56,0	15,4	536,3
15	1987- 88	7,9	88,5	121,9	61,0	11,1	82,2	120,3	51,3	38,6	54,9	6,9	1,3	645,9
16	1988- 89	7,5	7,7	133,4	58,0	0,0	7,5	44,7	22,7	49,1	72,0	92,2	19,8	514,6
17	1989- 90	20,8	51,0	71,1	54,9	0,0	5,6	20,0	51,0	40,1	21,6	19,9	28,6	384,6

18	1990- 91	69,1	33,3	11,8	144,5	4,2	43,3	20,8	44,9	46,1	47,1	95,7	59,3	620,1
19	1991- 92	7,2	16,6	102,5	15,1	0,0	2,0	35,9	44,8	37,6	55,5	28,9	9,9	356,0
20	1992- 93	5,8	54,6	54,8	59,1	5,9	17,9	34,0	52,3	72,6	STOPPED			-
21	1993- 94	STOPPED												-
22	1994-95	STOPPED												-
23	1995- 96	STOPPED		44,3	113,0	56,0	118,0	61,2	77,0	56,5	23,6	22,2	18,3	-
24	1996- 97	98,4	13,6	104,2	136,7	30,0	18,6	38,2	59,2	40,5	39,2	28,4	65,7	672,7
25	1997- 98	4,6	60,8	38,2	139,2	44,6	118,8	43,3	0,4	82,9	74,3	1,7	0,7	609,5
26	1998- 99	40,1	117,3	108,8	45,5	STOPPED							27,0	-
27	1999- 2000	57,3	11,4	35,6	59,6	48,5	44,6	15,4	52,9	60,2	22,5	7,3	15,2	430,5
28	2000- 01	25,8	45,5	12,9	11,6	109,9	32,1	24,8	44,9	70,9	68,2	39,8	25,4	511,8
29	2001- 02		0,0	26,4		42,7	19,5	94,2	36,4	29,9	58,6	130,1	37,8	-
30	2002- 03	70,0	130,7	92,5	235,0	STOPPED						38,4	32,6	-
31	2003- 04	75,2	110,0	75,3	160,5	93,0	3,5	62,7	44,7	66,3	74,9			-
32	2004- 05				157,4									-

Statistics and charts

Number of measurements	25	26	27	27	27	27	27	26	26	25	25	26	20
Highest value	98,4	130,7	133,4	235,0	109,9	177,1	120,3	87,7	161,4	161,0	130,1	85,5	797,4
Lowest value	0,0	0,0	11,8	11,6	0,0	2,0	10,8	0,4	23,1	15,2	1,7	0,7	356,0
Mean value	30,22	50,03	67,46	80,30	38,65	50,21	43,16	44,99	59,73	59,50	43,14	29,76	565,08
Years	26,17	Annual Precipitation from mean monthly of all years											597,15

Chart with the Mean monthly Precipitation during the station operation (mm)

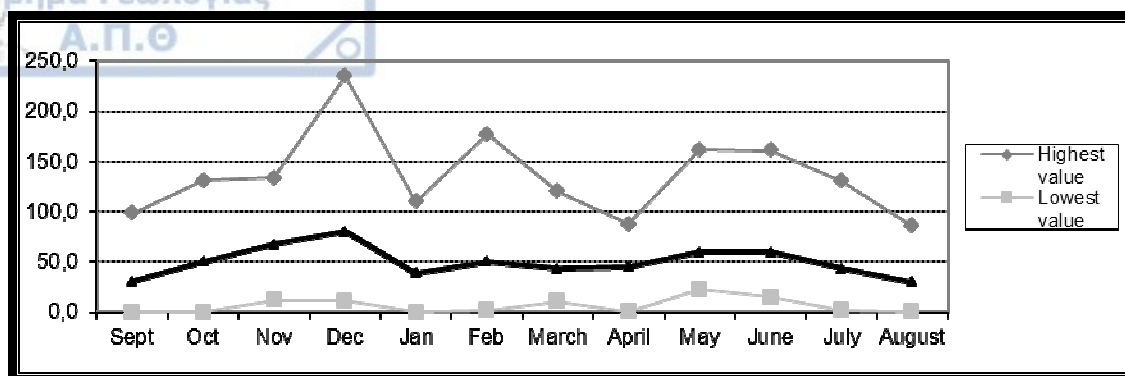
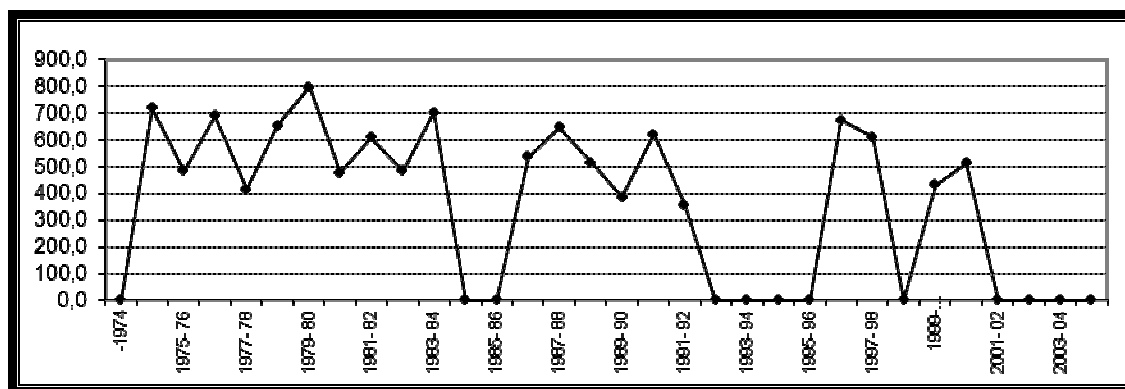


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 34:Kato Nevrokopi

Station	Kato Nevrokopi	Longitude:	488.696,344
County:	Drama	Latitude:	4.577.334,585
Period:	1974-2004	Altitude (meters):	580,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					39,0	46,0	60,0	57,0	73,0	80,0	21,0	6,0	574,0
2	1974- 75	54,0	97,0	48,0	72,0	25,0	10,0	50,0	42,0	54,0	79,0	93,0	122,0	746,0
3	1975- 76	0,0	93,0	58,0	26,0	45,0	28,0	29,0	31,0	63,0	54,0	130,0	32,0	589,0
4	1976- 77	10,0	104,0	131,0	48,0	90,0	73,0	10,0	18,0	61,0	70,0	40,0	28,0	683,0
5	1977- 78	44,0	3,0	54,0	7,0	25,0	46,6	23,0	139,0	96,0	20,0	9,0	75,0	541,6
6	1978- 79	108,0	69,0	52,0	67,0	45,0	49,0	25,0	134,0	118,0	58,0	70,0	25,0	820,0
7	1979- 80	22,0	156,0	158,0	45,0				56,0	181,0	17,0	53,0	58,0	-
8	1980- 81	29,0	103,0	60,0	98,0	70,0	0,0	33,0	7,0	41,0	10,0	21,0	112,0	584,0
9	1981- 82	13,0	31,0	93,0	128,0	18,0	34,0	67,0	48,9	77,0	29,0	66,0	51,0	655,9
10	1982- 83	25,0	52,0	155,4	110,0	12,0	35,0	66,0	30,0	98,0	187,0	140,0	34,0	944,4
11	1983- 84	29,0	12,0	30,6	0,0	25,4	25,0	85,0	53,0	51,0	23,0	7,0	52,5	393,5
12	1984- 85	40,0												-
13	1985- 86					82,9	238,2	21,1	3,2	97,9	92,3	44,0	6,2	-
14	1986- 87	0,0	24,5	30,7	47,4	210,9	94,8	73,3	91,7	49,3	54,6	37,7	33,8	748,7
15	1987- 88	45,0	94,5	192,8	47,3	17,5	130,2	112,0	40,1	28,7	75,0	37,6	16,8	837,5
16	1988- 89	18,7	9,9	114,1	91,5	0,0	15,4	43,0	49,9	68,9	58,9	79,4	31,1	580,8
17	1989- 90	30,7	93,8	69,2	37,9	0,0	16,9	24,6	60,8	77,1	38,0	21,1	67,9	538,0

18	1990- 91	20,5	37,1	10,7	265,9	4,8	74,7	17,7	66,7	79,9	25,3	96,1	32,0	731,4
19	1991- 92	4,7	37,8	83,2	12,3	0,0	0,7	42,6	103,7	54,0	63,0	34,7	36,8	473,5
20	1992- 93	50,6	53,3	59,3	88,9	27,4	32,2	78,2	28,9	65,3	STOPPED			-
21	1993- 94	STOPPED												-
22	1994-95	STOPPED												-
23	1995- 96	STOPPED		33,2	125,5	121,2	131,0	65,4	59,5	40,9	20,3	36,8	40,4	-
24	1996- 97	74,7	14,8	150,7	98,3	40,0	33,2	69,6	62,9	13,3	68,9	81,8	63,8	772,0
25	1997- 98	10,7	90,7	56,8	165,8	56,6	83,8	40,1	11,2	127,6	57,4	13,5	15,2	729,4
26	1998- 99	45,0	35,8	42,4	69,4								4,4	-
27	1999- 2000	51,5	35,7	73,5	183,0	20,0	59,3	20,7	54,8	87,2	23,6	25,2	1,8	636,3
28	2000- 01	9,6	43,9	28,3	38,9	76,0	42,4	24,5	87,7	47,9	28,4	15,8	93,3	536,7
29	2001- 02	51,0	0,0	26,0	115,0	29,0	17,5	149,2	87,2	58,0	78,8	182,2	24,0	817,9
30	2002- 03	104,3	111,0	91,8	251,2	STOPPED						133,4	27,9	-
31	2003- 04	11,7	90,2	51,0	194,5	53,2	7,6	57,0	25,4	24,8	42,2			-
32	2004- 05			129,0	175,7									-

Statistics and charts

Number of measurements	26	25	27	27	25	25	25	26	26	25	25	26	20
Highest value	108,0	156,0	192,8	265,9	210,9	238,2	149,2	139,0	181,0	187,0	182,2	122,0	944,4
Lowest value	0,0	0,0	10,7	0,0	0,0	0,0	10,0	3,2	13,3	10,0	7,0	1,8	393,5
Mean value	34,72	59,72	77,14	96,65	45,36	52,98	51,48	55,75	70,53	54,15	59,57	41,96	667,98
Years	25,67	Annual Precipitation from mean monthly of all years											700,00

Chart with the Mean monthly Precipitation during the station operation (mm)

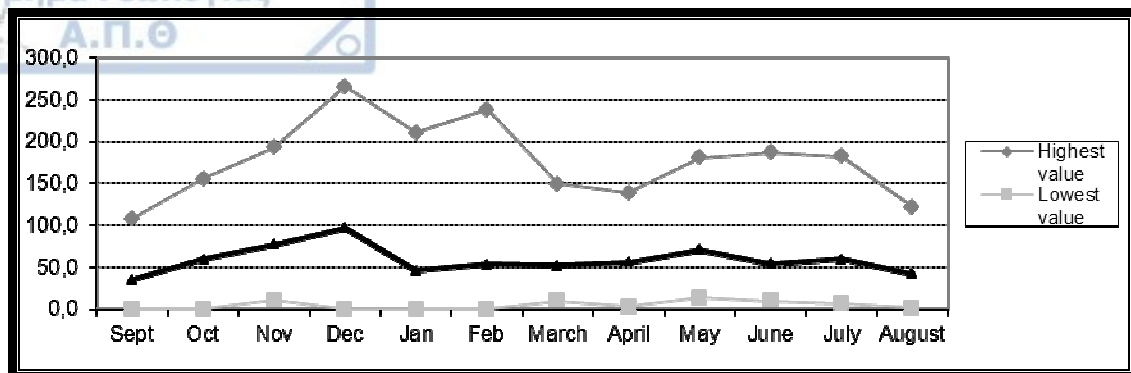
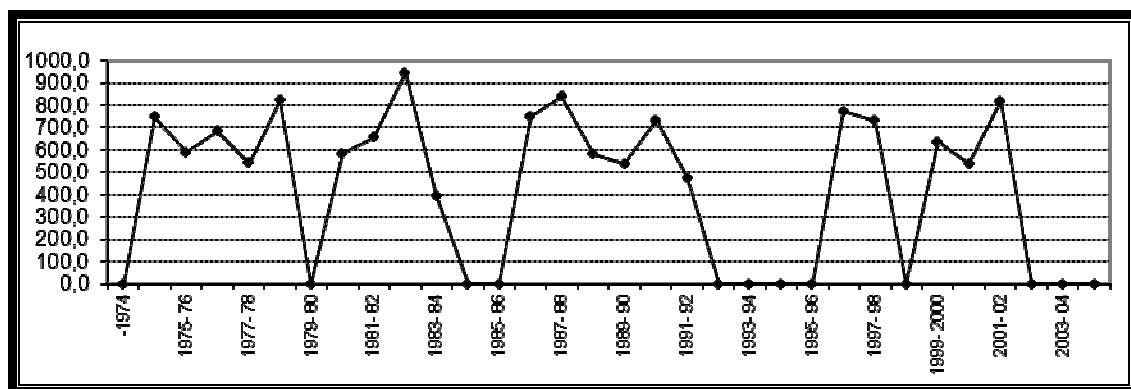


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 35: Nikiforos

Station	Nikiforos		Longitude:	525.017,441
County:	Drama		Latitude:	4.557.016,570
Period:	1974-2004		Altitude (meters):	236,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					47,0	36,0	39,0	63,0	42,0	34,0	26,0	0,0	56,0
2	1974- 75	11,0	48,0	56,0	79,0	44,0	17,0	36,0	38,0	82,0	91,0	62,0	98,0	11,0
3	1975- 76	18,0	52,0	46,0	34,0	24,0	8,0	42,2	22,0	45,0	31,0	63,0	32,0	18,0
4	1976- 77	21,0	86,0	76,0	35,0	66,0	41,0	16,0	0,0	60,0	74,0	33,0	2,0	21,0
5	1977- 78	31,0	4,0	50,0	14,0	20,0	36,0	29,0	62,0	89,0	6,0	5,0	34,0	31,0
6	1978- 79	66,0	76,0	17,0	56,0	53,0	50,0	10,0	65,0	77,0	45,0	65,0	23,0	66,0
7	1979- 80	19,0	69,0	60,0	43,0				59,0	56,0	31,0	52,0	71,0	19,0
8	1980- 81	20,0	53,0	43,0	69,0	66,0	63,0	19,0	11,0	40,0	11,0	28,0	37,0	20,0
9	1981- 82	0,0	33,0	70,0	92,0	5,0	31,0	16,0	40,0	26,0	5,0	34,0	70,0	0,0
10	1982- 83	0,0	16,0	81,0	88,0	12,0	15,0	33,0	18,0	38,0	116,0	69,0	111,0	0,0
11	1983- 84	30,0	5,0	62,0	79,0	56,0	62,0	104,0	46,0	19,0	7,0	15,0	40,0	30,0
12	1984- 85	7,0	0,0	53,0	25,0	41,0	57,0	66,0						7,0
13	1985- 86					38,0	126,0	8,0	5,0	53,0	139,0	18,0	23,0	
14	1986- 87	6,0	22,0	30,0	14,0	84,0	82,0	38,0	77,0	45,0	58,0	0,0	47,0	6,0
15	1987- 88	8,0	64,0	127,0	48,0	7,0	83,0	101,0	54,0	47,0	122,0	1,0	0,0	8,0
16	1988- 89	6,0	13,0	104,0	58,0	0,0	10,0	33,0	25,0	20,0	126,0	32,0	28,0	6,0
17	1989- 90	22,0	68,0	76,0	47,0	0,0	9,0	27,0	68,0	29,0	88,0	21,0	12,0	22,0

18	1990- 91	54,0	26,0	7,0	151,0	4,0	46,0	18,0	27,0	60,0	18,0	103,0	72,0	54,0
19	1991- 92	2,0	21,0	82,0	21,0	3,0	2,0	48,0	56,0	41,0	48,0	34,0	16,0	2,0
20	1992- 93	0,0	49,0	56,0	64,0	9,0	32,0	36,0	48,0	92,0	STOPPED			0,0
21	1993- 94	STOPPED												
22	1994-95	STOPPED												
23	1995- 96			31,0	82,0	46,0	95,0	55,0	68,0	50,0	20,0	36,0	34,0	
24	1996- 97	79,0	6,0	96,0	108,0	18,0	10,0	41,0	42,0	27,0	68,4	13,1	33,7	79,0
25	1997- 98	7,0	100,1	44,2	108,7	36,4	105,4	40,9	5,8	134,1	65,4	0,0	0,0	7,0
26	1998- 99	42,3	84,1	74,2	82,5	STOPPED							47,4	42,3
27	1999- 2000	21,3	40,0	43,8	133,0	47,0	56,6	25,5	41,9	118,4	63,0	3,0	21,5	21,3
28	2000- 01	33,5	44,4	4,0	11,1	106,6	31,0	37,7	61,0	82,6	42,6	34,0		33,5
29	2001- 02					45,0	21,0	130,6	53,4	36,1	31,0	243,7	60,5	
30	2002- 03	104,9	213,5	104,0	176,5							32,5	66,5	104,9
31	2003- 04	103,0	137,5	62,0	259,5	109,0	18,0	49,0	86,0	104,0	122,5			103,0
32	2004- 05			100,0	145,0									

Statistics and charts

Number of measurements	25	25	27	27	26	26	26	26	26	25	25	25	18
Highest value	104,9	213,5	127,0	259,5	109,0	126,0	130,6	86,0	134,1	139,0	243,7	111,0	662,0
Lowest value	0,0	0,0	4,0	11,1	0,0	2,0	8,0	0,0	19,0	5,0	0,0	0,0	374,0
Mean value	28,48	53,22	61,30	78,64	37,96	43,96	42,27	43,93	58,20	58,52	40,93	39,18	523,80
Years	25,75	Annual Precipitation from mean monthly of all years											586,60

Chart with the Mean monthly Precipitation during the station operation (mm)

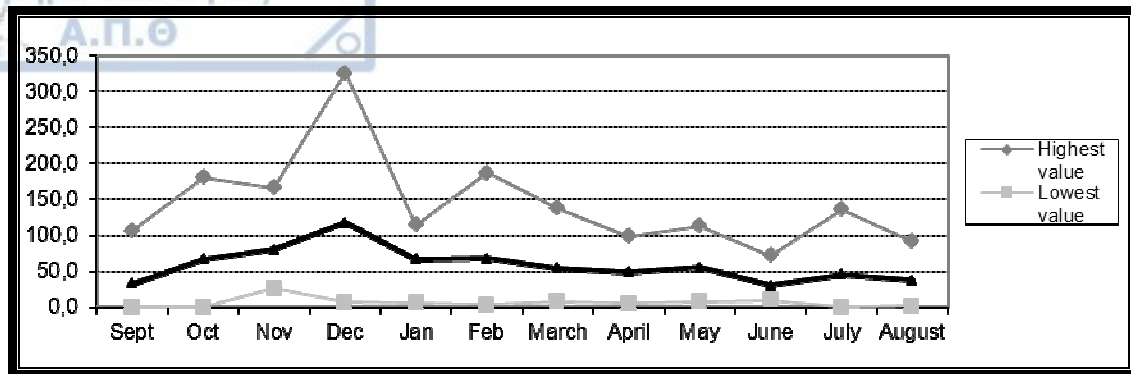
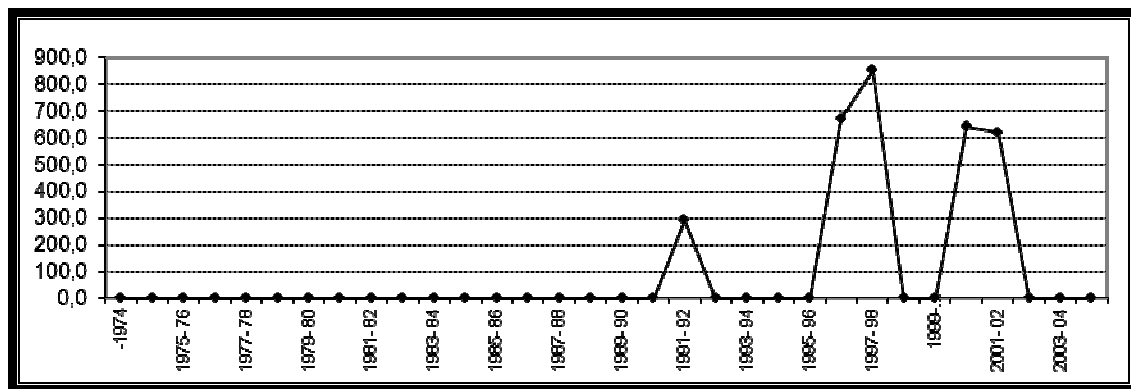


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 36: Livadero

Station	Livadero		Longitude:	517.855,148
County:	Drama		Latitude:	4.625.457,932
Period:	1974-2004		Altitude (meters):	650,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					76,0	75,0	70,0	83,0	48,0	121,0	26,0	0,0	-
2	1974- 75	18,0	77,0	66,0	119,0	66,0	16,0	56,0	36,0	76,0	102,0	79,0	144,0	855,0
3	1975- 76	19,0	98,0	44,0	48,0	30,0	22,0	64,0	36,0	80,0	57,0	79,0	56,0	633,0
4	1976- 77	0,0	78,0	92,0	59,0	72,0	66,0	14,0	8,0	80,0	103,0	20,0	33,0	625,0
5	1977- 78	42,0	0,0	118,0	22,0	84,0	79,0	56,0	125,0	123,0	31,0	22,0	58,0	760,0
6	1978- 79	101,0	120,0	74,0	80,0	82,0	48,0	26,0	121,0	76,0	24,0	71,0	104,0	927,0
7	1979- 80	18,0	110,0	120,0	64,0				95,0	111,0	67,0	87,0	30,0	-
8	1980- 81	16,0	86,0	67,0	110,0	79,0	78,0	30,0	17,0	60,0	34,0	24,0	73,0	674,0
9	1981- 82	0,0	50,0	98,0	162,0	14,0	44,0	62,0	94,0	79,0	21,0	93,0	68,0	785,0
10	1982- 83	0,0	54,0	121,0	156,0	30,0	43,0	53,0	41,0	54,0	145,0	124,8	94,5	916,3
11	1983- 84	24,0	10,0	122,0	127,0	101,0	138,0	126,0	46,0	32,0	27,0	25,4	88,0	866,4
12	1984- 85	53,0	0,0	95,0	55,0	72,0	74,0	84,0						-
13	1985- 86					95,0	280,0	22,0	24,0	78,0	1,2	48,0	0,0	-
14	1986- 87	0,0	36,0	45,0	41,0	59,0	130,0	65,0	96,0	58,0	120,0	0,0	34,0	684,0
15	1987- 88	0,0	66,0	199,0	50,0	0,0	172,0	141,0	44,0	90,0	98,0	13,0	12,0	885,0
16	1988- 89	10,0	0,0	152,0	70,0	0,0	34,0	32,0	36,0	40,0	54,0	44,0	40,0	512,0
17	1989- 90	24,0	92,0	124,0	48,0	0,0	10,0	15,0	106,0	86,0	87,0	36,0	36,0	664,0

18	1990- 91	8,0	36,0	24,0	302,0	0,0	121,0	40,0	58,0	88,0	19,5	90,5	129,5	916,5
19	1991- 92	0,0	34,5	123,5	25,5	4,0		104,0	95,0	74,0	112,5	51,0	10,0	-
20	1992- 93	5,5	79,5	99,5	61,0	24,0	47,0	81,0	49,3	108,8	STOPPED			-
21	1993- 94	STOPPED												-
22	1994-95	STOPPED												-
23	1995- 96			67,0	150,8	83,5	240,2	79,6	88,8	64,0	22,7	41,4	26,0	-
24	1996- 97	102,0	33,0	169,0	181,3	68,7	21,0	110,0	68,6	73,4	55,2	49,5	74,3	1006,0
25	1997- 98	15,0	99,5	63,5	259,5	65,2	167,7	47,5	8,5	138,5	82,0	6,5	8,6	962,0
26	1998- 99	73,1	141,0	175,6	105,5	STOPPED							33,2	-
27	1999- 2000	54,5	67,0	86,1	154,0	110,5	82,0	31,7	87,0	57,8	21,8	44,0	24,0	820,4
28	2000- 01	17,2	31,5	55,7	11,0	137,7	52,9	34,7	106,4	66,0	107,7	25,5		-
29	2001- 02					56,4	15,5	216,8	50,5	48,1	30,2	167,4	80,1	-
30	2002- 03	147,7	122,6	131,6	203,5	STOPPED						57,1	44,0	-
31	2003- 04	62,3	109,5	55,5	227,1	124,9	14,8	58,3	54,3	139,8	108,7			-
32	2004- 05			201,9	211,3									-

Statistics and charts

Number of measurements	25	25	27	27	26	25	26	26	26	25	25	25	17
Highest value	147,7	141,0	201,9	302,0	137,7	280,0	216,8	125,0	139,8	145,0	167,4	144,0	1006,0
Lowest value	0,0	0,0	24,0	11,0	0,0	10,0	14,0	8,0	32,0	1,2	0,0	0,0	512,0
Mean value	32,41	65,24	103,33	114,94	59,03	82,84	66,14	64,40	78,05	66,10	53,00	52,01	793,62
Years	25,67	Annual Precipitation from mean monthly of all years											837,51

Chart with the Mean monthly Precipitation during the station operation (mm)

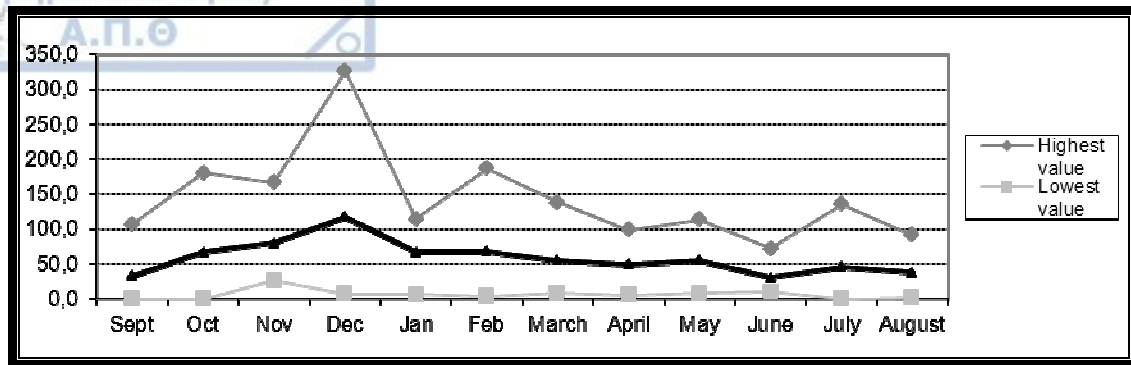
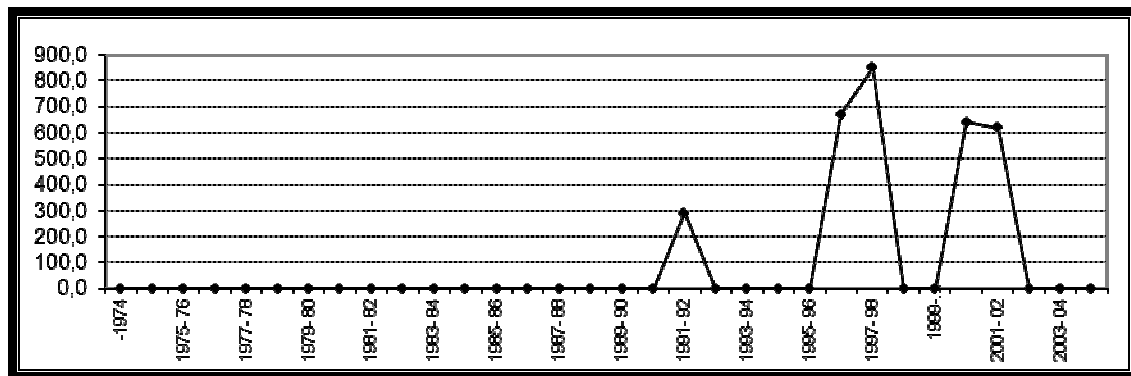


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 37: Mikropoli

Station	Mikropoli		Longitude:	484.478,409
County:	Drama		Latitude:	4.560.689,863
Period:	1974-2004		Altitude (meters):	360,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					41,0	89,0	90,0	72,0	57,0	49,0	39,0	11,0	-
2	1974- 75	30,0	109,0	105,0	152,0	40,0	21,0	88,0	7,0	66,0	115,0	25,0	104,0	862,0
3	1975- 76	12,0	91,0	95,0	49,0	27,0	80,0	83,0	53,0	71,0	40,0	160,0	60,0	821,0
4	1976- 77	10,0	274,0	137,0	88,0	70,0	56,0	24,0	18,0	74,0	107,5	18,0	15,0	891,5
5	1977- 78	18,0		136,0	32,0	72,0	84,0	55,0	187,0	148,0	8,0	9,0	30,0	-
6	1978- 79	114,0	183,0	87,0	90,0	122,0	84,0	34,0	140,0	99,0	24,0	54,0	84,0	1115,0
7	1979- 80	12,0	180,0	152,0	72,0				77,0	115,5	33,0	32,0	25,0	-
8	1980- 81	34,0	78,0	72,0	149,5	122,0	121,0	42,0	20,0		42,5	18,0	97,0	-
9	1981- 82	0,0	78,5	115,0	261,3	28,7	100,4	98,5	73,5	63,0	10,8	119,4	27,7	976,8
10	1982- 83	0,0	64,0	159,3	207,8	22,0	42,0	21,5	43,5	103,0	212,0	130,1	43,2	1048,4
11	1983- 84	14,8	8,0	127,9	163,0	134,5	138,7	166,9	61,3	26,5	12,0	21,0	92,2	966,8
12	1984- 85	34,5												-
13	1985- 86					80,0	315,0	10,2	15,9	77,0	96,7	70,0	34,0	-
14	1986- 87	13,0	22,0	48,0	22,0	127,5	105,0	55,0	108,0	70,0	91,0	9,0	34,0	704,5
15	1987- 88	24,0	91,8	240,0	88,0	20,0	215,0	99,1	52,5	81,5	99,8	12,0	12,0	1035,7
16	1988- 89	9,8	18,0	182,0	105,0	0,0	20,0	51,0	37,0	67,0	109,0	44,0	23,0	665,8
17	1989- 90	38,0	80,0	82,0	47,7	0,0	27,0	27,0	145,0	76,0	44,0	75,5	34,2	676,4

18	1990- 91	52,0	59,0	15,0	349,5		88,0	38,5	88,0	65,2	38,4	108,5	40,0	-
19	1991- 92	7,0	44,5	125,5	18,0	7,3	5,0	66,5	125,0	68,5	71,5	60,8	31,8	631,4
20	1992- 93	23,0	88,0	140,0	114,0	23,0	40,5	68,0	36,5	64,5	STOPPED			-
21	1993- 94	STOPPED												-
22	1994-95	STOPPED												-
23	1995- 96			59,5	140,0	153,0	232,0	83,5	93,0	75,0	40,5	36,5	34,0	-
24	1996- 97	85,0	28,5	168,0	152,0	54,0	39,0	111,0	61,5	29,0	39,0	25,0	61,0	853,0
25	1997- 98	20,0	108,5	57,5	209,0	85,0	118,0	30,5	21,0	118,5	51,0	3,0	15,0	837,0
26	1998- 99	49,0	70,0	200,0	95,0	STOPPED							70,0	-
27	1999- 2000	58,0	70,0	111,0	144,0	87,0	77,0	23,5	52,0	49,0	32,0	18,6	13,0	735,1
28	2000- 01	18,5	60,0	32,0	8,0	107,5	49,0	44,5	111,7	148,4	56,0	47,5	144,0	827,1
29	2001- 02	79,0	0,0	33,6	101,0	38,5	17,0	134,0	65,0	39,5	72,3	200,5	106,5	886,9
30	2002- 03	113,0	107,2	123,0	322,0	STOPPED						105,0	37,5	-
31	2003- 04	22,0	111,0	47,0	232,0	137,0	17,0	46,0	62,5	78,0	112,0			-
32	2004- 05			101,5	213,0									-

Statistics and charts

Number of measurements	26	24	27	27	24	25	25	26	25	25	25	26	17
Highest value	114,0	274,0	240,0	349,5	153,0	315,0	166,9	187,0	148,4	212,0	200,5	144,0	1115,0
Lowest value	0,0	0,0	15,0	8,0	0,0	5,0	10,2	7,0	26,5	8,0	3,0	11,0	631,4
Mean value	34,25	84,33	109,33	134,25	66,63	87,22	63,65	70,27	77,20	64,28	57,66	49,20	854,96
Years	25,42	Annual Precipitation from mean monthly of all years											898,26

Chart with the Mean monthly Precipitation during the station operation (mm)

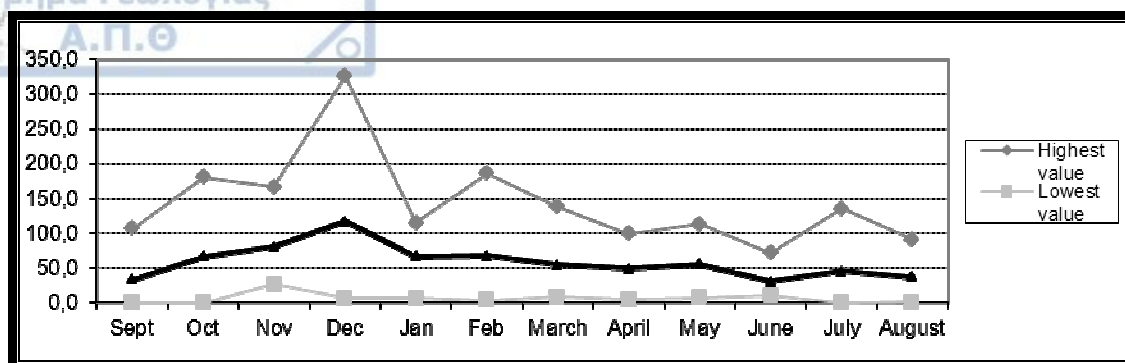
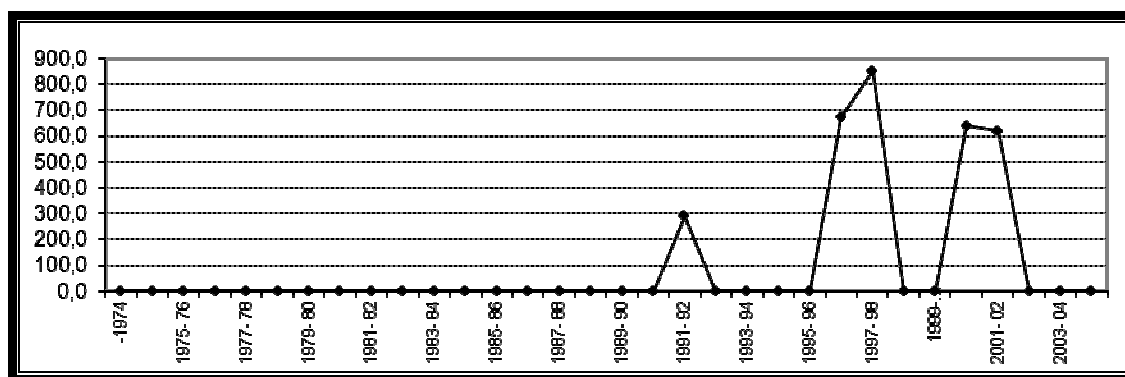


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 38: Kalampaki

Station	Kalampaki		Longitude:	515.257,514
County:	Drama		Latitude:	4.544.037,941
Period:	1974-2004		Altitude (meters):	67,30

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					64,6	44,4	59,4	62,7	51,4	62,1	10,0	5,2	-
2	1974- 75	22,2	42,7	59,5	91,5	50,8	22,7	35,1	8,8	95,7	78,4	55,0	77,0	639,4
3	1975- 76	0,4	57,7	51,2	28,0	21,3	27,3	43,9	21,9	29,9	20,2	61,3	52,8	415,9
4	1976- 77	6,5	141,8	98,0	38,2	50,3	42,9	38,7		74,4	89,7	22,5	14,0	-
5	1977- 78	15,8	6,2	48,0	19,3	42,1	46,0	21,7	76,6	76,6	1,4	4,3	28,8	386,8
6	1978- 79	74,7	69,7	36,1	68,0	40,1	75,0	21,6	79,0	50,7	71,2	38,4	58,2	682,7
7	1979- 80	49,3	140,8	157,8	72,4				51,1	117,1	24,3	48,3	28,4	-
8	1980- 81	23,8	99,5	49,6	109,1	91,0	77,6	24,2	13,6	45,8	16,8	48,7	33,5	633,2
9	1981- 82	0,0	35,9	104,0	135,3	22,2	42,0	58,4	51,7	22,5	15,0	58,9	83,2	629,1
10	1982- 83	20,5	41,7	99,6	67,1	15,8	46,0	37,8	22,1	58,8	100,5	91,8	68,1	669,8
11	1983- 84	18,3	6,8	44,3	143,0	65,9	98,1	107,3	50,6	24,4	29,2	31,2	71,2	690,3
12	1984- 85	13,0	0,0	35,0	76,3	31,0	39,6	61,4	28,5	53,9	34,5	24,0	23,8	421,0
13	1985- 86	7,4	14,4	137,5	6,1	44,7	205,8	8,6	2,8	47,7	157,0	23,0	22,0	677,0
14	1986- 87	0,0	90,0	146,4	43,4	9,6	88,3	94,0	39,4	34,8	63,2	23,3	0,0	632,4
15	1987- 88	0,0	90,0	146,4	43,4	9,6	88,3	94,0	39,4	34,8	63,2	23,3	0,0	632,4
16	1988- 89	8,0	3,6	125,8	58,0	0,0	5,1	50,5	19,2	69,4	62,3	77,5	22,4	501,8
17	1989- 90	29,9	65,4	67,7	58,5	0,0	7,0	17,8	81,7	32,5	30,4	47,0	19,5	457,4

18	1990- 91	36,8	31,9	7,5	178,7	5,5	57,0	14,0	34,2	32,2	17,3	37,2	37,4	489,7
19	1991- 92	4,4	20,7	67,3	15,7	2,6	4,5	58,7	55,6	44,0	40,7	42,4	7,7	364,3
20	1992- 93	1,6	48,7	57,0	84,6	7,5	18,2	47,5	40,0	55,2	STOPPED			-
21	1993- 94	STOPPED												-
22	1994-95	STOPPED												-
23	1995- 96			46,1	149,0	70,8	86,9	57,0	54,7	67,9	35,2	14,0	14,6	-
24	1996- 97	60,6	10,3	89,8	166,6	46,5	13,8	30,0	52,0	19,0	27,7	20,3	60,6	597,2
25	1997- 98	0,0	73,2	57,2	138,4	46,2	104,7	52,2	4,6	116,2	85,0	1,8	0,8	680,3
26	1998- 99	50,2	132,0	60,5	STOPPED								23,4	-
27	1999- 2000	15,3	39,0	34,0	218,0	0,0	49,3	16,6	42,6	20,0	8,8	10,2	3,2	457,0
28	2000- 01	22,8	47,5	15,9	9,4	130,0	31,2	22,8	55,6	42,1	42,2	82,8	75,4	577,7
29	2001- 02	64,3	0,0	24,2	55,0	26,2	9,4	108,8	28,6	20,2	84,7	101,0	59,5	581,9
30	2002- 03	58,7	168,0	75,6	243,8	STOPPED						31,8	18,4	-
31	2003- 04	41,2	87,4	25,4	236,4	88,1	14,7	44,6	49,5	53,2	37,0			-
32	2004- 05			138,6	126,0									-

Statistics and charts

Number of measurements	27	27	29	28	26	26	26	26	27	26	26	27	21
Highest value	74,7	168,0	157,8	243,8	130,0	205,8	108,8	81,7	117,1	157,0	101,0	83,2	690,3
Lowest value	0,0	0,0	7,5	6,1	0,0	4,5	8,6	2,8	19,0	1,4	1,8	0,0	364,3
Mean value	23,91	57,96	72,62	95,69	37,79	51,76	47,18	41,02	51,50	49,92	39,62	33,67	562,73
Years	26,75	Annual Precipitation from mean monthly of all years											602,63

Chart with the Mean monthly Precipitation during the station operation (mm)

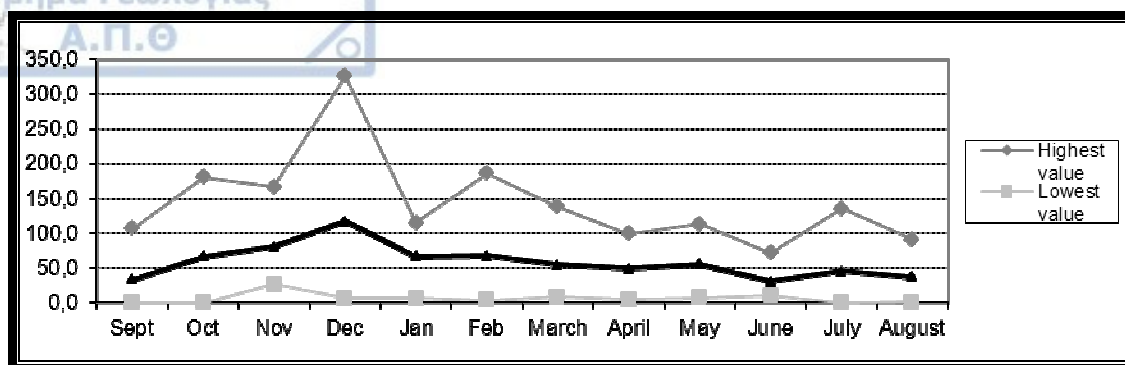
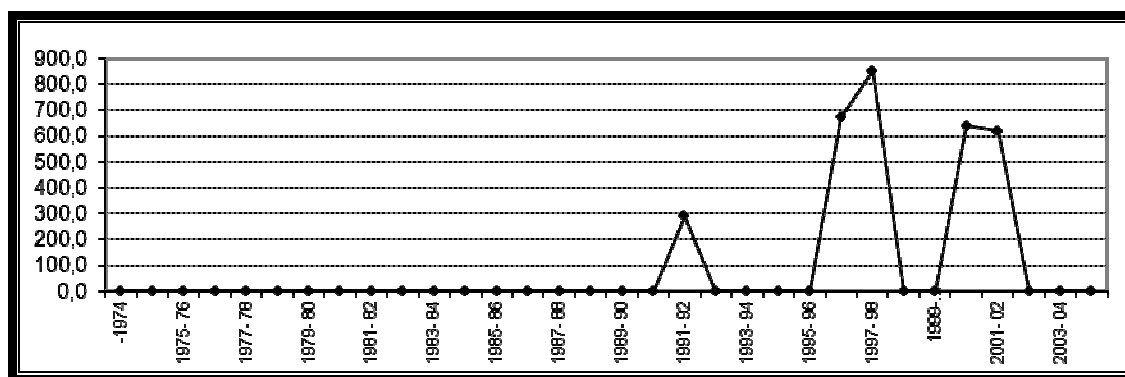


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 39: Eleftheroupoli

Station	Eleftheroupoli		Longitude:	520.902,445
County:	Kavala		Latitude:	4.529.250,503
Period:	1974-2004		Altitude (meters):	80,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					42,8	64,5	77,3	75,5	64,0	78,2	24,2	2,0	-
2	1974- 75	53,5	67,0	80,7	122,7	94,5	53,8	51,0	46,3	69,9	38,8	99,0	55,0	832,2
3	1975- 76	5,0	102,5	58,0	44,0	19,0	53,5	48,5	41,5	37,0	29,5			-
4	1976- 77					79,0	43,0	72,0	19,5	113,5	65,0	23,0	14,0	-
5	1977- 78	22,5	6,0	83,0	30,5	55,0	64,0	53,5	134,0	75,4	15,0	3,0	22,9	564,8
6	1978- 79	74,0	95,3	36,0	117,0	41,0	117,8	30,0	144,5	76,5	28,0	61,3	83,5	904,9
7	1979- 80	42,0	118,0	117,0	102,6				66,0	93,5	37,0	28,5	24,5	-
8	1980- 81	20,5	43,0	103,5	206,3	124,5	115,5	29,5	12,0	62,5	33,5	13,8	84,0	848,6
9	1981- 82	2,5	112,0	158,5	232,3	5,0			94,5	21,5	7,0	91,5	10,5	-
10	1982- 83	39,5	8,5	62,0	198,8	102,5	116,5	137,5	66,5	32,5	29,5	37,0	45,5	876,3
11	1983- 84	39,5	8,5	62,0	198,8	102,5	116,5	137,5	66,5	32,5	29,5	37,0	45,5	876,3
12	1984- 85	2,0	0,0	80,0	62,5	75,0	58,0	65,0						-
13	1985- 86					67,0					14,3	1,1	8,6	-
14	1986- 87	0,0	24,6	39,1	16,2	138,3	139,0	80,7	144,9	51,2	34,7	48,8	11,9	729,4
15	1987- 88	11,1	106,0	224,4	36,8	8,0	103,8	113,9	48,2	22,3	49,3	19,8	0,0	743,6
16	1988- 89		0,5	160,2	118,8	0,0	19,1	56,4	19,5	67,1	53,4			-
17	1989- 90	54,2	59,6	58,4	90,9	0,0	20,2	8,3	72,4	36,7	37,7	26,2	4,1	468,7

18	1990- 91	33,4	28,7	45,6	245,3	11,4	63,4	31,3	33,7	84,6	38,7	46,4	60,6	723,1
19	1991- 92	6,1	29,6	64,9	23,2	6,3	8,7	28,4	60,5	26,4	33,4	55,7	3,2	346,4
20	1992- 93	2,3	49,2	94,4	91,4	18,2	STOPPED							-
21	1993- 94	STOPPED												-
22	1994-95	STOPPED												-
23	1995- 96			7,6	129,3	62,7	138,6	64,5	55,5	72,8	6,9	4,0	26,7	-
24	1996- 97	100,9	15,4	120,3	140,5	49,3	19,8	5,0	23,4	62,3	46,4	44,6	68,4	696,3
25	1997- 98	0,6	103,6	64,0	145,0	68,4	166,5	67,3	4,0	119,0	60,1	3,4		-
26	1998- 99	77,2	74,5	98,6	82,6	STOPPED							-	
27	1999- 2000		31,2	63,8	257,0	0,0	30,0	21,1	43,8	37,3	8,5	18,7	0,0	-
28	2000- 01	15,1	73,5	62,6	9,7	80,0	32,2	16,9	77,1	41,0	30,2	63,6	40,2	542,1
29	2001- 02	66,5	0,0	36,4	10,6	0,0	13,4	126,9	29,6	22,1	30,1	77,0	46,9	459,5
30	2002- 03	107,5	111,0	132,3	317,4	STOPPED						37,0	14,5	-
31	2003- 04	36,0	79,0	64,0	354,0	151,0	22,0	48,0	92,5	87,5	58,0			-
32	2004- 05													-

Statistics and charts

Number of measurements	23	25	26	26	26	23	23	24	24	25	23	22	14
Highest value	107,5	118,0	224,4	354,0	151,0	166,5	137,5	144,9	119,0	78,2	99,0	84,0	904,9
Lowest value	0,0	0,0	7,6	9,7	0,0	8,7	5,0	4,0	21,5	6,9	1,1	0,0	346,4
Mean value	35,30	53,89	83,74	130,16	53,90	68,69	59,59	61,33	58,71	35,71	37,59	30,57	686,59
Years	24,17	Annual Precipitation from mean monthly of all years											709,18

Chart with the Mean monthly Precipitation during the station operation (mm)

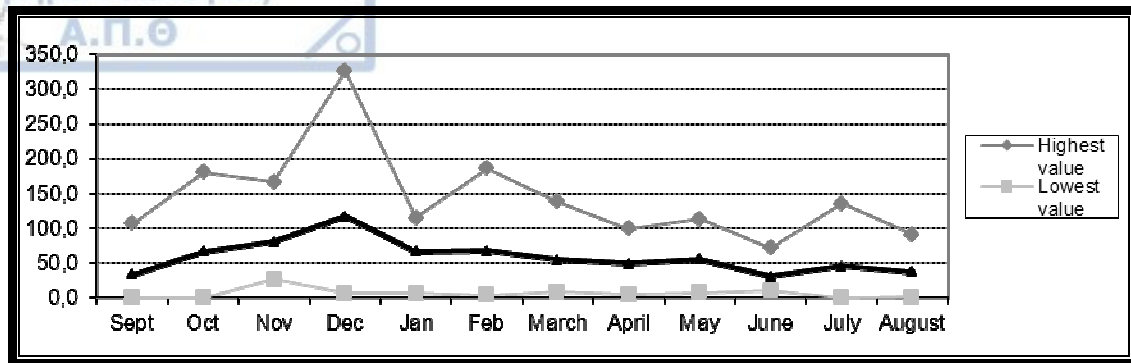
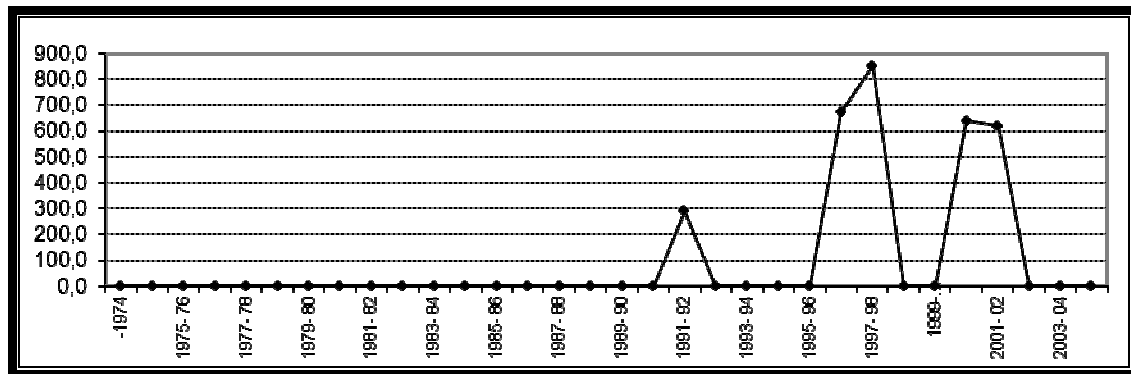


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs

Station 40: Chrusoupoli

Station	Chrusoupoli		Longitude:	558.736,979
County:	Kavala		Latitude:	4.536.856,957
Period:	1974-2004		Altitude (meters):	18,00

Table with the Precipitation data of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Annual sum
1	-1974					39,0	19,3	73,6	55,9	49,0	52,4	11,6	7,0	-
2	1974- 75	15,2	21,7	31,7	112,2	4,3	11,0	23,6	53,6	72,9	128,8	30,7	98,6	604,3
3	1975- 76	1,0	51,4	31,9	33,8	15,0	13,2	14,4	6,0	26,7	9,3	71,6	43,8	318,1
4	1976- 77	16,9	136,6	132,0	24,6	58,4	32,0	34,2	22,4	69,4	37,5	27,1	2,8	593,9
5	1977- 78	50,7	5,2	37,1	16,3	17,7	51,0	33,4	54,0	60,9	23,7	39,0	0,0	389,0
6	1978- 79	89,0	48,5	49,0	58,7	90,0	63,9	18,9	19,0	91,1	14,8	97,0	61,0	700,9
7	1979- 80	25,2	89,1	172,0	51,1				42,3	109,7	63,8	39,4	30,0	-
8	1980- 81	4,8	39,9	77,3	141,5	97,5	26,0	17,0	13,5	27,6	19,0	33,6	0,0	497,7
9	1981- 82	9,5	55,4	101,8	146,2	0,0	36,4	49,8	66,3	21,1	17,0		18,9	-
10	1982- 83	7,7	29,2	67,8	124,8	3,8	37,9	45,2	20,5	37,8	207,0	71,2	23,6	676,5
11	1983- 84	8,9	16,8	55,6	68,1				67,7	9,8	31,7	24,1	17,5	-
12	1984- 85	10,4	4,4	53,3	28,1	43,9	34,3	33,6						-
13	1985- 86					40,4	176,3	7,5	11,9	63,3	56,6	6,7	19,6	-
14	1986- 87	11,5	13,8	31,8	23,5									-
15	1987- 88													-
16	1988- 89					0,0	1,5	56,0	22,0	24,8	30,6	30,6		-
17	1989- 90	34,1	9,1	59,6	4,9	0,0	0,0	0,0	81,0	17,0	1,0	0,0	36,0	242,7

18	1990- 91	41,0	41,8	30,0	83,5	0,0	11,3	18,5	14,5	78,2	61,4	17,5	19,7	417,4
19	1991- 92	11,7	46,0	34,4	82,6			26,0	17,5	26,8	70,0	0,0	0,0	-
20	1992- 93	0,0	18,4	79,3	4,0	STOPPED								-
21	1993- 94	STOPPED												-
22	1994-95	STOPPED												-
23	1995- 96			0,3	106,1	82,4	110,9	53,5					6,7	-
24	1996- 97	35,9	16,5	109,1	210,8	39,2	17,7	34,0	68,1	20,9	39,8	5,6	100,3	697,9
25	1997- 98	2,8	79,7	39,3	116,7	52,0	116,4	52,2	0,0	79,6	17,5	16,8	0,0	573,0
26	1998- 99	54,0	105,6		54,5									-
27	1999- 2000	55,5	27,2	39,8	30,3	24,0	21,6	44,3	47,7	16,0	0,8	0,0	1,8	309,0
28	2000- 01	20,8	52,2	82,0	24,8	86,3	9,4	14,5	90,4	24,9	17,7	5,3	48,6	476,9
29	2001- 02	63,5	0,0	32,0	44,3	83,2	6,5	59,8	14,4	9,2	12,9	179,4	37,2	542,4
30	2002- 03	97,1	206,2	81,5	266,0	57,8	24,2	30,7	59,9	56,8	4,7	25,3	0,7	910,9
31	2003- 04	22,0	112,5	1,5	307,1	127,4	20,5	37,9	45,9	143,9	16,1	17,3		-
32	2004- 05													-

Statistics and charts

Number of measurements	25	25	25	26	22	22	23	23	23	23	22	22	16
Highest value	132,5	206,2	172,0	307,1	127,4	176,3	73,6	90,4	143,9	207,0	179,4	100,3	910,9
Lowest value	0,0	0,0	0,3	4,0	0,0	0,0	0,0	0,0	9,2	0,8	0,0	0,0	242,7
Mean value	32,87	51,59	58,80	84,37	43,74	38,24	33,85	38,89	49,45	40,61	34,08	26,08	532,64
Years	23,08	Annual Precipitation from mean monthly of all years											530,97

Chart with the Mean monthly Precipitation during the station operation (mm)

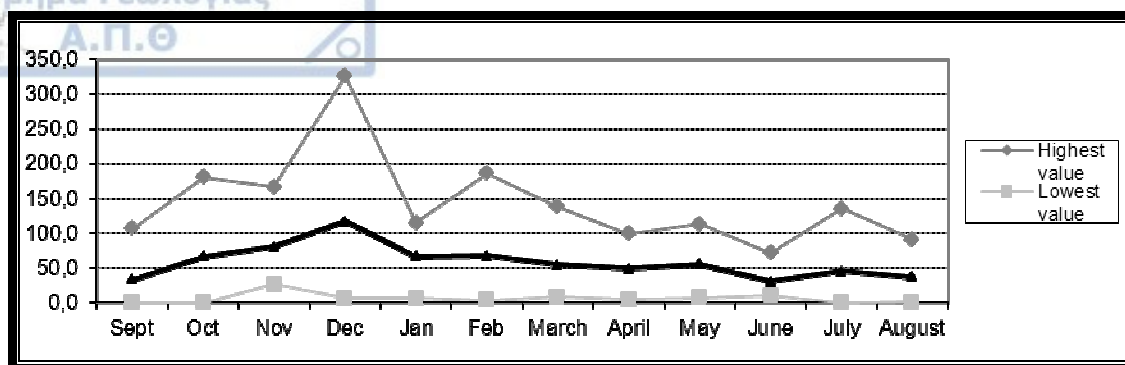
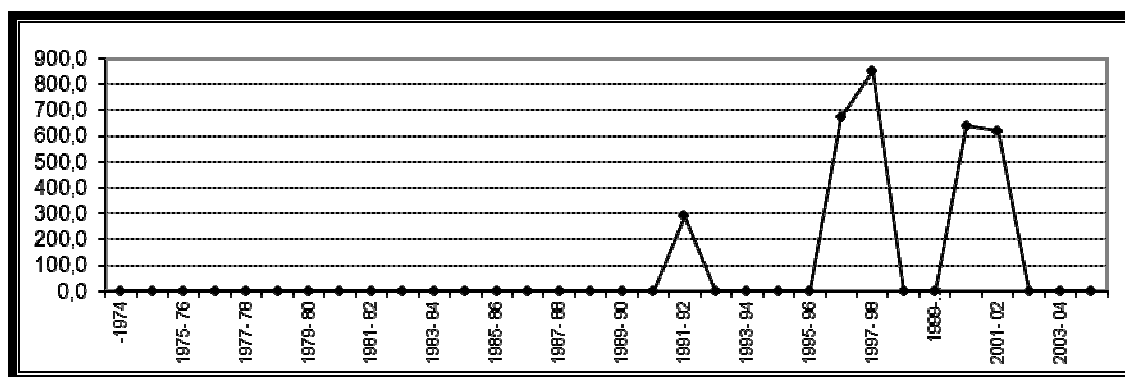


Chart with the Annual Precipitation of station (mm)



When one monthly measurement is missing annual value is considered as 0 at graphs



SECTION 2

DIGITIZED TEMPERATURE DATA OF HANDWRITTEN MEASUREMENTS FROM 25 METEOROLOGICAL STATIONS AT NORTH GREECE

Station 1T: Ano Kalliniki

Station	Ano Kalliniki		Longitude:	284.948,05
County:	Florina		Latitude:	4.526.799,97
Period:	1974-2004		Altitude (meters):	634,60

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974								8,5	12,6	18,0	20,9	21,7	-	-
2	1974- 75	18,1	11,3	5,4	-0,9	-7,4	-1,7	6,3	10,7	15,3	18,1	20,7	19,7	9,6	28,1
3	1975- 76	19,4	11,6	6,0	1,6	1,1	2,9		11,4		19,4	22,5	21,7	-	-
4	1976- 77	20,4		6,4	4,2	3,3	8,8	10,0	12,8	17,4	20,3	24,5	23,3	-	-
5	1977- 78	17,8	13,9	11,8	5,8	5,7	9,9	9,6						-	-
6	1978- 79				7,0	2,7	6,5	9,0	9,2	14,8	20,6	22,1	20,0	-	-
7	1979- 80	18,2	13,1	8,4	6,8	0,9	5,0	7,1	9,9	13,7	18,8	22,9	23,1	12,3	22,2
8	1980- 81	20,2	18,1	10,7	5,7	0,7	1,2	9,8	11,0	13,4	21,3	21,2	21,9	12,9	21,2
9	1981- 82	18,7	15,9	4,2	6,4	4,0	2,7	7,0	9,6	14,5	20,5	21,5	22,1	12,3	19,4
10	1982- 83	20,0	15,2	7,8	6,5	4,4	5,6	10,0	13,8	18,7	19,0	22,6	22,1	13,8	18,2
11	1983- 84	19,0	12,4	8,4	5,4	6,2	6,9	7,0	10,0	17,7	20,9	24,0	22,2	13,3	18,6
12	1984- 85	20,4	18,3	10,3	5,4	5,5	3,4	8,5	15,7	20,5	24,8	25,6	24,1	15,2	22,2
13	1985- 86	20,4	13,2	10,8	7,1	5,3	5,4	8,1	15,3	18,6	20,7	23,8	24,8	14,5	19,5
14	1986- 87	22,7	16,9	8,3	0,0	4,8	5,9	3,5	13,9	17,3	22,4	26,5	24,9	13,9	26,5
15	1987- 88	23,0	13,8	8,3	5,8	3,9	4,9	7,8	11,9	18,3	21,9	26,5	26,8	14,4	22,9
16	1988- 89	27,5						9,8	14,1	14,7	18,4	21,4	22,4	-	-
17	1989- 90	19,0	11,7	7,1	3,0	-5,7	6,2	10,4	12,3	16,1	21,2	24,2	22,5	12,3	29,9

18	1990- 91	18,5	15,0	10,5	0,5	-1,5	0,0	9,7	9,4	13,9	21,0	22,5	21,5	11,8	24
19	1991- 92	17,6	13,9	8,6	-2,2		3,0	7,0	11,9	15,1	20,4	22,0	25,4	-	-
20	1992- 93	20,5	16,8	8,3	3,6	-2,4	2,1	7,0	12,8	16,1	21,9	24,2	24,0	12,9	26,6
21	1993- 94	21,5	17,7	6,8	5,6	4,5	4,0	10,8	12,9	18,1	21,9	24,1	25,2	14,4	21,2
22	1994-95	23,5	14,9	8,4	3,9	0,4	7,4	7,8	10,4	16,9	23,3	24,1	22,2	13,6	23,7
23	1995- 96	18,6	13,2	8,1	6,6	3,1	2,6	3,7	10,5	17,1	21,7	22,8	22,8	12,6	20,2
24	1996- 97	14,7	11,1	8,6	3,3	3,8	4,5	6,1	6,9	17,9	23,2	24,1	21,3	12,1	20,8
25	1997- 98	18,0	11,0	7,8	3,5	3,5	4,4	5,0	13,8	15,7	22,5	25,4	25,6	13,0	22,1
26	1998- 99	18,1	14,6	6,6	-0,5									-	-
27	1999- 00													-	-
28	2000- 01													-	-
29	2001- 02													-	-
30	2002- 03									17,8	21,1	22,9	23,0	-	-
31	2003- 04	16,3	12,9	7,8		-1,1	1,2	6,8	11,7	13,5	19,2	21,6	21,0	-	-
32	2004- 05	16,8	14,4	8,4	3,2									-	-

Statistics and charts

Years	24,9												Aver	A
Number of measurements	26	24	25	25	23	24	24	25	25	26	26	26	18	18
Highest value	27,5	18,3	11,8	7,1	6,2	9,9	10,8	15,7	20,5	24,8	26,5	26,8	15,2	29,9
Lowest value	14,7	11,0	4,2	-2,2	-7,4	-1,7	3,5	6,9	12,6	18,0	20,7	19,7	9,6	18,2
Mean value	19,6	14,2	8,2	3,9	2,0	4,3	7,8	11,6	16,2	20,9	23,3	22,9	12,9	22,6

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

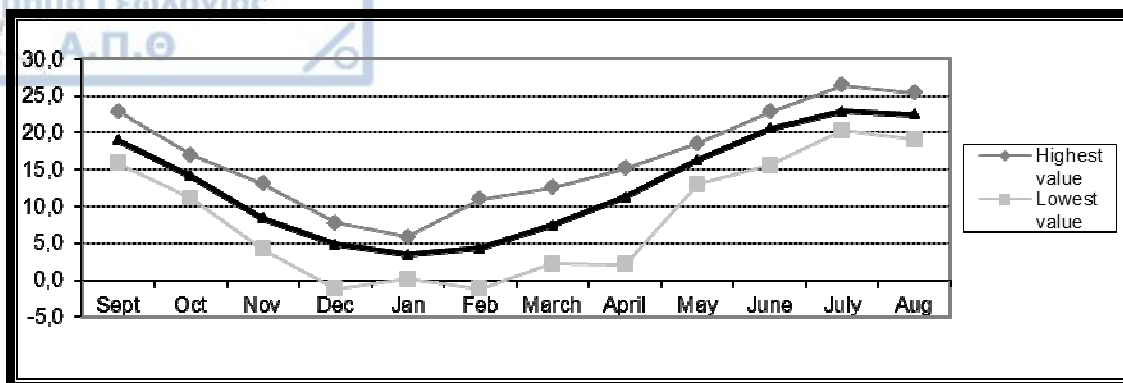


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

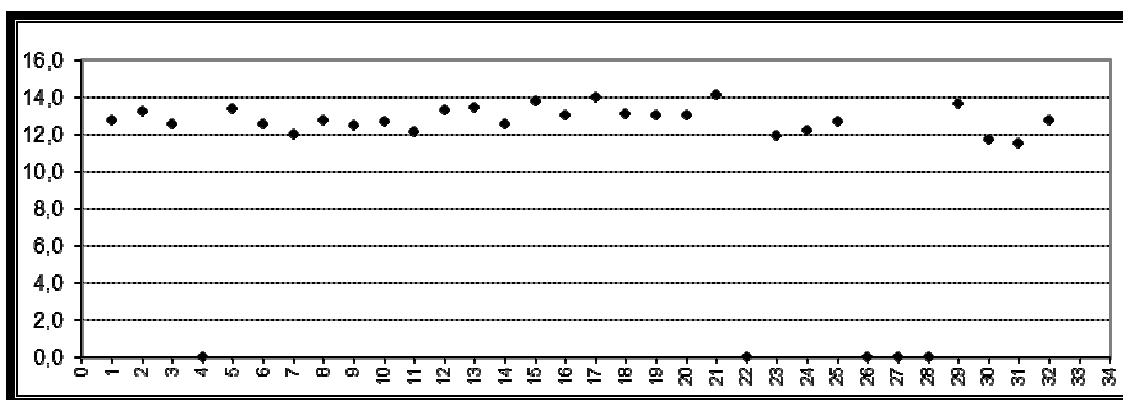
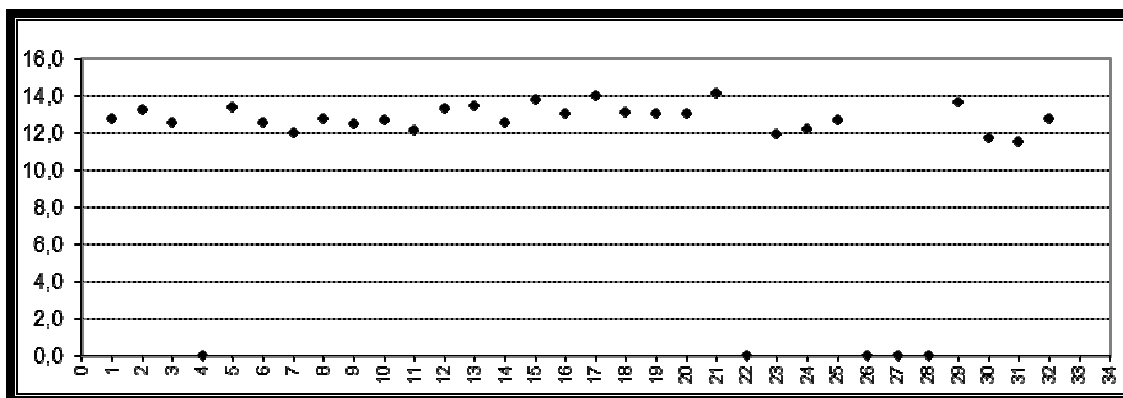


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 2T: Limnochori

Station	Limnochori	Longitude:	294.062,52
County:	Florina	Latitude:	4.500.615,25
Period:	1974-2004	Altitude (meters):	598,90

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974	19,9	15,3									21,6	22,0	-	-
2	1974- 75	18,2	13,4	5,7	0,4	-0,2	-1,2	3,9	8,6	13,3	16,3	18,7	17,8	9,6	19,9
3	1975- 76	16,4	9,4	6,2	0,3	0,6		6,4	11,0	15,1	17,8	20,7	18,5	-	-
4	1976- 77	17,6	13,8	6,9	2,4	2,4	7,7	7,7	9,1	17,5	20,3	23,1	22,7	12,6	20,7
5	1977- 78	17,3	12,2	10,5	0,1	1,4	9,9	12,8	8,1	12,8	18,1	19,7	19,5	11,9	19,6
6	1978- 79	9,1	3,6	4,1	6,6	3,0	0,9		12,7	18,9	18,9	18,9	18,5	-	-
7	1979- 80	14,8	10,5	8,8	4,9	-1,0	2,8	5,6	9,9	12,7	18,0	21,3	21,0	10,8	22,3
8	1980- 81	17,6	13,4	9,5	3,7	-1,5	2,8	8,5	10,8	13,9	20,6	20,6	20,4	11,7	22,1
9	1981- 82	17,8	14,8	7,9	5,1	2,5	1,1	5,0	9,8	15,4	20,3	21,2	21,5	11,9	20,4
10	1982- 83	19,2	13,9	6,6	6,3	4,8	3,5	9,2	15,2	17,6	18,5	21,7	19,8	13,0	18,2
11	1983- 84	17,4	11,0	6,7	5,7	7,7	5,0	5,7	9,4	15,4	19,4	21,1	20,1	12,1	16,1
12	1984- 85	18,3	16,3	8,5	2,9	2,6	1,3	5,9	12,6	17,6	19,7	22,1	22,6	12,5	21,3
13	1985- 86	18,1	11,8	9,5	6,3	3,7	3,6	6,8	13,1	16,4	19,8	21,2	22,5	12,7	18,9
14	1986- 87	19,3	12,9	6,4	1,3	2,6	4,8		11,4	14,5	20,0	23,8	22,6	-	-
15	1987- 88	21,9	13,5	7,7	4,6	4,9	3,9	6,7	11,1	16,5		25,7	23,6	-	-
16	1988- 89	18,6	12,8	4,4	2,4	2,3	5,3	9,3	13,9	14,9	18,4	21,8	21,9	12,2	19,6
17	1989- 90	18,4	11,9	7,8	4,4	4,5	7,0	10,0	12,2	16,1	20,1	23,2	21,9	13,1	18,8
18	1990- 91	17,9	14,0	11,8	3,7	3,3	0,4	12,0	12,3	13,7	21,0	22,4	20,7	12,8	22

19	1991- 92	20,6	16,3	9,9	2,4	3,5	2,4	7,4	11,3	14,4	19,9	20,8	23,7	12,7	21,3
20	1992- 93	18,5	16,0	8,5	2,3	2,2	2,1	7,6	13,7	16,9	20,3	21,6	22,9	12,7	20,8
21	1993- 94	17,1	15,3	7,4	8,4	7,4	2,6	14,3	12,9	17,0	19,8	22,9	23,2	14,0	20,6
22	1994-95	21,0	14,1	7,6	3,0	1,6	6,6	7,4	10,2	15,3	20,5	22,8	20,9	12,6	21,2
23	1995- 96	17,0	11,3	5,8	4,3	1,5	2,3	1,9	9,3	18,9	23,1	24,6	24,5	12,0	23,1
24	1996- 97	17,3	12,0	10,6	5,6	5,5	4,6	6,2	7,0	14,1	22,8	25,0	21,8	12,7	20,4
25	1997- 98	18,1	11,6	7,8	3,5	3,3	5,8	5,3	14,6	16,2	23,3	25,9	25,3	13,4	22,6
26	1998- 99	17,9	14,1	3,9	0,9									-	-
27	1999- 00				2,5	-3,8	-0,5	2,2	7,8	12,9			24,7	-	-
28	2000- 01	20,1	13,4	12,2	5,2	4,1	4,7	12,4	10,5	17,2	22,7	25,8	25,1	14,5	21,7
29	2001- 02	21,2	16,2	6,6	-2,9	1,2	6,9	7,4	9,7	14,2	20,7	24,8	23,1	12,4	27,7
30	2002- 03	18,1	13,2	9,4	3,3				8,5	17,4	22,0	24,0	25,0	-	-
31	2003- 04	18,2	15,1	10,6	2,6			8,4	9,3	12,8	19,3	24,2	23,6	-	-
32	2004- 05	17,5	15,8	8,2	4,7	1,7	0,7	5,8	10,6	16,3	19,4	20,8	21,0	11,9	20,3

Statistics and charts

Years	29,5												Aver	A
Number of measurements	31	31	30	31	28	27	27	30	30	28	30	31	23	23
Highest value	21,9	16,3	12,2	8,4	7,7	9,9	14,3	15,2	18,9	23,3	25,9	25,3	14,5	27,7
Lowest value	9,1	3,6	3,9	-2,9	-3,8	-1,2	1,9	7,0	12,7	16,3	18,7	17,8	9,6	16,1
Mean value	18,1	13,2	7,9	3,4	2,6	3,6	7,5	10,9	15,5	20,0	22,4	22,0	12,3	20,9

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

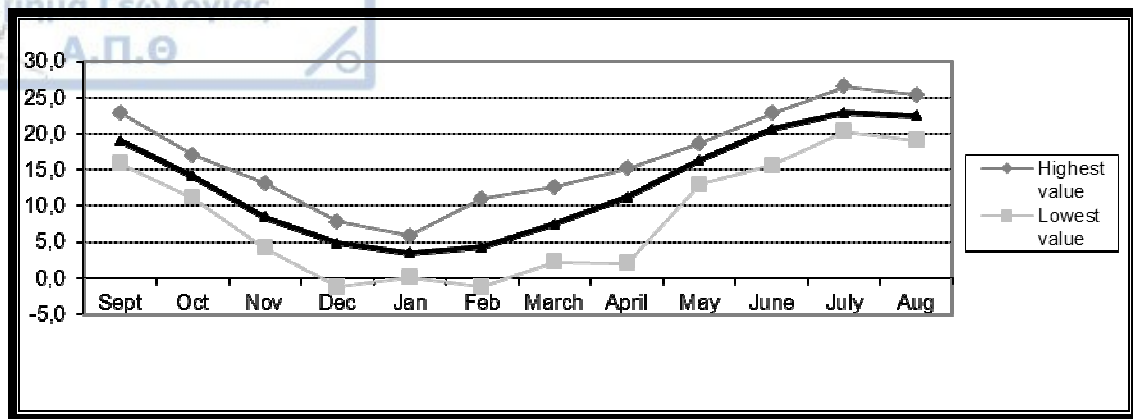


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

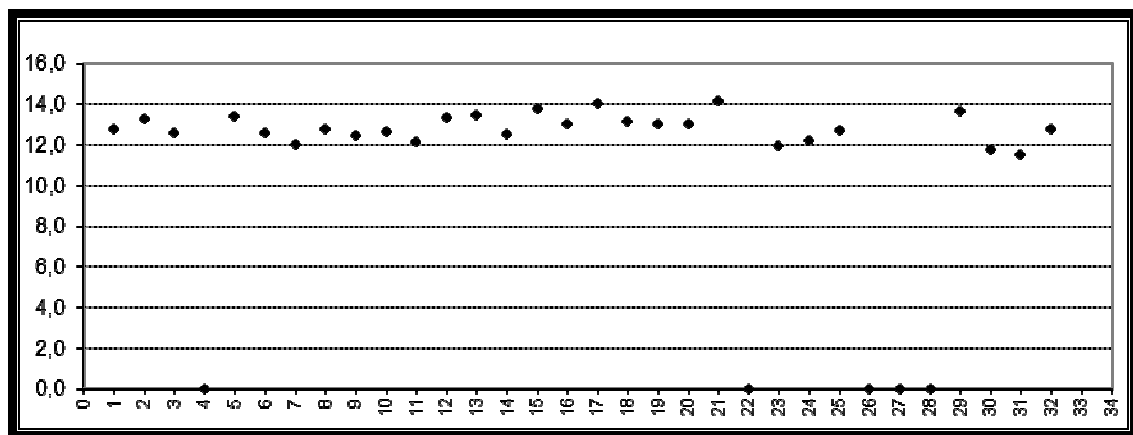
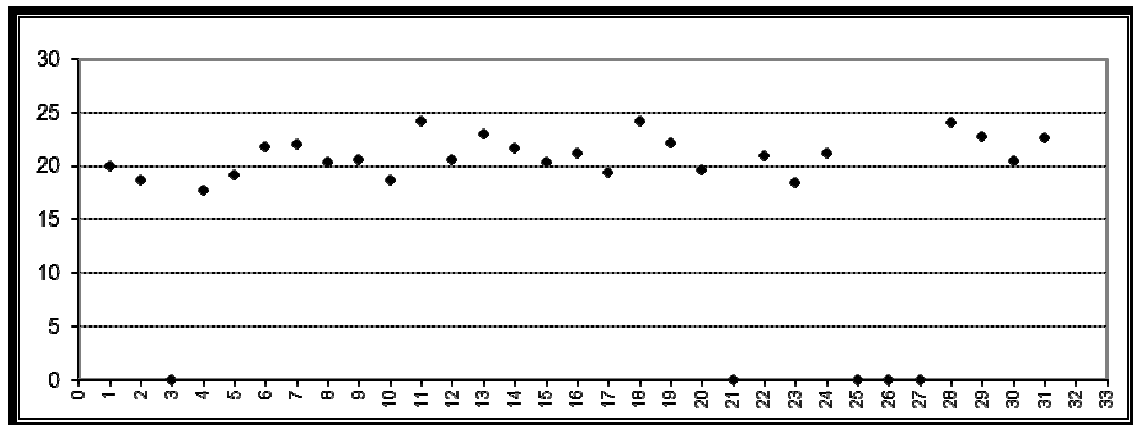


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 3T: Amuntaio

Station	Amuntaio		Longitude:	304.125,02
County:	Florina		Latitude:	4.507.749,93
Period:	1974-2004		Altitude (meters):	579,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974	17,1	12,3	6,1	3,9	4,4	5,4	6,9	9,7	16,6	18,2	21,3	21,7	12,0	17,8
2	1974- 75	17,8	12,4	8,9	3,4	2,9	3,3	8,5	13,5	16,7	21,4	21,8	20,9	12,6	18,9
3	1975- 76	18,3	13,8	9,4	5,4	5,3	4,6	8,6	16,0	16,4	17,6	20,3	18,3	12,8	15,7
4	1976- 77	16,3	12,6	7,4	3,6	5,8	13,8	13,6	14,0	18,3	22,5	25,5	23,4	14,7	21,9
5	1977- 78	16,7	14,4	9,9	5,0	4,1	10,8	12,7	13,7	16,9	22,5	27,0	23,1	14,7	22,9
6	1978- 79	23,1	15,3	5,4	5,5	3,0	8,5	9,2	11,3	13,8	21,0	22,2	20,6	13,2	20,1
7	1979- 80	17,9	16,5	10,9	6,9	1,3	2,5	4,9	9,2	11,7	16,9	21,4	21,6	11,8	20,3
8	1980- 81	18,0	13,4	9,0	3,7	1,6	-9,0			13,7	20,2	20,4	20,6	-	-
9	1981- 82	17,8	14,0	4,2	4,3	2,0	1,1	5,0	8,9	14,4	20,2	20,7	21,2	11,2	20,1
10	1982- 83	19,0	12,7	5,4	4,4	1,9	0,2	6,6	11,7	15,9	17,4	21,5	19,7	11,4	21,3
11	1983- 84	16,0	10,7	5,3	2,8	2,0	2,7	4,9	8,1	14,2	18,4			-	-
12	1984- 85		14,2	7,5	2,0	1,3	1,8	5,1	11,9	16,5	18,7	21,4	21,7	-	-
13	1985- 86	16,8	9,2	5,8	5,2	2,6	1,8	5,5	11,4	14,9	19,1	21,0	22,1	11,3	20,3
14	1986- 87	18,2	11,9	4,8	-0,3	3,0	3,6	0,9	10,5	13,7	19,0	23,2	21,3	10,8	23,5
15	1987- 88	20,5	12,0	6,4	3,7	3,4	2,5	5,1	8,9	13,7				-	-
16	1988- 89							13,2	15,9	17,4	23,2	25,4	23,7	-	-
17	1989- 90	21,2	12,9	8,4	3,3	1,4	5,6	12,8	15,9	17,7	20,7	23,7	22,1	13,8	22,3
18	1990- 91	16,8	13,1	9,3	2,0	1,1	0,8	8,1	9,2	12,2	20,3	21,6	21,7	11,4	20,9

19	1991- 92	17,5	13,8	7,0	-4,2		2,2	6,6	10,9	14,2	19,5	22,2	23,4	-	-
20	1992- 93	17,8	15,2	8,5	3,3	0,5	0,9	5,9	10,5	16,2	21,1	22,5	22,8	12,1	22,3
21	1993- 94	18,2	15,2	6,0	5,2	6,0	4,2	9,8	15,2	18,2	22,1	23,8	25,0	14,1	20,8
22	1994-95	22,9	16,3	9,7	6,2	3,7	7,7	8,5	11,7	17,5	23,8	24,5	22,5	14,6	20,8
23	1995- 96	18,7	14,3	7,2	6,8	3,6	4,3	4,9	10,9	19,9	23,7	26,0	24,9	13,8	22,4
24	1996- 97	18,4	12,9	10,1	5,2	6,4	6,2	7,7	7,8	19,3	24,1	25,5	22,8	13,9	20,3
25	1997- 98	19,4	12,5	8,2	4,3	5,1	7,0	6,7	14,6	17,0	23,4	26,6	25,7	14,2	22,3
26	1998- 99	19,4	15,5	7,8	3,0									-	-
27	1999- 00													-	-
28	2000- 01													-	-
29	2001- 02													-	-
30	2002- 03		12,7	7,2	3,0	3,8	-1,3	5,1	8,7	18,3	22,0	23,3	23,8	-	-
31	2003- 04	16,9	13,0	8,2	2,3	-0,5	3,5	6,9	11,4	13,7	19,7	22,4	21,9	11,6	22,9
32	2004- 05	17,7	13,7	7,4	3,9	1,6	0,4	5,9	10,8	16,9	19,5	22,9	22,2	11,9	22,5

Statistics and charts

Years	27,0													Aver	A
Number of measurements	26	28	28	28	26	27	27	27	28	27	26	26	21	21	
Highest value	23,1	16,5	10,9	6,9	6,4	13,8	13,6	16,0	19,9	24,1	27,0	25,7	14,7	23,5	
Lowest value	16,0	9,2	4,2	-4,2	-0,5	-9,0	0,9	7,8	11,7	16,9	20,3	18,3	10,8	15,7	
Mean value	18,4	13,4	7,6	3,7	3,0	3,5	7,4	11,6	15,9	20,6	23,0	22,3	12,5	21,0	

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

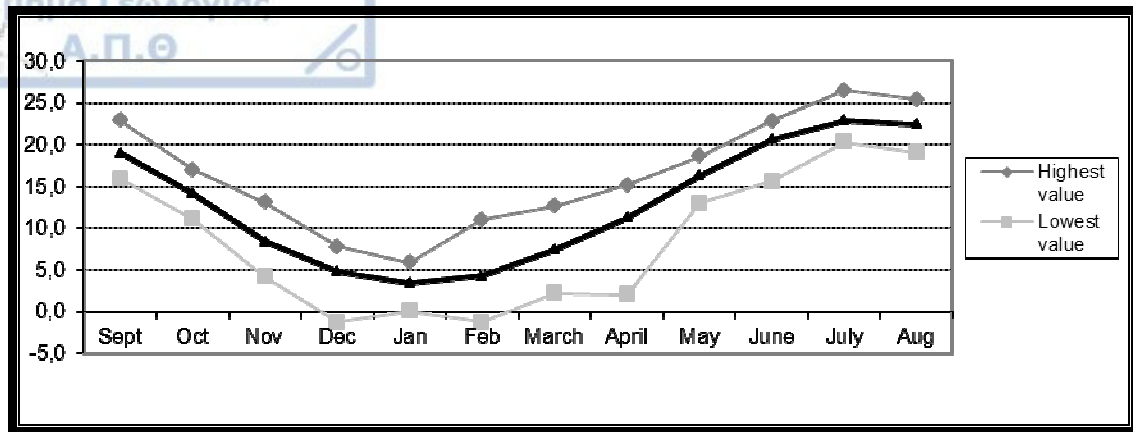


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

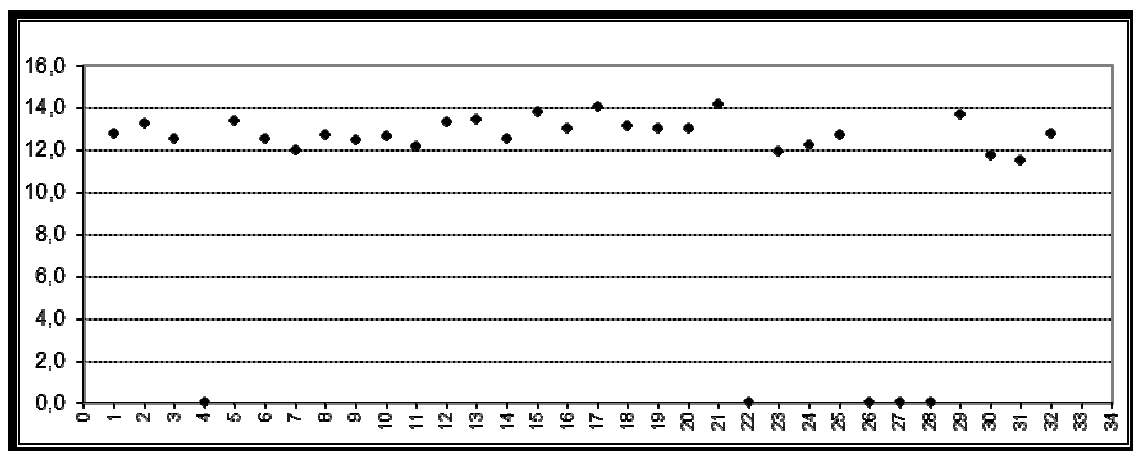
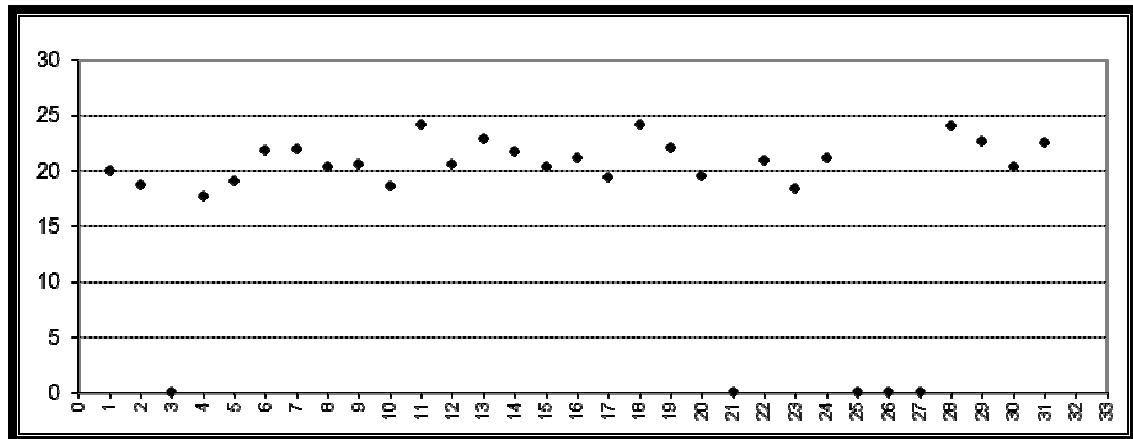


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 4T: Tropeouchos

Station	Tropeouchos	Longitude:	276.016,10
County:	Florina	Latitude:	4.510.396,80
Period:	1974-2004	Altitude (meters):	1.000,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974	17,8	12,7	4,9	1,9	1,7	2,9	6,7	8,0	12,9	18,0	20,5	21,1	10,8	19,4
2	1974- 75	17,6	12,4	5,2	-0,5	-5,3	-1,3	6,2	10,2	14,9	17,8	20,7	19,7	9,8	26
3	1975- 76	19,3	11,7	5,9	1,5	1,0	1,6	4,4	9,9	14,2	19,7	17,9	15,6	10,2	18,7
4	1976- 77	15,6	13,0	6,7	6,7						16,5	19,9	18,4	-	-
5	1977- 78	13,6	8,8	6,7	-0,5	-0,1	2,9	4,8	6,5	11,5	16,7	18,2	17,4	8,9	18,7
6	1978- 79	12,5	8,8	0,1	3,3	-0,6	2,4					20,1	18,5	-	-
7	1979- 80	17,4	11,7	7,2	3,8	-3,6	1,6	5,1	8,0	11,9	17,6	20,9	20,7	10,2	24,5
8	1980- 81	17,1	12,3	7,9	2,1	-4,1	1,4	8,3	9,5	13,3	19,9	19,6	19,8	10,6	24
9	1981- 82	17,6	13,8	1,3	3,5	2,2	1,0	4,9	8,7	14,2	19,6	20,3	20,5	10,6	19,5
10	1982- 83	18,6	12,8	4,6	4,2	3,8	1,1	7,5				19,6	18,7	-	-
11	1983- 84	15,6	10,0		3,2	1,8	3,1	4,2		14,6	17,3	19,3		-	-
12	1984- 85		14,9	7,1	1,1	0,8	2,3	4,6	10,9	15,9	18,4	21,6	21,7	-	-
13	1985- 86	17,4	10,6	8,3	3,9	2,1	2,9	6,3	11,9	15,0	18,4	20,2	22,0	11,6	19,9
14	1986- 87	17,7	11,7	5,4	0,3	3,0	4,1	0,4	10,3	13,1	18,3	23,2	21,0	10,7	22,9
15	1987- 88	20,9	11,3						7,2	15,3	20,2			-	-
16	1988- 89									14,2	17,1	20,9	21,4	-	-
17	1989- 90	17,9	11,5	7,4	3,5	-2,2	6,4	9,7	12,4	15,3	19,3	22,6	21,8	12,1	24,8
18	1990- 91	17,2	14,5	9,8	1,5	-1,4	1,5	8,8	9,4	12,9	20,0	21,4	21,1	11,4	22,8

19	1991- 92	18,1	14,0	8,2	-0,7	1,2	3,1	7,8	11,6	14,7	19,3	21,0	24,3	11,9	25
20	1992- 93	18,8	16,5	10,2	2,8	0,1	1,2	7,1	12,0	16,2	21,1	23,1	23,9	12,8	23,8
21	1993- 94	19,0	16,0	5,7	6,6	4,8	4,3	10,3	12,0	17,3	20,3	23,2	23,6	13,6	19,3
22	1994-95	21,7	14,1	8,1	2,6	1,6	7,4	7,8	11,1	15,9	20,8	23,1	20,4	12,9	21,5
23	1995- 96	16,9	12,0	4,8	5,9	3,2	3,8	3,5	11,2	17,7	21,4	22,5	22,1	12,1	19,3
24	1996- 97	16,0	11,6	10,0	5,4	4,6	4,8	6,3	6,9	16,6	21,6	23,0	20,0	12,2	18,4
25	1997- 98	17,2	10,5	7,8	3,8	3,9	5,2	4,8	13,7	14,6	21,7	17,9	23,1	12,0	19,3
26	1998- 99	17,3	13,4	7,9	0,1									-	-
27	1999- 00				4,7	5,2	4,7	5,7	6,5					-	-
28	2000- 01				4,7	3,0	2,1	9,5	5,5	12,8	25,7	33,1	34,3	-	-
29	2001- 02	24,6			-2,0	-0,5	8,3	12,2	12,3	18,8	23,8	26,7	24,9	-	-
30	2002- 03	22,5								17,2	20,6	22,1	22,5	-	-
31	2003- 04	15,8	12,4	7,4	0,6	-1,2	2,5	6,2	10,9	12,8	18,4	21,1	20,4	10,6	22,3
32	2004- 05	16,0	13,6	6,0	3,9	0,5	-1,5	5,2	10,3	15,8	18,3	21,9	20,6	10,9	23,4

Statistics and charts

Years	27,2													Aver	A
Number of measurements	28	27	25	29	27	27	26	25	27	28	29	28	20	20	
Highest value	24,6	16,5	10,2	6,7	5,2	8,3	12,2	13,7	18,8	25,7	33,1	34,3	13,6	26,0	
Lowest value	12,5	8,8	0,1	-2,0	-5,3	-1,5	0,4	5,5	11,5	16,5	17,9	15,6	8,9	18,4	
Mean value	17,8	12,5	6,6	2,7	0,9	3,0	6,5	9,9	14,8	19,6	21,6	21,4	11,4	21,7	

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

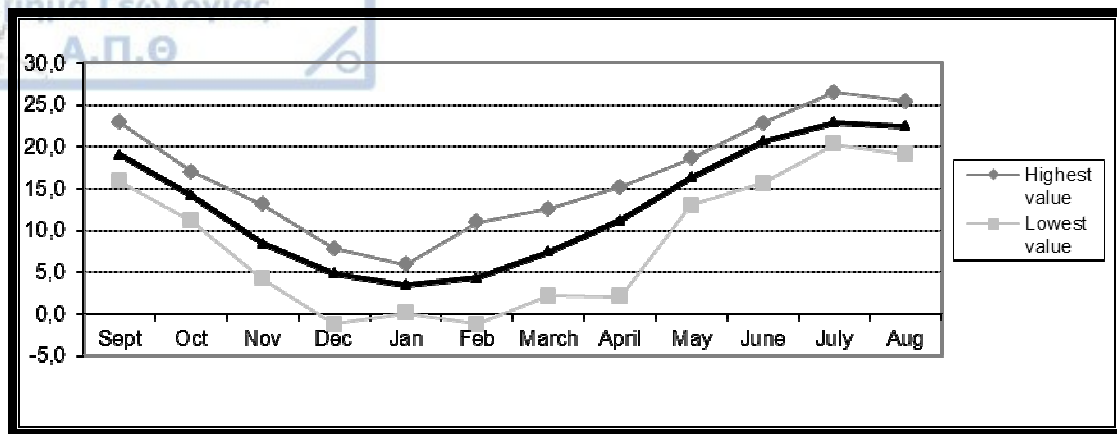


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

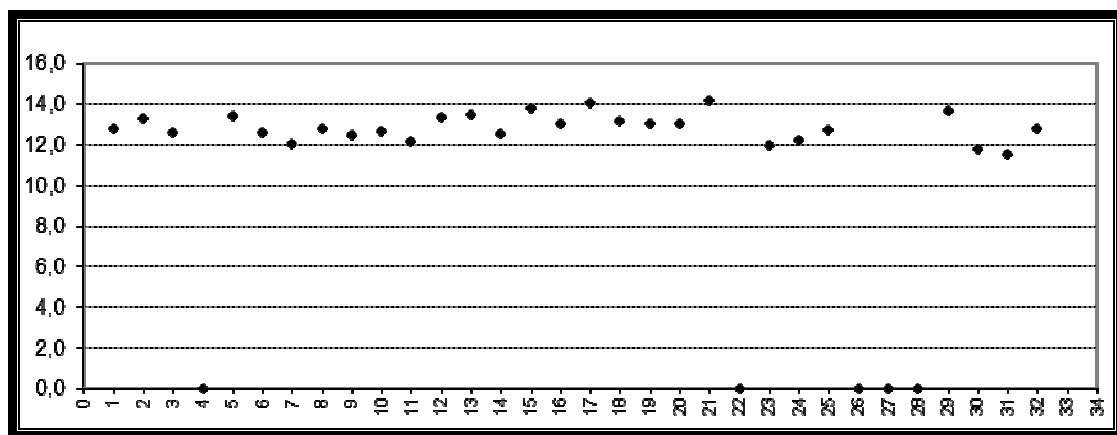
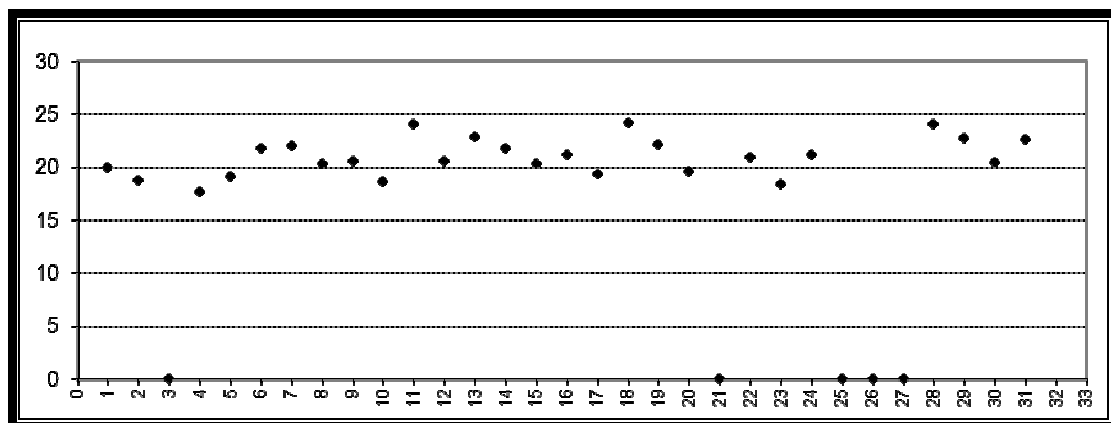


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 5T: Monospita

Station	Monospita	Longitude:	346.179,19
County:	Imathia	Latitude:	4.497.504,86
Period:	1974-2004	Altitude (meters):	47,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974													-	-
2	1974- 75													-	-
3	1975- 76													-	-
4	1976- 77													-	-
5	1977- 78					3,4	7,0	10,3	11,9	16,9	23,3	24,0	24,0	-	-
6	1978- 79	18,2	14,2	8,5	7,4	1,5	6,8	10,4	11,3	18,6	23,2	23,9	23,9	14,0	22,4
7	1979- 80	20,0	14,6	10,3	6,3	2,1	5,0	7,9	11,0	15,5	21,6	24,0	23,6	13,5	21,9
8	1980- 81	19,8	15,9	11,4	5,0	1,3	5,1	11,4	12,6	16,4	23,6	23,6	23,0	14,1	22,3
9	1981- 82	20,7	17,0	7,7	6,8	3,5	3,4	7,2	11,6	17,6	23,0	23,3	23,1	13,7	19,9
10	1982- 83	22,0	15,6	8,0	6,6	4,5	3,6	8,8	14,3	19,4	20,7	24,4	22,9	14,2	20,8
11	1983- 84	19,4	14,1	7,7	5,5	4,8	5,7	7,9	11,4	17,8	21,4	23,0	22,3	13,4	18,2
12	1984- 85	20,9	17,4	10,2	5,1	3,8	2,1	7,5	14,4	19,1	21,7			-	-
13	1985- 86		13,9	10,3	7,2	5,3	5,1	8,5	14,7	18,9	23,0	23,6	25,4	-	-
14	1986- 87	21,0	15,0	8,5	2,5	3,5	6,8	4,3	12,9	17,0	21,8	26,2	23,6	13,6	23,7
15	1987- 88	23,4	14,4	9,3	6,1									-	-
16	1988- 89					3,1	6,6	11,3	15,4	17,3	20,9	24,5	24,8	-	-
17	1989- 90	21,2	14,8	9,6	3,7									-	-
18	1990- 91								11,9	15,9	23,3	24,6	24,2	-	-

19	1991- 92	20,8	16,7	10,3	2,5	4,4	4,6	9,2	13,6	17,3	22,6	23,9	26,4	14,4	23,9
20	1992- 93	20,9	16,8	11,1	4,3	4,0	3,4	8,4	12,9	19,0	25,0	24,5	25,0	14,6	21,6
21	1993- 94	20,4	18,0	8,2	7,2	6,7	5,7	10,8	14,4	18,9	22,7	25,5	25,6	15,3	19,9
22	1994-95	23,5	16,3	9,8	5,8	4,3	8,4	9,0	12,8	18,1	23,6	25,2	23,1	15,0	20,9
23	1995- 96	19,7	14,5	6,1	7,1	4,6	4,8	5,7	11,6	19,8	23,3	24,3	24,4	13,8	19,8
24	1996- 97	18,7	13,7	10,2	6,9	5,7	5,1	7,9	8,7	18,9	23,5	25,0	23,3	14,0	19,9
25	1997- 98	19,2	12,8	9,7	5,7	5,1	7,8	6,6	14,3	17,6	23,9	25,9	26,2	14,6	21,1
26	1998- 99	19,8	15,7	9,1	4,0	4,8	-			18,7	23,8	26,3	25,9	-	-
27	1999- 00	21,5	16,6	9,8	7,4	1,5	6,1	8,0	15,1	20,8	23,5	25,7	25,3	15,1	24,2
28	2000- 01	20,7	15,0	12,2	6,6	6,4	7,1	12,7	12,5	18,0	22,3	25,7	26,2	15,5	19,8
29	2001- 02	21,6	17,5	8,6	0,2	3,7	9,7	11,4	12,4	18,6	24,1	25,8	24,7	14,9	25,6
30	2002- 03	19,3	15,0	10,6	5,8	7,1	2,4	7,9		21,6	24,4			-	-
31	2003- 04		14,9	12,7	7,2	5,5	8,3	11,7	15,4	19,5	24,9	28,1	26,3	-	-
32	2004- 05	23,6	18,9	12,5	8,9	8,0	6,3	11,5	15,6	21,2	24,1	27,0	26,4	17,0	20,7

Statistics and charts

Years	24,6												Aver	A
Number of measurements	23	25	25	25	25	24	24	24	26	26	24	24	18	18
Highest value	23,6	18,9	12,7	8,9	8,0	9,7	12,7	15,6	21,6	25,0	28,1	26,4	17,0	25,6
Lowest value	18,2	12,8	6,1	0,2	1,3	2,1	4,3	8,7	15,5	20,7	23,0	22,3	13,4	18,2
Mean value	20,7	15,6	9,7	5,7	4,3	5,7	9,0	13,0	18,4	23,0	24,9	24,6	14,6	21,5

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

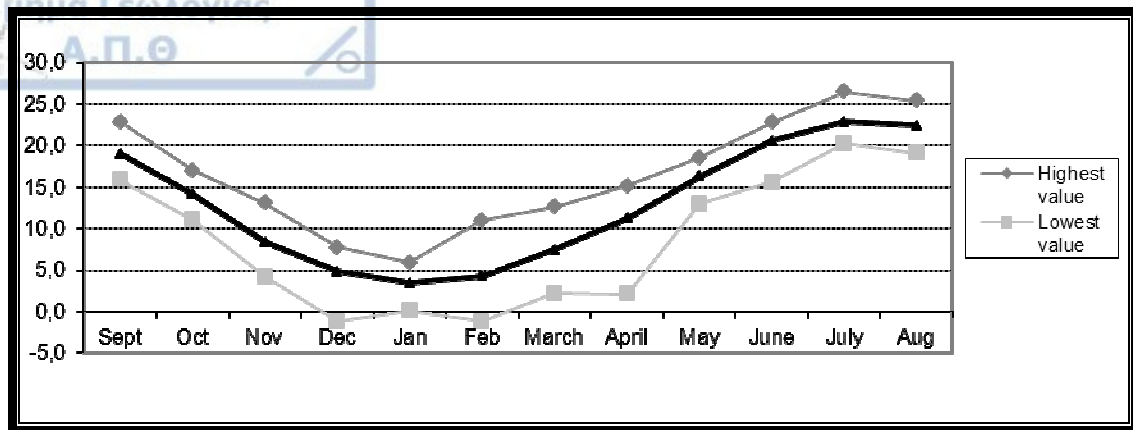


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

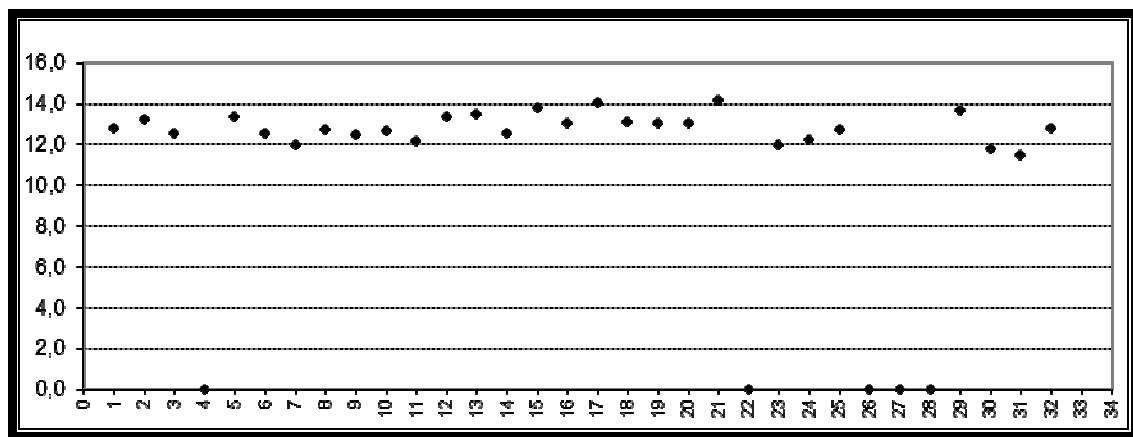
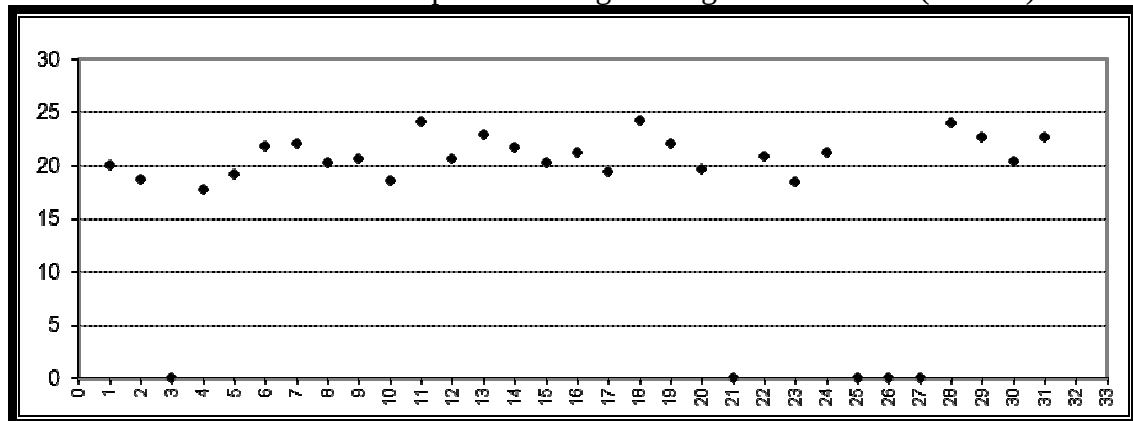


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 6T: Rodochori

Station	Rodochori	Longitude:	332.288,80
County:	Imathia	Latitude:	4.507.060,48
Period:	1974-2004	Altitude (meters):	545,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974							7,1	9,5	16,0	21,0	24,0	24,4	-	-
2	1974- 75	20,5	15,5	9,5	6,2	6,3	3,1	8,8	13,2	18,0	20,1	22,5	21,3	13,8	19,4
3	1975- 76	20,6	14,4	6,6	4,5	2,8	1,7	4,6	11,7	13,2	19,7	21,9	20,1	11,8	20,2
4	1976- 77	19,5	12,9	10,3	5,7	5,2	9,8	9,7	11,7	17,9	22,1	24,6	23,5	14,4	19,4
5	1977- 78	16,8	14,0	11,6		3,1	7,1	6,9	5,4	13,4	22,0	23,8	21,5	-	-
6	1978- 79	14,9	11,8	11,0	7,7	3,2	9,0	8,3	11,8	13,5	22,8	22,3	22,6	13,2	19,6
7	1979- 80	19,5	12,3	9,1	6,8	0,6	4,1	6,2	10,6	13,9	19,6	23,3	23,6	12,5	23
8	1980- 81	20,0	13,3	10,9	6,5	1,1	3,8	10,4	11,7	15,1	22,1	22,5	22,5	13,3	21,4
9	1981- 82	20,0	16,5	7,6	5,9	3,8	2,1	5,7	9,7	16,8	22,0	22,7	23,1	13,0	21
10	1982- 83	21,6	14,6	8,9	6,1	5,6	2,6	8,9	14,5	18,1	18,8	21,8	21,5	13,6	19,2
11	1983- 84	18,8	13,8	6,9	4,4	4,6	2,6	5,4	9,5	16,8	20,3	22,3	21,8	12,3	19,7
12	1984- 85	20,6	17,2	9,9	4,1	2,9	0,1	5,5	13,6	18,4	20,4			-	-
13	1985- 86		13,5	9,1	7,5	5,0	3,9	5,8	13,9	16,9	21,0	22,3	24,5	-	-
14	1986- 87	21,0	13,8	7,8	3,2	3,6	4,3	1,9	11,1	14,7	20,7	24,8	22,3	12,4	22,9
15	1987- 88	22,5	12,3	8,1	5,6									-	-
16	1988- 89					3,8	6,2	10,0	14,8	15,5	19,2	22,3	23,8	-	-
17	1989- 90	19,6	13,4	8,5	4,3									-	-
18	1990- 91								9,9	13,9	21,6	22,5	22,3	-	-
19	1991- 92	19,1	14,7	8,8	1,3	4,9	4,2	7,7	11,4	15,6	20,8	21,8	25,7	13,0	24,4

20	1992- 93	19,4	15,8	10,4	3,3	5,1	2,1	7,2	12,9	16,6	21,6	23,3	25,0	13,6	22,9
21	1993- 94	20,1	16,8	5,5	8,0		4,9	9,0	11,8	17,0	19,7	23,2	24,8	-	-
22	1994-95	23,7	15,9	8,4	5,3	1,5	6,8	6,4	13,5	16,2	22,0	23,5	21,3	13,7	22,2
23	1995- 96	19,2	13,1	4,4	5,2	2,0	2,0	3,1	9,5	17,8	20,6	23,7	23,8	12,0	21,8
24	1996- 97	16,8	13,0	9,9	6,0	4,3	4,5	7,7	7,3	18,6	21,6	23,3	22,1	12,9	19
25	1997- 98	17,8	12,3	7,6	4,5	4,8	6,4	4,5	13,2	15,4	23,1	26,8	26,0	13,5	22,3
26	1998- 99	18,7	15,6	8,1	2,5	4,4	2,9	7,8				27,7	26,7	-	-
27	1999- 00	20,7	16,3	8,6	6,2	0,5	5,0	7,6	14,7	17,9	22,4	26,4	25,6	14,3	25,9
28	2000- 01	20,8	13,7	12,3	6,3	4,6	5,4	12,6	11,4	16,1	21,7	25,7	25,8	14,7	21,2
29	2001- 02	21,1	17,5	8,3	-0,3	3,7	9,0	10,1	11,1	17,5	23,1	24,2	22,7	14,0	24,5
30	2002- 03	17,6	14,1	9,9	3,0	5,8	0,5	6,4		20,1	23,4	24,3	25,2	-	-
31	2003- 04	18,8	14,2	9,8	4,9	2,1	6,5	8,6	11,9	15,3	20,6	23,6	23,1	13,3	21,5
32	2004- 05	19,5	15,5	9,2	6,4	4,5	3,0	7,4	12,2	17,5	20,7	24,7	23,7	13,7	21,7

Statistics and charts

Years	28,5												Aver	A
Number of measurements	28	29	29	28	27	28	29	28	29	29	29	29	21	21
Highest value	23,7	17,5	12,3	8,0	6,3	9,8	12,6	14,8	20,1	23,4	27,7	26,7	14,7	25,9
Lowest value	14,9	11,8	4,4	-0,3	0,5	0,1	1,9	5,4	13,2	18,8	21,8	20,1	11,8	19,0
Mean value	19,6	14,4	8,9	5,0	3,7	4,4	7,3	11,6	16,3	21,2	23,6	23,5	13,3	21,6

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

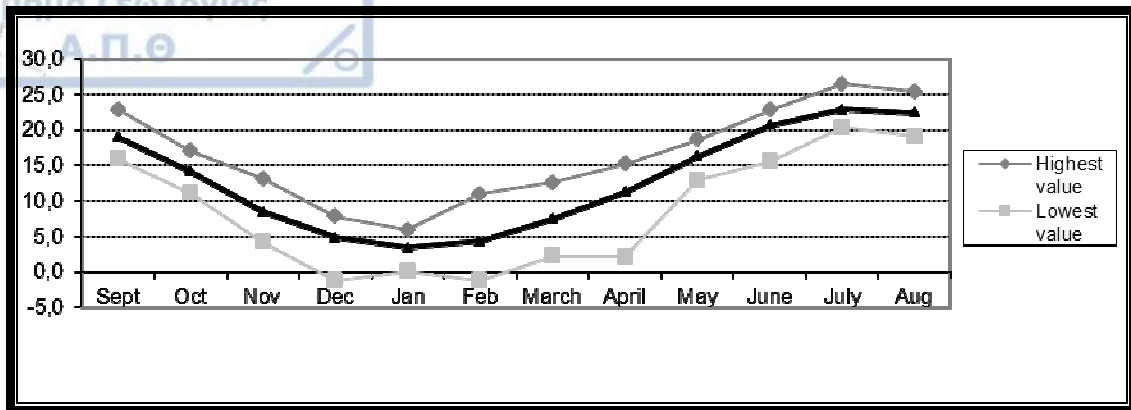


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

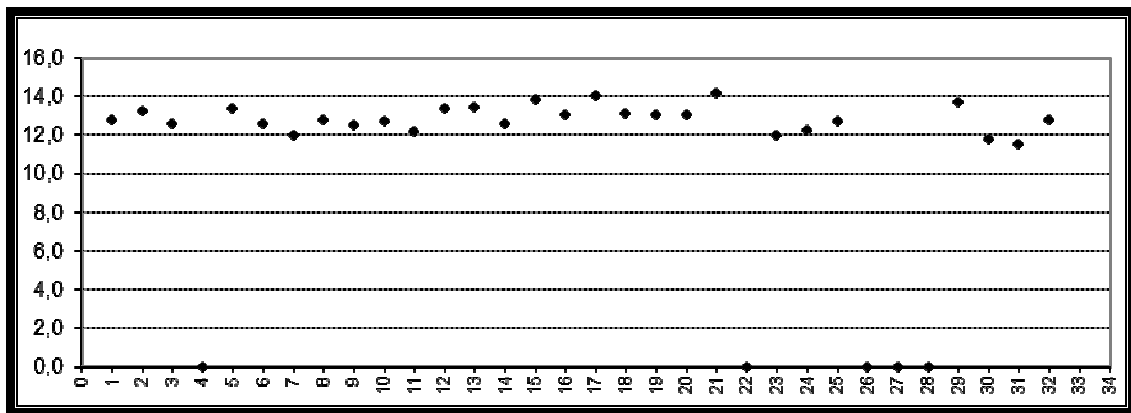
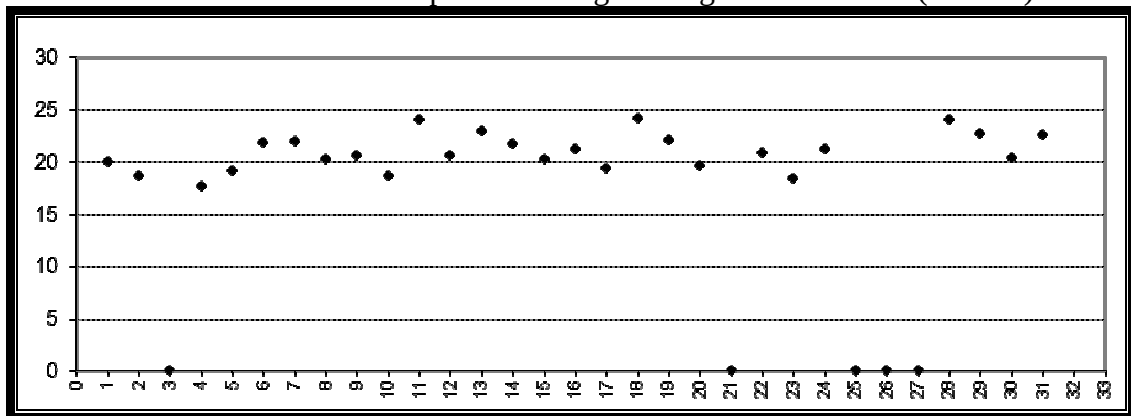


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 7T: Exaplatanos

Station	Exaplatanos	Longitude:	342.816,28
County:	Pella	Latitude:	4.538.298,95
Period:	1974-2004	Altitude (meters):	133,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974													-	-
2	1974- 75													-	-
3	1975- 76													-	-
4	1976- 77													-	-
5	1977- 78					4,0	7,5	10,3	11,5	19,2	21,8	22,7	22,3	-	-
6	1978- 79	17,5	13,8	6,2	7,1	2,2	5,8	9,5	9,6	16,9	22,0	23,2	22,6	13,0	21
7	1979- 80	18,7	13,2	10,3	5,6	1,5	5,5	7,5	12,4	15,6	20,9	23,9	23,3	13,2	22,4
8	1980- 81	19,3	15,6	11,3	6,9	7,0	5,7	11,1	12,5	17,0	24,2	23,4	23,7	14,8	18,5
9	1981- 82	20,3	17,2	9,1	7,3	4,8	3,8	8,3	11,8	15,8	23,3	24,2	23,5	14,1	20,4
10	1982- 83	21,4	16,2	8,4	6,6	6,4	4,7	10,4	14,9	20,5	21,2	23,7	23,7	14,8	19
11	1983- 84	19,3	13,7	8,1	6,2	6,0	5,9	7,8	11,4	17,7	21,1	23,1	22,2	13,5	17,2
12	1984- 85	20,4	16,8	9,7	4,4	3,1	1,9	7,1	14,1	18,9	21,3	23,9	24,0	13,8	22,1
13	1985- 86	20,2	13,3	9,3	7,4	4,7	4,7	8,2	14,2	18,0	22,3	23,1	25,0	14,2	20,3
14	1986- 87	20,8	13,5	7,6	2,9	3,3		4,4	12,0	16,3	21,9	25,6	23,1	-	-
15	1987- 88	22,2	13,4	8,9	5,7	5,0	4,4	7,5	11,6	17,2	22,1	26,6	24,8	14,1	22,2
16	1988- 89	20,2	13,6	4,5	4,3	4,3	7,3	11,8	15,7	17,6	20,9	24,1	24,9	14,1	20,6
17	1989- 90	21,6	15,0	10,3	4,3	4,3	8,7	12,4	14,6	18,4	22,7	25,9	24,3	15,2	21,6
18	1990- 91	20,6	15,6	12,2	6,0	3,3	4,7	10,5	12,2	15,8	23,2	24,5	24,6	14,4	21,3

19	1991- 92	20,5	16,2	10,5	3,4	5,7	5,8	9,0	12,3	15,9	21,6	22,6	25,5	14,1	22,1
20	1992- 93	18,9	15,3	9,4	3,1	3,3	2,8	7,1	11,7	17,8	22,4	23,9	23,9	13,3	21,1
21	1993- 94	19,3	17,0	6,7	6,7	5,9	4,9	10,0	13,2	17,9	21,7	25,0	24,6	14,4	20,1
22	1994-95	23,1	15,9		4,8									-	-
23	1995- 96					4,4	4,9	5,8		19,7	23,2	26,1	24,8	-	-
24	1996- 97	17,6				6,7	6,4	8,8	9,1	18,0	22,3	23,8	22,1	-	-
25	1997- 98	19,0	11,1	8,8	4,6	5,3	7,9	6,5	13,2	16,8	22,2	24,4	24,8	13,7	20,2
26	1998- 99	18,0	13,8	7,5	3,0	4,0	<u>4,0</u>	9,2	12,9	18,0	22,7	24,5	25,0	13,6	22
27	1999- 00	20,3	14,4	7,6	5,7	1,6	6,2	7,8	15,0	18,8	23,4	26,2	25,1	14,3	24,6
28	2000- 01	20,0	14,6	12,2	6,8									-	-
29	2001- 02					4,5	9,1		12,2	18,0	23,7	25,8	23,9	-	-
30	2002- 03	19,1	14,4	9,8	<u>5,1</u>	<u>7,7</u>		7,8	11,8	21,2	24,6	26,4	26,1	-	-
31	2003- 04	21,1	15,3	11,8	6,4	3,4	6,6	10,2	13,3	16,8	22,3	24,9	24,8	14,7	21,5
32	2004- 05	20,7	17,2	10,6	6,7	5,5	3,3	9,5	13,5	18,7	22,5	25,7	23,5	14,8	22,4

Statistics and charts

Years	25,0													Aver	A
Number of measurements	25	24	23	24	26	24	25	25	26	26	26	26	26	20	20
Highest value	23,1	17,2	12,2	7,4	7,7	9,1	12,4	15,7	21,2	24,6	26,6	26,1	15,2	24,6	
Lowest value	17,5	11,1	4,5	2,9	1,5	1,9	4,4	9,1	15,6	20,9	22,6	22,1	13,0	17,2	
Mean value	20,0	14,8	9,2	5,5	4,5	5,5	8,7	12,7	17,8	22,4	24,5	24,1	14,1	21,0	

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

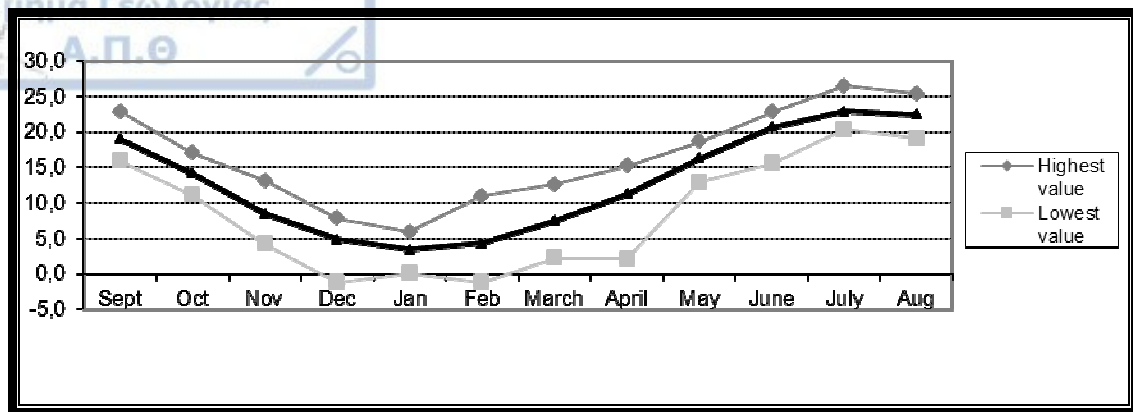


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

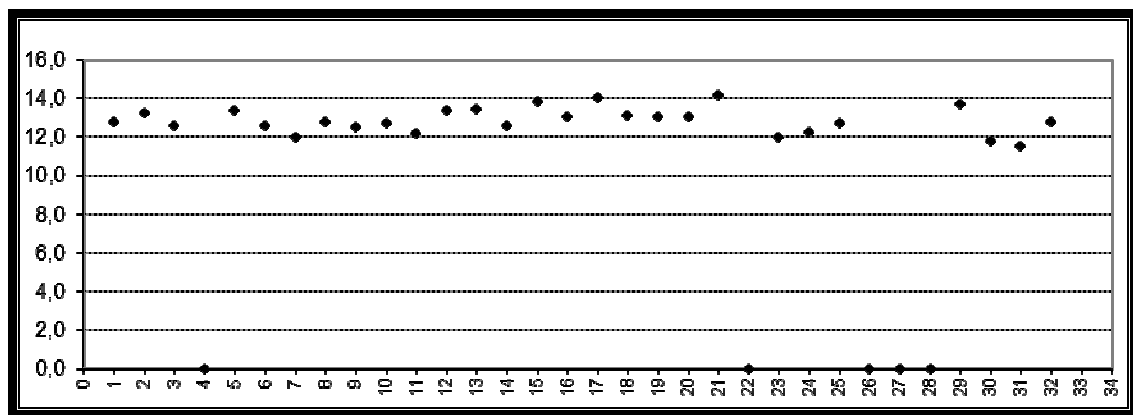
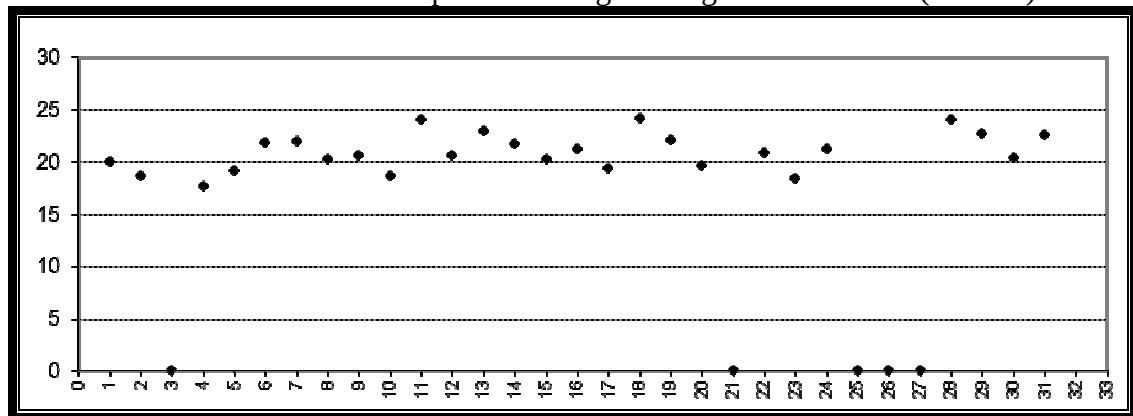


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 8T: Vrontou

Station	Vrontou	Longitude:	352.321,40
County:	Pieria	Latitude:	4.451.109,71
Period:	1974-2004	Altitude (meters):	180,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974													-	-
2	1974- 75													-	-
3	1975- 76													-	-
4	1976- 77													-	-
5	1977- 78					4,5	7,2	11,1	12,6	17,5	23,1	24,9	23,9	-	-
6	1978- 79	19,1	15,3	8,7	8,6	4,4	7,1	10,9	12,0	18,7	24,2	24,4	24,0	14,8	20
7	1979- 80	21,5	14,5	11,6	8,0	3,2	5,8	8,1	12,6	16,1	22,4	25,0	24,7	14,5	21,8
8	1980- 81	20,9	17,3	13,1	8,8		5,2	11,4	13,4	16,5	24,1	24,5	24,2	-	-
9	1981- 82	21,6	18,6	9,4	8,0	4,9	4,7	7,5	11,4	17,7	23,3	24,7	24,7	14,7	20
10	1982- 83	23,0	16,5	10,0	7,2	6,5	4,3	10,3	14,7	20,3	21,1	25,5	23,8	15,3	21,2
11	1983- 84	21,0	18,8	9,1	6,4	6,4	6,0	7,8	11,8	18,7	22,3	24,3	23,0	14,6	18,3
12	1984- 85	22,2	19,5	12,3	6,0	5,3	3,6	7,8	15,1	20,3	23,5	25,8	26,4	15,7	22,8
13	1985- 86	22,2	15,4	11,6	8,9	7,5	6,3	8,6	15,7	19,2	23,9	25,3	26,7	15,9	20,4
14	1986- 87	22,6	17,3	9,0	5,4		0,6	4,0	14,7	18,7	24,4	28,2	25,5	-	-
15	1987- 88	25,2	16,4	11,5	8,5	7,3	7,7	9,9	13,5	19,7	24,7	29,4	24,3	16,5	22,1
16	1988- 89	21,2	16,5	7,4	6,7	5,8	9,1	12,1	17,0	18,4	21,1	23,1	24,7	15,3	18,9
17	1989- 90	21,2	16,3	10,4	5,8					18,6	23,7	25,5	24,3	-	-
18	1990- 91	20,7	16,2	13,0	6,5	4,4	5,0	9,6	12,2	15,7	22,6	23,3	23,1	14,4	18,9

19	1991- 92	19,9	16,5	11,2	3,8	5,3	5,2	8,8	12,4	16,8	22,1	23,3	25,9	14,3	22,1
20	1992- 93	21,2	17,8	12,0	5,0	4,6	3,4	8,0	12,7	18,0	23,4	24,3	25,6	14,7	22,2
21	1993- 94	20,7	18,7	8,4	8,6	7,9	6,0	10,7	13,8	18,3	22,8	25,7	25,9	15,6	19,9
22	1994-95	23,2	17,4	10,6	6,8	5,0	8,6	9,1	12,5	17,5	23,6	25,1	23,0	15,2	20,1
23	1995- 96	19,4	16,0	7,8	7,6	4,4	4,6	4,8	11,4	20,3	23,4	24,5	24,3	14,0	20,1
24	1996- 97	19,4	14,6	11,5	7,8	6,8	6,6	8,6	9,4	18,6	23,1	24,7	23,4	14,5	18,1
25	1997- 98	19,4	13,8	9,9	6,0	6,0	8,6	6,9	14,5	17,6	23,6	26,0	26,3	14,9	20,3
26	1998- 99	20,6	16,5	10,6	5,2	7,9	5,9	4,4	13,1	20,4	23,2	26,0	25,1	14,9	21,6
27	1999- 00	21,4	17,8	11,5	7,6	2,9	6,9	9,5	16,1	19,5	24,4	25,4	24,9	15,7	22,5
28	2000- 01	21,1	15,3	14,0	7,5	6,7	8,4	13,8	13,3	18,2	22,3	26,3	25,9	16,1	19,6
29	2001- 02	21,2	18,6	11,0	1,3	4,2	9,6	11,1	11,9	17,9	24,2	26,0	23,5	15,0	24,7
30	2002- 03	19,3	16,4	12,7	6,1	7,2	0,7	3,7	10,3	19,1	23,8	25,8	26,3	14,3	25,6
31	2003- 04	20,8	16,7	12,6	5,7	3,7	7,0	9,9	12,5	14,5	20,5	23,2	23,3	14,2	19,6
32	2004- 05	20,5	18,0	12,4	9,5	5,8	3,5	8,4	13,4	19,1	22,5	25,0	23,1	15,1	21,5

Statistics and charts

Years	27,2													Aver	A
Number of measurements	27	27	27	27	25	27	27	27	27	28	28	28	28	24	24
Highest value	25,2	19,5	14,0	9,5	7,9	9,6	13,8	17,0	20,4	24,7	29,4	26,7	16,5	25,6	
Lowest value	19,1	13,8	7,4	1,3	2,9	0,6	3,7	9,4	14,5	20,5	23,1	23,0	14,0	18,1	
Mean value	21,1	16,8	10,9	6,8	5,5	5,8	8,8	13,1	18,3	23,1	25,2	24,6	15,0	20,9	

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

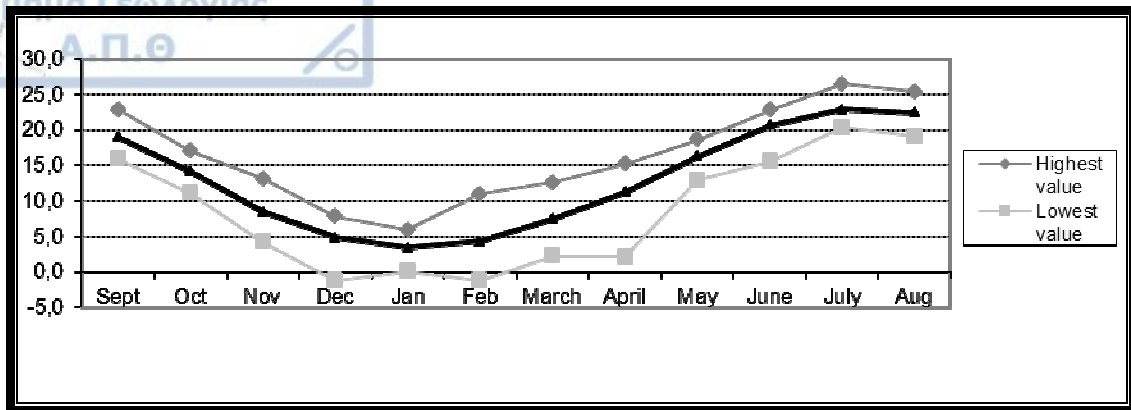


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

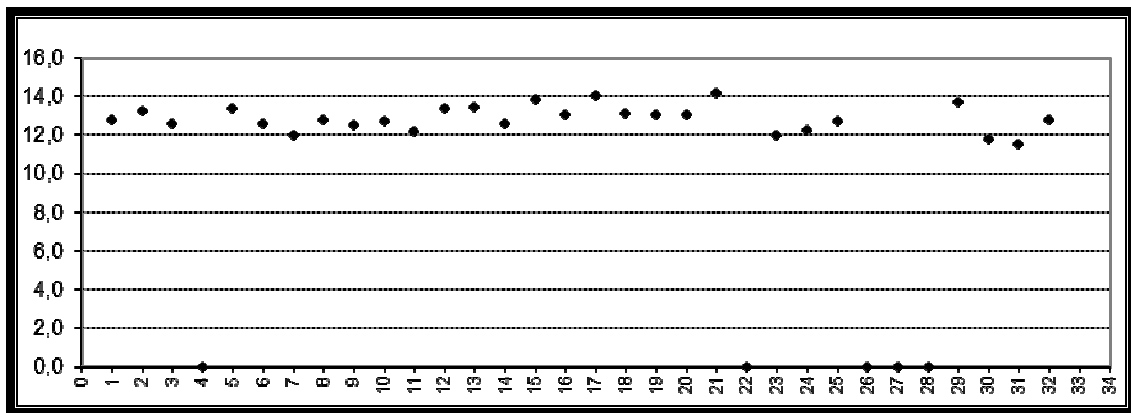
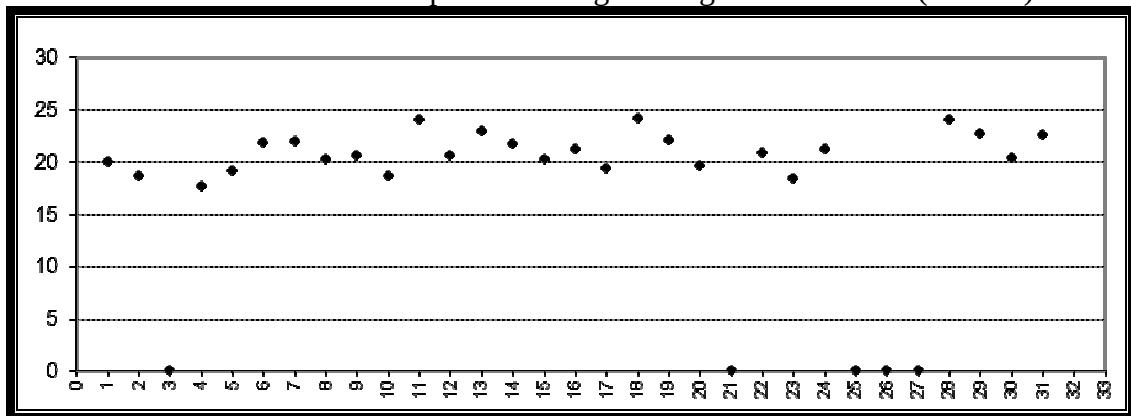


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 9T: Moschopotamos

Station	Moschopotamos	Longitude:	356.858,37
County:	Pieria	Latitude:	4.465.828,33
Period:	1974-2004	Altitude (meters):	516,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974													-	-
2	1974- 75													-	-
3	1975- 76													-	-
4	1976- 77													-	-
5	1977- 78					2,3	5,6	9,7	10,7	15,7	21,6	23,3	22,5	-	-
6	1978- 79	17,6	13,5	8,0	7,5	2,4	5,6	9,8	10,3	17,1	22,2	22,6	22,6	13,3	20,2
7	1979- 80	19,6	13,1	9,8	7,0	1,8	4,6	6,8	11,2	14,3	20,0	23,7		-	-
8	1980- 81	19,4	15,2	11,7	7,2	12,0	15,3	10,5	12,0	15,3	22,6	22,7	23,0	15,6	15,8
9	1981- 82	20,2	17,3	8,3	7,2	4,6	3,2	6,6	9,6	16,7	21,8	23,0	23,1	13,5	19,9
10	1982- 83	21,6	14,8	8,8	6,6	5,5	3,0	9,0	14,2	18,6	19,0	23,2	21,7	13,8	20,2
11	1983- 84	19,0	14,1	7,1	4,7	5,4	3,8	5,8	9,7	16,8	20,5	22,7	21,8	12,6	18,9
12	1984- 85	20,6	17,5	9,9	4,7	3,8	0,9	5,3	14,0	17,8	21,0	23,8	24,5	13,7	23,6
13	1985- 86	19,6	13,6	9,9	8,0	5,8	4,4	6,6	14,4	17,1	21,9	22,5	24,8	14,1	20,4
14	1986- 87	21,2	14,9	8,3	3,8	4,4	5,8	3,4	11,7	15,2	21,6	25,9	22,7	13,2	22,5
15	1987- 88	23,5	13,4	9,1	6,7	6,0	5,6	7,6	11,4	17,7	22,1	27,0	25,5	14,6	21,4
16	1988- 89	23,2	14,3	5,1	5,7	4,2	7,0	10,3	15,0	16,0	19,8	23,6	25,1	14,1	20,9
17	1989- 90	18,9	14,5	9,2	4,9					17,0	21,8	25,3	23,6	-	-
18	1990- 91	19,8	15,1	11,8	5,3	4,3	3,0	8,5	10,1	13,8	22,0	23,1	23,4	13,4	20,4

19	1991- 92	20,0	15,4	9,6	2,6	5,2	4,3	7,4	12,9	15,6	20,8	22,4	25,9	13,5	23,3
20	1992- 93	20,0	16,8	11,5	5,0		3,3	7,8	12,6	17,1	22,4	24,0	25,4	-	-
21	1993- 94	21,1	18,0	7,0	7,8	7,0	3,9	10,0	13,2	18,0	21,5	24,8	25,8	14,8	21,9
22	1994-95	24,1	15,8	9,2					11,6	16,7	22,6	24,5	23,2	-	-
23	1995- 96	19,7	14,8	7,4	7,5	3,2	3,8	4,9	10,5	19,8	22,8	24,5	25,1	13,7	21,9
24	1996- 97	18,7	14,0	11,9	7,5	5,6	5,6	7,1	8,4	18,9	22,6	25,2	22,8	14,0	19,6
25	1997- 98	18,6	12,2	8,7	5,7	4,8	8,0	5,9	13,6	16,6	22,2	25,9	25,5	14,0	21,1
26	1998- 99	19,4	15,6	8,8	3,5	5,5	6,1	9,7	13,9	19,2	23,4	26,0	25,4	14,7	22,5
27	1999- 00	20,8	17,4	9,4	7,4	1,6	5,3	7,2	14,3	18,1	22,8	25,9	24,8	14,6	24,3
28	2000- 01	20,5	14,1	12,4	6,9	6,0	6,6	12,9	11,0	16,1	22,1	25,3	25,6	15,0	19,6
29	2001- 02	20,8	17,2	9,2	2,9	4,2	9,4	10,2	11,4	17,6	23,0	25,0	23,6	14,5	22,1
30	2002- 03	18,4	15,7	10,8	5,3	7,6	2,1	6,5	11,4	19,4	25,0	26,0	25,4	14,5	23,9
31	2003- 04	18,9	16,0	11,8	5,7	3,3	6,4	9,1	12,7	16,8	22,8	25,0	24,0	14,4	21,7
32	2004- 05	20,6	15,4	9,7	6,9	5,0	5,8	9,0	12,8	17,6	22,2	24,9	24,6	14,5	19,9

Statistics and charts

Years	26,8												Aver	A
Number of measurements	27	27	27	26	25	26	26	27	28	28	28	27	23	23
Highest value	24,1	18,0	12,4	8,0	12,0	15,3	12,9	15,0	19,8	25,0	27,0	25,9	15,6	24,3
Lowest value	17,6	12,2	5,1	2,6	1,6	0,9	3,4	8,4	13,8	19,0	22,4	21,7	12,6	15,8
Mean value	20,2	15,2	9,4	5,9	4,9	5,3	8,0	12,0	17,0	21,9	24,4	24,1	14,0	21,1

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

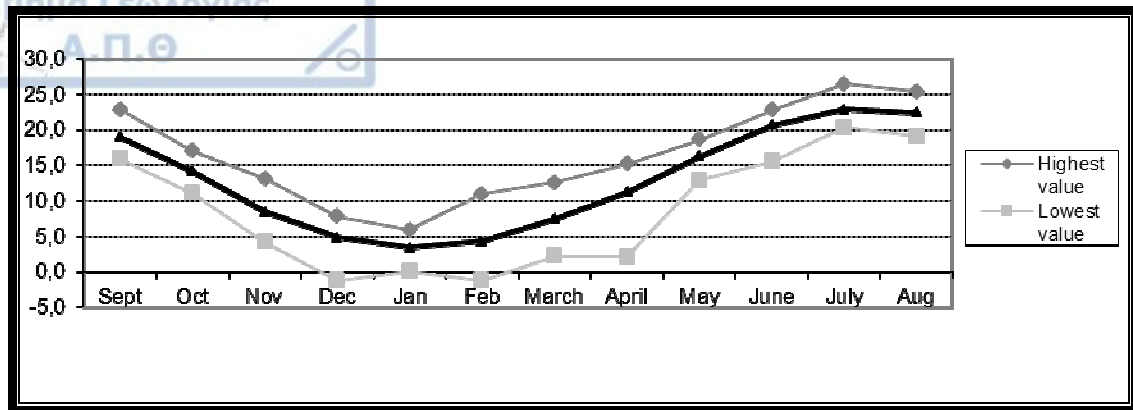


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

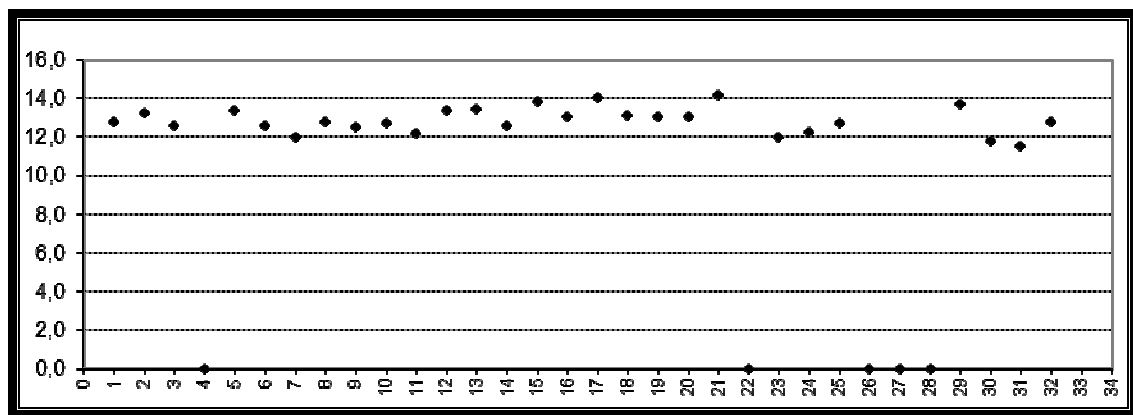
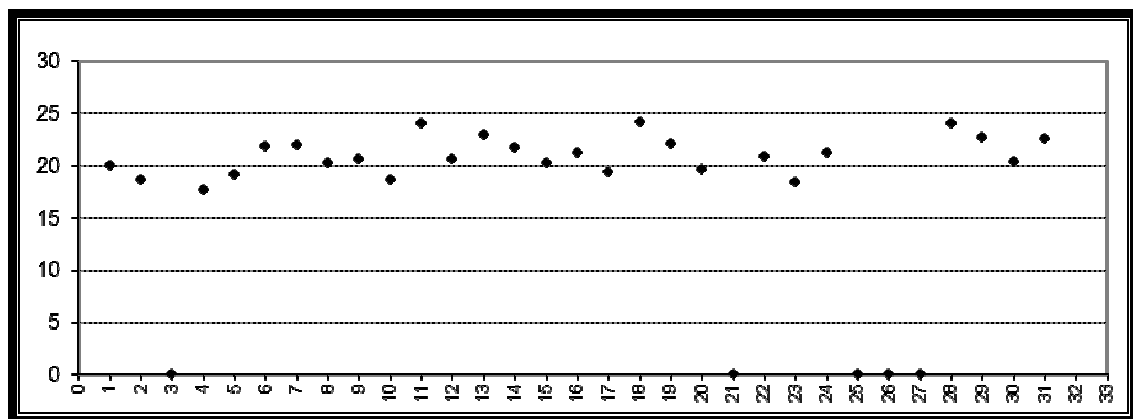


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 10T: Agia Paraskevi

Station	Agia Paraskevi	Longitude:	281.013,00
County:	Grevena	Latitude:	4.439.877,05
Period:	1974-2004	Altitude (meters):	615,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974													-	-
2	1974- 75													-	-
3	1975- 76													-	-
4	1976- 77													-	-
5	1977- 78								9,8	13,7	19,4	21,7	20,7	-	-
6	1978- 79	15,6	10,8	13,0	5,6	-0,6	3,3	6,6	9,5	15,1	19,8	21,5	20,7	11,7	22,1
7	1979- 80	17,1	12,5	8,5	5,0	1,3	4,4		10,9	12,6	18,6	23,6	23,2	-	-
8	1980- 81	19,6	14,8	10,3	7,1	3,9	3,1	11,0	13,5	15,0	21,1	21,9	20,8	13,5	18,8
9	1981- 82	19,8	14,7	5,5	5,5	4,8	3,0	5,6	10,3	16,1	21,5	22,6	23,0	12,7	20
10	1982- 83	20,0	13,5	6,5	6,1	3,3	2,6	8,6	14,0	18,4	19,1	22,6	21,1	13,0	20
11	1983- 84	17,8	12,3	7,4	2,4	4,6	5,1	6,0	9,5	16,7	21,0	22,8	20,9	12,2	20,4
12	1984- 85	19,0	16,2	9,6	4,6	3,1	2,3	6,4	13,1	17,6	21,1	23,8	23,7	13,4	21,5
13	1985- 86	19,0	12,0	10,0	6,0	4,3	3,7	6,6					23,1	-	-
14	1986- 87	19,2	14,0	6,3	1,6	3,8	4,9	2,0	11,6	15,0	20,0	24,6	22,8	12,2	23
15	1987- 88	21,3	12,0	7,1	4,2	4,7	2,8	5,2	9,8	15,0	19,6	25,2	23,2	12,5	22,4
16	1988- 89	18,7	12,0	3,3	1,4	1,3	4,8	9,4	14,0	14,5	19,1	21,2	22,2	11,8	20,9
17	1989- 90	19,3	12,5	8,1	4,3	0,8	5,3	10,0	11,7	16,0	21,2	24,4	21,7	12,9	23,6
18	1990- 91	18,5	15,2	9,4	2,6	1,3	2,0	8,8	9,9	12,9	20,1	21,8	22,0	12,0	20,7

19	1991- 92	18,7	14,2	7,8	-0,4	2,0	2,5	6,2	11,3	14,3	19,8	21,2	23,7	11,8	24,1
20	1992- 93	18,0	16,1	9,5	3,3	1,3	2,3	8,0	13,2	16,5	22,7	19,7	23,5	12,8	22,2
21	1993- 94	19,5	16,1	5,8	5,0	5,3	3,6	10,2	12,0	16,9	20,7	22,8	23,9	13,5	20,3
22	1994-95	21,8	14,5	7,7	3,1	2,0	7,5	6,8	10,4	15,9	21,1	22,8	21,5	12,9	20,8
23	1995- 96	18,1	11,9	5,7	6,5	3,2	3,1	3,8	10,1	17,5	21,0	23,3	22,7	12,2	20,2
24	1996- 97	16,8	11,7	9,6	5,2	5,2	5,3	6,2	7,9	17,6	23,4	24,3	21,7	12,9	19,1
25	1997- 98	17,8	12,0	8,5	3,8	5,0	6,2	5,7	13,7	16,3	22,6	24,9	24,5	13,4	21,1
26	1998- 99	18,4	14,5	6,8	2,1									-	-
27	1999- 00													-	-
28	2000- 01													-	-
29	2001- 02							9,0	10,1	15,6	20,7	20,0	21,3	-	-
30	2002- 03	16,5	12,3	8,2	3,7	4,4	-1,1	5,0				23,2	22,3	-	-
31	2003- 04	16,8	13,4	8,4	3,4	0,7	3,6	6,5	10,9	13,4	19,8			-	-
32	2004- 05					2,9	0,9	7,2	10,5	16,4	19,1	23,2	22,6	-	-

Statistics and charts

Years	23,1												Aver	A
Number of measurements	23	23	23	23	23	23	23	23	23	23	23	24	18	18
Highest value	21,8	16,2	13,0	7,1	5,3	7,5	11,0	14,0	18,4	23,4	25,2	24,5	13,5	24,1
Lowest value	15,6	10,8	3,3	-0,4	-0,6	-1,1	2,0	7,9	12,6	18,6	19,7	20,7	11,7	18,8
Mean value	18,6	13,4	8,0	4,0	3,0	3,5	7,0	11,2	15,6	20,5	22,7	22,4	12,5	21,2

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

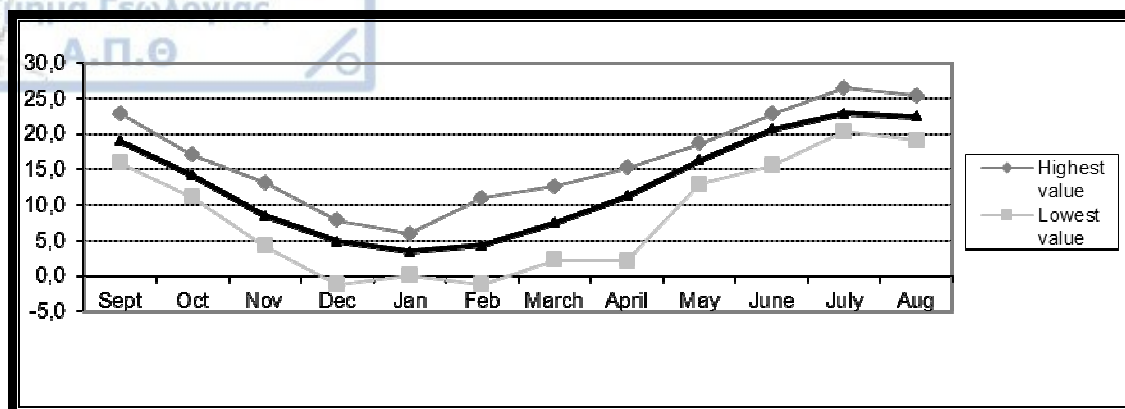


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

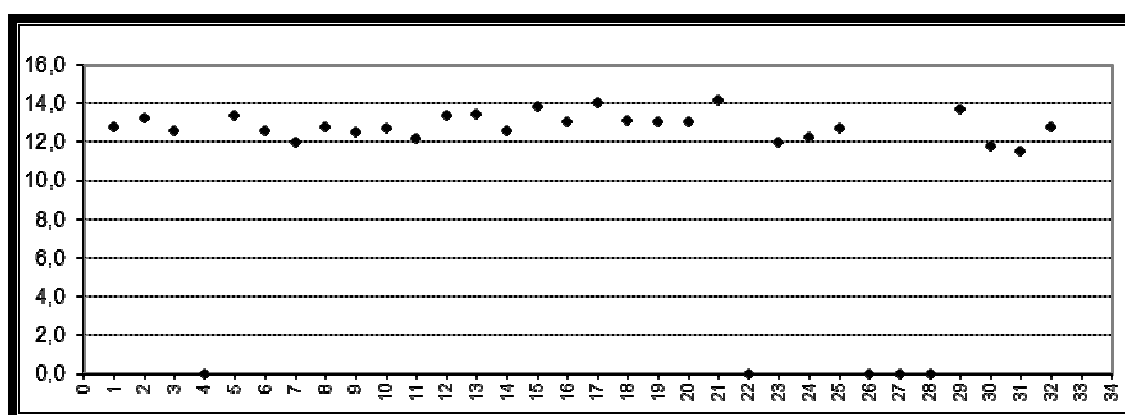
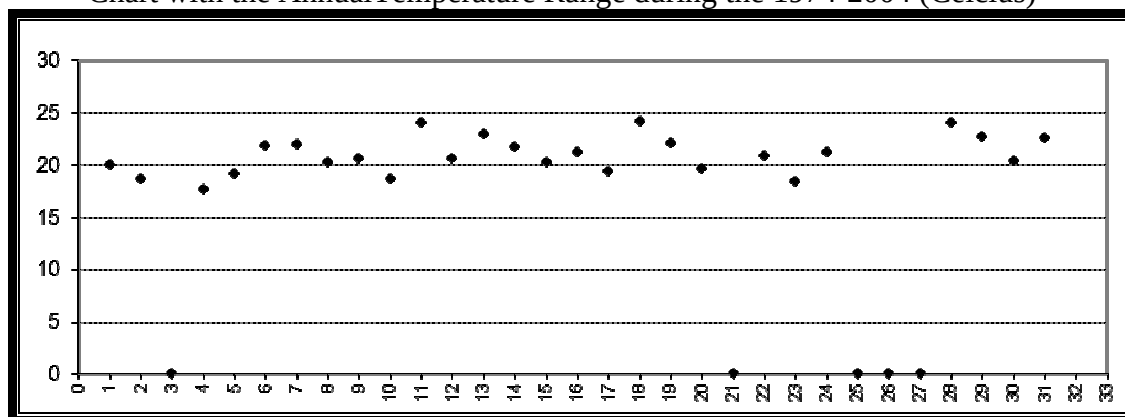


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 11T: Alatopetra

Station	Alatopetra		Longitude:	262.479,39
County:	Grevena		Latitude:	4.438.582,59
Period:	1974-2004		Altitude (meters):	1.250,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974														
2	1974- 75														
3	1975- 76														
4	1976- 77														
5	1977- 78														
6	1978- 79														
7	1979- 80														
8	1980- 81														
9	1981- 82														
10	1982- 83														
11	1983- 84														
12	1984- 85														
13	1985- 86														
14	1986- 87														
15	1987- 88														
16	1988- 89														
17	1989- 90														
18	1990- 91					-1,0	1,0	6,1	5,8	9,3	17,3	18,1	17,9	-	-

19	1991- 92	15,9	11,6	5,6	-0,3	0,4	-0,2	3,0	7,1	11,0	15,6	17,9	18,5	8,8	18,8
20	1992- 93	15,0	10,6	7,8	2,1	3,0	5,4	10,4	13,8	10,0	14,0	17,8	18,0	10,7	15,9
21	1993- 94	19,4	16,3	4,2	-0,2		2,6	8,5	9,8	14,8	17,8	21,1	23,2	-	-
22	1994-95	21,7	14,5	7,2	4,0	2,8	6,7	5,1	7,7	14,1	19,9	21,5	19,6	12,1	18,9
23	1995- 96	16,4	12,3	4,7		1,1	2,4	2,3	7,9	16,1	20,1	21,6	23,0	-	-
24	1996- 97	14,7	10,4	10,9	5,8	5,2	3,3	4,5	5,0	15,9	20,2	22,1	19,5	11,5	18,8
25	1997- 98	17,0	10,9	6,6	4,7	4,2	6,4	3,0	12,8	12,3	20,2	24,5	24,8	12,3	21,8
26	1998- 99	17,0	13,9	8,2	5,1									-	-
27	1999- 00													-	-
28	2000- 01													-	-
29	2001- 02													-	-
30	2002- 03	15,8	13,4	9,1	2,8	3,6	-2,8					22,8	23,1	-	-
31	2003- 04	16,4	12,2	8,0	2,1	0,7	3,7	5,2	9,4	12,2	18,8			-	-
32	2004- 05					2,2	-0,5	5,7	9,6	15,7	18,2	22,3	21,8	-	-

Statistics and charts

Years	10,0												Aver	A
Number of measurements	10	10	10	9	10	11	10	10	10	10	10	10	5	5
Highest value	21,7	16,3	10,9	5,8	5,2	6,7	10,4	13,8	16,1	20,2	24,5	24,8	12,3	21,8
Lowest value	14,7	10,4	4,2	-0,3	-1,0	-2,8	2,3	5,0	9,3	14,0	17,8	17,9	8,8	15,9
Mean value	16,9	12,6	7,2	2,9	2,2	2,5	5,4	8,9	13,1	18,2	21,0	20,9	11,1	18,8

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

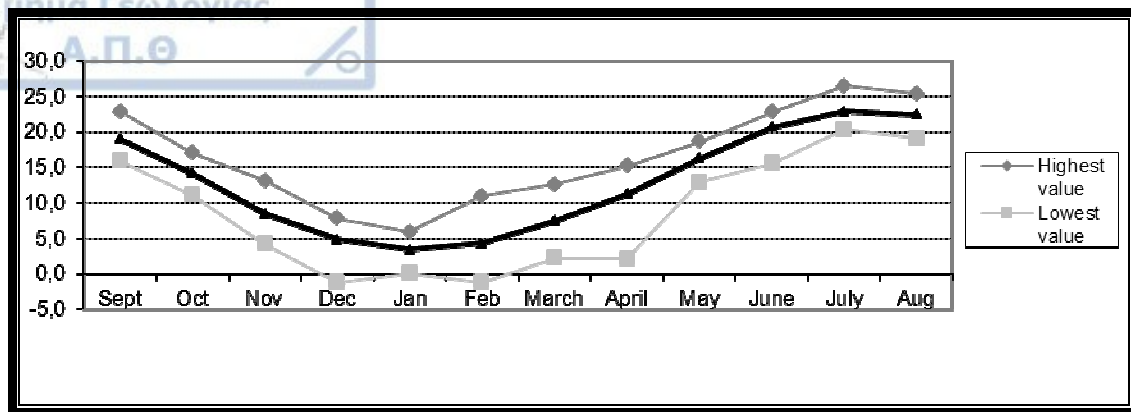


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

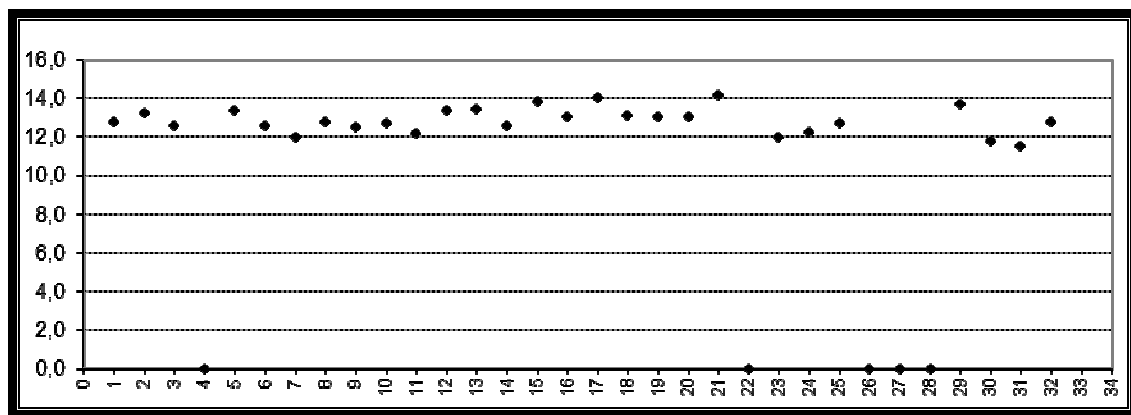
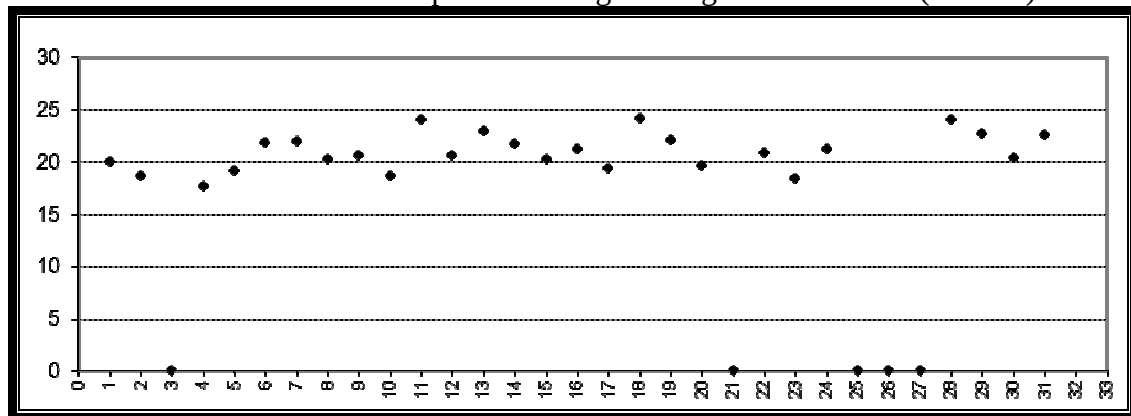


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 12T: Krua Vrusi

Station	Krua Vrusi	Longitude:	356.302,52
County:	Pella	Latitude:	4.504.740,16
Period:	1974-2004	Altitude (meters):	8,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974	19,6	13,3	5,5	1,1	3,2	6,0	8,1	8,6	14,7	19,6	23,0	23,1	12,2	22
2	1974- 75	16,8	14,0	8,2	3,8	3,0	3,1	8,5	13,0	18,6	21,5	24,0	23,2	13,1	21
3	1975- 76	22,5	15,0	9,7	5,0	3,5	5,3	8,0	14,5	18,3	22,0	23,7	21,0	14,0	20,2
4	1976- 77	18,3	15,6	11,0	5,3	5,5	10,4	10,9	13,3	18,2	21,8	24,0	23,2	14,8	18,7
5	1977- 78	18,8	14,5	12,1	3,7	3,9	7,9	11,1	12,8	18,0	23,1	24,8	23,2	14,5	21,1
6	1978- 79	18,9	13,5	6,9	7,7	3,0	6,3	10,8	11,8	19,2	23,7	23,8	23,1	14,1	20,8
7	1979- 80	19,8	14,4	11,8	5,8	1,8	5,7	9,3	12,5	16,4	21,8	24,3	22,8	13,9	22,5
8	1980- 81	19,7	16,1	11,2	6,4	1,9	5,4	11,5	12,3	17,0	23,4	22,6	23,2	14,2	21,5
9	1981- 82	19,9	17,0	7,2	6,8	3,8	4,2	6,5	10,8	17,1	22,4	22,3	22,2	13,4	18,6
10	1982- 83	20,5	14,2	8,2	6,6	4,9	3,3	10,2	15,3	20,5	21,8	26,7	22,7	14,6	23,4
11	1983- 84	19,7	13,7	8,0	5,6	5,1	6,0	8,1	11,5	18,3	21,2	21,9	21,6	13,4	16,8
12	1984- 85	20,2	16,7	9,8	7,3	4,8	2,8	8,2	15,3	20,2	21,8	23,5	23,6	14,5	20,8
13	1985- 86	19,8	13,0	10,7	7,6	5,3	4,5	8,8	16,0	18,7	23,1	25,5	25,3	14,9	21
14	1986- 87	20,4	14,4	8,5	2,7	3,6	7,4	5,0	13,1	17,3	23,9	26,5	23,9	13,9	23,8
15	1987- 88	22,8	14,3	10,2	7,0	6,0	6,2	9,0	13,5	18,5	23,9	27,0	24,5	15,2	21
16	1988- 89	20,8	13,9	4,8	2,7	2,6	7,4	11,8	15,2	17,4	20,6	23,4	22,9	13,6	20,8
17	1989- 90	19,7	14,5	8,9	3,8	3,8	8,3	11,7	14,5	18,3	22,6	24,7	23,1	14,5	20,9
18	1990- 91	19,1	15,2	11,3	6,2	3,5	4,0	10,5	12,7	16,0	22,8	23,6	23,1	14,0	20,1

19	1991- 92	20,1	15,3	10,0	2,0	3,6	5,3	9,4	13,8	17,0	21,9	22,7	25,2	13,9	23,2
20	1992- 93	19,6	15,7	9,6	4,4	3,3	3,1	7,8	13,1	18,3	22,7	23,5	23,7	13,7	20,6
21	1993- 94	19,3	17,4	8,1	7,3	6,6	5,7	11,2	14,2	19,1	22,2	24,6	24,5	15,0	18,9
22	1994-95	22,7	15,7	9,7	5,3	3,5	8,0	8,8	12,6	17,6	22,8	25,0	22,9	14,6	21,5
23	1995- 96	18,5	13,5	6,4	5,9	4,0	4,6	5,6	11,8	20,1	23,1	23,0	15,6	12,7	19,1
24	1996- 97					5,1	6,9	7,7	10,5	19,7	25,0	28,0	23,6	-	-
25	1997- 98	18,4	11,2	9,7	5,3	5,6	8,3	7,8	15,1	18,2	24,5	25,9	26,2	14,7	20,9
26	1998- 99	19,8	17,2	10,2	4,5		5,0	10,7	15,0	19,4	24,4	25,8	26,6	-	-
27	1999- 00	22,0	16,5		6,5	2,1	6,9	8,7	15,5	19,5	23,5	25,7	25,7	-	-
28	2000- 01	20,2	15,6	12,5	6,4									-	-
29	2001- 02					3,5	8,9	11,6	12,9	18,9	23,9	26,1	24,8	-	-
30	2002- 03	20,2	15,3	10,9	6,1	7,0	3,0	7,6	12,3	21,0	25,5	25,8	26,2	15,1	23,2
31	2003- 04	20,3	16,0	11,8	6,0	3,6	6,5	10,0	13,8	17,2	23,2	25,0	24,4	14,8	21,4
32	2004- 05	20,9	17,7	10,0	7,3	5,5	2,2	9,5	14,0	19,6	22,0	25,8	24,7	14,9	23,6

Statistics and charts

Years	30,5												Aver	A
Number of measurements	30	30	29	30	30	31	31	31	31	31	31	31	27	27
Highest value	22,8	17,7	12,5	7,7	7,0	10,4	11,8	16,0	21,0	25,5	28,0	26,6	15,2	23,8
Lowest value	16,8	11,2	4,8	1,1	1,8	2,2	5,0	8,6	14,7	19,6	21,9	15,6	12,2	16,8
Mean value	20,0	15,0	9,4	5,4	4,1	5,8	9,2	13,3	18,3	22,8	24,6	23,5	14,3	21,0

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

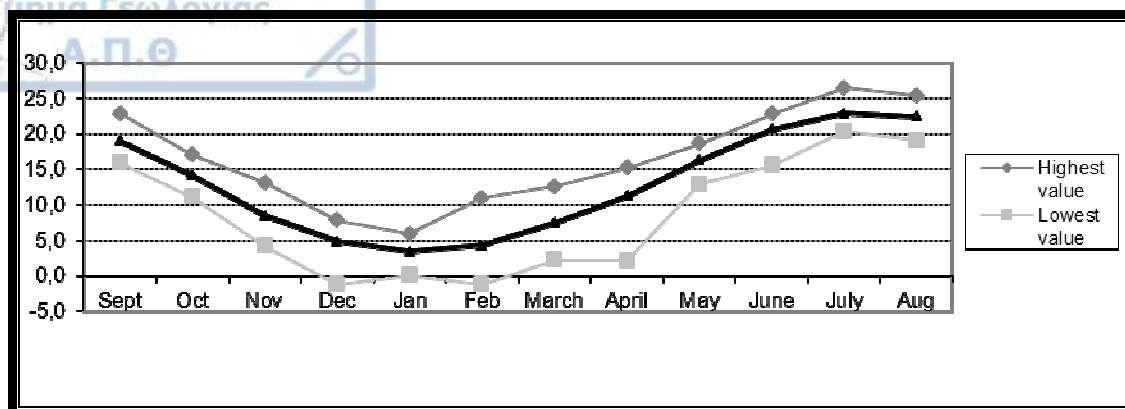


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

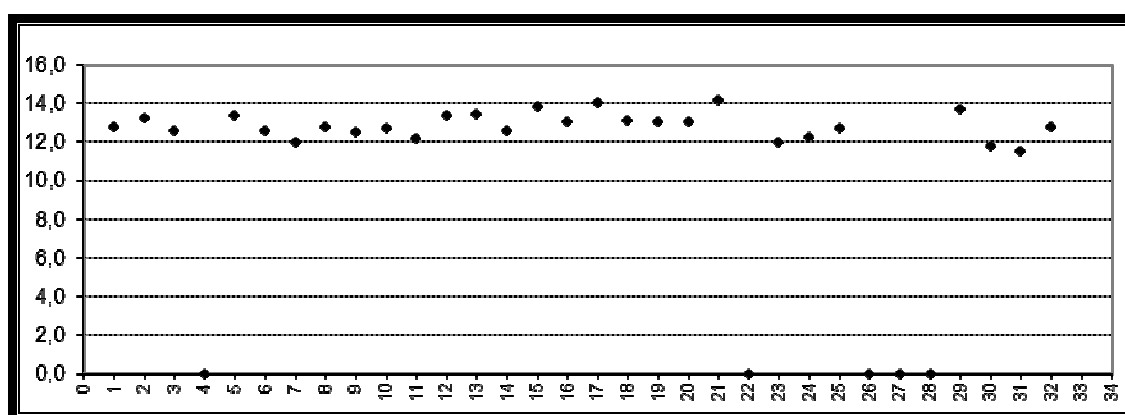
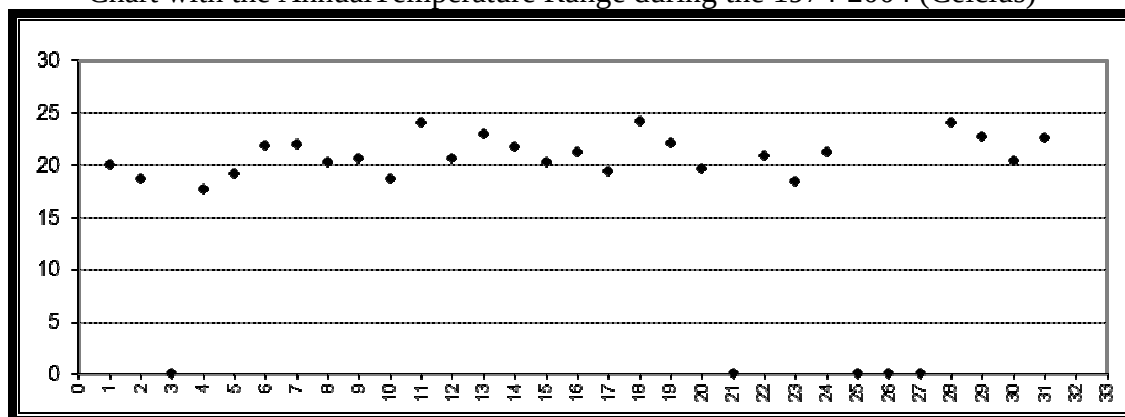


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 13T: Plana

Station	Plana		Longitude:	471.556,73
County:	Chalkidiki		Latitude:	4.470.071,87
Period:	1974-2004		Altitude (meters):	11,50

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974														
2	1974- 75														
3	1975- 76														
4	1976- 77														
5	1977- 78														
6	1978- 79														
7	1979- 80														
8	1980- 81														
9	1981- 82														
10	1982- 83														
11	1983- 84														
12	1984- 85														
13	1985- 86														
14	1986- 87														
15	1987- 88														
16	1988- 89														
17	1989- 90														
18	1990- 91														

19	1991- 92					5,0		7,9	11,8	15,1	22,0	22,8	24,1	-	-
20	1992- 93	18,9	16,1	10,4	5,5	4,2	4,9	6,9	10,7	16,0	21,1	22,3	23,0	13,3	18,8
21	1993- 94	18,9	17,0	8,8	7,6	7,2	6,8	9,2	12,9	16,7	20,8	23,6	24,1	14,5	17,3
22	1994-95	22,2	16,9	10,0	6,8	5,5	8,4	8,1	10,6	16,5	22,3	24,7	22,8	14,6	19,2
23	1995- 96	19,0	12,5	7,5	8,2	5,3		5,6	10,0	18,4	20,9	23,6	24,0	-	-
24	1996- 97	18,6	13,8	10,8	8,6	6,2		7,1						-	-
25	1997- 98	18,0	12,9	9,3	6,2	5,7	8,7	5,7	12,3	16,7	22,3	24,6	25,3	14,0	19,6
26	1998- 99													-	-
27	1999- 00	19,4	16,1	9,5	7,7	2,1	6,2	6,6	13,0	16,9	21,9	23,9	23,8	13,9	21,8
28	2000- 01	19,9	15,2	12,0	7,2	7,1	7,0	11,4	12,0	17,1	21,4	24,8	25,4	15,0	18,4
29	2001- 02	20,7				4,8	8,3	9,8	11,6	16,7	22,8	25,3	23,8	-	-
30	2002- 03	19,1	15,7	11,7	6,8							24,7	25,5	-	-
31	2003- 04	18,9	15,5	11,6	6,9	4,1	5,8	8,5	11,6	14,8	21,0			-	-
32	2004- 05			10,8	8,3	5,5	5,8	8,5	11,9	17,5	20,3	24,2	23,9	-	-

Statistics and charts

Years	10,9												Aver	A
Number of measurements	11	10	11	11	12	9	12	11	11	11	11	11	6	6
Highest value	22,2	17,0	12,0	8,6	7,2	8,7	11,4	13,0	18,4	22,8	25,3	25,5	15,0	21,8
Lowest value	18,0	12,5	7,5	5,5	2,1	4,9	5,6	10,0	14,8	20,3	22,3	22,8	13,3	17,3
Mean value	19,4	15,2	10,2	7,3	5,2	6,9	7,9	11,7	16,6	21,5	24,0	24,2	14,2	19,2

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

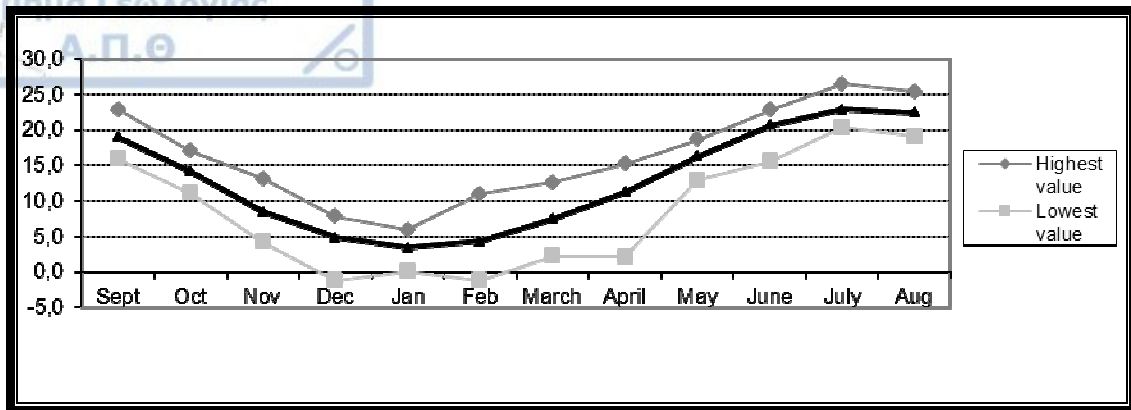


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

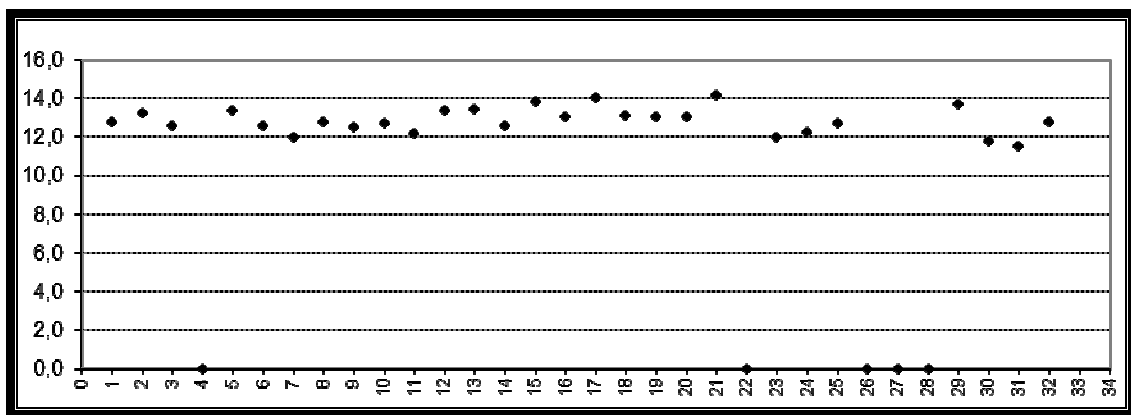
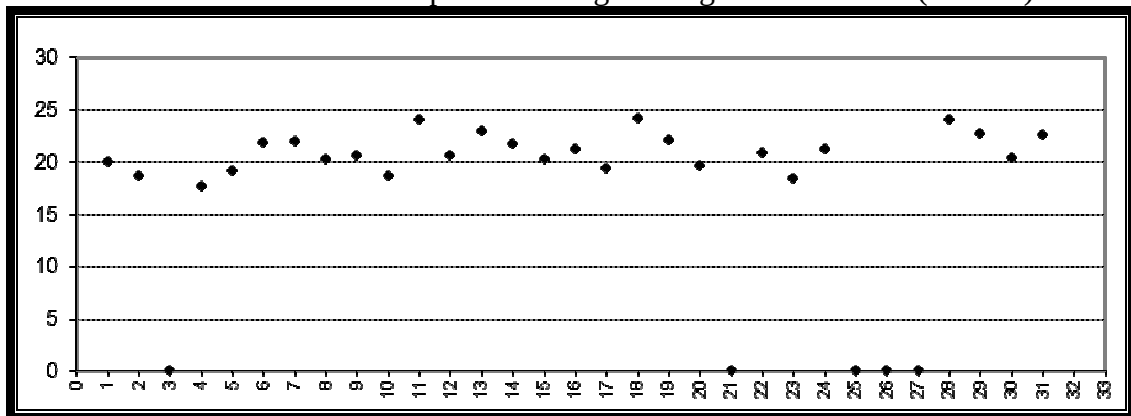


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 14T: Arnaia

Station	Arnaia		Longitude:	466.373,529
County:	Chalkidiki		Latitude:	4.481.532,566
Period:	1974-2004		Altitude (meters):	585,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974	18,6	13,1	5,8	4,3	1,2	4,6	6,2	8,5	15,0	18,7	22,0	21,8	11,7	20,8
2	1974- 75	17,7	13,9	7,6	3,5	2,4	1,6	8,0	11,7	15,9	19,4	21,7	19,6	11,9	20,1
3	1975- 76	18,8	12,4	6,1	2,9	3,3	1,7	4,8	10,9	14,9	18,5	20,7	17,6	11,1	19,0
4	1976- 77	16,2	13,2	8,4	3,7									-	-
5	1977- 78					1,5	5,1	7,9	10,2	15,2	21,0	22,5	20,9	-	-
6	1978- 79	15,7	11,8	6,3	6,0	2,7	4,6	8,9	9,7	16,7	22,1	21,4	21,0	12,2	19,4
7	1979- 80	18,1	11,6	8,7	5,6	0,1	2,6	5,9	9,8	13,9	20,0	22,9	21,4	11,7	22,8
8	1980- 81	17,7	14,6	10,3	4,7	0,1	2,7	8,8	11,3	14,0	21,8	21,6	21,1	12,4	21,7
9	1981- 82	18,3	15,1	5,2	5,9	2,2	1,1	5,4	9,6	16,4	21,5	21,2	21,3	11,9	20,4
10	1982- 83	19,9	13,2	7,1	5,3	3,4	1,6	7,5	13,1	17,3	18,1	22,2	20,0	12,4	20,6
11	1983- 84	17,2	11,8	6,4	4,3	3,8	2,8	4,6	8,4	16,8	19,6	21,5	19,8	11,4	18,7
12	1984- 85	19,2	15,5	8,3	3,5	3,4	1,3	5,0	13,4	18,6	20,4	23,4	23,3	12,9	22,1
13	1985- 86	18,5	11,6	8,9	6,5	4,4	3,6	5,9	14,0	16,3	20,5	22,1	23,7	13,0	20,1
14	1986- 87	19,3	12,1	6,4	2,5	2,9	4,8	2,2	10,4	14,9	21,1	24,8	22,1	12,0	22,6
15	1987- 88	21,5	12,0	8,5	5,3	4,8	4,0	6,0	10,7	16,3	20,7	25,6	23,5	13,2	21,6
16	1988- 89	18,8	12,4	3,8	2,7	1,2	5,0	8,8	14,2	15,1	19,1	22,2	23,1	12,2	21,9
17	1989- 90	18,6	11,8	7,4	3,4	2,1	5,7	9,8	11,8	16,2	21,2	23,8	22,5	12,9	21,7
18	1990- 91	17,8	14,0	10,5	5,5	1,4	2,5	7,0	9,4	13,4	21,3	22,1	21,3	12,2	20,7

19	1991- 92	18,9	13,4	8,5	-0,5	2,4	2,4	6,2	11,5	15,1	20,7	22,2	25,3	12,2	25,8
20	1992- 93	18,2	16,8	9,2	2,9	2,3	0,8	5,7	11,1	15,9	21,0	23,1	24,0	12,6	23,2
21	1993- 94	19,4	16,2	6,0	7,4	5,8	3,9	9,1	13,3	18,3	21,7	23,9	24,6	14,1	20,7
22	1994-95	23,5	14,6	7,7	5,0				9,8	14,1	19,2	20,2		-	-
23	1995- 96				5,5					16,0	18,7	20,4	20,0	-	-
24	1996- 97	14,3	11,0			1,4	2,0	3,3	4,5	15,3	18,8	20,4	18,2	-	-
25	1997- 98	14,5	9,1	6,1	2,4	1,9	4,3	1,8	11,1	13,1	18,7	21,8	21,8	10,6	20,0
26	1998- 99	15,2	11,8	6,4										-	-
27	1999- 00				4,4	-2,5	2,1	3,8			20,6	23,7	23,3	-	-
28	2000- 01		10,8	9,4	3,9	2,9	3,4	9,8	8,9	13,7	18,1	21,6	21,8	-	-
29	2001- 02	16,8	15,7				7,1	8,2	9,7	15,7	21,2	22,5	21,2	-	-
30	2002- 03	16,4	12,8	9,1	3,5	5,1	-1,2	4,1	8,3	17,8	21,5	22,2	23,3	11,9	24,5
31	2003- 04	16,6	13,5	9,4	4,0	1,4	4,4	6,9	10,8	13,8	18,9	22,0	21,3	11,9	20,6
32	2004- 05	17,9	14,6	7,8	5,7	3,2	1,7	6,4	10,9	15,9	18,4	20,2		-	-

Statistics and charts

Years	28,3												Aver	A
Number of measurements	28	29	27	28	27	28	28	28	29	30	30	28	22	22
Highest value	23,5	16,8	10,5	7,4	5,8	7,1	9,8	14,2	18,6	22,1	25,6	25,3	14,1	25,8
Lowest value	14,3	9,1	3,8	-0,5	-2,5	-1,2	1,8	4,5	13,1	18,1	20,2	17,6	10,6	18,7
Mean value	18,0	13,1	7,6	4,3	2,4	3,1	6,4	10,6	15,6	20,1	22,2	21,7	12,1	21,3

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

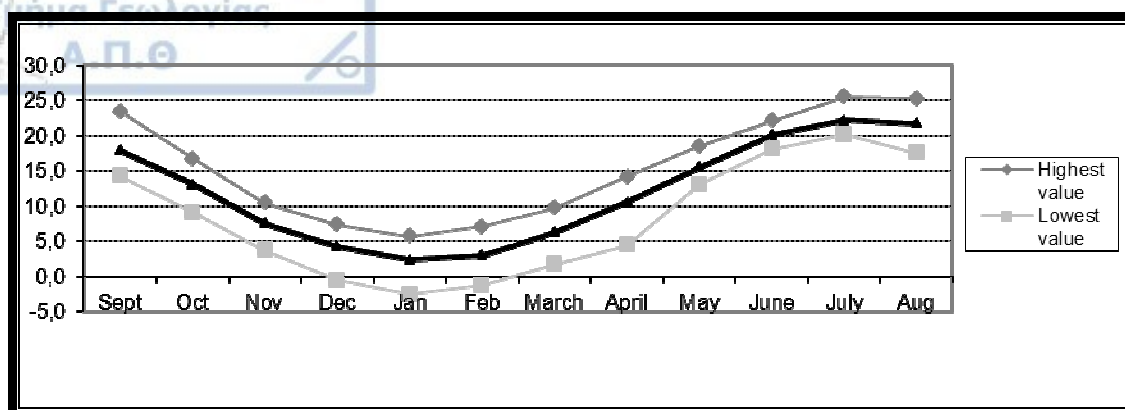


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

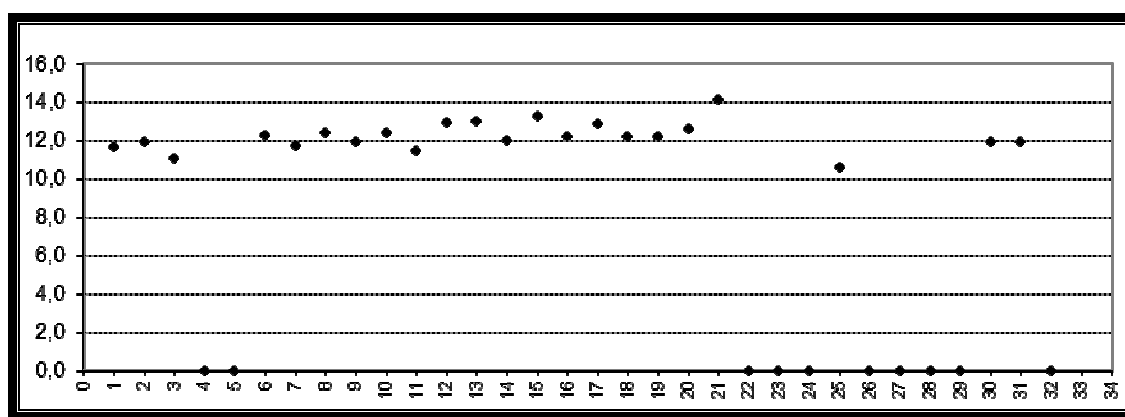
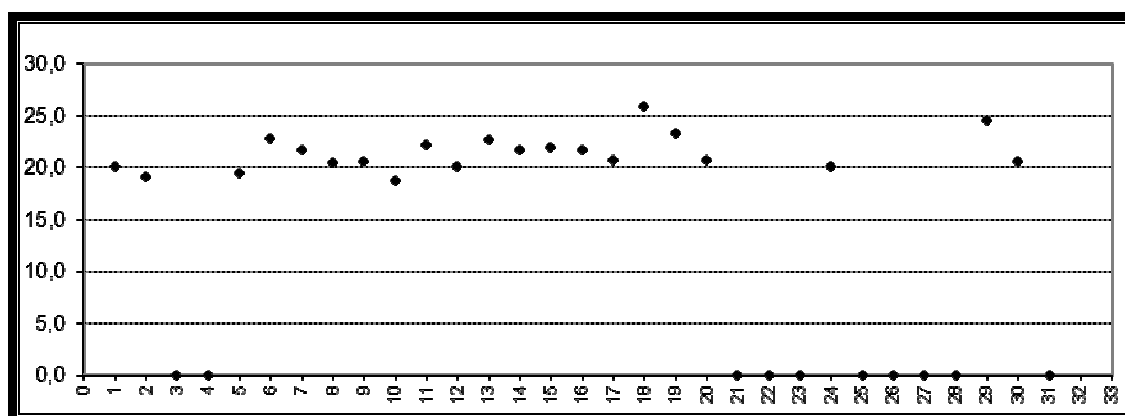


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 15T: Ano Theodoraki

Station	Ano Theodoraki	Longitude:	415.959,91
County:	Chalkidiki	Latitude:	4.557.455,10
Period:	1974-2004	Altitude (meters):	480,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974	20,2	14,2	6,6	4,6	2,7	5,7	7,3	9,1	14,8	19,6	22,9	23,4	12,6	20,7
2	1974- 75	19,9	14,8	8,8	5,0	3,7	3,0	8,7	12,0	16,8	20,1	22,5	21,5	13,1	19,5
3	1975- 76	21,4	21,4	13,6	6,8	4,5	4,0	2,3	5,8	11,3	15,5	19,0	21,3	12,2	19,1
4	1976- 77	17,4	15,4	10,0	4,6	4,1	9,1	9,1	11,6	17,5	20,0	22,9	22,1	13,7	18,8
5	1977- 78	18,0	13,7	10,0	3,5	3,0	5,4	8,5	9,7	15,3	20,3	22,2	21,5	12,6	19,2
6	1978- 79	16,9	12,7	6,9	6,5	2,6	6,5	9,0	9,9	16,6	22,0	22,0	21,6	12,8	19,4
7	1979- 80	19,2	12,6	9,1	6,1	10,4	3,9	6,5	10,2	13,6	19,8	22,7	22,1	13,0	18,8
8	1980- 81	18,4	14,7	10,4	5,0	0,6	3,0	9,4	11,3	14,8	21,5	21,4	21,8	12,7	21,2
9	1981- 82	19,8	16,3	6,7	6,0	4,3	2,5	5,9	10,0	16,4	21,9	21,8	22,3	12,8	19,8
10	1982- 83	21,4	15,4	8,5	5,6	4,4	2,5	7,8	13,4	17,4	18,5	22,5	21,4	13,2	20
11	1983- 84	18,7	13,7	7,3	4,7	4,9	4,3	5,6	8,8	16,7	19,8	22,1	20,8	12,3	17,8
12	1984- 85	20,3	17,2	9,7	4,1	3,6	0,2	6,1	12,7	18,4	20,2	23,3	23,8	13,3	23,6
13	1985- 86	19,5	12,4	9,0	7,2	4,6	3,7	6,7	13,8	17,0	20,6	21,8	2,3	11,6	19,5
14	1986- 87	20,4	13,7	7,4	2,7	3,5	5,4	2,5	10,0	14,5		25,3	23,1	-	-
15	1987- 88	22,4	22,4	8,7	8,7	4,9	4,4	6,5	10,7	16,0	20,1	26,1	24,9	14,7	21,7
16	1988- 89	19,7	13,8	4,4	3,7	2,7	5,9	10,0	14,5	15,7	18,4	22,8	23,4	12,9	20,7
17	1989- 90	19,3	13,3	8,1	4,7	3,4	7,2	11,3	12,2	16,6	20,7	24,1	22,9	13,7	20,7
18	1990- 91	18,7	13,9	10,9	5,1	3,7	3,1	9,0	10,0	13,0	21,5	22,4	21,6	12,7	19,3

19	1991- 92	18,7	15,0	9,2	1,6	4,5	4,0	8,1	12,0	15,5	21,0	22,2	29,0	13,4	27,4
20	1992- 93	21,0	16,1	9,6	3,9		3,3	6,4	12,0	17,1	20,3	23,5	24,0	-	-
21	1993- 94	20,5	17,5	6,2	7,4	6,4	5,4	9,4	12,3					-	-
22	1994-95	24,2	16,5	9,2	5,2	2,9	7,6	7,4	10,9	16,5	22,5	24,6	21,8	14,1	21,7
23	1995- 96	19,0	17,4	6,0	6,4	3,0	3,4	3,2	10,3	19,0	22,2	24,0	23,7	13,1	21
24	1996- 97	16,5	12,4	11,0	7,3	6,0	5,3	6,4	7,5		21,3	23,6	22,3	-	-
25	1997- 98	19,3	12,7	9,1	5,7	5,2	7,6	5,6	13,5	16,4	22,0	24,3	26,5	14,0	21,3
26	1998- 99	18,1	15,3	8,4										-	-
27	1999- 00		15,9	9,2	6,8	0,4	5,2	6,9	13,8	18,1	22,1	24,8	25,2	-	-
28	2000- 01	20,1	14,5	12,5	6,7		5,3	11,7	10,4	6,0	21,2	25,0	26,0	-	-
29	2001- 02	20,2	17,3	8,6	0,5	4,1	9,4	9,9	10,8	17,2	22,4	24,0	23,4	14,0	23,5
30	2002- 03	17,9	14,9	10,9	4,0	5,5	0,7	6,4	9,8	19,8	23,0	24,1	25,5	13,5	24,8
31	2003- 04	18,9	14,2	11,2	5,9	2,3	5,5	7,9	11,9	15,0	20,6	23,5	23,1	13,3	21,2
32	2004- 05	19,5	16,6	9,7	7,4	5,1	3,4	7,6	11,6	17,6	20,7	24,6	23,5	13,9	21,2

Statistics and charts

Years	30,5												Aver	A
Number of measurements	31	32	32	31	29	31	31	31	29	29	30	30	25	25
Highest value	24,2	22,4	13,6	8,7	10,4	9,4	11,7	14,5	19,8	23,0	26,1	29,0	14,7	27,4
Lowest value	16,5	12,4	4,4	0,5	0,4	0,2	2,3	5,8	6,0	15,5	19,0	2,3	11,6	17,8
Mean value	19,5	15,2	9,0	5,3	4,0	4,7	7,4	11,0	15,9	20,7	23,2	22,5	13,2	20,9

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

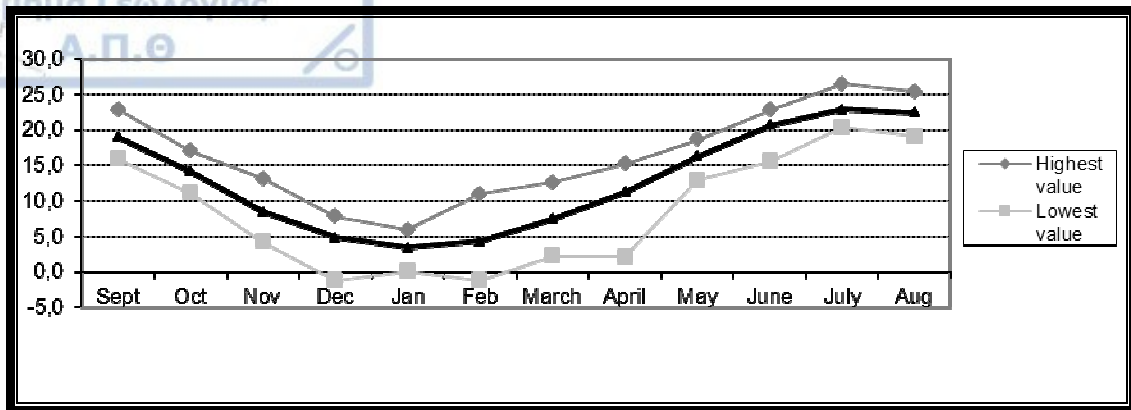


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

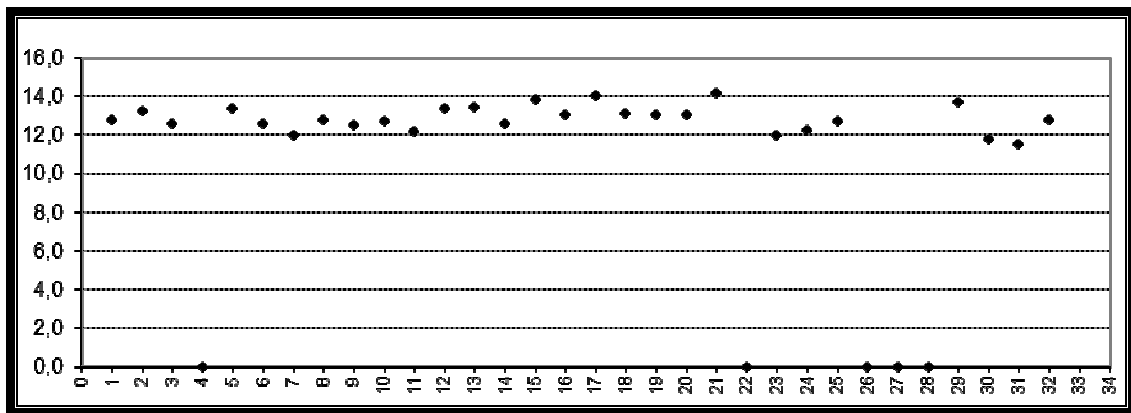
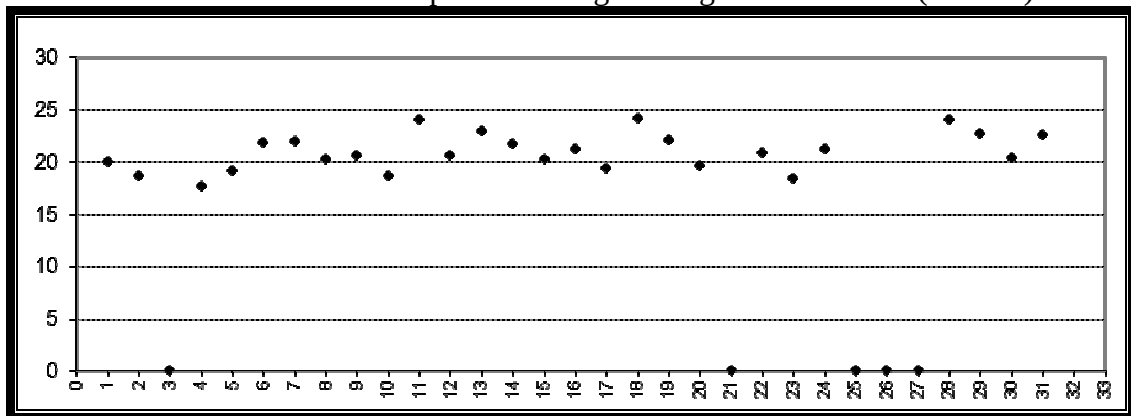


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 16T: Metaxochori

Station	Metaxochori	Longitude:	411.631,53
County:	Kilkis	Latitude:	4.546.402,98
Period:	1974-2004	Altitude (meters):	63,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974		14,2	7,7	4,3	5,8	8,3	10,0	11,6	16,7	20,3	28,5	23,7	-	-
2	1974- 75	25,7	15,9	11,5	6,1	7,1	6,0	9,6	13,1	17,8	22,0	25,5	22,7	15,3	19,7
3	1975- 76	22,4	14,7	8,9	6,7	16,0	5,4	8,5	13,1	16,7	20,2	22,3	19,4	14,5	17
4	1976- 77	17,3	17,5			,								-	-
5	1977- 78					,								-	-
6	1978- 79					,	7,1	10,8	9,9	14,7	19,2	17,1	19,5	-	-
7	1979- 80	16,4	7,6	7,1	5,4	0,1	5,6	7,7	11,0	19,0	14,2	23,6	22,7	11,7	23,5
8	1980- 81	19,3	15,7	12,0	6,4	0,3			12,4	15,3	19,5	22,7	23,0	-	-
9	1981- 82	19,2	17,8	9,3	7,1	6,0	6,6	7,1	11,1	16,5	22,1	22,4	22,8	14,0	16,8
10	1982- 83	21,7	16,4	9,1	7,1	4,9		9,6	14,7	19,0	19,5	23,0	21,9	-	-
11	1983- 84	18,4	14,0	8,0	5,7	5,4	5,2	7,0	10,4	17,6	20,0	22,3	22,0	13,0	17,1
12	1984- 85	20,7	17,0	10,7	5,3	4,5	2,5	6,1	13,0	18,4	20,0	23,2	22,2	13,6	20,7
13	1985- 86	18,0	11,5	9,9					16,2	18,7	23,4	24,5	26,6	-	-
14	1986- 87	22,7	16,2	10,5		5,0	7,8	5,8	14,3	18,7	24,1	27,8	25,5	-	-
15	1987- 88	25,8	16,3	12,6		18,0	8,9	9,6	14,6	20,4	25,0	30,1	20,2	-	-
16	1988- 89	24,5	17,9	7,9	7,6	5,2					18,1			-	-
17	1989- 90											22,6	22,7	-	-
18	1990- 91		12,9	10,7	5,9	4,9	4,5	9,9	11,5	17,7	26,2	26,5		-	-

19	1991- 92			10,6	1,7	3,5	3,7	8,6	12,6	15,5	21,5	22,5	26,0	-	-
20	1992- 93	19,9	16,4	12,4	5,4	6,1	4,4	9,6	14,9	20,2	24,7	26,6	27,2	15,7	22,8
21	1993- 94	22,7	20,2	8,3	9,1	8,5	8,3	12,1	16,6	24,3	25,4	28,2	28,2	17,7	19,9
22	1994-95	26,6	17,9	10,6	7,4	4,2		9,6	14,8	20,2	26,5	27,9	24,2	-	-
23	1995- 96	21,1	16,9	7,8	7,6	4,5	5,2	5,8	13,4	22,1	25,8	26,1	27,0	15,3	22,5
24	1996- 97	19,6	14,3	12,6	8,2	7,8	8,1	11,1	10,5	22,3	26,4	27,2	24,5	16,1	19,4
25	1997- 98	20,0	13,2	10,1	6,3	5,9	9,3	7,9	16,3	18,7	25,9	28,7	28,4	15,9	22,8
26	1998- 99	21,2	17,4	9,5										-	-
27	1999- 00									20,0	24,8	27,5	26,5	-	-
28	2000- 01	21,0	14,3	12,0	6,9		6,5	13,1	13,2	18,2	23,6	26,8	25,8	-	-
29	2001- 02	21,0	17,3		-0,2	4,3	10,0	10,2	12,4	19,2	24,1	23,7	23,5	-	-
30	2002- 03	19,3	17,0	11,4	6,2	6,6	2,2	7,9	12,5	21,1	25,4	28,0	28,9	15,5	26,7
31	2003- 04	21,0	21,1	12,0	6,0	2,7	5,3	9,8	13,3	17,3	22,9	26,8	26,6	15,4	24,1
32	2004- 05	21,6	17,9	9,1	6,6	3,9	3,4	8,3	13,4	19,9	23,7	27,1	26,0	15,1	23,7

Statistics and charts

Years	25,6												Aver	A
Number of measurements	25	27	26	23	24	22	24	26	27	28	28	27	14	14
Highest value	26,6	21,1	12,6	9,1	18,0	10,0	13,1	16,6	24,3	26,5	30,1	28,9	17,7	26,7
Lowest value	16,4	7,6	7,1	-0,2	0,1	2,2	5,8	9,9	14,7	14,2	17,1	19,4	11,7	16,8
Mean value	21,1	15,9	10,1	6,0	5,9	6,1	9,0	13,1	18,7	22,7	25,3	24,4	14,9	21,2

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

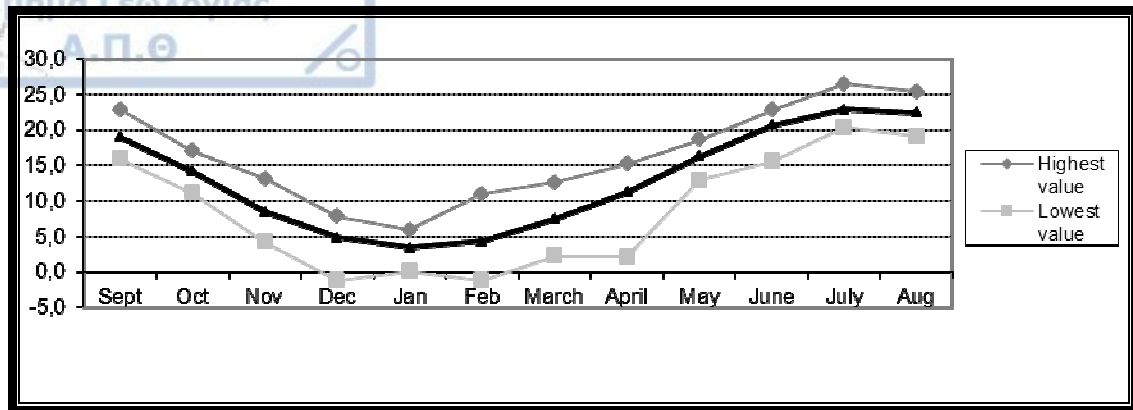


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

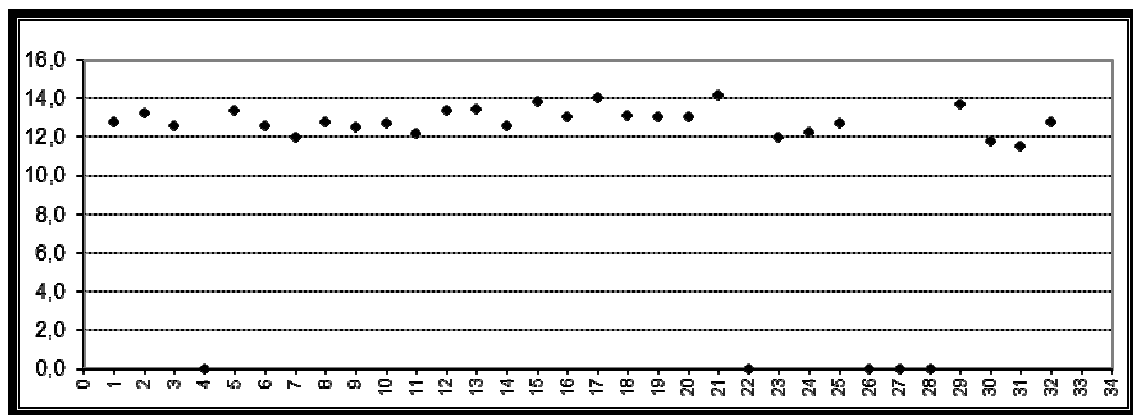
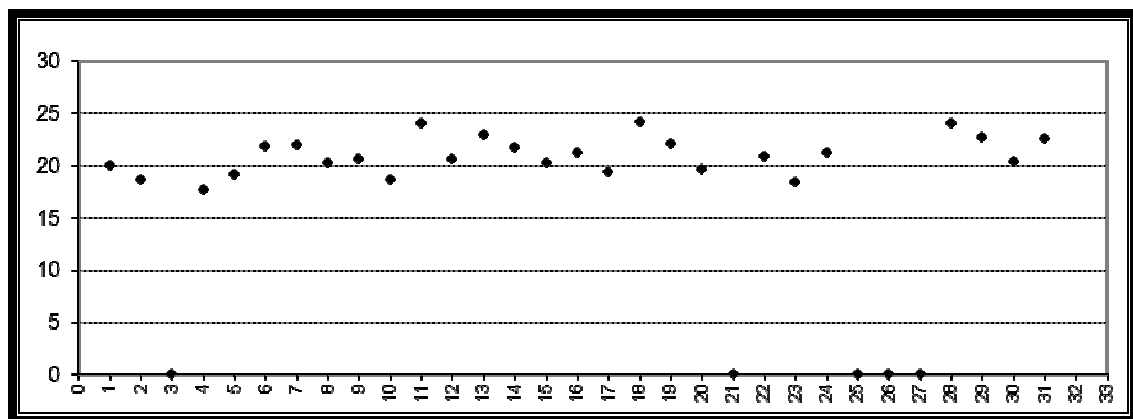


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 17T: Melanthio

Station	Melanthio		Longitude:	419.912,64
County:	Kilkis		Latitude:	4.535.205,37
Period:	1974-2004		Altitude (meters):	490,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974	20,0	14,8	6,2	5,3	2,7	5,7	7,6	9,1	15,2	19,6	23,6	23,4	12,8	20,9
2	1974- 75	19,6	15,0	9,0	4,9	3,2	3,1	9,4	12,5	17,0	20,6	23,1	21,6	13,3	20
3	1975- 76	21,2	14,0	9,3	4,5	4,5	3,0	5,9	12,0	16,3	19,2	21,7	19,1	12,6	18,7
4	1976- 77	17,4	14,9	9,3		4,4	9,0	9,4	2,1	18,0	20,9	23,7	23,1	-	-
5	1977- 78	17,9	13,5	11,0	7,8	5,4	7,1	8,8	10,6	14,1	20,2	23,1	20,9	13,4	17,7
6	1978- 79	16,2	12,8	6,7	6,2	2,9	4,8	9,2	9,9	16,8	22,0	21,9	21,3	12,6	19,1
7	1979- 80	18,5	12,3	9,1	6,2	0,6	3,5	6,1	9,8	13,9	19,2	22,4	22,3	12,0	21,8
8	1980- 81	18,2	14,5	10,6	5,5	0,1	3,0	9,4	11,8	14,3	22,1	21,8	21,5	12,7	22
9	1981- 82	19,2	15,9	5,8	5,7	3,3	1,9	5,8	9,9	16,6	21,6	21,8	22,2	12,5	20,3
10	1982- 83	22,6	14,6	8,4	6,4	3,6	2,0	8,2	14,0	16,2	15,6	20,3	20,0	12,7	20,6
11	1983- 84	18,1	13,0	6,7	4,7	4,3	3,7	5,6	9,7	17,1	19,2	22,3	21,5	12,2	18,6
12	1984- 85	20,3	17,0	9,8	4,0	3,4	-0,5	6,2	14,0	18,6	20,2	23,5	23,6	13,3	24,1
13	1985- 86	19,8	13,4	9,2	7,4	4,1	3,5	6,7	14,4	16,5	20,4	21,9	24,1	13,5	20,6
14	1986- 87	20,4	13,3	7,1	3,3	3,5	5,5	2,2	11,2	15,1	21,3	25,1	22,4	12,5	22,9
15	1987- 88	22,0	12,7	8,7	5,0	5,4	4,8	6,7	11,8	17,1	20,6	26,5	24,2	13,8	21,7
16	1988- 89	19,6	13,2	4,2	3,4	3,0	7,0	11,1	15,2	15,6	18,4	22,3	23,3	13,0	20,3
17	1989- 90	19,3	13,5	7,6	4,6	3,4	7,1	12,6	13,7	17,6	21,6	24,6	22,6	14,0	21,2
18	1990- 91	19,0	14,6	11,2	5,1	3,1	3,6	9,4	10,9	14,4	21,9	22,5	21,7	13,1	19,4

19	1991- 92	19,3	14,8	9,6	1,2	3,5	4,1	7,6	13,1	15,5	20,3	21,8	25,4	13,0	24,2
20	1992- 93	18,5	15,4	9,4	3,2	3,8	1,9	6,6	12,5	16,6	21,1	23,5	24,0	13,0	22,1
21	1993- 94	20,1	17,0	5,5	7,6	5,9	4,5	9,2	13,5	17,6	20,9	23,9	24,1	14,2	19,6
22	1994-95	22,9	14,3	7,7	4,4	2,7		6,3	11,4	16,4	21,4	22,9	21,5	-	-
23	1995- 96	17,8	13,1	5,5	5,8	2,0	2,3	2,5	9,6	18,1	21,3	22,9	22,5	12,0	20,9
24	1996- 97	15,9	11,9	9,0	6,0	4,7	4,4	5,5	6,3	17,5	21,8	22,8	20,6	12,2	18,4
25	1997- 98	17,7	11,1	7,5	4,1	3,7	6,0	3,8	12,5	15,4	21,3	24,9	24,3	12,7	21,2
26	1998- 99	17,8	14,5	7,3										-	-
27	1999- 00									18,6	22,3	24,2	23,9	-	-
28	2000- 01	19,8	15,2	13,1	7,0		6,7	12,5	12,4	16,5	21,3	23,6	23,7	-	-
29	2001- 02	19,7	16,6	8,7	-1,2	4,7	11,0	11,1	11,3	17,5	22,8	20,9	20,8	13,7	24
30	2002- 03	16,8	14,3	11,0	2,3	3,2	-1,2	4,3	10,7	17,2	20,3	20,7	21,5	11,8	22,7
31	2003- 04	17,1	12,6	9,0	2,9	0,7	4,5	6,6	10,4	13,0	19,6	20,4	21,1	11,5	20,4
32	2004- 05	17,2	15,1	7,9	6,2	3,9	2,0	7,0	10,6	15,8	18,9	24,6	24,0	12,8	22,6

Statistics and charts

Years	30,3													Aver	A
Number of measurements	31	31	31	29	29	29	30	30	31	31	31	31	31	27	27
Highest value	22,9	17,0	13,1	7,8	5,9	11,0	12,6	15,2	18,6	22,8	26,5	25,4	14,2	24,2	
Lowest value	15,9	11,1	4,2	-1,2	0,1	-1,2	2,2	2,1	13,0	15,6	20,3	19,1	11,5	17,7	
Mean value	19,0	14,2	8,4	4,8	3,4	4,3	7,4	11,2	16,3	20,6	22,9	22,5	12,9	21,0	

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

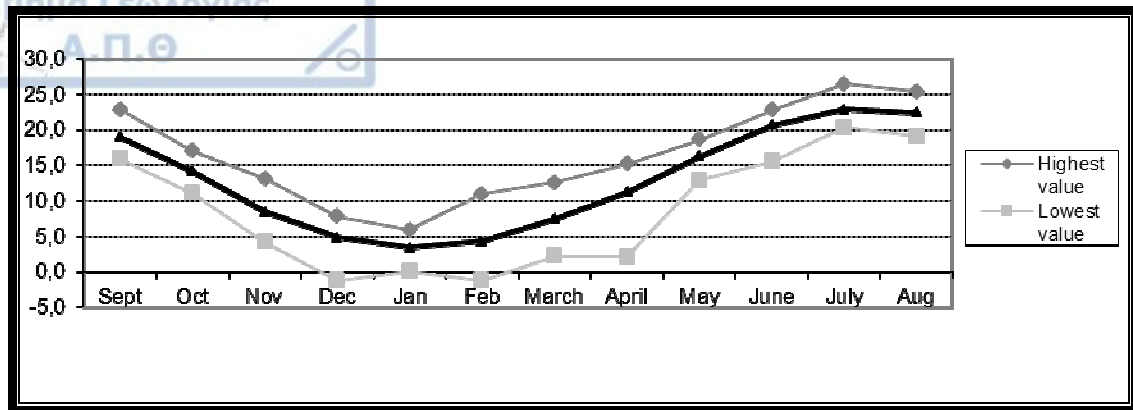


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

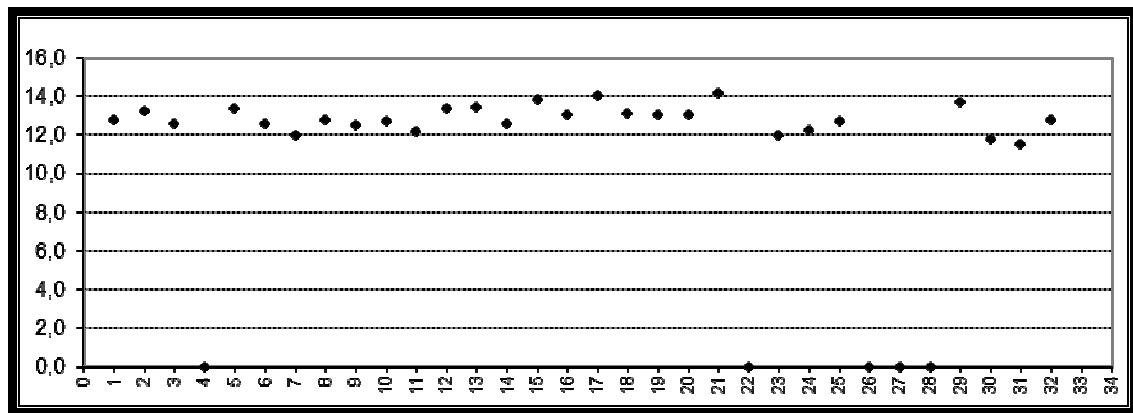
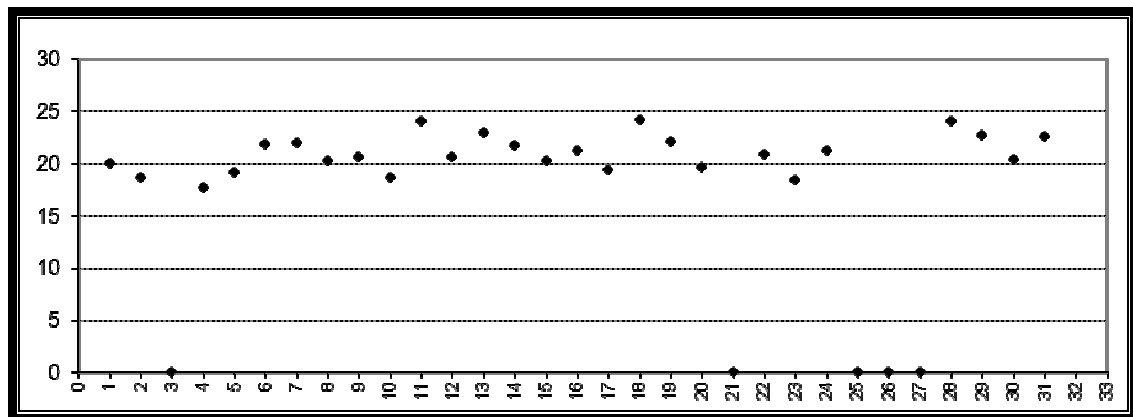


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 18T: Nea Chalkidona

Station	Nea Chalkidona	Longitude:	381.632,42
County:	Thessaloniki	Latitude:	4.509.811,68
Period:	1974-2004	Altitude (meters):	29,50

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974	23,8	18,2	8,0	7,0		7,5	9,9		17,6	22,5			-	-
2	1974- 75	21,5	16,7	10,4	6,4	4,6	5,3	10,6	14,3	19,9	22,9	25,8	24,1	15,2	21,2
3	1975- 76	23,7	15,6	9,6	5,5	5,0	5,7	8,2	14,0	18,2	21,7	24,5	21,7	14,5	19,5
4	1976- 77	19,7	16,9	11,6	6,3	5,9	9,8	10,7	13,1	19,7	23,4	26,0	24,9	15,7	20,1
5	1977- 78	20,4	15,1	12,1	3,4	4,4	7,5	11,0	12,3	17,6	23,1	24,8	23,9	14,6	21,4
6	1978- 79	18,7	14,9	7,6	7,3	3,8	7,4	11,6	10,2	19,2	24,2	24,5	23,8	14,4	20,7
7	1979- 80	20,1	15,0	11,5	7,2	2,8	6,0	9,1	12,8	16,6	22,4	25,1	24,5	14,4	22,3
8	1980- 81	21,0	17,1	11,8	7,3	2,7	5,8	12,2	13,5	17,6	24,3	24,4	23,9	15,1	21,7
9	1981- 82	21,9	18,2	8,5	6,5	4,4	4,7	8,0	11,8	18,4	23,8	24,5	24,3	14,6	20,1
10	1982- 83	23,3	16,2	9,3	7,2	5,7	4,6	10,3	15,5	20,5	21,4	25,4	23,5	15,2	20,8
11	1983- 84	20,6	15,5	8,2	5,9	5,6	6,5	8,3	12,4	18,8	22,0	23,2	22,8	14,2	17,6
12	1984- 85	22,0	18,9	10,8	4,8	3,3	1,0	8,4	15,0	20,6	22,8	24,7	24,8	14,8	23,8
13	1985- 86	21,0	15,0	10,9	8,6	5,5	5,2	8,6	14,6	18,9	22,9	23,7	25,6	15,0	20,4
14	1986- 87	20,1	15,5	9,3	3,6	3,1	7,0	4,4	12,5	16,8	23,0	26,5	24,1	13,8	23,4
15	1987- 88	23,6	14,7	10,3	6,7	6,2	7,0	8,7	12,8	18,8	23,4	27,0	25,6	15,4	20,8
16	1988- 89	21,5	15,5	5,3	2,8	4,3	8,0	11,6	15,7	17,9	21,8	24,6	25,0	14,5	22,2
17	1989- 90	21,5	14,7	9,6	4,7	4,8	8,7	12,4	14,5	19,1	23,5	26,1	24,5	15,3	21,4
18	1990- 91	20,8	16,5	12,3	5,9	4,4	4,4	10,6	11,2	16,3	23,4	24,3	23,8	14,5	19,9

19	1991- 92	20,9	16,3	11,2	2,4	5,4	5,4	10,5	13,2	17,8	23,4	24,6	26,9	14,8	24,5
20	1992- 93	21,3	17,3	11,7	5,2	5,0	4,8	8,6	13,8	19,2	24,1	25,2	25,8	15,2	21
21	1993- 94	21,2	18,2	7,6	8,4	7,5	6,6	9,9	12,7	17,1	20,7	23,3	23,6	14,7	17
22	1994-95	23,1	16,4	10,3	6,0	4,5	8,8	9,0	13,5	18,0	23,8	25,9	24,8	15,3	21,4
23	1995- 96	20,7	16,0	7,2	7,6	4,0	5,2	5,9	11,7	20,8	24,2	24,5	25,0	14,4	21
24	1996- 97	18,7		11,1	6,7	6,6	6,6	8,4	9,3	20,2	23,0	26,0	24,7	-	-
25	1997- 98													-	-
26	1998- 99													-	-
27	1999- 00	22,5	17,7	10,3	7,0	2,3	6,9	8,7	16,4	20,7	24,9	26,8	26,6	15,9	24,5
28	2000- 01	22,7	16,1	13,4	7,7	6,6	8,3	12,4	12,8	18,8	23,5	27,2	26,6	16,3	20,6
29	2001- 02	22,1	19,4	10,3	0,6	5,4	11,6	12,9	12,9	20,4	26,0	26,7	25,4	16,1	26,1
30	2002- 03	19,2									22,5	25,4	27,0	-	-
31	2003- 04	21,2	16,5	12,6	6,4	3,2	5,6	9,5	13,8	16,7	23,3			-	-
32	2004- 05				7,4	5,9	4,9	9,6	14,3	20,0	23,4	26,4	26,1	-	-

Statistics and charts

Years	28,5												Aver	A
Number of measurements	29	27	28	29	28	29	29	28	29	30	28	28	25	25
Highest value	23,8	19,4	13,4	8,6	7,5	11,6	12,9	16,4	20,8	26,0	27,2	27,0	16,3	26,1
Lowest value	18,7	14,7	5,3	0,6	2,3	1,0	4,4	9,3	16,3	20,7	23,2	21,7	13,8	17,0
Mean value	21,3	16,4	10,1	5,9	4,7	6,4	9,7	13,2	18,7	23,2	25,3	24,8	15,0	21,3

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

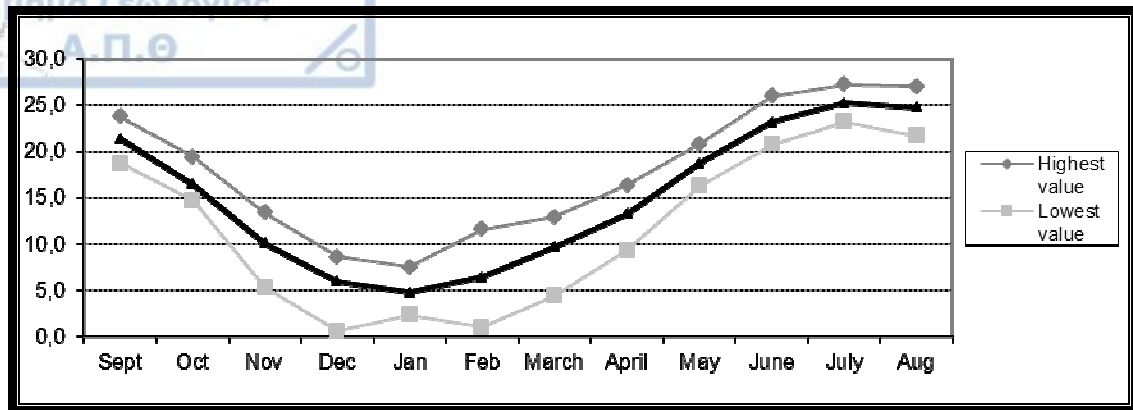


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

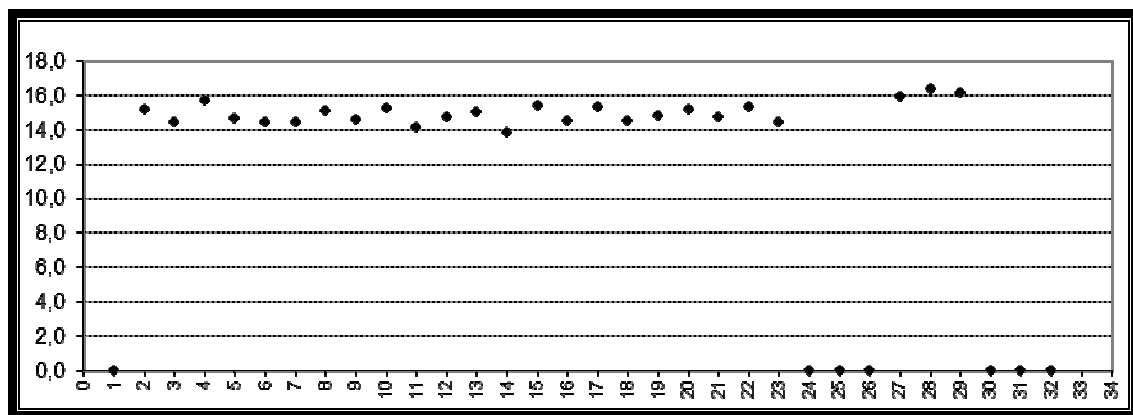
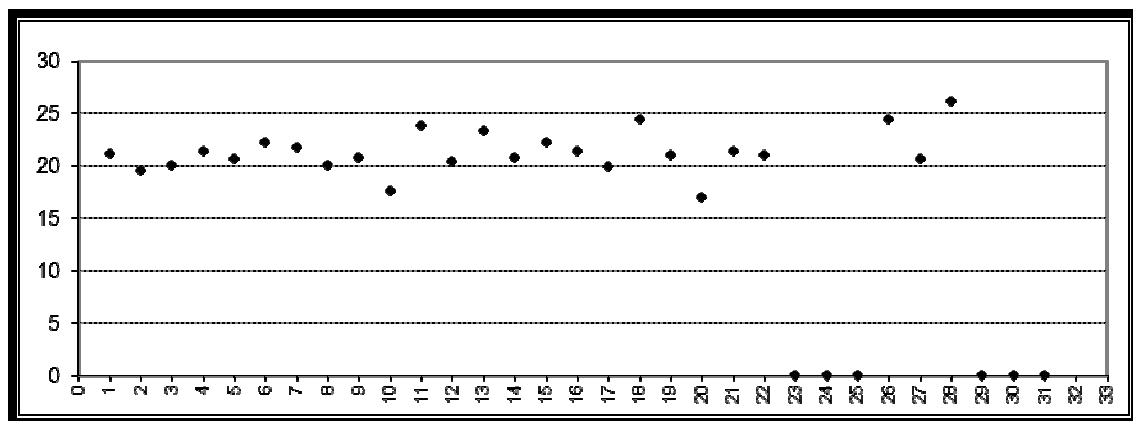


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 19T: Chalastra

Station	Chalastra	Longitude:	393.266,17
County:	Thessaloniki	Latitude:	4.535.543,33
Period:	1974-2004	Altitude (meters):	4,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974													-	-
2	1974- 75													-	-
3	1975- 76													-	-
4	1976- 77					3,1			12,4	19,3	22,2			-	-
5	1977- 78		12,9	10,3	3,0		6,0	9,4	10,7	17,0	22,7	22,7	21,6	-	-
6	1978- 79	16,5	18,7	6,7	6,8	2,3	5,4	9,3	10,0	18,1	23,3	25,0	21,5	13,6	22,7
7	1979- 80	18,7	13,0	9,8	5,5				10,6	14,6	22,0	23,9	22,1	-	-
8	1980- 81	19,6	15,8	11,9	5,6	-0,4	3,7	9,9	10,2	15,0	22,1	21,8	21,5	13,1	22,5
9	1981- 82	20,8	15,7	4,8	3,8	1,7	1,6	6,2	10,7	16,6	22,0	22,1	23,2	12,4	21,6
10	1982- 83	22,2	16,1	7,9	6,4	3,8	1,8	7,6	13,4	19,1	20,9	24,7	23,0	13,9	22,9
11	1983- 84	20,0	14,7	8,6	5,0	4,7	5,6	7,7	11,4	19,2	23,4	25,0	24,4	14,1	20,3
12	1984- 85	23,2	20,0	12,6	7,1	5,2	4,3	10,0	15,7	20,8	22,7	21,5	24,4	15,6	20,1
13	1985- 86	21,3	15,0	11,9	8,7	6,2	5,4	9,5	15,6	20,0	23,2	24,0	25,5	15,5	20,1
14	1986- 87	21,4	16,2	11,0	4,6	3,4	8,0	5,1	12,2	16,7	22,9	27,7	25,2	14,5	24,3
15	1987- 88	23,6	15,0	9,7	5,9	6,5	6,8	8,7	12,6	19,9	24,7	29,6	29,0	16,0	23,7
16	1988- 89	26,0	18,6	9,2	5,3	8,5	11,5	16,5	20,6	21,5	25,5	24,4	25,6	17,8	20,7
17	1989- 90	22,6	16,8	10,2	6,5	6,5	10,3	15,5	16,7	19,2	21,5	25,2	18,7	15,8	18,7
18	1990- 91	19,0	16,5	15,6	12,8	8,4	5,2	10,5	13,3	16,8	23,9	25,8	25,4	16,1	20,6

19	1991- 92	21,7	17,0	11,6	2,8	5,2	5,3	8,6	13,6	18,6	23,4	24,0	26,2	14,8	23,4
20	1992- 93	21,2	17,4	11,4	5,2	4,5	4,6	8,5	13,5	19,5	23,5	23,3	25,2	14,8	20,7
21	1993- 94	20,4	17,8	8,6	9,2	7,7	6,6	10,6	13,8	19,6	23,0			-	-
22	1994-95													-	-
23	1995- 96													-	-
24	1996- 97													-	-
25	1997- 98						8,5	7,5						-	-
26	1998- 99			7,4	2,6	5,1				18,3	24,7	26,9	26,1	-	-
27	1999- 00	21,6	17,7	11,1	6,6	2,2	7,2	9,2	16,4	20,6	24,2	26,3	25,5	15,7	24,1
28	2000- 01	20,6	15,4	12,9	7,2	6,2	7,5	12,6	12,4	18,7	23,1	26,7	26,9	15,9	20,7
29	2001- 02	21,3	17,6	8,0	-0,1	3,8	8,9	10,1	12,8	19,1	23,6	25,7	23,6	14,5	25,8
30	2002- 03			11,6	-							25,9	27,2	-	-
31	2003- 04	21,4	16,5	12,8	7,3	4,1	6,8		14,5	15,6				-	-
32	2004- 05				7,7	5,9	4,1	8,0	12,6	18,3	22,7	26,9	26,4	-	-

Statistics and charts

Years	22,2													Aver	A
Number of measurements	20	21	23	23	22	22	21	23	24	23	22	22		17	17
Highest value	26,0	20,0	15,6	12,8	8,5	11,5	16,5	20,6	21,5	25,5	29,6	29,0		17,8	25,8
Lowest value	16,5	12,9	4,8	-0,1	-0,4	1,6	5,1	10,0	14,6	20,9	21,5	18,7		12,4	18,7
Mean value	21,2	16,4	10,2	5,9	4,8	6,1	9,6	13,3	18,4	23,1	25,0	24,5		14,9	21,9

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

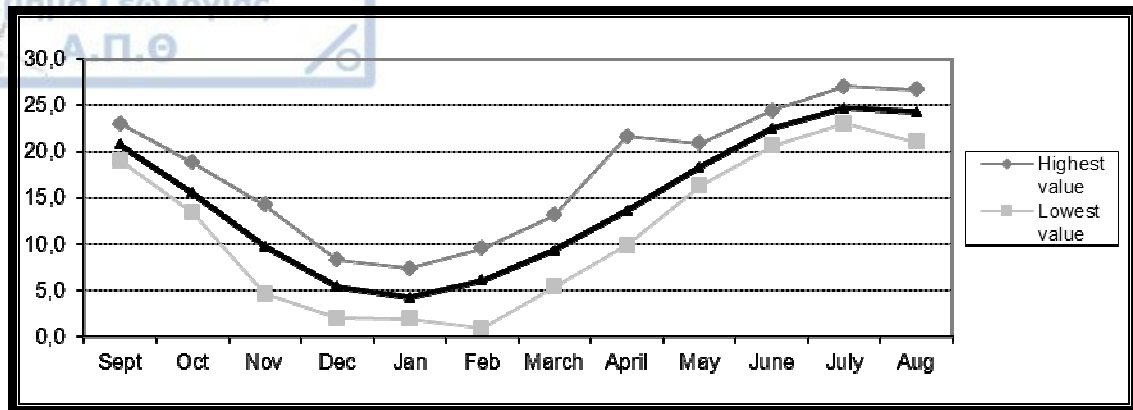


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

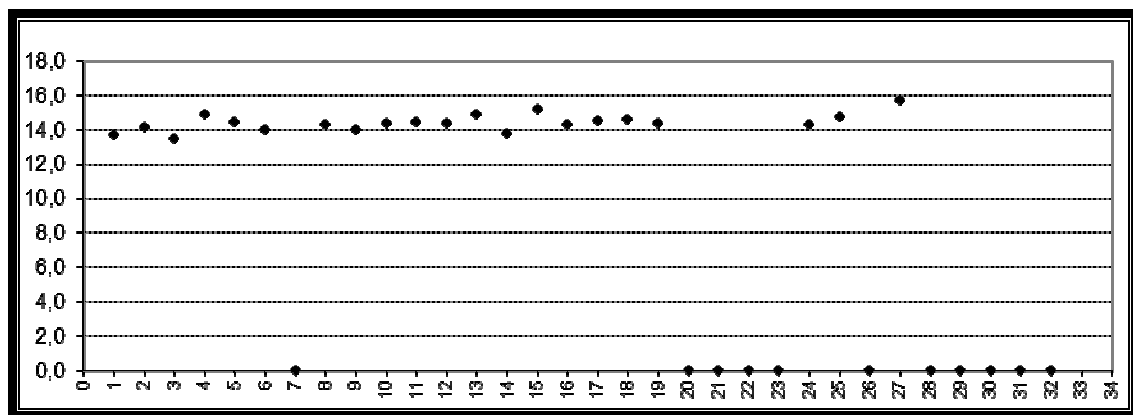
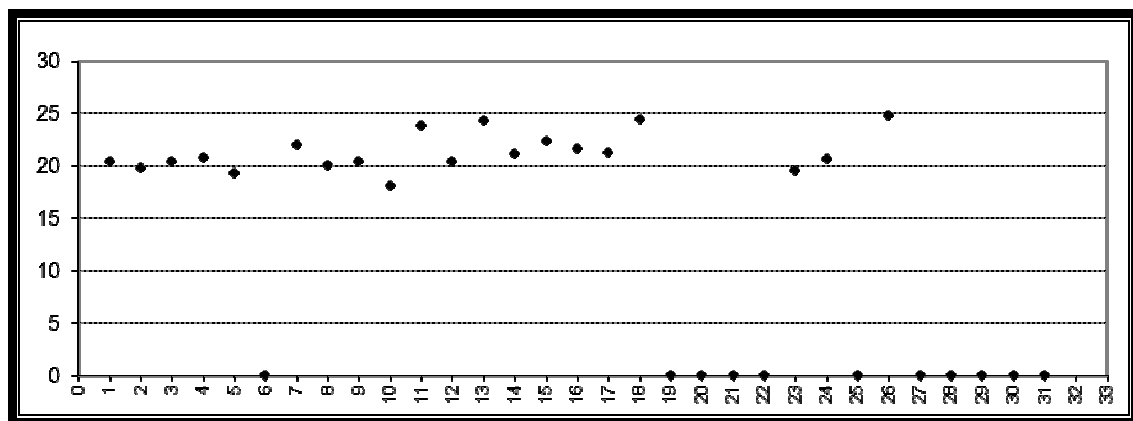


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 20T: Dramas

Station	Dramas	Longitude:	511.038,60
County:	Dramas	Latitude:	4.555.131,55
Period:	1974-2004	Altitude (meters):	101,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974	22,4	16,3	8,1	5,2	4,3	8,2	9,7	12,3	19,8	23,7	27,5	26,7	15,4	23,2
2	1974- 75	23,1	18,1	10,0	4,9	4,0	8,9	13,0	15,3	19,1	23,3	25,2	23,4	15,7	21,2
3	1975- 76	23,3	15,5	8,6	4,6	4,7	4,6	8,3	13,9	18,3	23,5	24,3	21,2	14,2	19,7
4	1976- 77	19,2	17,3	11,7	4,9	4,5	9,9	10,5	14,4	19,8	23,2	25,5	23,0	15,3	21
5	1977- 78	20,5	12,8	12,4	4,7	3,6	8,1	10,6	12,7	17,5	23,7	26,3	23,9	14,7	22,7
6	1978- 79	19,0	15,4	7,1	4,8	3,8	6,8	11,5	12,4	18,6	24,6	23,9	22,9	14,2	20,8
7	1979- 80	19,4	14,0	11,1	5,7	3,8	6,8	11,5	12,0	17,3	12,5	24,3	25,0	13,6	21,2
8	1980- 81	21,0	16,0	13,0	5,7	1,4	3,7	9,3	11,7	15,6	22,7	22,8	21,9	13,7	21,4
9	1981- 82	20,0	15,4	6,3	6,0	2,7	2,1	6,5	10,0	17,0	22,2	22,3	22,9	12,8	20,8
10	1982- 83	21,0	15,3	6,5	5,3	1,5	3,3	6,8	13,7	18,5	13,7	23,6	21,5	12,6	22,1
11	1983- 84	18,5	11,9	6,8	4,5	3,5	4,6	7,1	10,2	17,7	20,6	21,8	20,5	12,3	18,3
12	1984- 85	20,0	15,0	8,9	3,6	3,9	0,3	6,4						-	-
13	1985- 86													-	-
14	1986- 87													-	-
15	1987- 88													-	-
16	1988- 89					3,0	1,1	11,4	15,8	17,6	21,7	24,8	25,3	-	-
17	1989- 90	19,9	14,8	9,1	3,2	3,3	7,5	13,7	14,7	18,9	23,5	26,8	25,8	15,1	23,6
18	1990- 91	2,0	15,9	12,4	7,3	4,4	4,9	9,7	13,1	17,4	24,2	25,1	25,1	13,5	23,1

19	1991- 92	24,2	17,1	11,4	3,3	4,5	5,2	9,8	14,4	18,6	23,8	25,1	28,1	15,5	24,8
20	1992- 93	21,6	16,9	11,0	3,9	4,1	3,6	8,6	13,3	19,1				-	-
21	1993- 94													-	-
22	1994-95													-	-
23	1995- 96			8,0	6,6	4,4	5,1	5,6	11,9	21,3	24,5	25,8	25,4	-	-
24	1996- 97	19,8	15,2	10,8	8,5	8,5	6,3	9,4	10,7	19,6	22,6	24,4	22,8	14,9	18,1
25	1997- 98	20,4	13,2	9,3	5,4	5,5	8,1	8,0	14,8	19,7	23,6	27,2	28,0	15,3	22,6
26	1998- 99	20,7	16,9	10,7	4,2								27,4	-	-
27	1999- 00	23,0	18,8	10,8	6,8	2,6	7,0	8,7	16,9	19,7	24,7	27,2	26,9	16,1	24,6
28	2000- 01	21,9	16,2	15,1	8,6	6,8	9,2	14,2	15,2	20,2	25,0	28,8		-	-
29	2001- 02					5,2	9,8	11,7	12,9	19,1	24,1	23,7	24,0	-	-
30	2002- 03	20,2	26,0	11,0	6,0							25,2	25,3	-	-
31	2003- 04	19,8	19,2	13,2	5,7	4,8	6,1	11,4	12,8	17,1	21,7		,	-	-
32	2004- 05				8,8	7,0	6,0	12,3	16,4	19,2	21,9	22,8	25,4	-	-

Statistics and charts

Years	23,9												Aver	A
Number of measurements	23	23	24	25	25	25	25	24	24	23	23	23	17	17
Highest value	24,2	26,0	15,1	8,8	8,5	9,9	14,2	16,9	21,3	25,0	28,8	28,1	16,1	24,8
Lowest value	2,0	11,9	6,3	3,2	1,4	0,3	5,6	10,0	15,6	12,5	21,8	20,5	12,3	18,1
Mean value	20,0	16,2	10,1	5,5	4,2	5,9	9,8	13,4	18,6	22,4	25,0	24,5	14,6	21,7

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

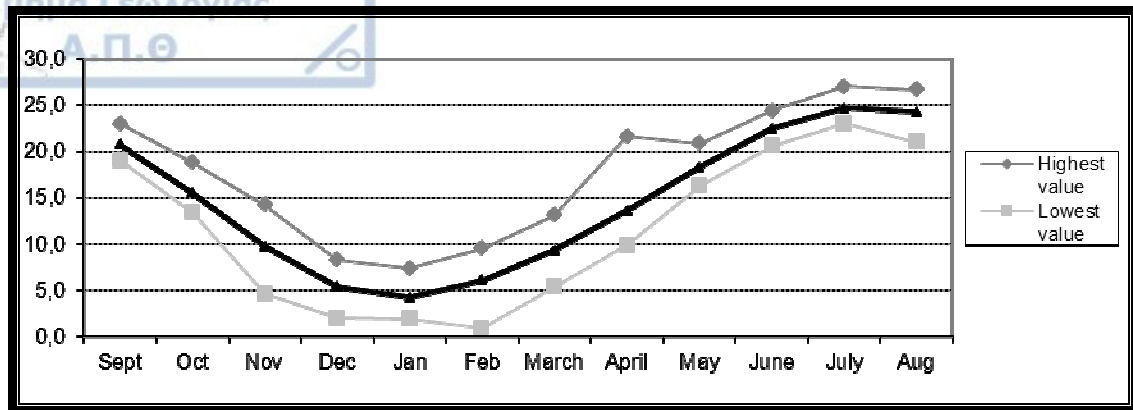


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

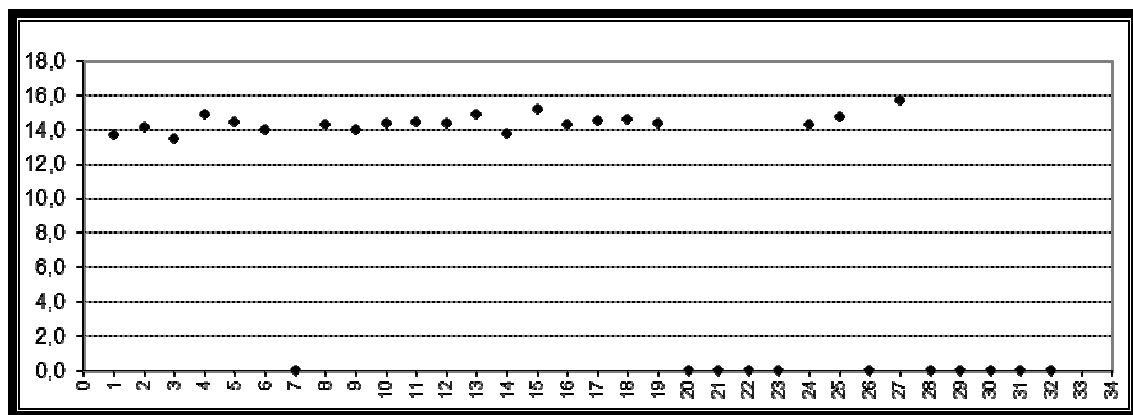
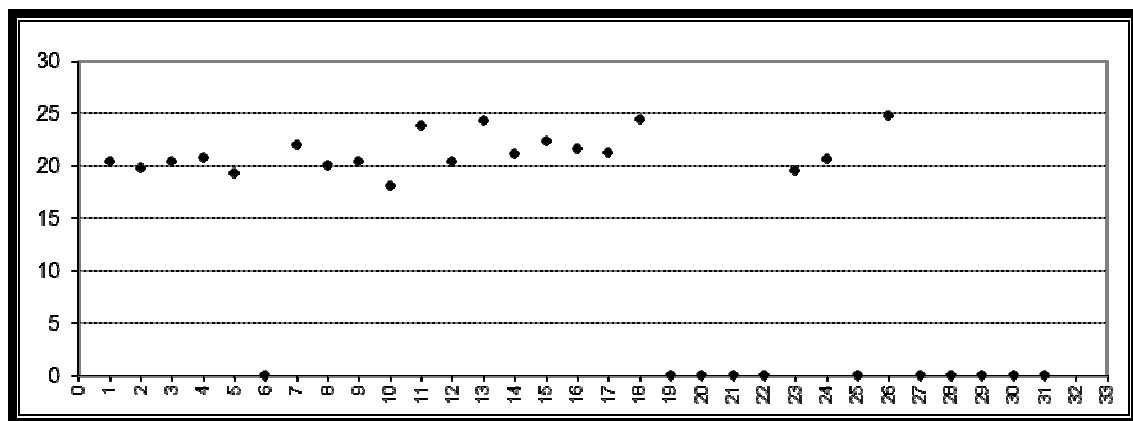


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 21T: Kato Nevrokopi

Station	Kato Nevrokopi	Longitude:	488.696,34
County:	Dramas	Latitude:	4.577.334,59
Period:	1974-2004	Altitude (meters):	580,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974	18,1	12,9	5,3	2,1	0,3	4,8	7,9	8,7	14,2	17,7	20,5	20,6	11,1	20,3
2	1974- 75	17,4	12,3	6,2	1,5	0,6	0,5	7,6	10,9	16,5	16,9	20,6	19,7	10,9	20,1
3	1975- 76	18,4	11,8	6,2	2,3	1,6	1,9	5,5	11,0	15,5	16,3	19,2	16,8	10,5	17,6
4	1976- 77	15,1	13,8	8,0	-1,0	-2,0	7,8	9,0	11,1	16,2	19,5	21,5	20,7	11,6	23,5
5	1977- 78	15,2	10,8	9,6	1,0	-0,5	6,4	8,2	10,4	15,0	19,0	21,0	19,0	11,3	21,5
6	1978- 79	15,5	10,7	3,0	3,7	1,3	3,9	8,3	9,9	15,2	19,6	19,7	20,0	10,9	18,7
7	1979- 80	17,0	10,8	7,5	2,0				9,6	13,4	18,8	21,3	21,1	-	-
8	1980- 81	16,5	12,7	9,2	2,5	0,5	-0,9	9,1	11,7	14,6	20,8	21,0	20,4	11,5	21,9
9	1981- 82	17,8	15,7	2,6	3,5	1,2	1,3	6,3	11,2	15,5	19,9	19,3	20,8	11,3	19,6
10	1982- 83	18,7	12,1	4,9			1,5	7,6	13,9	15,8	18,3	20,8	19,4	-	-
11	1983- 84	17,2	11,3	5,0	2,4	1,2	3,8	6,5	10,5	15,7	18,4	19,4	19,4	10,9	18,2
12	1984- 85	17,2	14,9	8,8	0,4	3,1	0,2	7,2						-	-
13	1985- 86					1,6	1,3	6,3	12,1	15,1	18,5	19,9	21,9	-	-
14	1986- 87	17,7	11,0	4,9	-1,6	-0,6	4,3	1,9	9,9	13,6	18,7	22,9	21,1	10,3	24,5
15	1987- 88	19,9	11,9	5,9	2,9	2,6	3,3	5,5	10,2	15,6	18,6	24,2	22,2	11,9	21,6
16	1988- 89	17,7	11,5	1,9	-0,4	-8,0	0,1	8,1	12,3	13,3	16,5	20,5	20,7	9,5	28,7
17	1989- 90	16,3	11,4	6,5	0,1	-6,8	4,1	8,0	10,6	14,7	17,1	20,6	20,1	10,2	27,4
18	1990- 91	16,5	12,2	9,0	2,5	-0,4	1,1	7,8	9,1	12,4	19,3	20,5	20,2	10,9	20,9

19	1991- 92	15,7	12,8	7,0	-1,4	-0,8	-0,1	5,0	9,8	13,7	17,6	18,7	21,6	10,0	23
20	1992- 93	15,8	13,6	7,6	1,2	5,4	-1,1	5,0	10,1	15,0				-	-
21	1993- 94													-	-
22	1994-95													-	-
23	1995- 96			3,2	2,8	0,2	2,6	2,5	9,1	17,0	19,3	21,2	21,3	-	-
24	1996- 97		10,8	8,2	6,1	4,0	4,4	4,3	7,0	16,2	19,6	20,6	19,3	-	-
25	1997- 98	15,2	10,1	7,3	1,7	2,7	4,2	4,5	11,1	15,2	20,0	23,4	23,5	11,6	21,8
26	1998- 99	17,0	13,9	6,0	-1,7								23,0	-	-
27	1999- 00	18,2	13,8	7,1	3,8	-9,7	1,1	5,2	12,1	15,7	19,4	22,4	22,8	11,0	32,5
28	2000- 01	16,7	12,8	9,5		2,6		10,7	10,1	15,5	18,8	22,8		-	-
29	2001- 02					3,7	3,8	8,2	10,0	15,7	19,7	21,7	20,0	-	-
30	2002- 03	16,6	12,7	7,6	3,4							21,5	22,7	-	-
31	2003- 04	18,9	12,4	8,3	1,7	1,1	2,9	6,6	10,7	24,2	29,4			-	-
32	2004- 05				4,8	2,0	1,0	8,4	12,8	18,2	21,2	24,8	23,8	-	-

Statistics and charts

Years	26,3												Aver	A
Number of measurements	25	26	27	26	26	26	27	27	27	26	26	26	17	17
Highest value	19,9	15,7	9,6	6,1	5,4	7,8	10,7	13,9	24,2	29,4	24,8	23,8	11,9	32,5
Lowest value	15,1	10,1	1,9	-1,7	-9,7	-1,1	1,9	7,0	12,4	16,3	18,7	16,8	9,5	17,6
Mean value	17,1	12,3	6,5	1,8	0,3	2,5	6,7	10,6	15,5	19,2	21,2	20,9	11,2	22,5

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

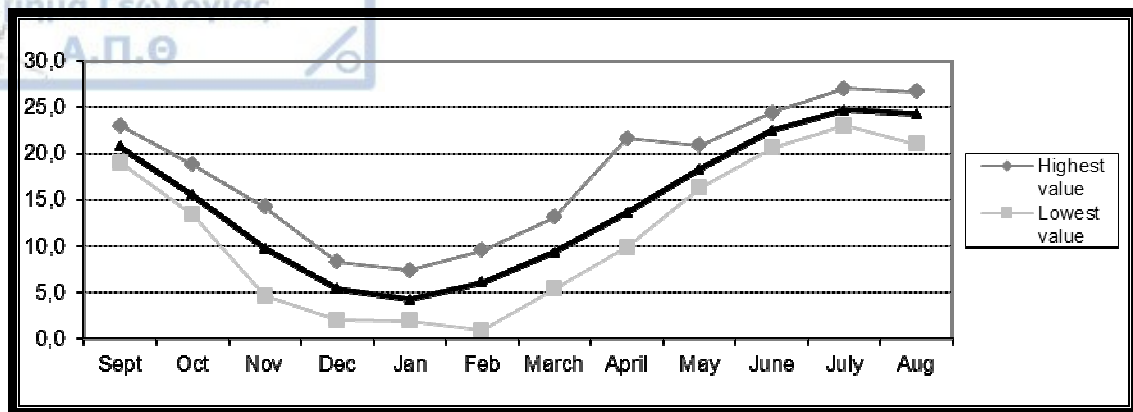


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

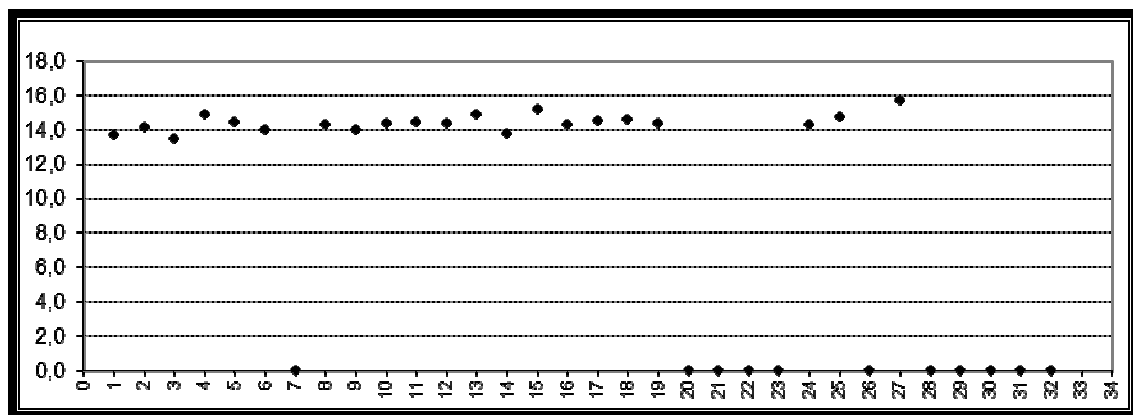
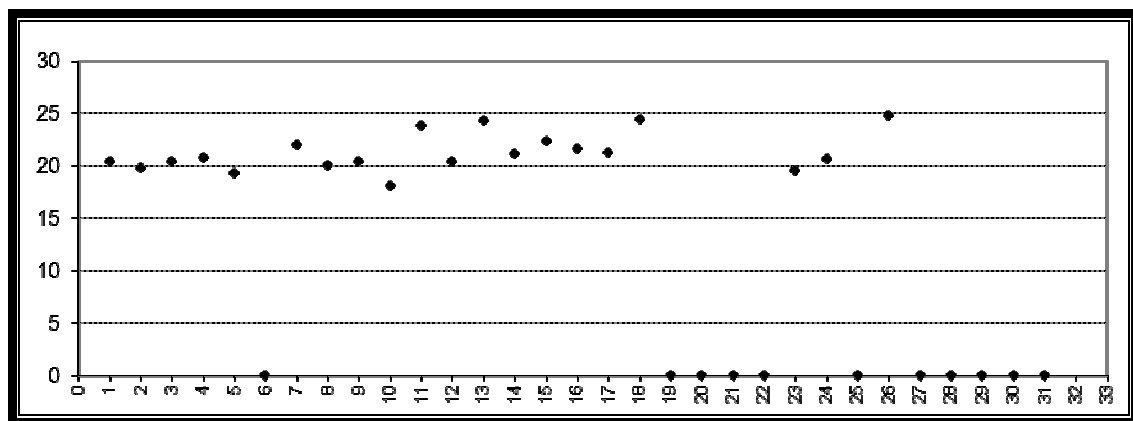


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 22T: Kalampaki

Station	Kalampaki	Longitude:	515.257,51
County:	Dramas	Latitude:	4.544.037,94
Period:	1974-2004	Altitude (meters):	67,30

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrological Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974	21,5	15,1	7,2	4,4	3,6	7,4	8,6	11,2	17,0	21,2	23,6	23,8	13,7	20,2
2	1974- 75	20,3	16,4	9,2	4,0	4,0	4,3	10,3	13,5	18,7	22,0	24,4	22,8	14,2	20,4
3	1975- 76	22,4	15,0	8,4	4,3	3,6	4,2	7,1	12,9	17,7	21,2	23,4	21,0	13,4	19,8
4	1976- 77	19,2	16,1	11,3	4,6	5,1	9,3	9,6	12,7	18,9	22,5	25,0	23,9	14,9	20,4
5	1977- 78	19,7	13,6	11,6	3,9	4,6	8,0	10,5	13,0	17,8	22,6	24,7	23,3	14,4	20,8
6	1978- 79	19,0	14,7	7,1	6,3	3,9	6,6	11,0	12,1	18,0	23,0	23,2	23,1	14,0	19,3
7	1979- 80	20,3	13,9	10,9	5,8				12,2	16,3	21,5	24,2	23,5	-	-
8	1980- 81	19,6	16,2	11,2	5,8	1,9	5,3	11,0	13,0	16,6	23,4	23,9	23,3	14,3	22
9	1981- 82	21,1	17,8	7,0	6,6	3,7	3,8	8,0	12,0	18,1	22,8	23,0	23,8	14,0	20,1
10	1982- 83	21,9	16,2	8,0	6,8	3,7	3,7	9,1	14,9	20,3	21,3	24,1	22,3	14,4	20,4
11	1983- 84	20,0	14,0	7,9	5,5	4,9	5,8	8,1	21,6	18,6	21,5	23,0	22,1	14,4	18,1
12	1984- 85	21,1	17,3	10,6	4,5	5,1	0,9	7,6	14,6	20,1	21,7	24,0	24,7	14,4	23,8
13	1985- 86	20,6	13,6	10,8	6,8	5,5	5,8	8,6	15,4	18,6	22,4	24,4	25,9	14,9	20,4
14	1986- 87	22,0	14,5	7,8	2,0	3,0	7,6	5,8	12,5	17,1	22,7	26,3	24,0	13,8	24,3
15	1987- 88	23,0	14,4	10,6	6,1	5,9	6,6	8,9	13,1	18,5	22,8	27,0	25,5	15,2	21,1
16	1988- 89	21,3	14,4	5,8	4,9	2,7	6,9	11,4	15,9	17,5	21,1	24,4	25,1	14,3	22,4
17	1989- 90	21,0	13,6	9,1	3,5	3,4	7,5	11,6	13,9	18,4	22,7	25,0	24,2	14,5	21,6
18	1990- 91	20,8	15,5	12,0	6,8	3,3	5,1	9,7	12,6	16,5	23,7	24,5	24,6	14,6	21,3

19	1991- 92	20,8	16,7	11,2	2,3	3,6	4,4	8,8	13,7	17,1	22,8	23,9	26,7	14,3	24,4
20	1992- 93	20,5	17,1	10,4	3,5	3,1	3,2	8,4	13,0	18,4				-	-
21	1993- 94													-	-
22	1994-95													-	-
23	1995- 96			4,6	4,8	4,6	4,9	5,4	11,8	20,9	23,3	24,6	26,7	-	-
24	1996- 97	19,5	14,4	10,8	7,8	5,3	6,0	7,9	9,9	19,3	22,9	24,8	23,1	14,3	19,5
25	1997- 98	19,4	13,4	9,8	5,7	5,5	7,7	7,5	14,8	18,3	23,0	25,6	26,1	14,7	20,6
26	1998- 99	20,0	15,7	10,3	4,4								26,6	-	-
27	1999- 00	21,5	16,9	10,1	7,5	2,2	7,9	8,8	16,4	20,2	24,4	27,0	25,5	15,7	24,8
28	2000- 01	21,2	15,6	12,8	6,1	7,4	7,3	13,1	13,5	18,7	23,5	26,4		-	-
29	2001- 02					3,8	9,5	12,5	13,1	18,9	24,2	25,7	23,9	-	-
30	2002- 03	21,0	16,2	11,7	5,9							26,0	26,2	-	-
31	2003- 04	21,1	18,8	14,2	8,3	4,8	6,8	11,4	12,5	17,0	20,6			-	-
32	2004- 05			10,5	7,4	6,1	6,7	10,9	14,8	19,9	20,8	24,7	24,0	-	-

Statistics and charts

Years	27,5												Aver	A
Number of measurements	27	27	29	29	27	27	27	28	28	27	27	27	21	21
Highest value	23,0	18,8	14,2	8,3	7,4	9,5	13,1	21,6	20,9	24,4	27,0	26,7	15,7	24,8
Lowest value	19,0	13,4	4,6	2,0	1,9	0,9	5,4	9,9	16,3	20,6	23,0	21,0	13,4	18,1
Mean value	20,7	15,4	9,8	5,4	4,2	6,0	9,3	13,6	18,3	22,4	24,7	24,3	14,5	21,2

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

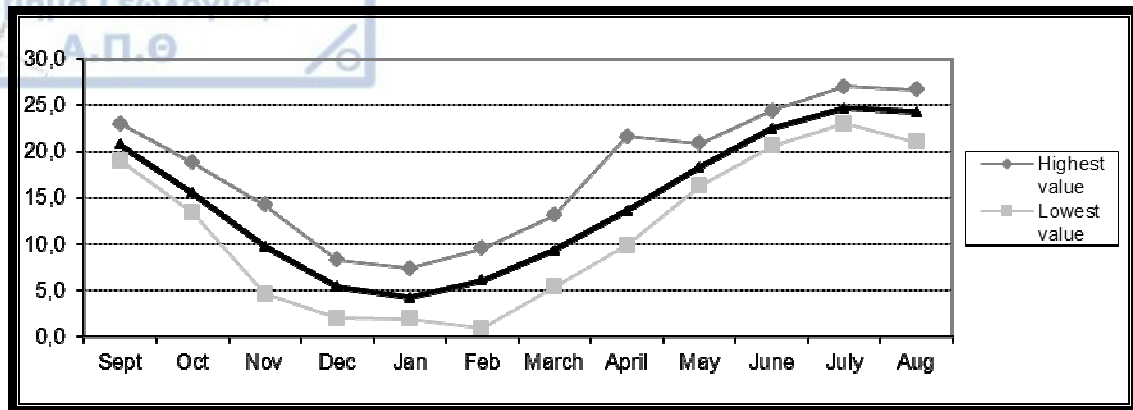


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

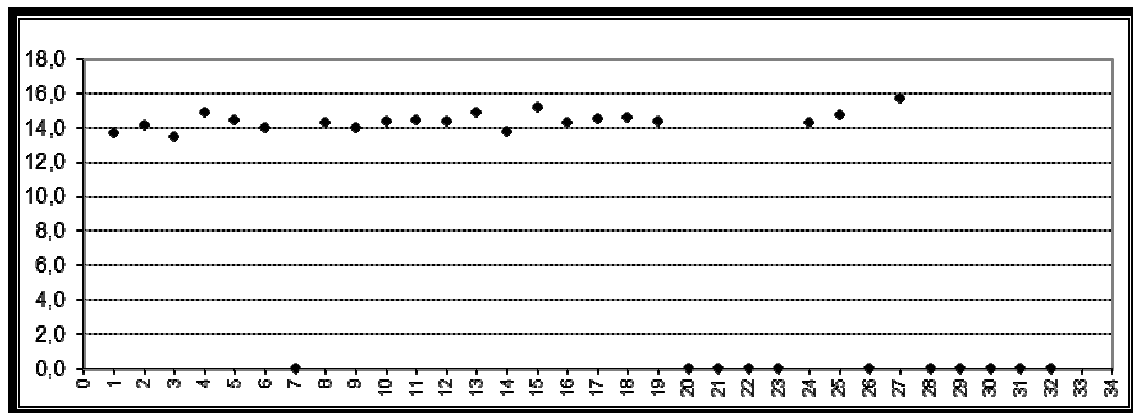
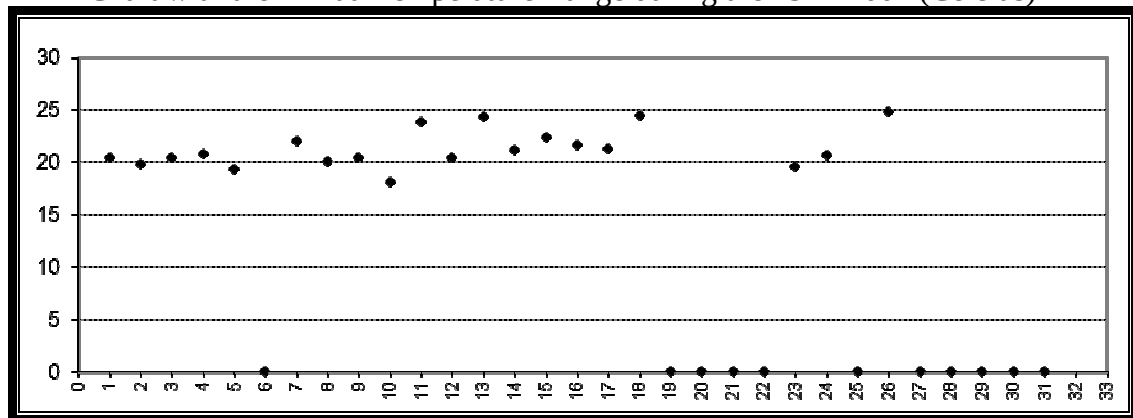


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 23T: Arguroupoli

Station	Arguroupoli		Longitude:	502.648,90
County:	Dramas		Latitude:	4.551.423,08
Period:	1974-2004		Altitude (meters):	74,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974													-	-
2	1974- 75													-	-
3	1975- 76													-	-
4	1976- 77													-	-
5	1977- 78													-	-
6	1978- 79													-	-
7	1979- 80													-	-
8	1980- 81													-	-
9	1981- 82													-	-
10	1982- 83													-	-
11	1983- 84													-	-
12	1984- 85													-	-
13	1985- 86													-	-
14	1986- 87													-	-
15	1987- 88													-	-
16	1988- 89													-	-
17	1989- 90													-	-
18	1990- 91													-	-

19	1991- 92													-	-
20	1992- 93													-	-
21	1993- 94													-	-
22	1994-95													-	-
23	1995- 96													-	-
24	1996- 97							6,3	8,6	17,8	23,5	21,4	21,6	-	-
25	1997- 98	17,4	12,1	8,6	4,3	3,8	6,0	6,0	13,3	17,2	22,2	24,5	24,7	13,3	20,9
26	1998- 99	18,9	15,3	9,1	2,4								24,8	-	-
27	1999- 00	20,4	15,7	8,7	5,6	0,0	5,6	7,0	14,9	18,9	22,8	24,8	24,0	14,0	24,8
28	2000- 01	20,4	14,8	12,1		5,8	6,7	12,3	12,8	18,8	22,7	25,5		-	-
29	2001- 02		24,2			2,6	8,4	10,8	12,5	18,7	23,4	25,4	23,4	-	-
30	2002- 03	19,6	15,2	10,5	4,3							26,5	25,4	-	-
31	2003- 04	19,3		10,6	5,2	3,1	5,2	9,3	13,0	17,1	22,3			-	-
32	2004- 05		14,9	9,2	6,7	5,3	4,6	7,9	12,9	19,0	17,8	21,4	24,6	-	-

Statistics and charts

Years	6,7												Aver	A
Number of measurements	6	7	7	6	6	6	7	7	7	7	7	7	2	2
Highest value	20,4	24,2	12,1	6,7	5,8	8,4	12,3	14,9	19,0	23,5	26,5	25,4	14,0	24,8
Lowest value	17,4	12,1	8,6	2,4	0,0	4,6	6,0	8,6	17,1	17,8	21,4	21,6	13,3	20,9
Mean value	19,3	16,0	9,8	4,8	3,4	6,1	8,5	12,6	18,2	22,1	24,2	24,1	13,7	22,9

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

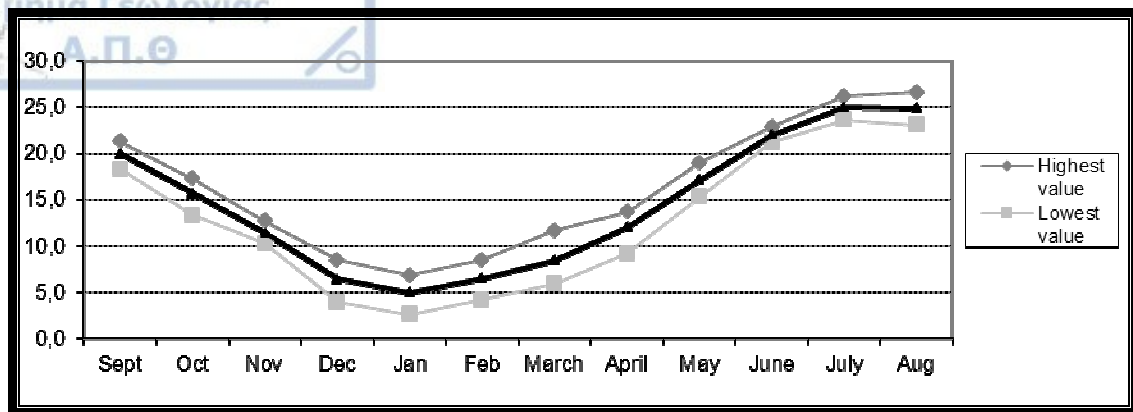


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

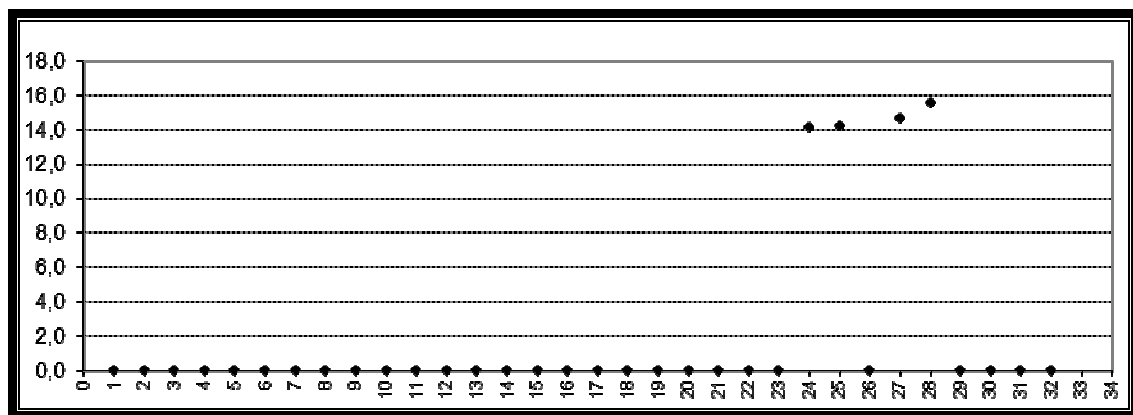
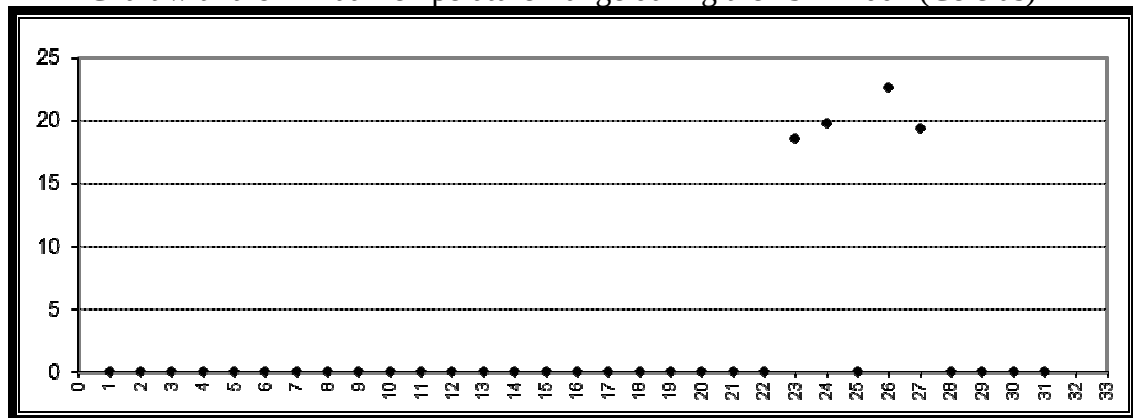


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 24T: Leukogia

Station	Leukogia		Longitude:	490.098,08
County:	Dramas		Latitude:	4.582.883,46
Period:	1974-2004		Altitude (meters):	621,40

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974													-	-
2	1974- 75													-	-
3	1975- 76													-	-
4	1976- 77													-	-
5	1977- 78													-	-
6	1978- 79													-	-
7	1979- 80													-	-
8	1980- 81													-	-
9	1981- 82													-	-
10	1982- 83													-	-
11	1983- 84													-	-
12	1984- 85													-	-
13	1985- 86													-	-
14	1986- 87													-	-
15	1987- 88													-	-
16	1988- 89													-	-
17	1989- 90													-	-
18	1990- 91													-	-

19	1991- 92													-	-
20	1992- 93													-	-
21	1993- 94													-	-
22	1994-95													-	-
23	1995- 96													-	-
24	1996- 97							3,9	4,6	14,3	18,4	19,8	17,8	-	-
25	1997- 98	14,5	9,3	5,8	0,7	2,5	3,8	3,5	11,4	14,4	19,0	21,6	22,3	10,7	21,6
26	1998- 99	15,9	12,7	6,2	-0,7								22,5	-	-
27	1999- 00	17,6	13,2	6,5	-3,7	-6,2	1,7	4,9	12,0	16,0	19,3	22,1	20,9	10,4	28,3
28	2000- 01	17,2	12,1		2,6	3,0	3,9	10,3	10,0	15,2	18,8	22,6		-	-
29	2001- 02					1,7	4,7	8,3	9,6	15,5	19,7	21,4	19,8	-	-
30	2002- 03	16,3	23,2	7,7	2,4							21,6	21,5	-	-
31	2003- 04	15,9	12,4	8,3	1,7	0,5	2,8	6,3	10,6	13,1	18,7			-	-
32	2004- 05			7,2	3,8	0,7	-0,2	5,2	9,9	15,5	22,5	25,5	20,6	-	-

Statistics and charts

Years	6,6												Aver	A
Number of measurements	6	6	6	7	6	6	7	7	7	7	7	7	2	2
Highest value	17,6	23,2	8,3	3,8	3,0	4,7	10,3	12,0	16,0	22,5	25,5	22,5	10,7	28,3
Lowest value	14,5	9,3	5,8	-3,7	-6,2	-0,2	3,5	4,6	13,1	18,4	19,8	17,8	10,4	21,6
Mean value	16,2	13,8	7,0	1,0	0,4	2,8	6,1	9,7	14,9	19,5	22,1	20,8	10,5	25,0

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

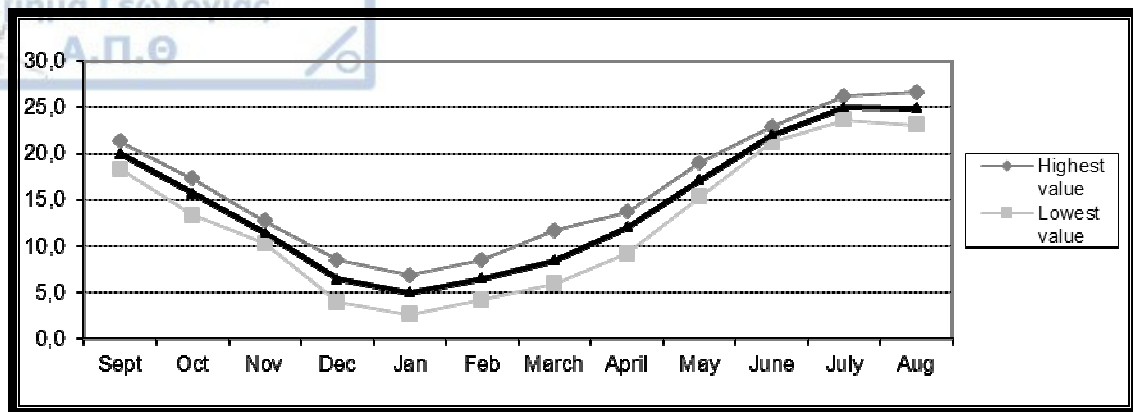


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

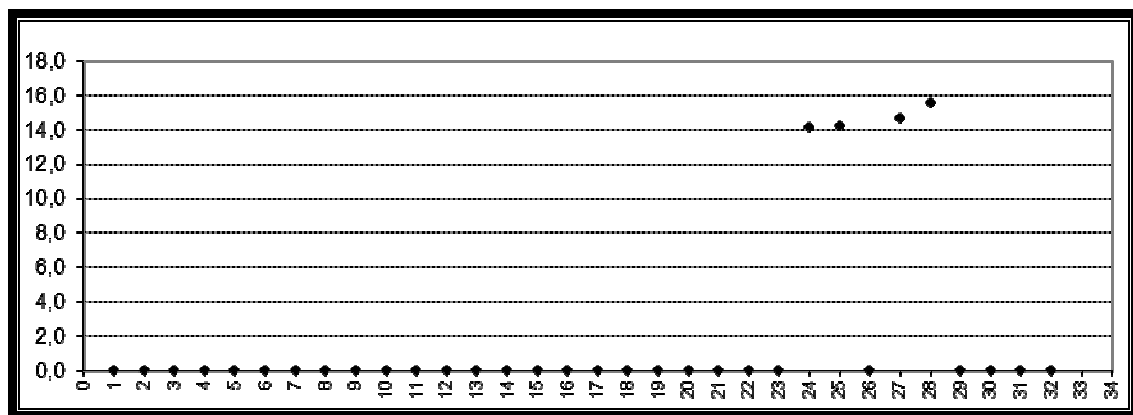
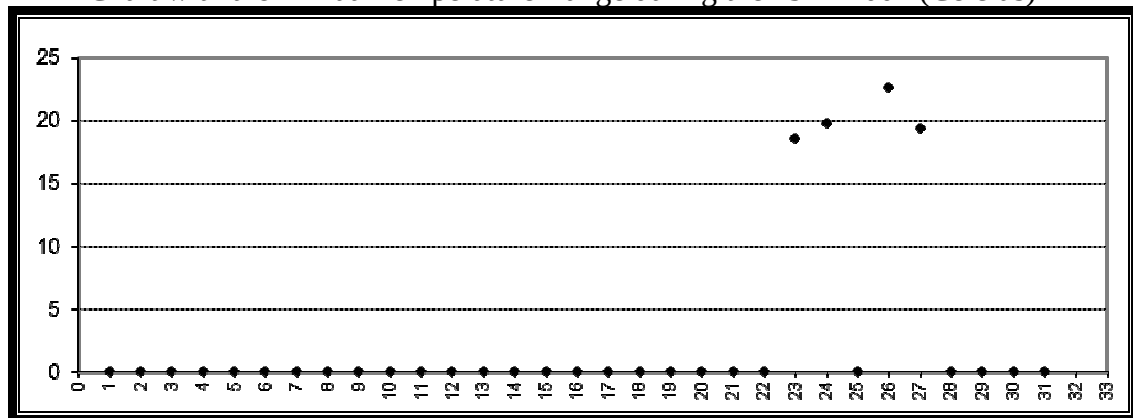


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)



Station 25T: Prinos Thasou

Station	Prinos Thasou	Longitude:	548.325,84
County:	Kavalas	Latitude:	4.510.168,57
Period:	1974-2004	Altitude (meters):	684,00

Table with the mean monthly Temperature data (Celcius) of meteorological station

S/N	Hydrolo- gical Year	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Aver	A
1	-1974													-	-
2	1974- 75													-	-
3	1975- 76													-	-
4	1976- 77													-	-
5	1977- 78													-	-
6	1978- 79													-	-
7	1979- 80													-	-
8	1980- 81													-	-
9	1981- 82													-	-
10	1982- 83													-	-
11	1983- 84													-	-
12	1984- 85													-	-
13	1985- 86													-	-
14	1986- 87													-	-
15	1987- 88													-	-
16	1988- 89													-	-
17	1989- 90													-	-
18	1990- 91													-	-

19	1991- 92													-	-
20	1992- 93		16,8	12,2	3,9	4,0	4,2	7,7	12,3	15,6	21,9	23,6	26,6	-	-
21	1993- 94	20,1	17,3	12,2	5,5									-	-
22	1994-95													-	-
23	1995- 96									19,0	21,7	23,8	23,8	-	-
24	1996- 97	18,3	14,3	11,4	8,5	6,7	6,0	7,6	9,2	18,4	21,8	24,5	23,1	14,2	18,5
25	1997- 98	19,0	13,3	10,3	6,5	5,7	7,1	5,9	12,9	17,0	22,0	25,4	25,5	14,2	19,8
26	1998- 99	19,9	15,7	10,5	5,1								25,1	-	-
27	1999- 00	20,8	16,7	10,5	8,0	2,6	6,7	6,9	13,7	17,7	22,4	25,2	24,9	14,7	22,6
28	2000- 01	20,7	15,6	12,7	7,8	6,8	7,6	11,7	12,4	17,0	21,7	26,2	26,1	15,5	19,4
29	2001- 02	21,3				4,4	8,5	10,1	11,7	17,2	22,9	25,8	23,8	-	-
30	2002- 03	20,1	16,1	11,6	5,6								25,1	-	-
31	2003- 04	19,6	15,5	11,4	6,6	4,3	5,5	8,9	12,1	15,3	21,2			-	-
32	2004- 05													-	-

Statistics and charts

Years	8,0												Aver	A
Number of measurements	9	9	9	9	7	7	7	7	8	8	7	9	4	4
Highest value	21,3	17,3	12,7	8,5	6,8	8,5	11,7	13,7	19,0	22,9	26,2	26,6	15,5	22,6
Lowest value	18,3	13,3	10,3	3,9	2,6	4,2	5,9	9,2	15,3	21,2	23,6	23,1	14,2	18,5
Mean value	20,0	15,7	11,4	6,4	4,9	6,5	8,4	12,0	17,2	22,0	24,9	24,9	14,6	20,1

Chart with the Mean monthly Temperature during the 1974-2004 (Celcius)

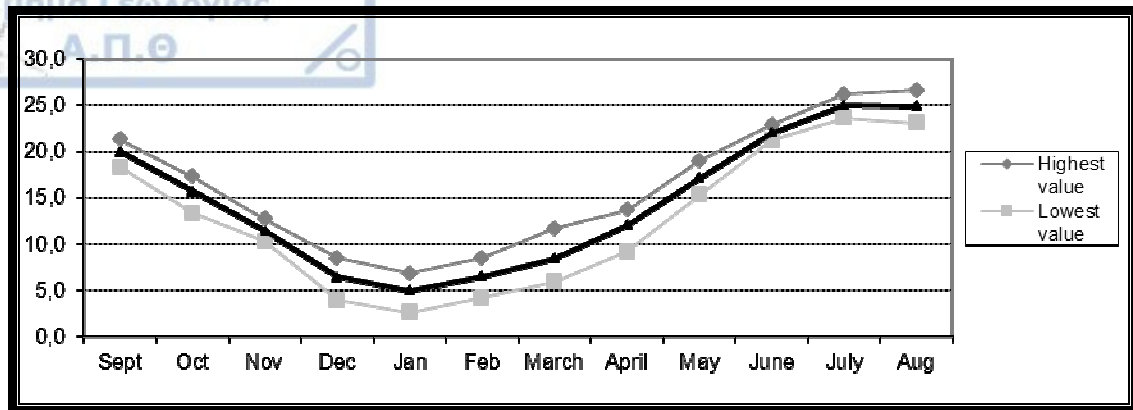


Chart with the Mean annual Temperature during the 1974-2004 (Celcius)

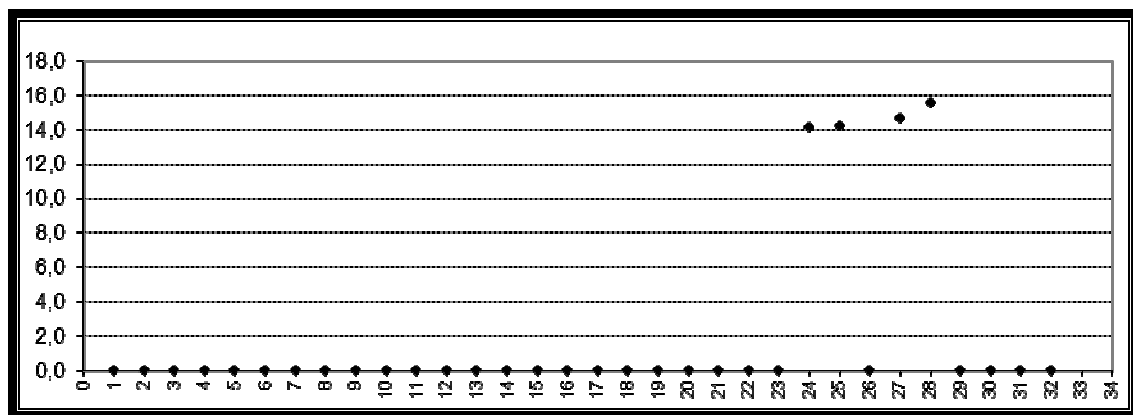
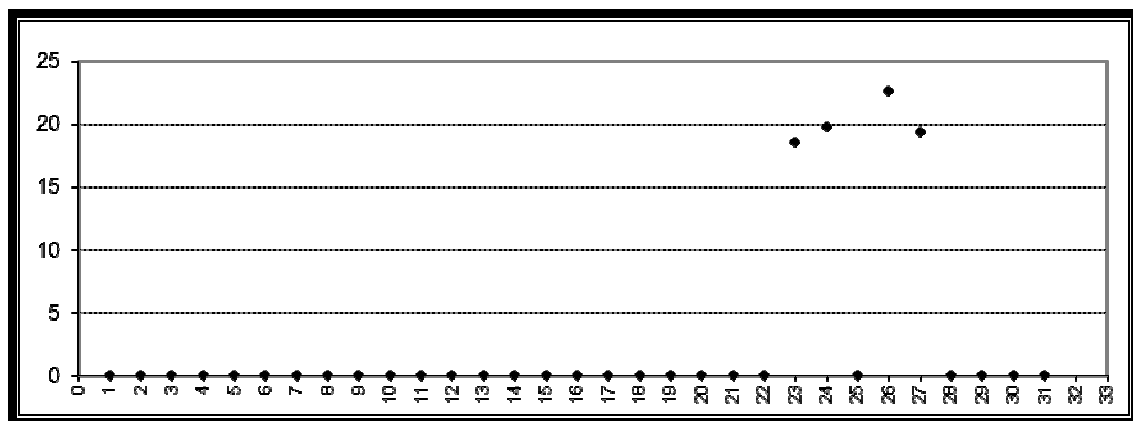


Chart with the Annual Temperature Range during the 1974-2004 (Celcius)





APPENDIX I

DIGITIZED GEOLOGICAL MAPS OF STUDYING AREAS AT SCALE 1:500.000 AND 1:50.000. XRD CHARTS OF STUDYING AREAS. GEOLOGICAL MAPS OF S6GG CLASSIFICATION.



SECTION 1

DIGITIZED GEOLOGICAL MAPS OF STUDYING SITES AND NORTH GREECE IN 2 CLASSES AT SCALE 1:500.000

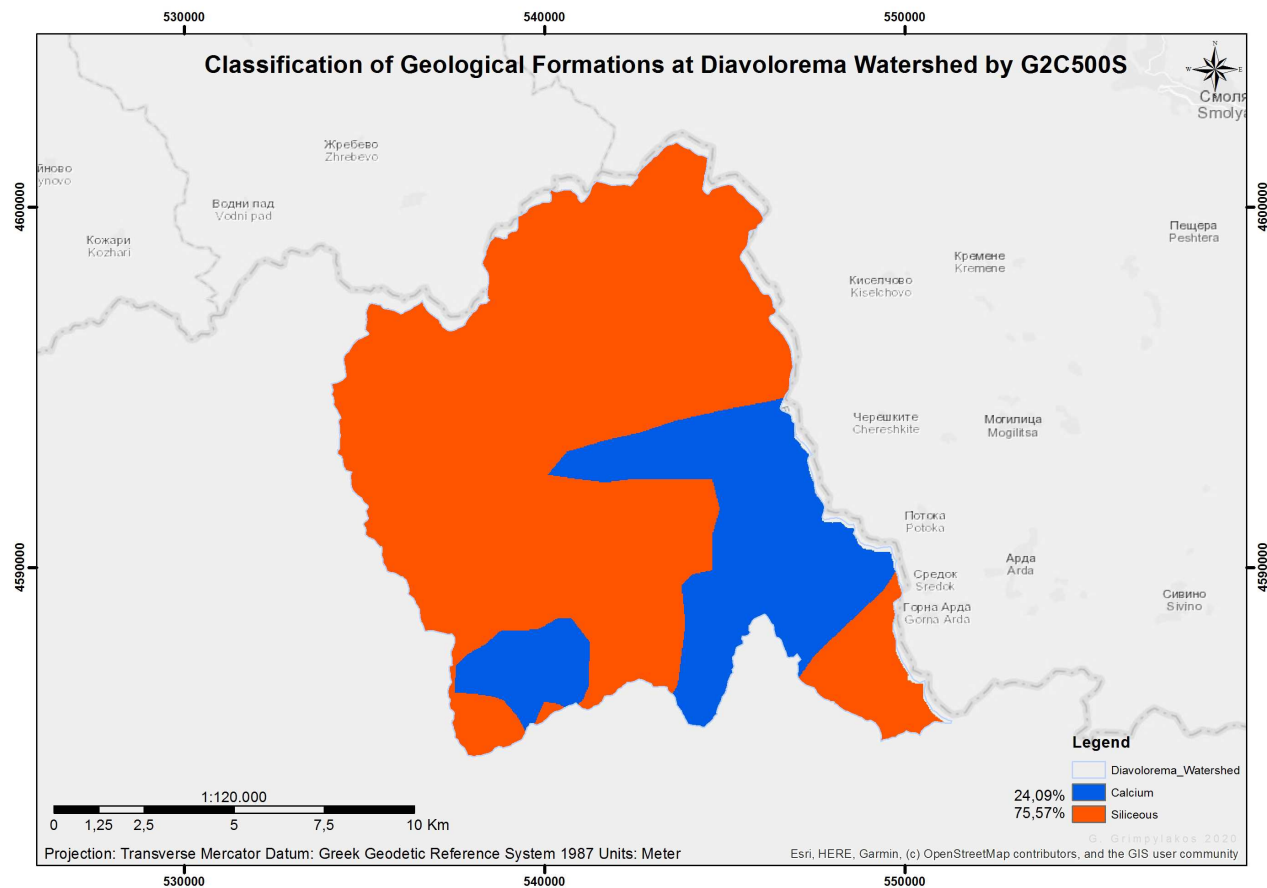


Figure 1K – Diavolorema Watershed. Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

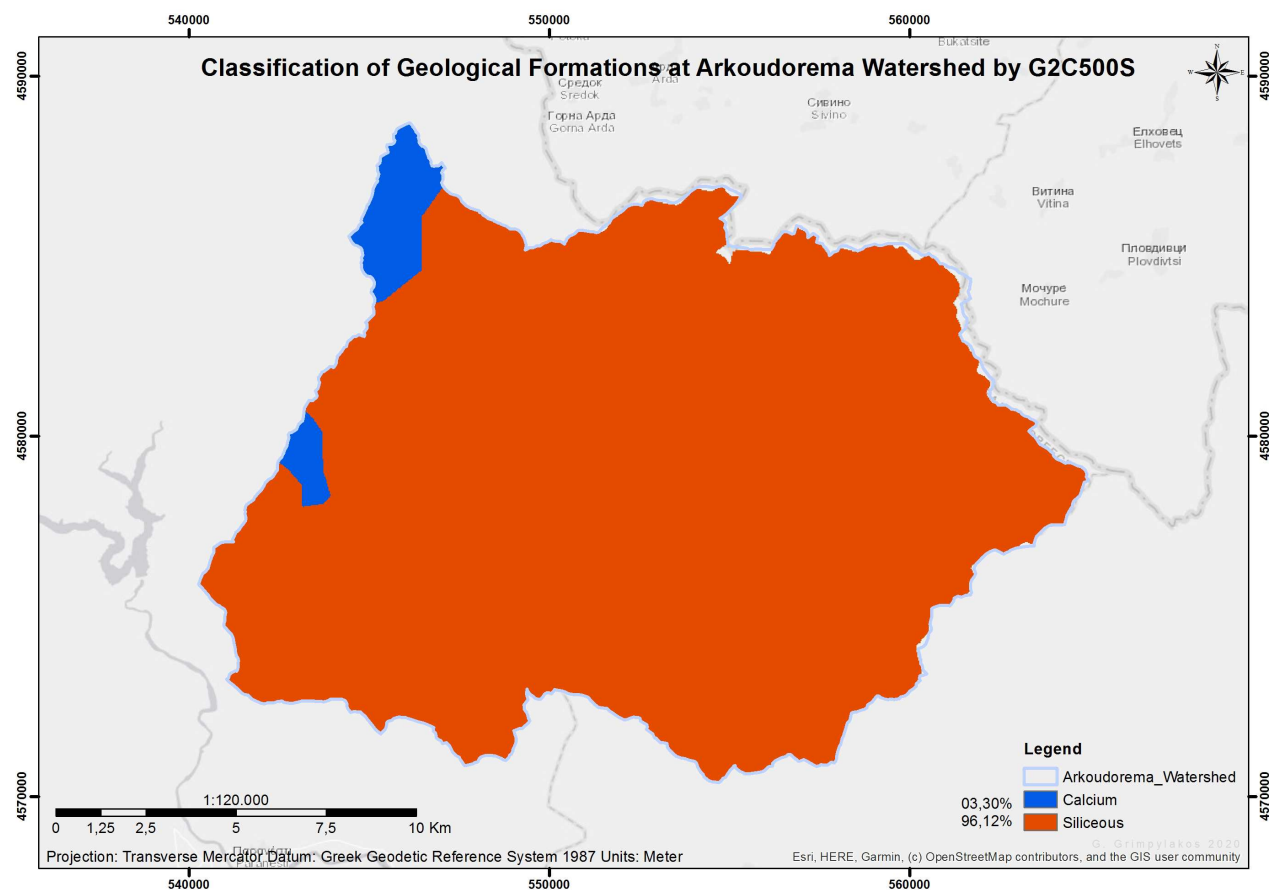


Figure 2K – Arkoudorema Watershed. Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

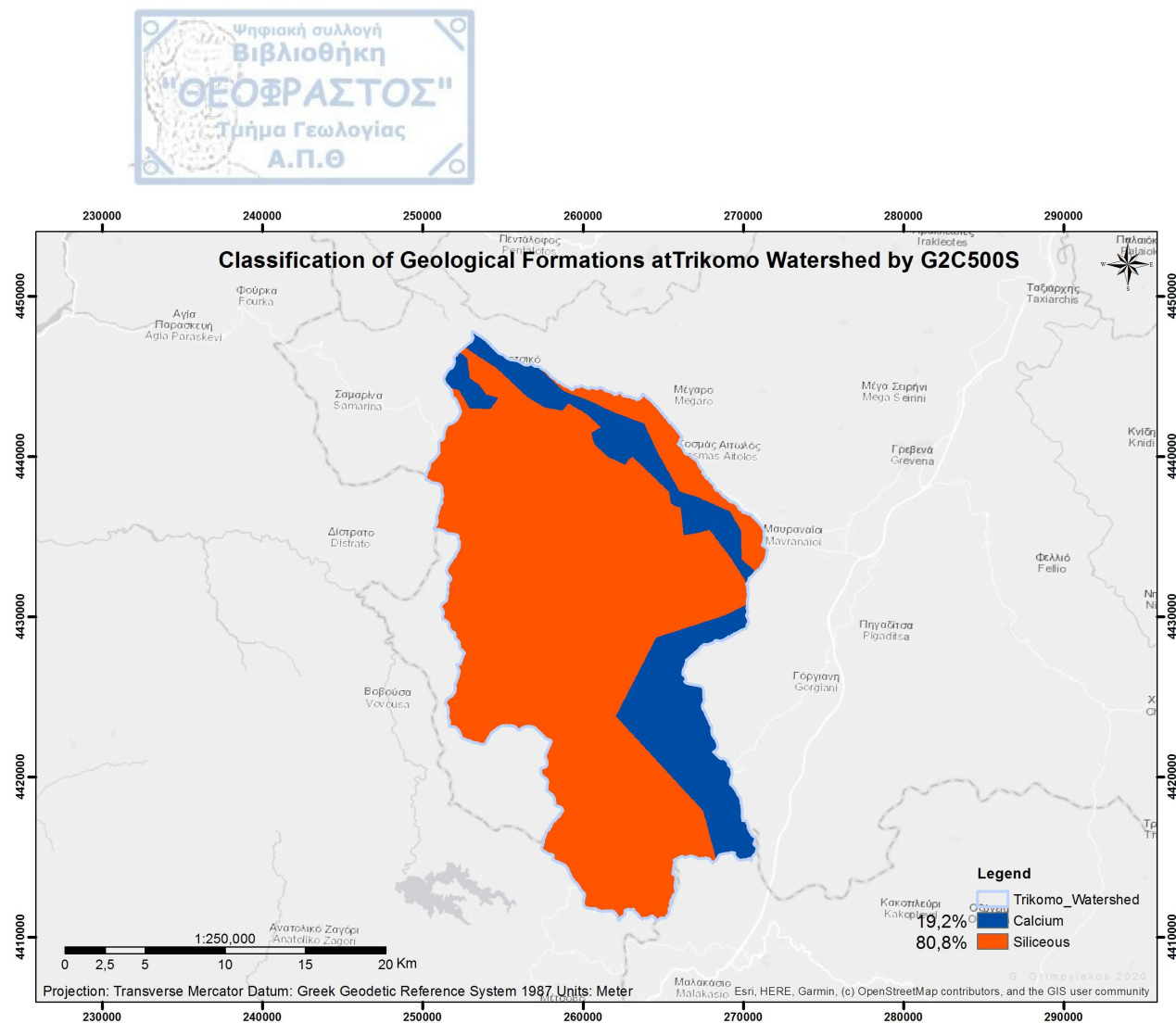


Figure 3K – Trikomo Watershed. Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

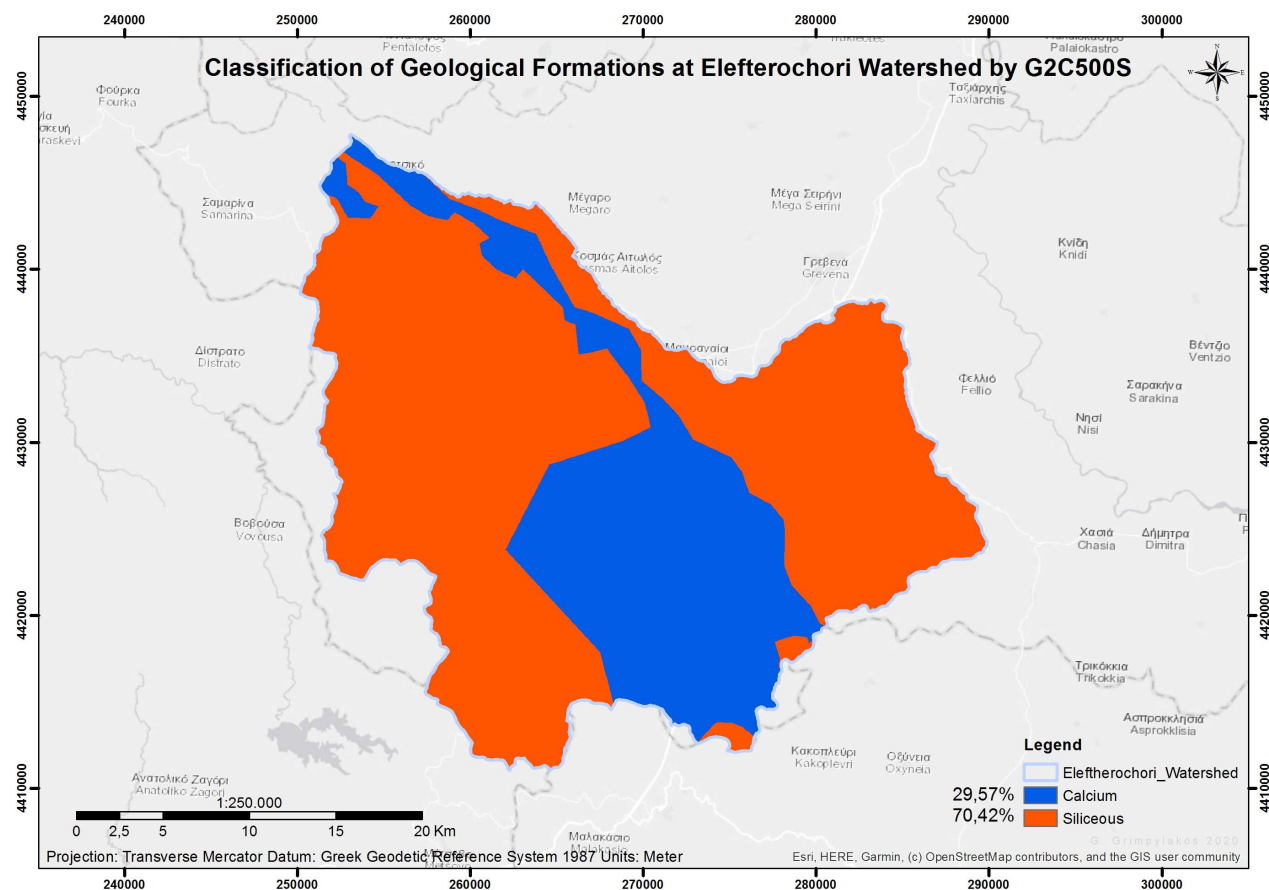


Figure 4K – Eleftherochori Watershed. Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

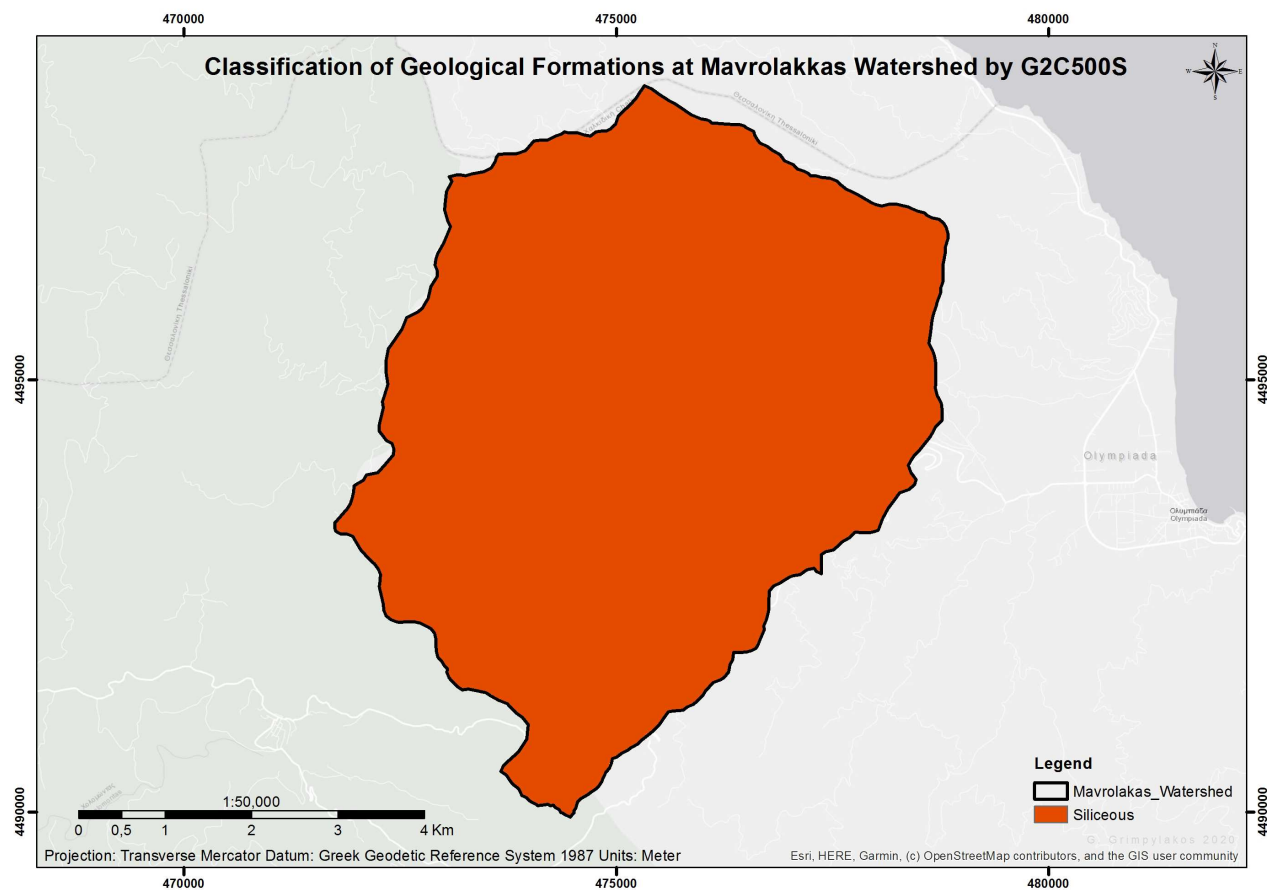


Figure 5K – Mavrolakkas Watershed (KAL). Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

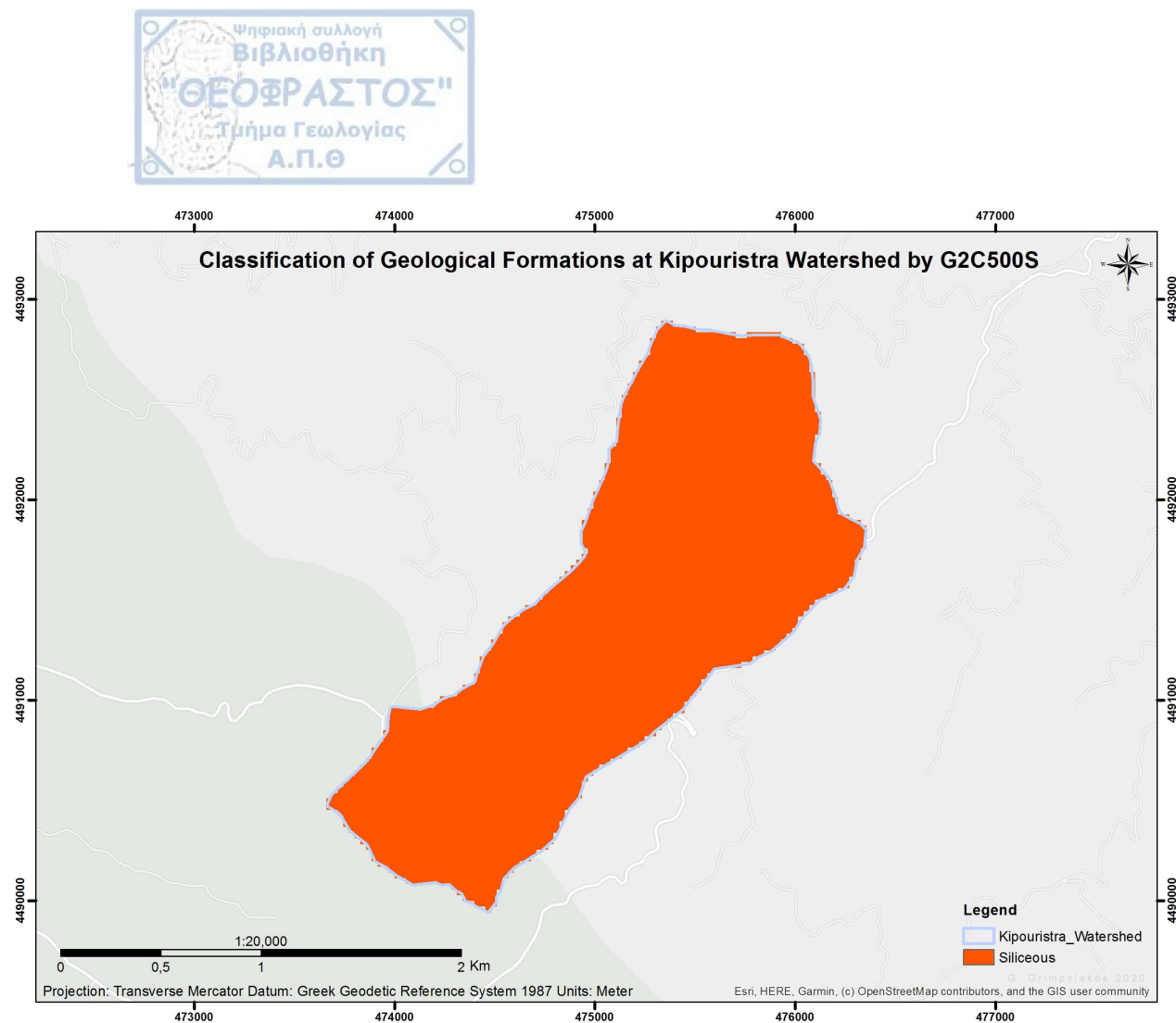


Figure 6K – Kipouristra Watershed (OL). Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

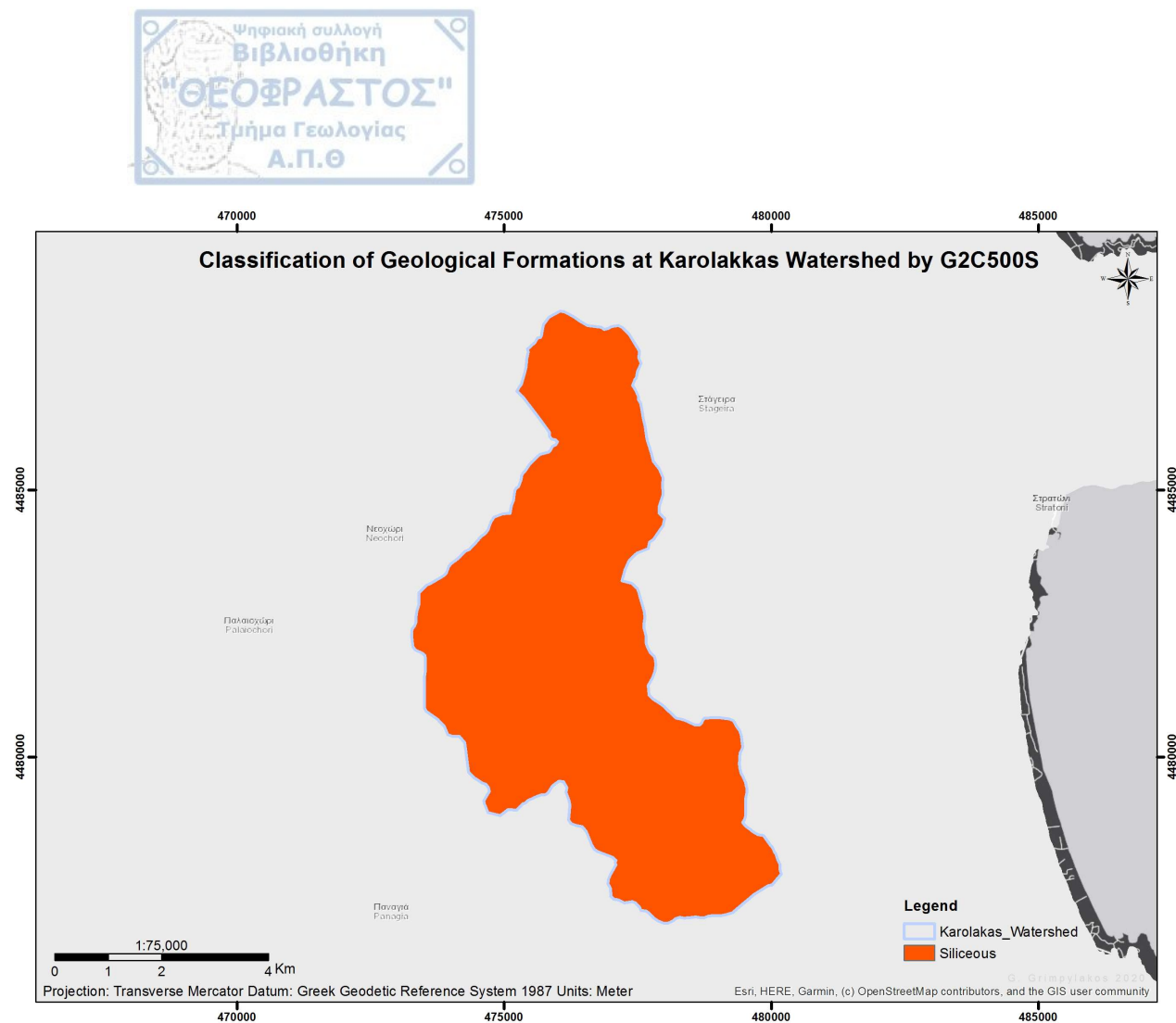


Figure 7K – Karolakkas Watershed (KAR). Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

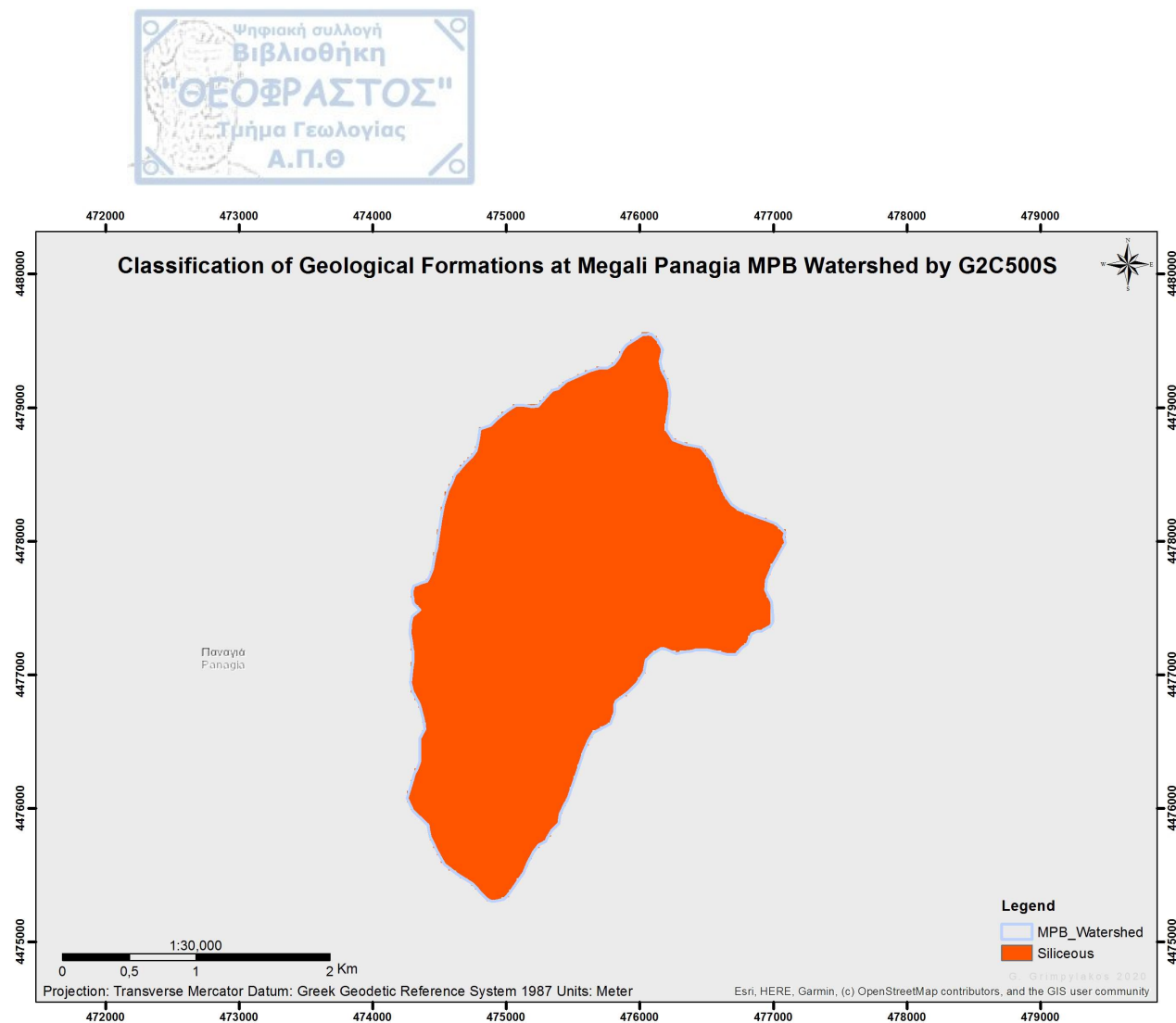


Figure 8K – Megali Panagia Watershed (MPB). Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

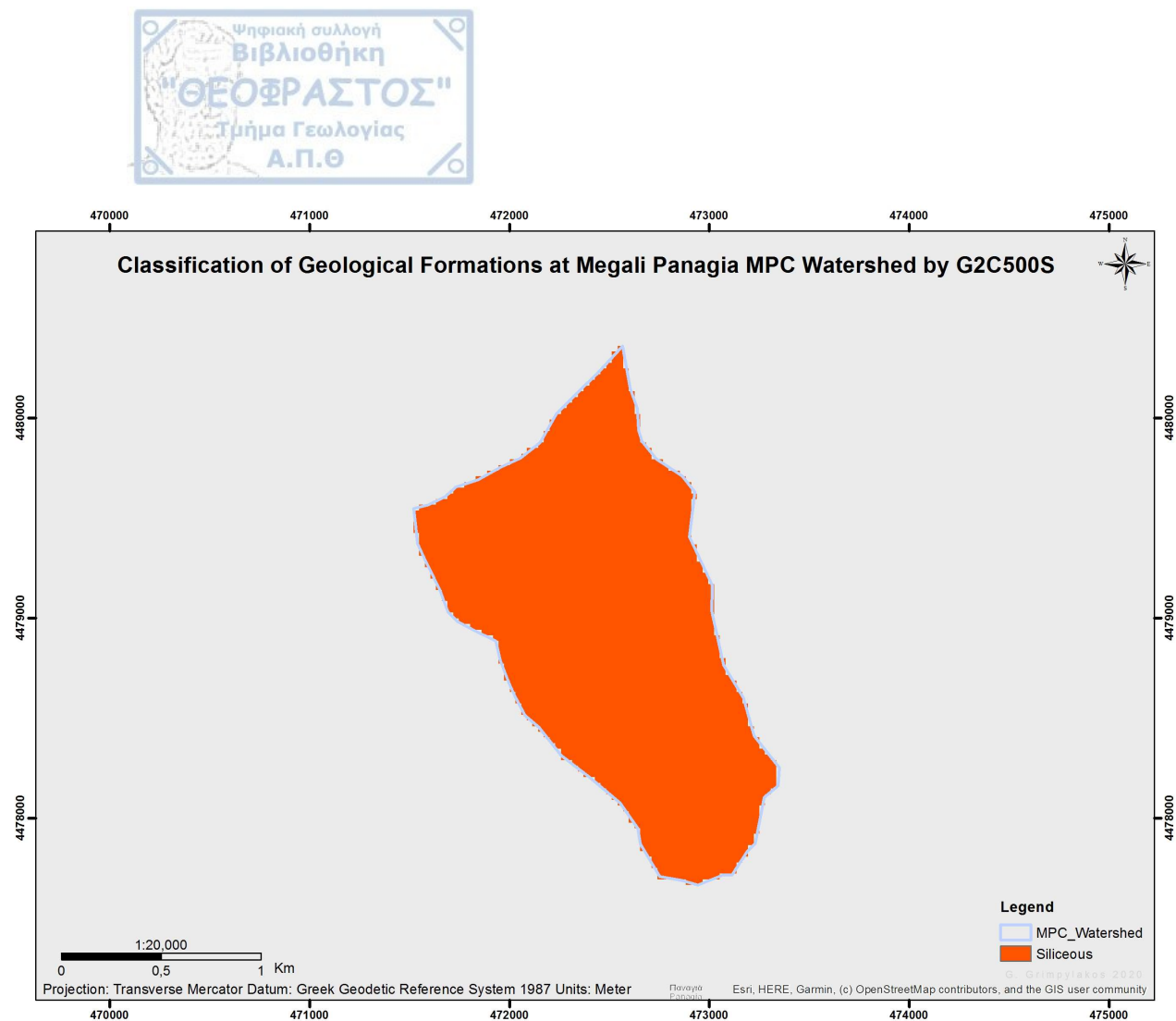


Figure 9K – Skouries Watershed (MPC). Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

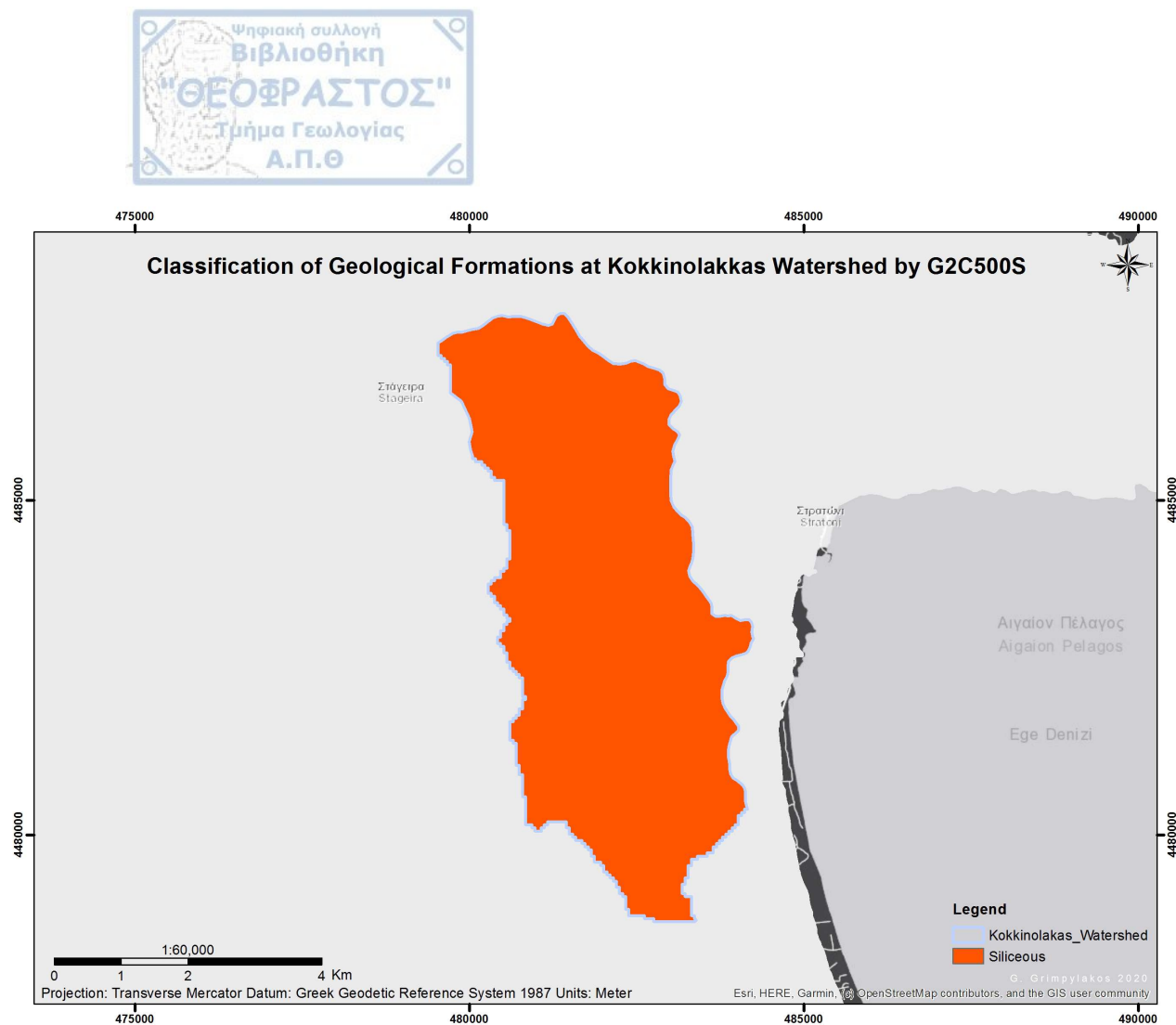


Figure 10K – Kokkinolakkas Ierissos Watershed (KOK). Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

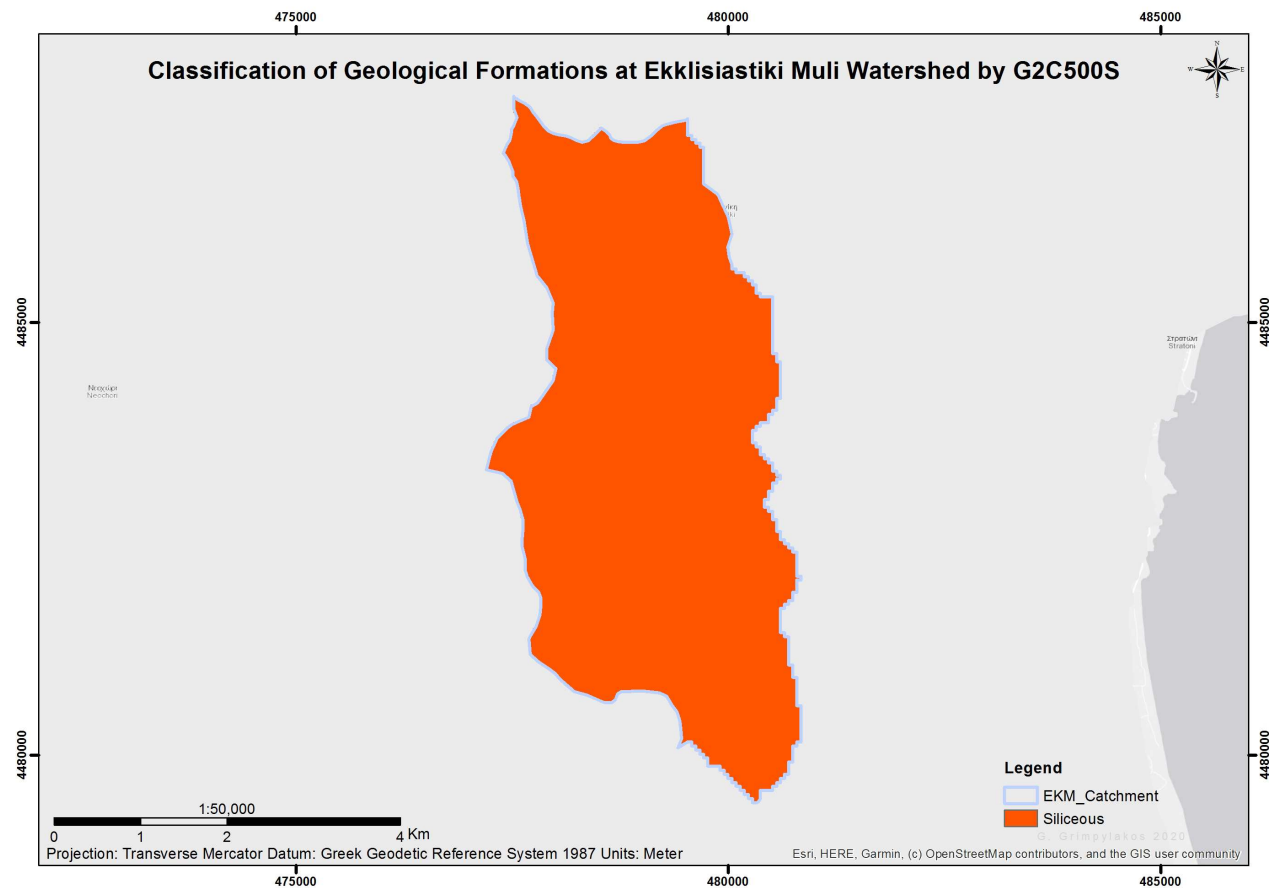


Figure 11K – Ekklesiastikoi Muli Ierissos Watershed (EKM). Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

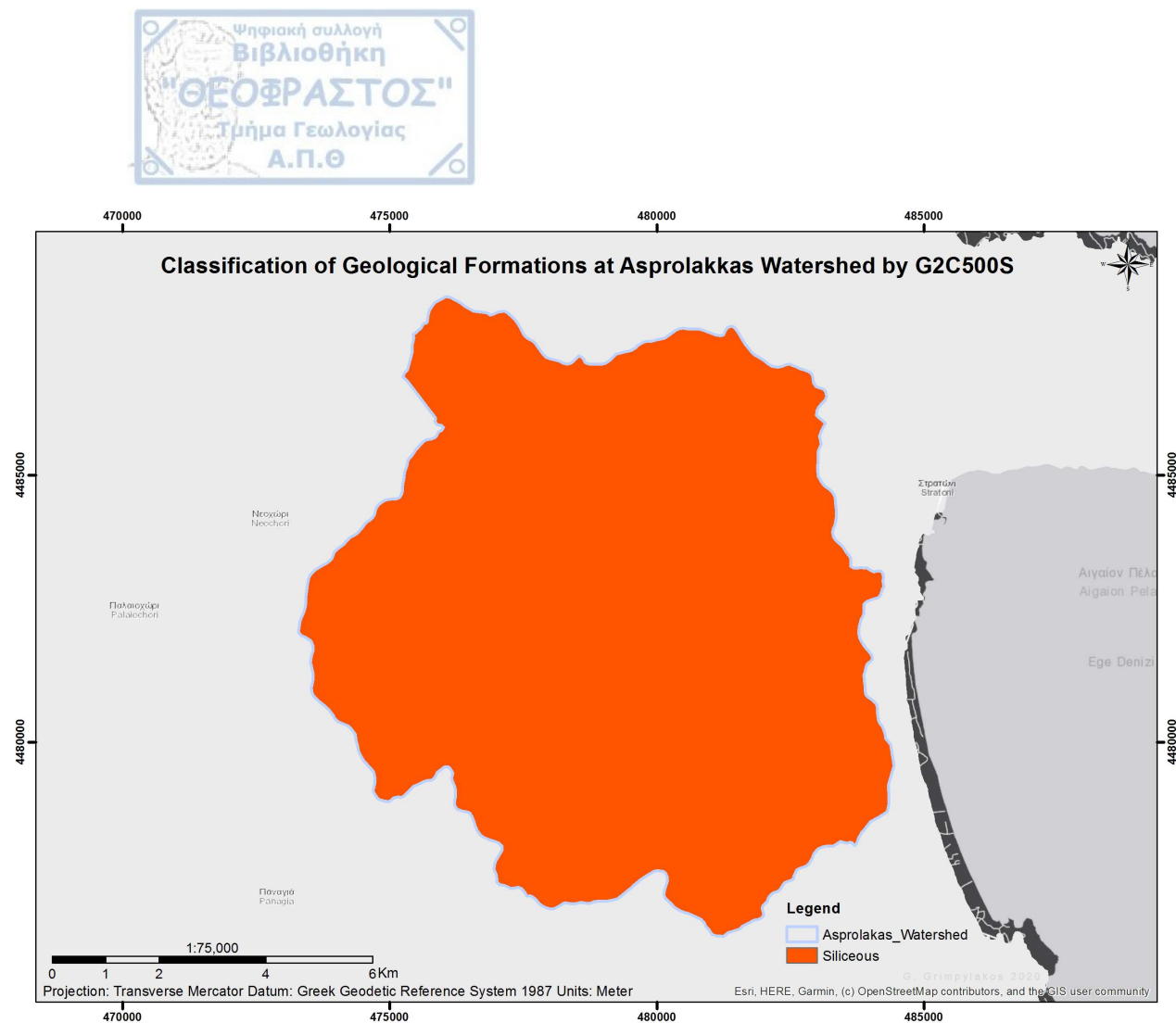


Figure 12K – Asprolakkas Watershed (ASPR). Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

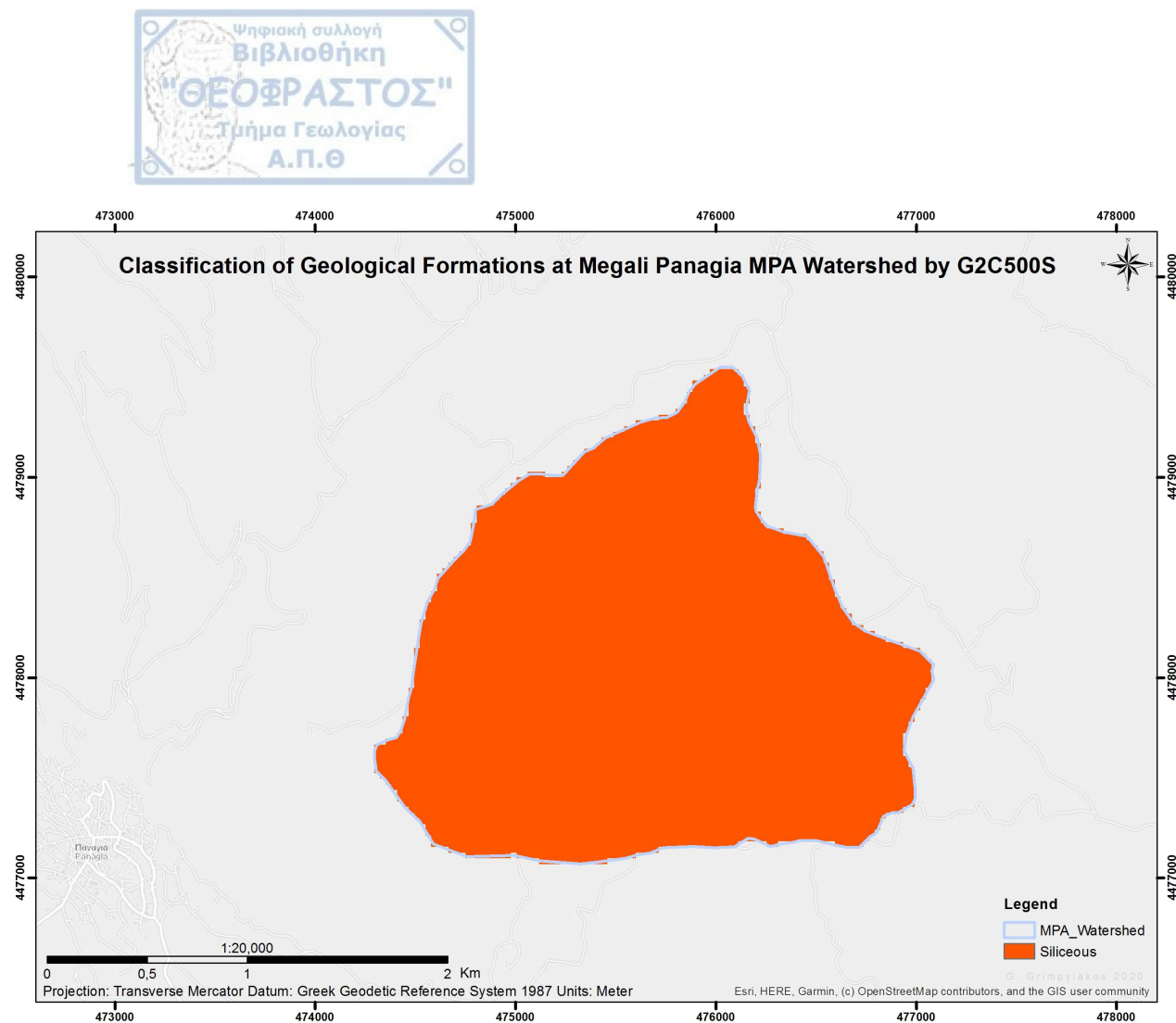


Figure 13K – Megali Panagia Watershed (MPA). Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

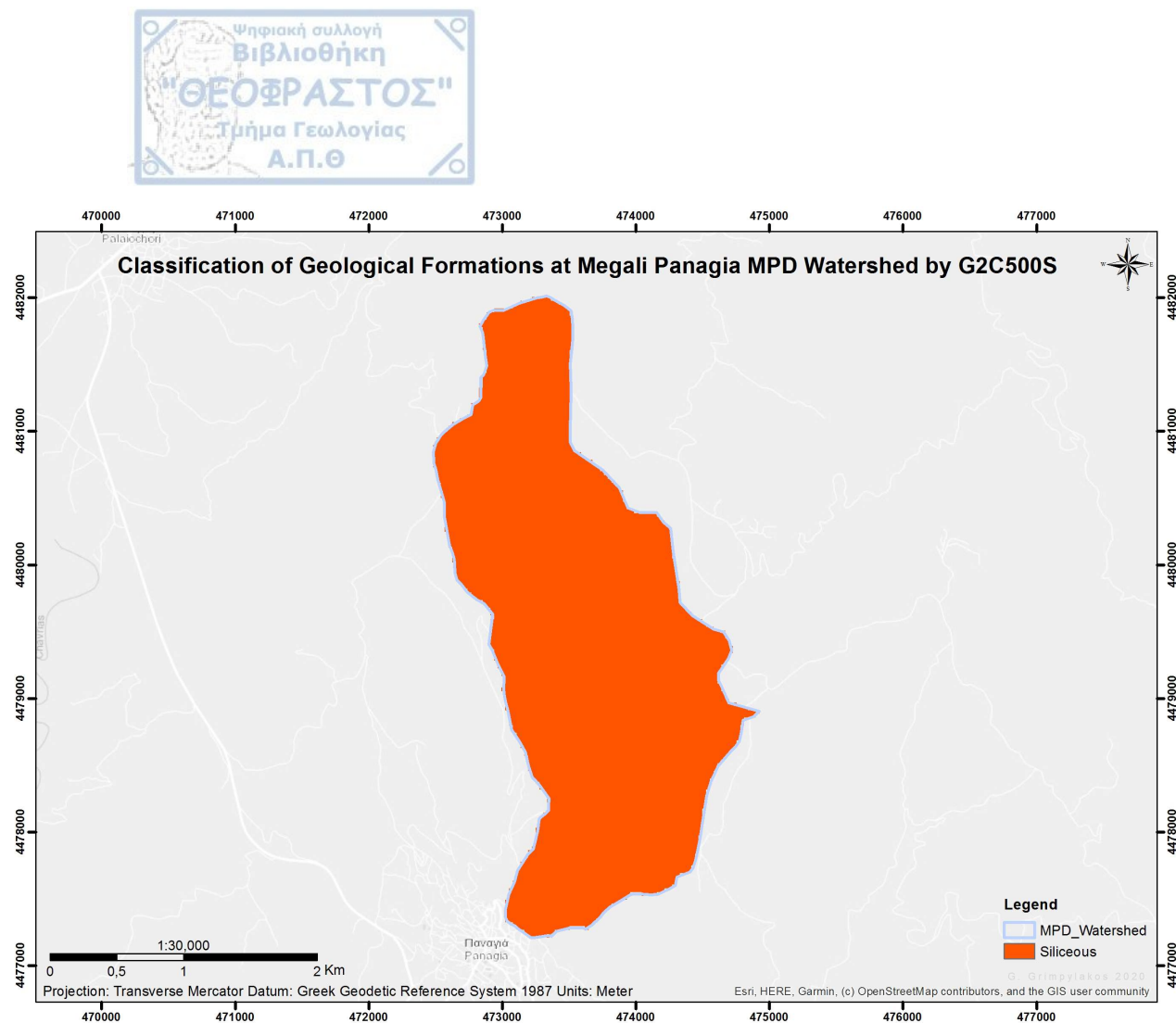


Figure 14K – Skouries Watershed (MPD). Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).

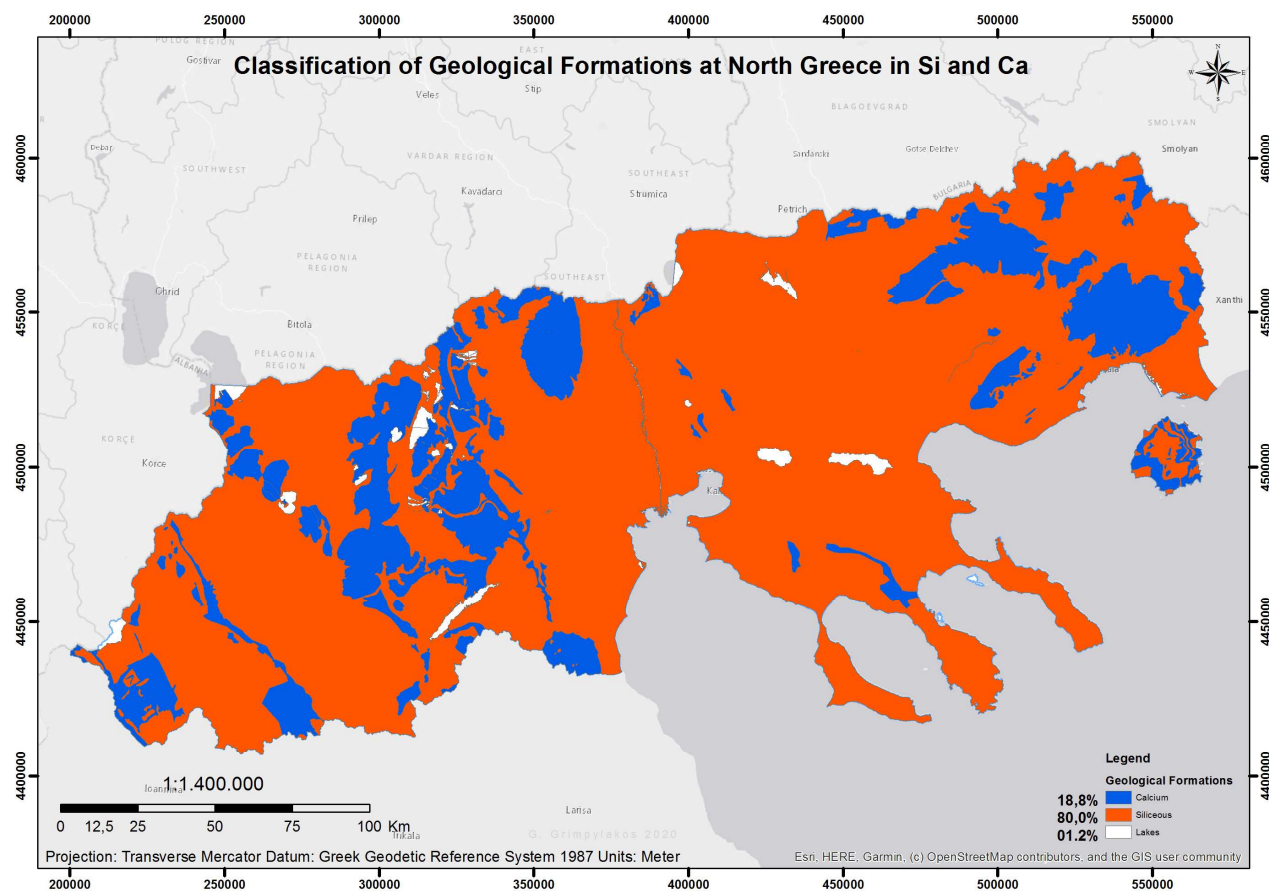


Figure 15K – Macedonia Watershed (MAC). Classification of geology by two classes Ca and Si according to WFD, cell size 500 meters (modified map of Kanli 2009).



SECTION 2

DIGITIZED GEOLOGICAL MAPS OF STUDYING SITES AT NORTH GREECE IN 1-44 CLASSES AT SCALE 1:50.000

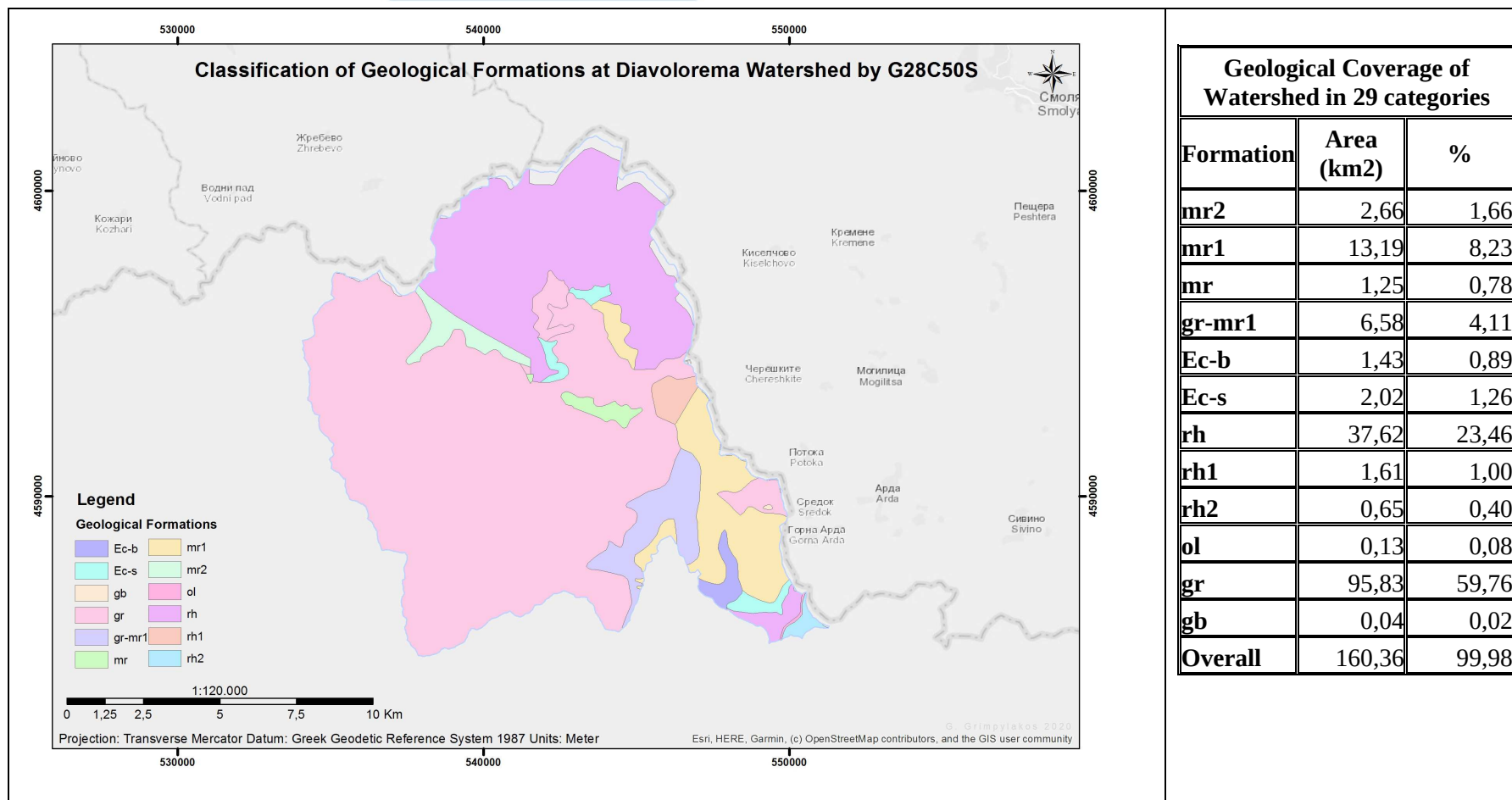


Figure 1G28 – Diavolorema Watershed (DIA). Geological classification in twenty eight main categories according to IGME geological mapping and the corresponding coverage of each category at the table next to it. Cell size 50 meters.

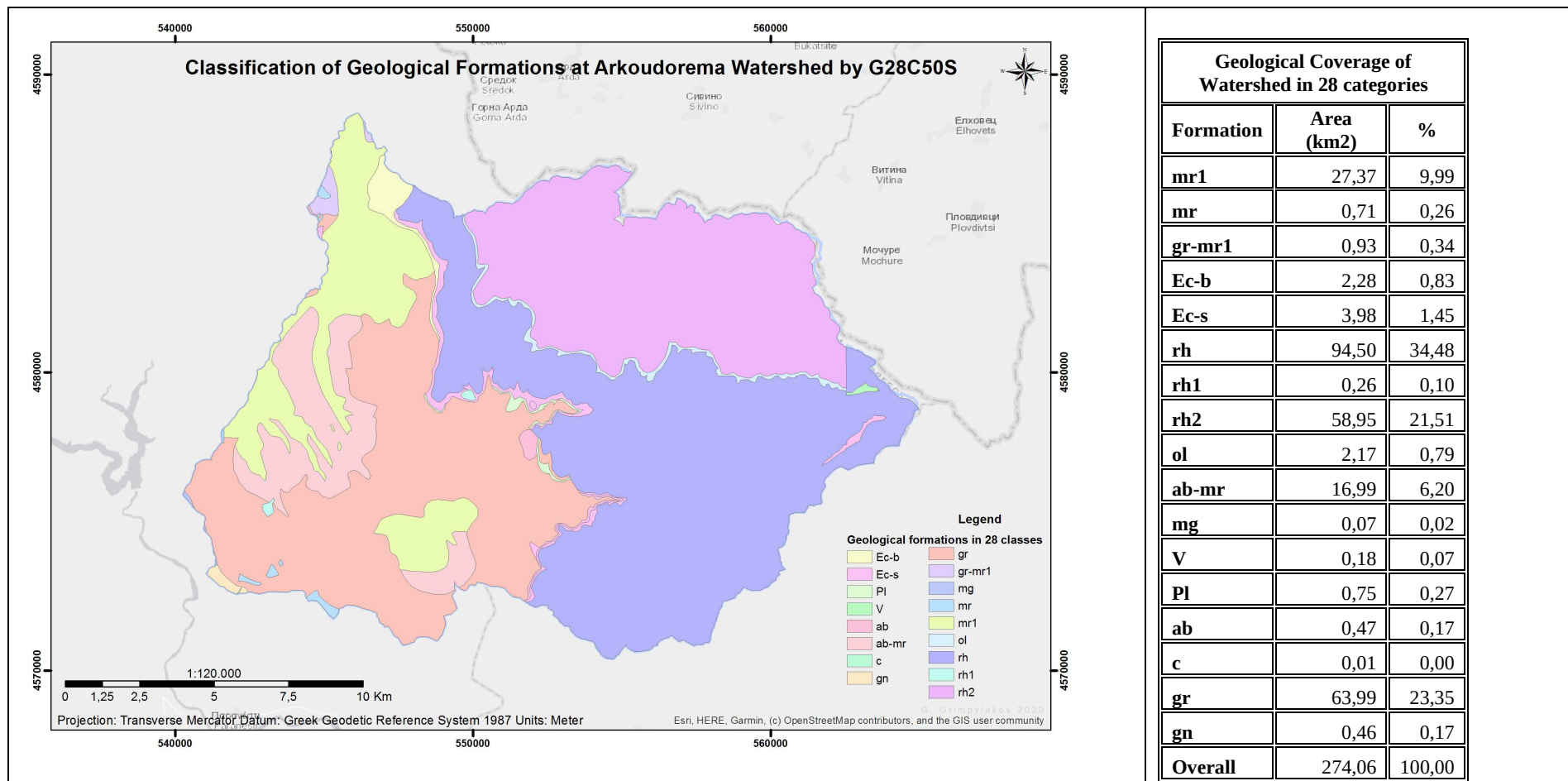


Figure 2G28 – Arkoudorema Watershed (ARK). Geological classification in twenty eight main categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

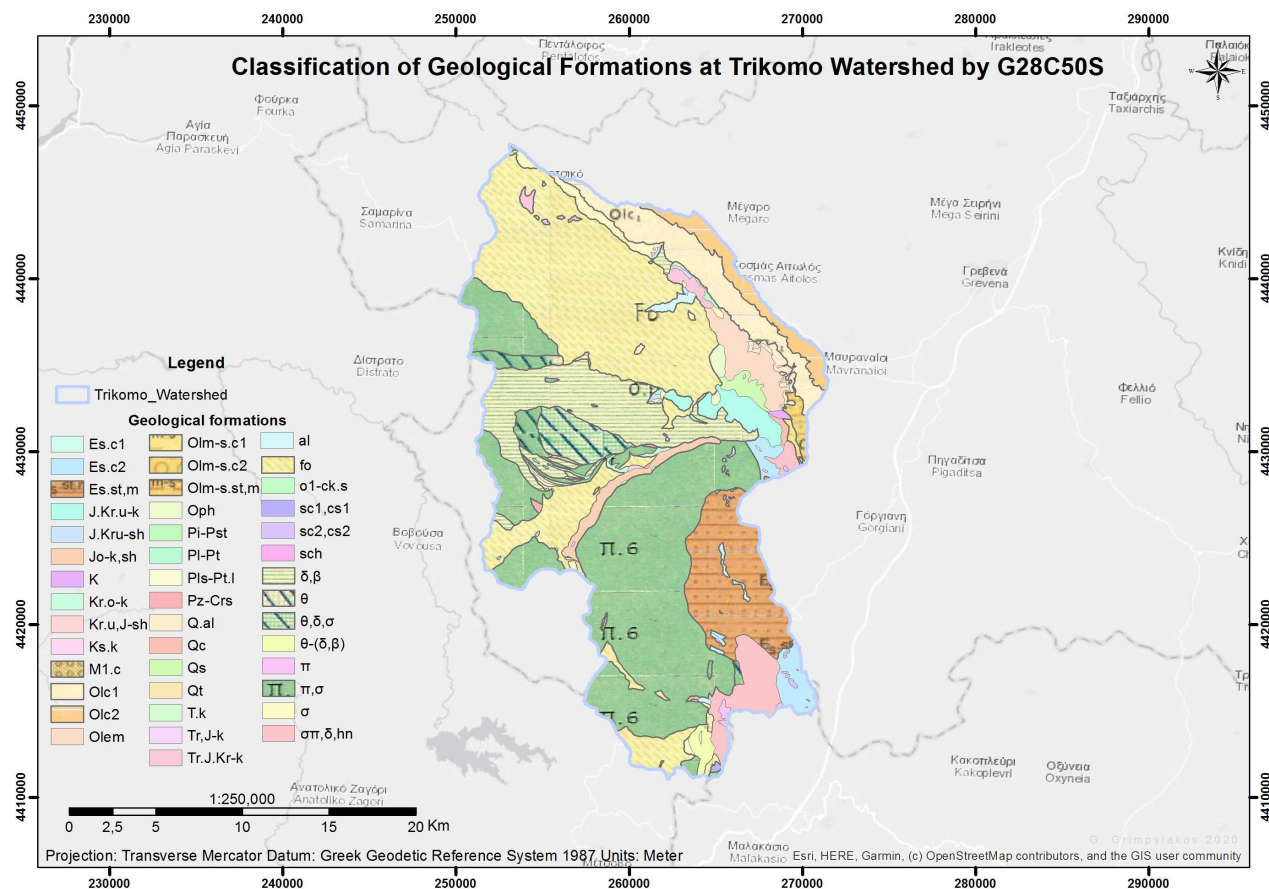


Figure 3G28a – Trikomo Watershed geological and Hydrographic network map (TRIK). Geological classification in thirty six categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

Geological Coverage of Watershed in 36 categories								
Formation	Area (km2)	%	Formation	Area (km2)	%	Formation	Area (km2)	%
fo	128,70	26,59	J.Kr.u-k	0,39	0,08	Olm-s.st,m	2,63	0,54
π,σ	136,86	28,28	Es.c1	0,40	0,08	Qc	0,70	0,14
Tr.J.Kr-k	3,19	0,66	Qs	2,75	0,57	Q.al	2,47	0,51
Es.st,m	36,89	7,62	Tr.J.-k	0,23	0,05	σ	6,57	1,36
δ,β	45,50	9,40	θ-(δ,β)	2,47	0,51	Jo-k,sh	6,53	1,35
Olc1	25,50	5,27	Oph	1,68	0,35	al	2,38	0,49
θ	7,98	1,65	π	0,66	0,14	Pz-Crs	0,59	0,12
Olc2	11,48	2,37	sch	0,01	0,00	Ks.k,	0,17	0,03
σπ,δ,hn	14,44	2,98	scs2	0,32	0,07	Kr.o-k	1,20	0,25
θ,δ,σ	10,79	2,23	scs1	0,26	0,05	K	0,43	0,09
Olem	10,36	2,14	O1-ck.s	0,50	0,10	River	1,20	0,25
Es.c2	8,84	1,83	Olm-s.c1	0,89	0,18	Overall	476,24	98,40

Figure 3G28b – Table of Trikomo Watershed (TRIK) Geological classification in thirty six categories according to IGME geological mapping and the corresponding area coverage.

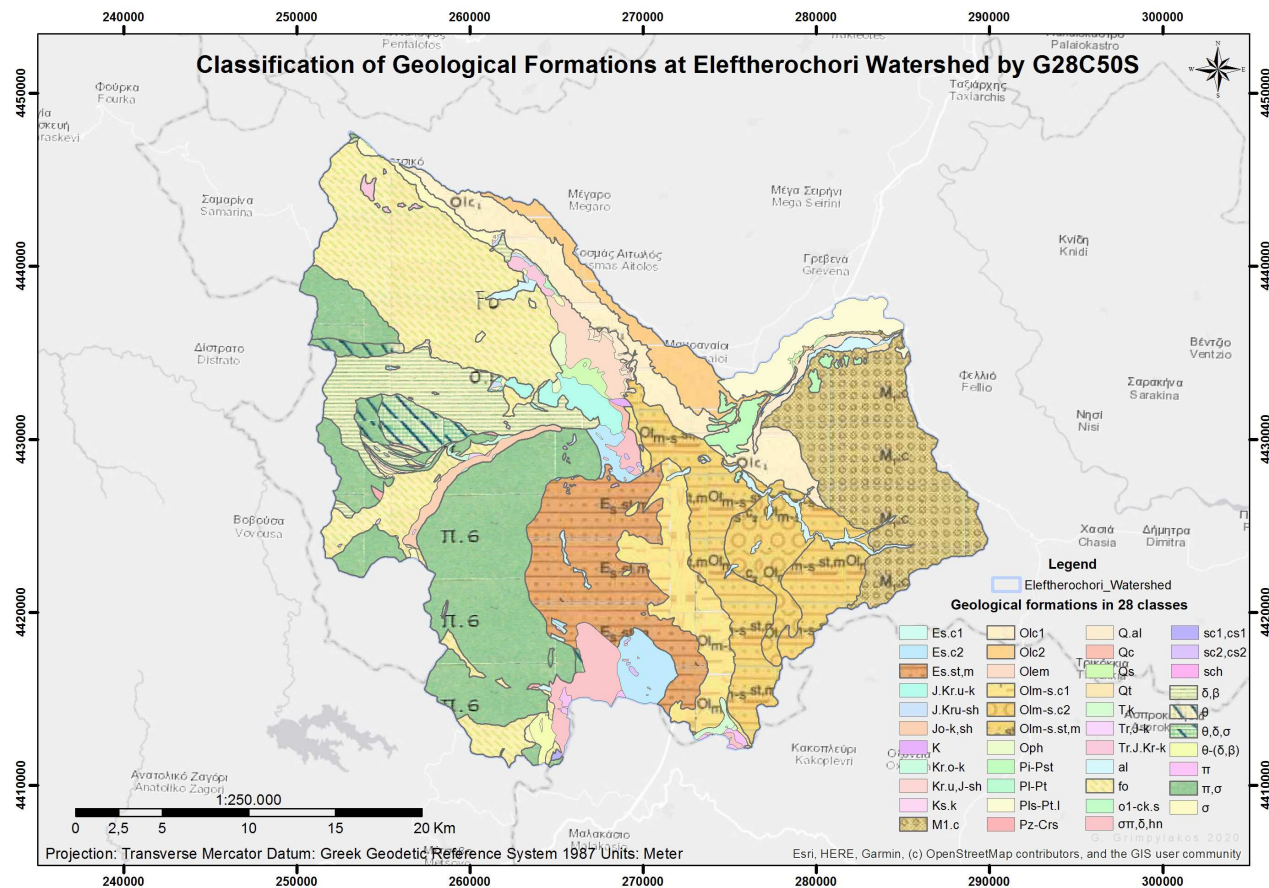


Figure 4G28a – Eleftherochori Watershed, geological and Hydrographic network map (ELEF). Geological classification in forty three categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

Geological Coverage of Watershed in 43 categories									Overall	809,94	98,78
Formation	Area (km2)	%	Formation	Area (km2)	%	Formation	Area (km2)	%	Formation	Area (km2)	%
π,σ	137,03	16,71	σπ,δ,hn	15,75	1,92	Qs	3,46	0,42	o1-ck.s	0,50	0,06
fo	128,82	15,71	θ,δ,σ	10,79	1,32	Tr.J.Kr-k	3,19	0,39	Qt	0,50	0,06
M1.c	94,38	11,51	Olem	10,36	1,26	θ-(δ,β)	2,47	0,30	K	0,43	0,05
Olm-s.st,m	76,80	9,37	al	8,92	1,09	Oph	1,68	0,20	Es.c1	0,40	0,05
Es.st,m	68,97	8,41	J.Kr.u-k	8,48	1,03	π	1,53	0,19	Water surf	0,39	0,05
δ,β	45,50	5,55	θ	7,98	0,97	T.k	1,37	0,17	Tr,J-k	0,31	0,04
Olc1	43,07	5,25	Pi-Pst	7,74	0,94	Kr.o-k	1,36	0,17	sc1,cs1	0,27	0,03
Olm-s.c1	39,21	4,78	Q.al	6,75	0,82	J.Kru-sh	0,77	0,09	Kr.u,J-sh	0,26	0,03
Olm-s.c2	22,67	2,76	σ	6,57	0,80	Qc	0,70	0,08	Ks.k	0,26	0,03
Olc2	22,54	2,75	Jo-k,sh	5,95	0,73	Pz-Crs	0,59	0,07	Pl-Pt	0,17	0,02
Pls-Pt.I	16,28	1,99	Es.c2	4,25	0,52	sc2,cs2	0,52	0,06	sch	0,01	0,001

Figure 4G28b – Table of Eleftherochori Watershed (ELEF) Geological classification in, forty three categories, according to IGME geological mapping and the corresponding area coverage.

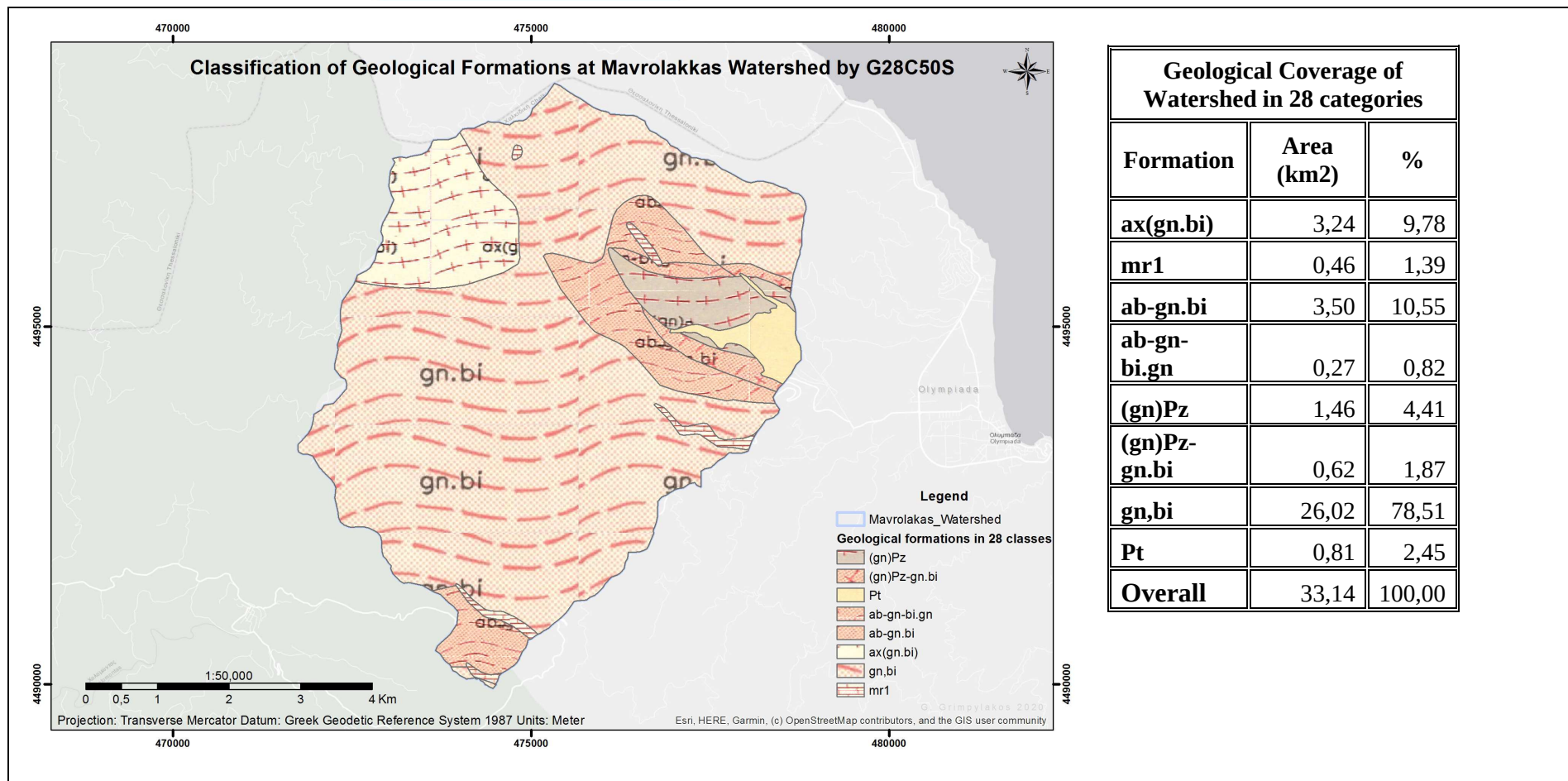


Figure 5G28 – Mavrolakkas Watershed, geological and Hydrographic network map (KAL). Geological classification in twenty eight main categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

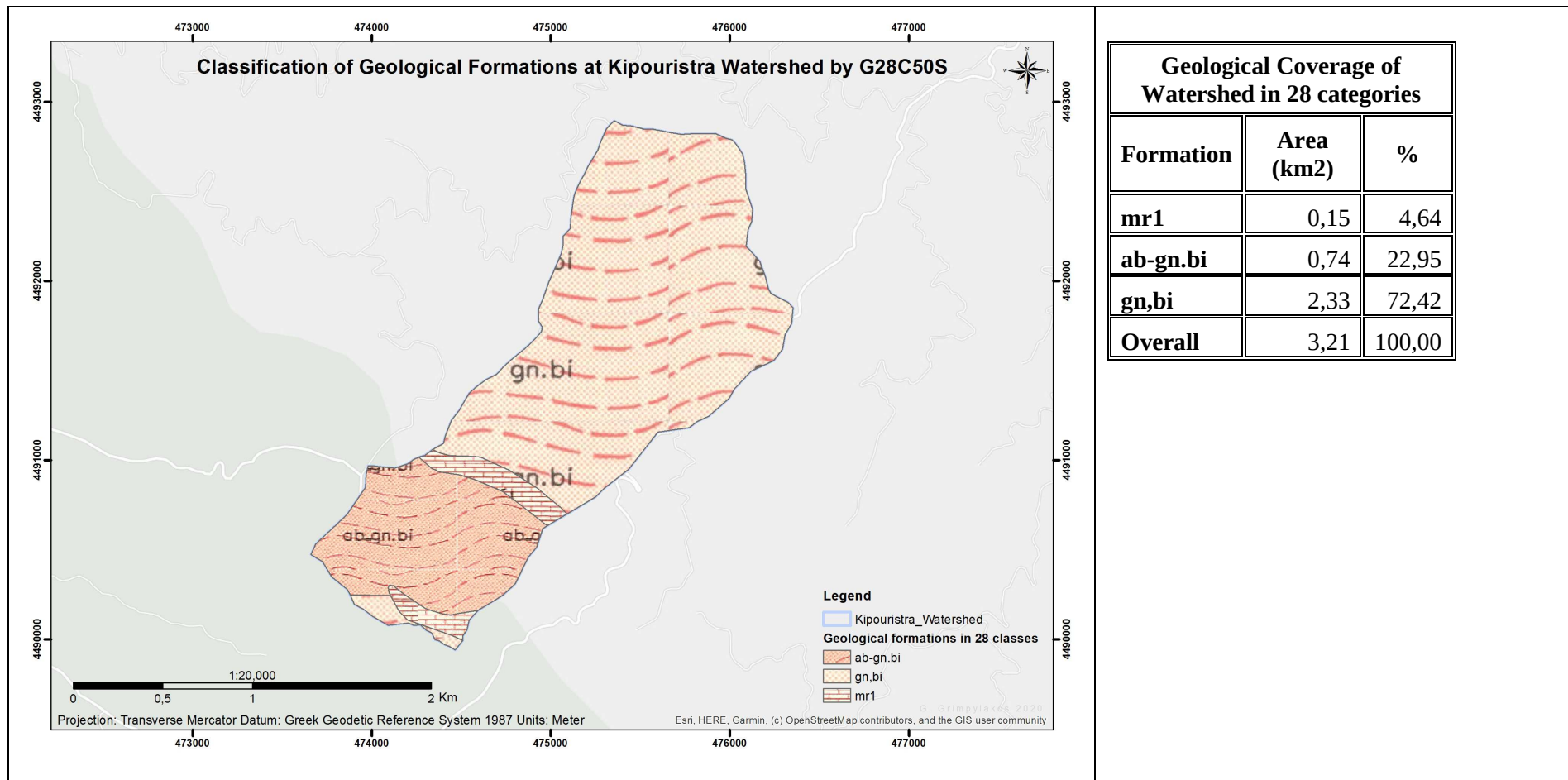


Figure 6G28 – Kipouristra Watershed, geological and Hydrographic network map (OL). Geological classification in twenty eight main categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

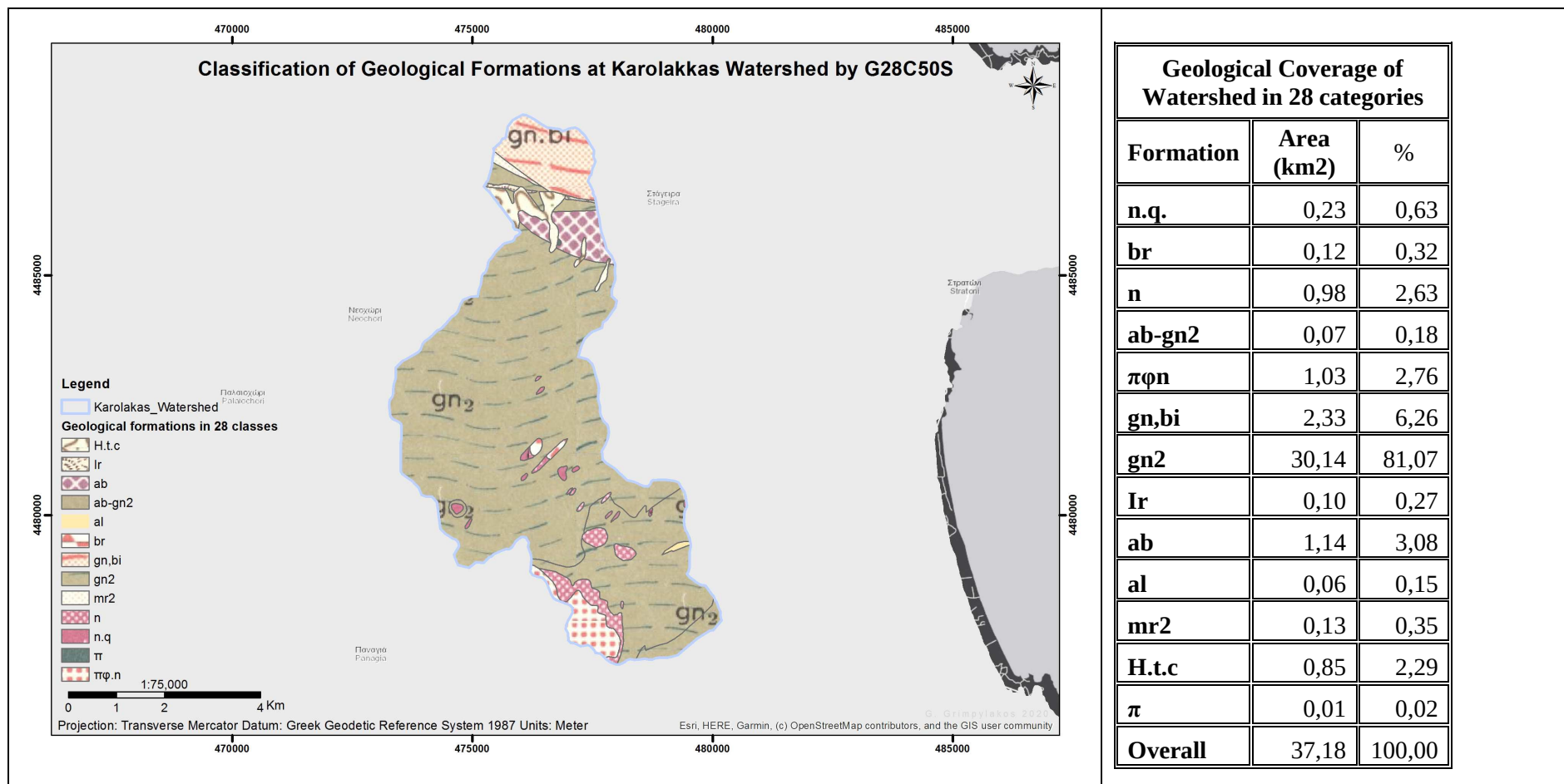


Figure 7G28 – Karolakkas Watershed, geological and Hydrographic network map (KAR). Geological classification in twenty eight main categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

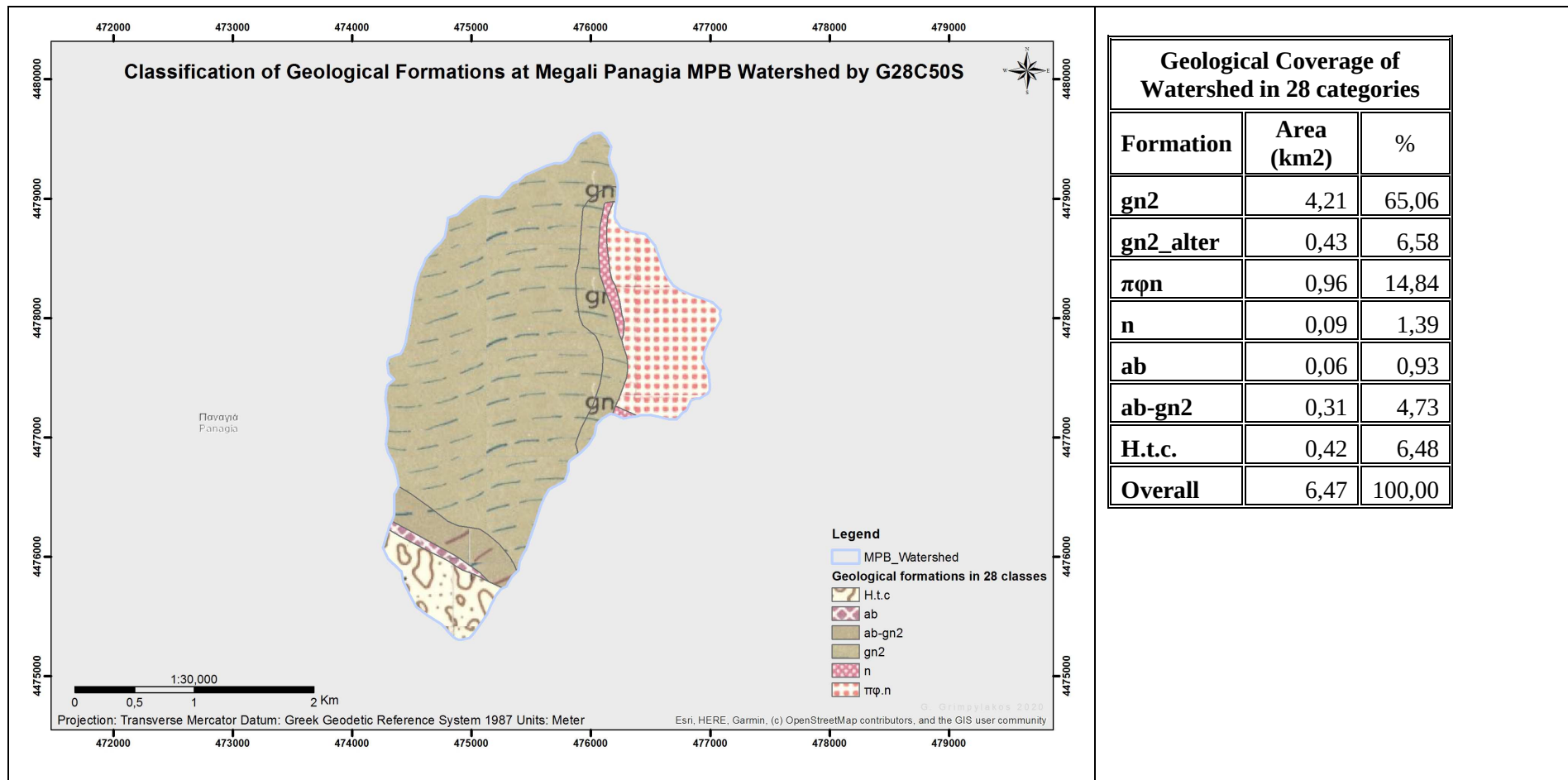


Figure 8G28 – Megali Panagia Watershed, geological and Hydrographic network map (MPB). Geological classification in twenty eight main categories according to IGME geological mapping and Grimpylakos, cell size 50 meters (Grimpylakos 2020)

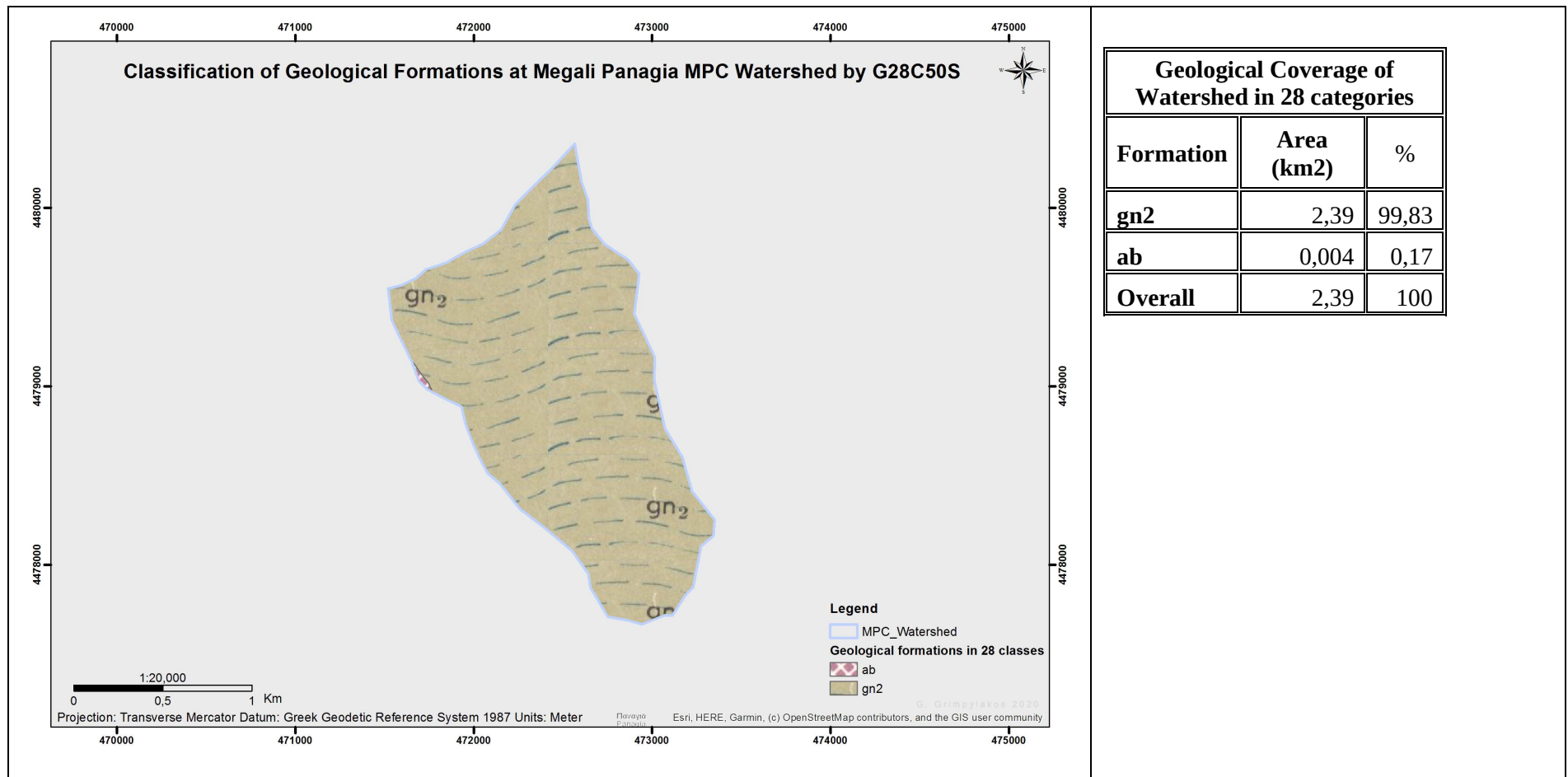


Figure 9G28 – Skouries Watershed, geological and Hydrographic network map (MPC). Geological classification in twenty eight main categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

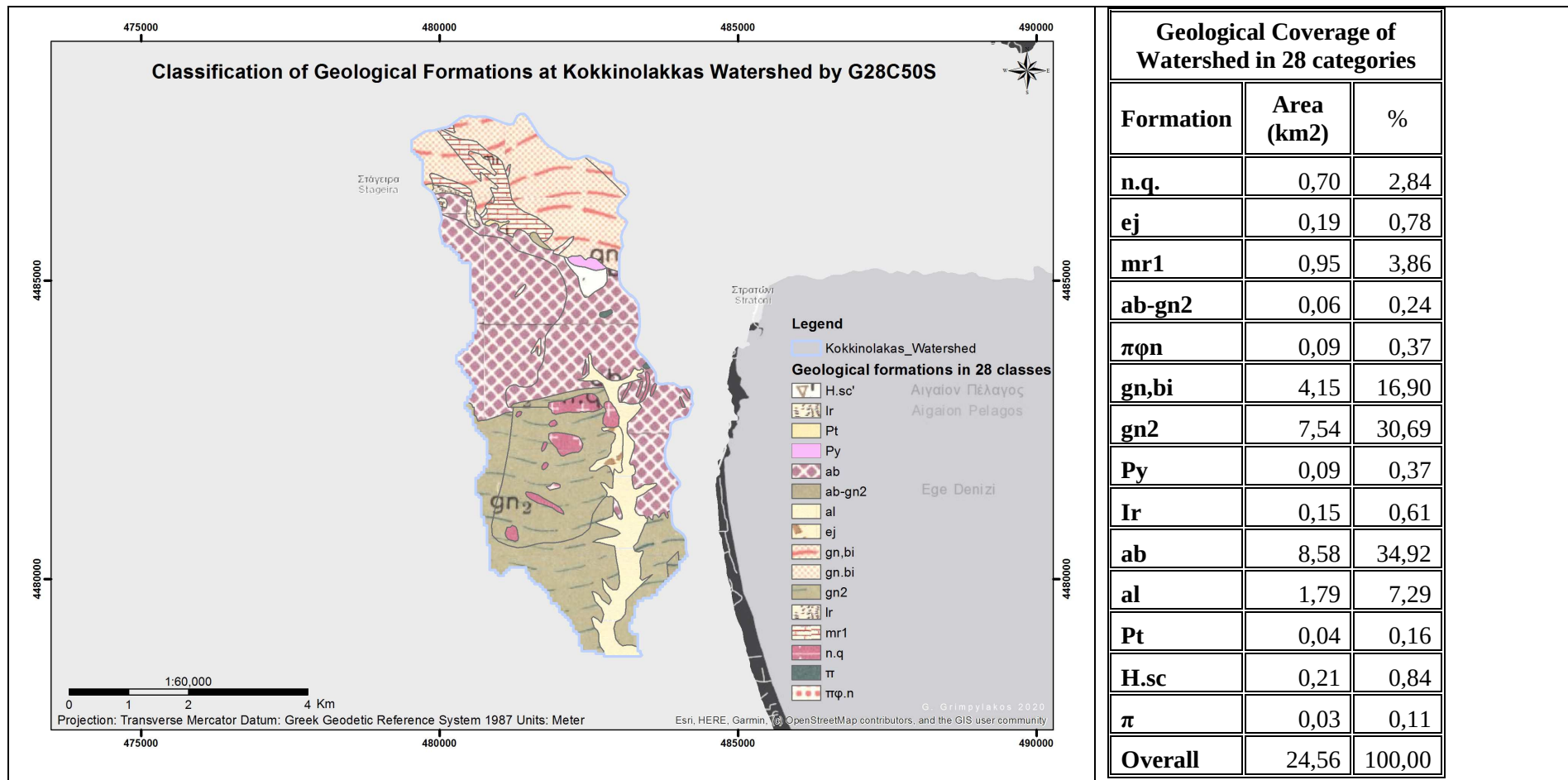


Figure 10G28 – Kokkinolakkas Ierissos Watershed, geological and Hydrographic network map (KOK). Geological classification in twenty eight main categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

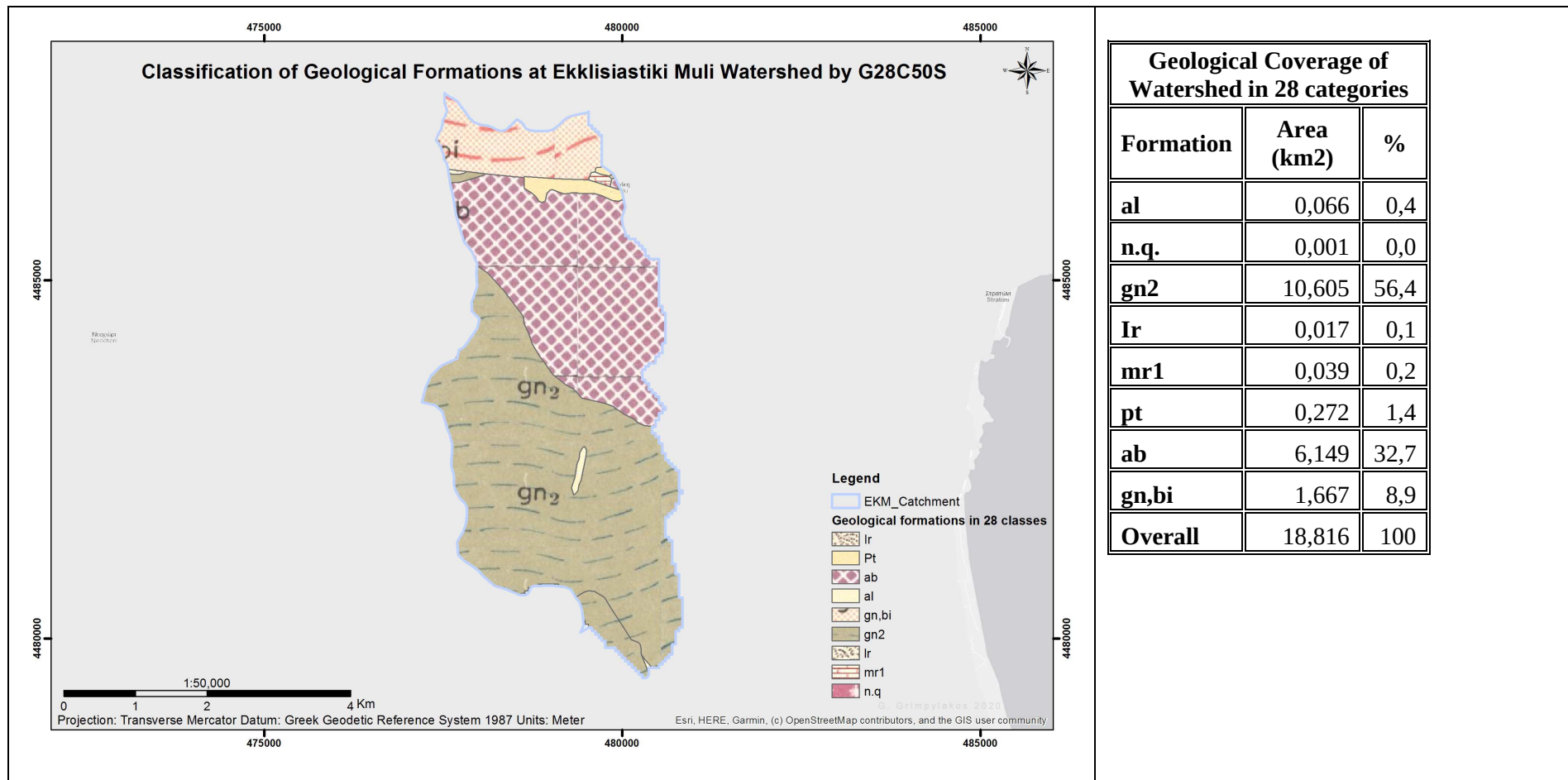


Figure 11G28 – Ekklesiastikoi Muli Ierissos Watershed, geological and Hydrographic network map (EKM). Geological classification in twenty eight main categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

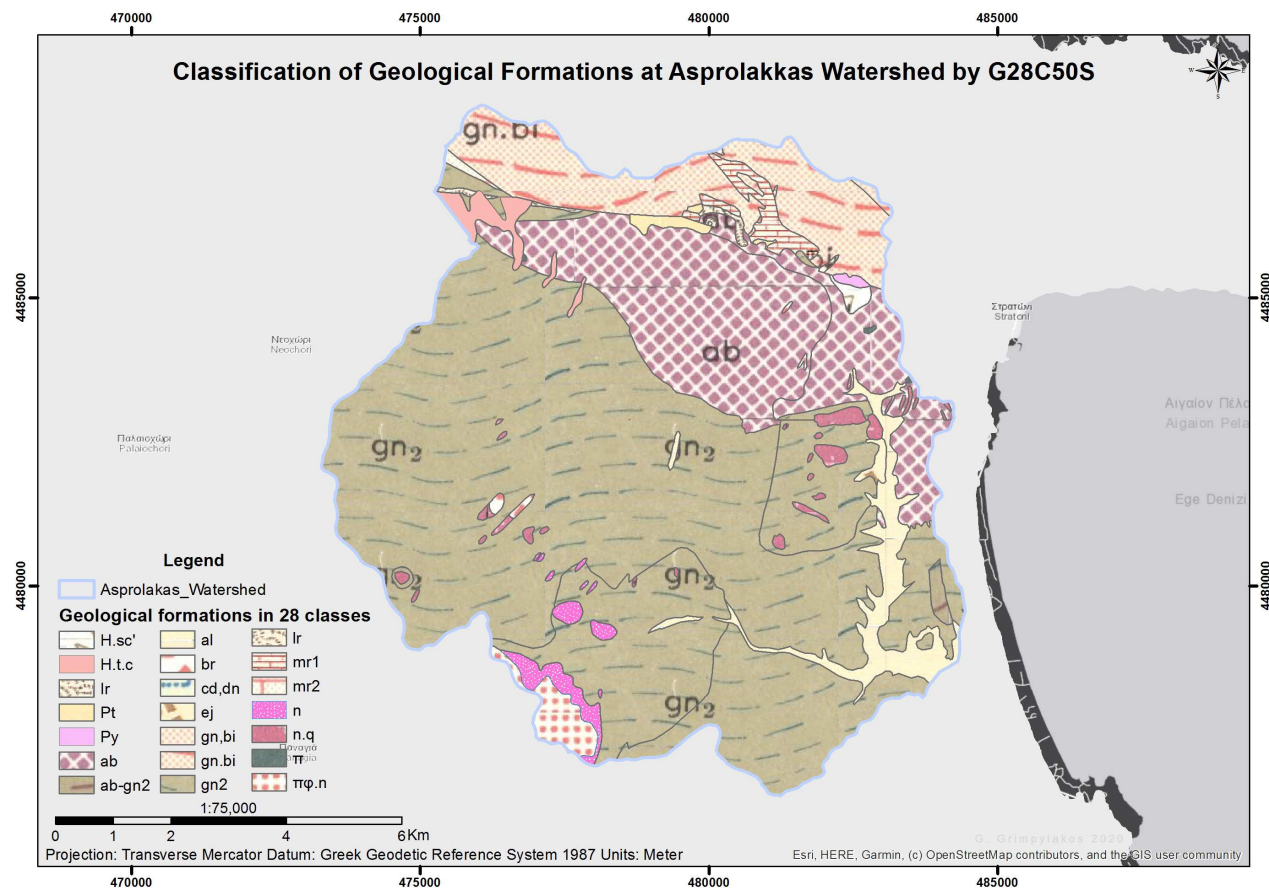


Figure 12G28a – Asprolakkas Watershed, geological and Hydrographic network map (ASPR). Geological classification in twenty eight main categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

Geological Coverage of Watershed in 28 categories					
Formation	Area (km2)	%	Formation	Area (km2)	%
n.q.	0,91	1,01	al	3,04	3,34
ej	0,20	0,21	Pt	0,33	0,36
mr1	0,98	1,08	H.sc	0,21	0,23
ab-gn2	0,31	0,35	π	0,04	0,04
πφn	1,12	1,24	H.t.c	0,85	0,94
gn,bi	8,19	9,01	br	0,12	0,13
gn2	57,17	62,91	n	0,97	1,07
Py	0,09	0,10	cd,dn	0,07	0,08
Ir	0,27	0,29	mr2	0,13	0,14
ab	15,88	17,47	Overall	90,89	100,00

Figure 12G28b – Table of Asprolakkas Watershed (ASPR). Geological classification in, nineteen categories, according to IGME geological mapping, and the corresponding area coverage.

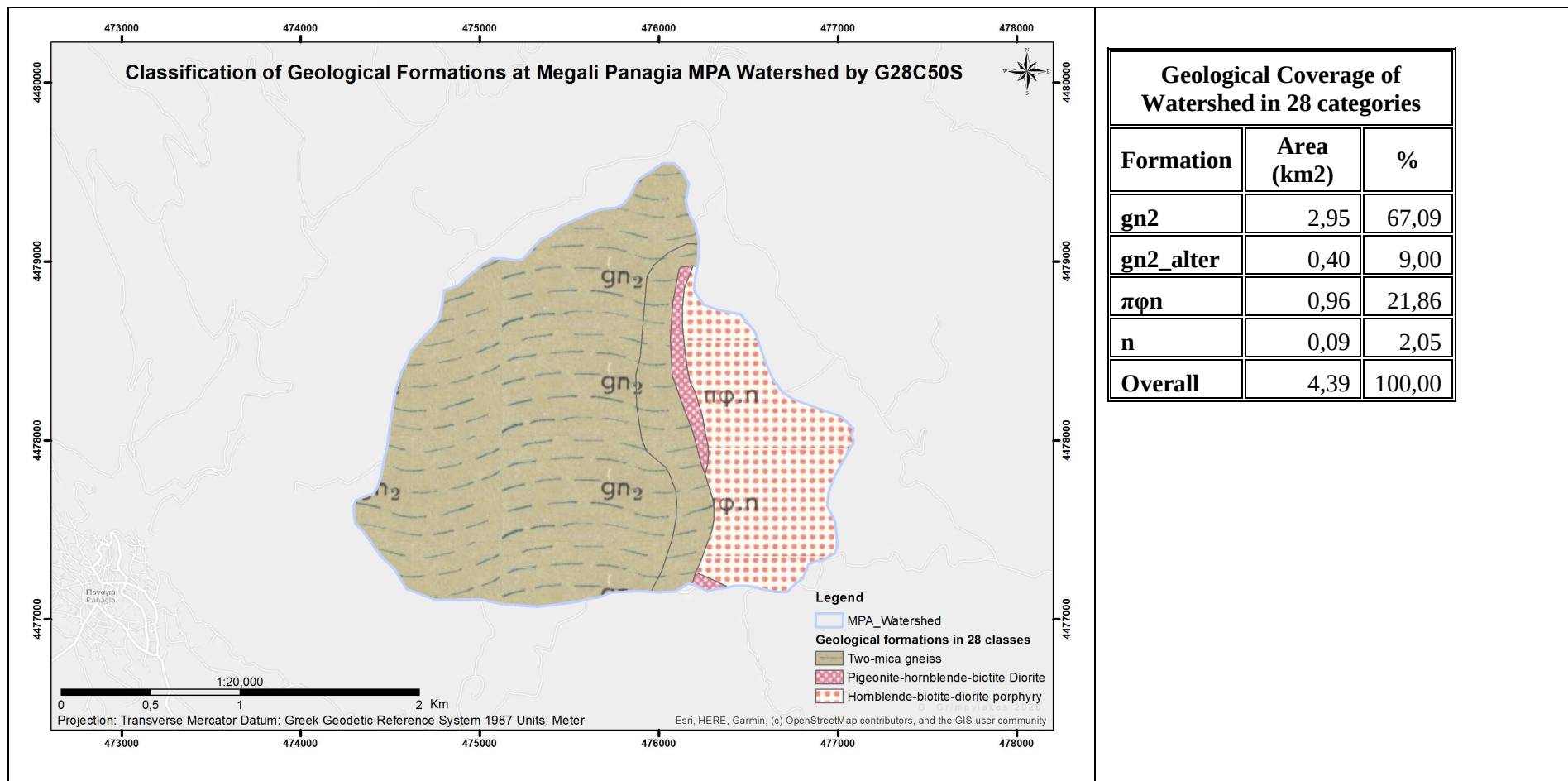


Figure 13G28 – Megali Panagia Watershed, geological and Hydrographic network map (MPA). Geological classification in twenty eight main categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

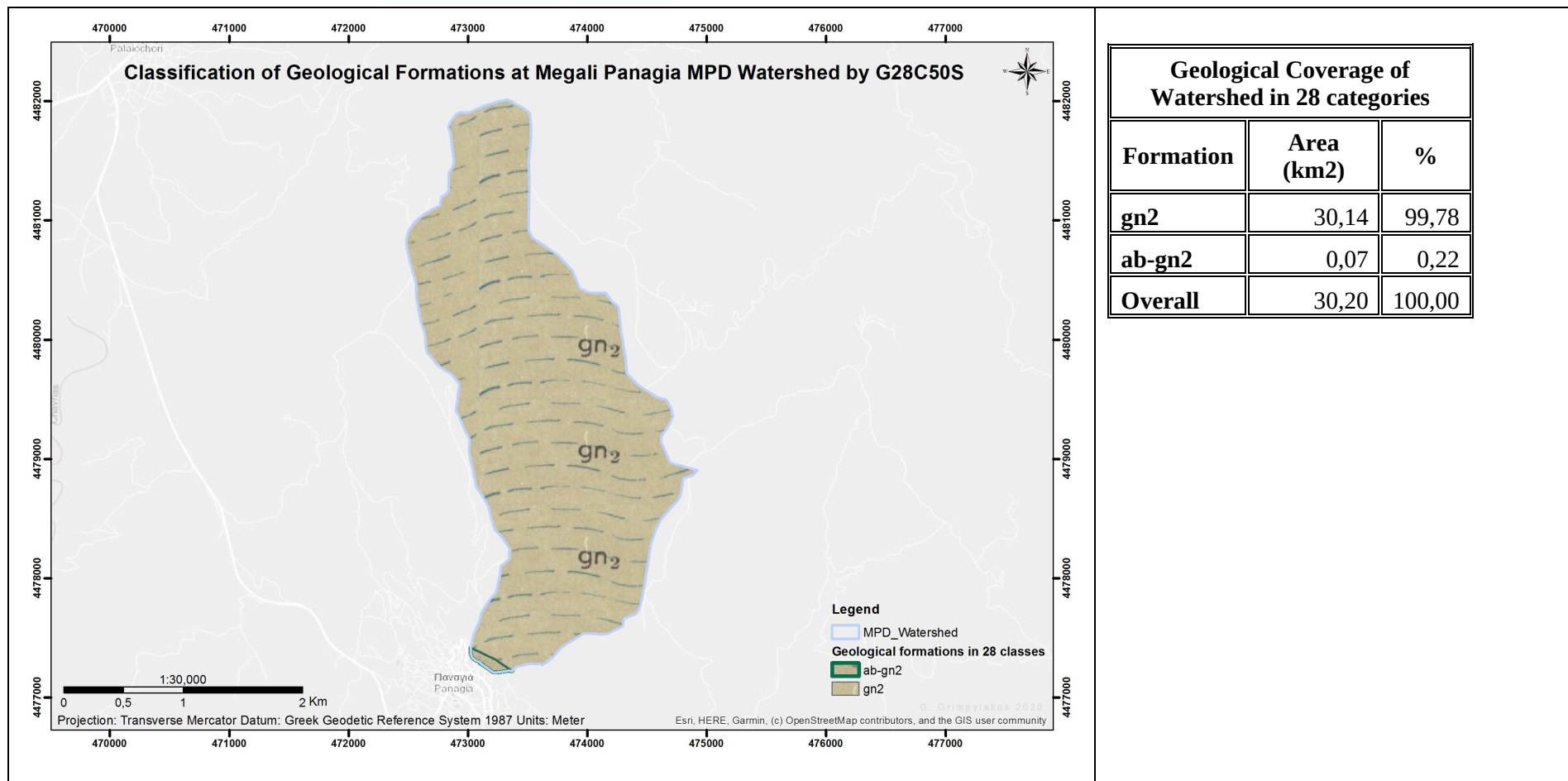


Figure 14G28 – Skouries Watershed, geological and Hydrographic network map (MPD). Geological classification in twenty eight main categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

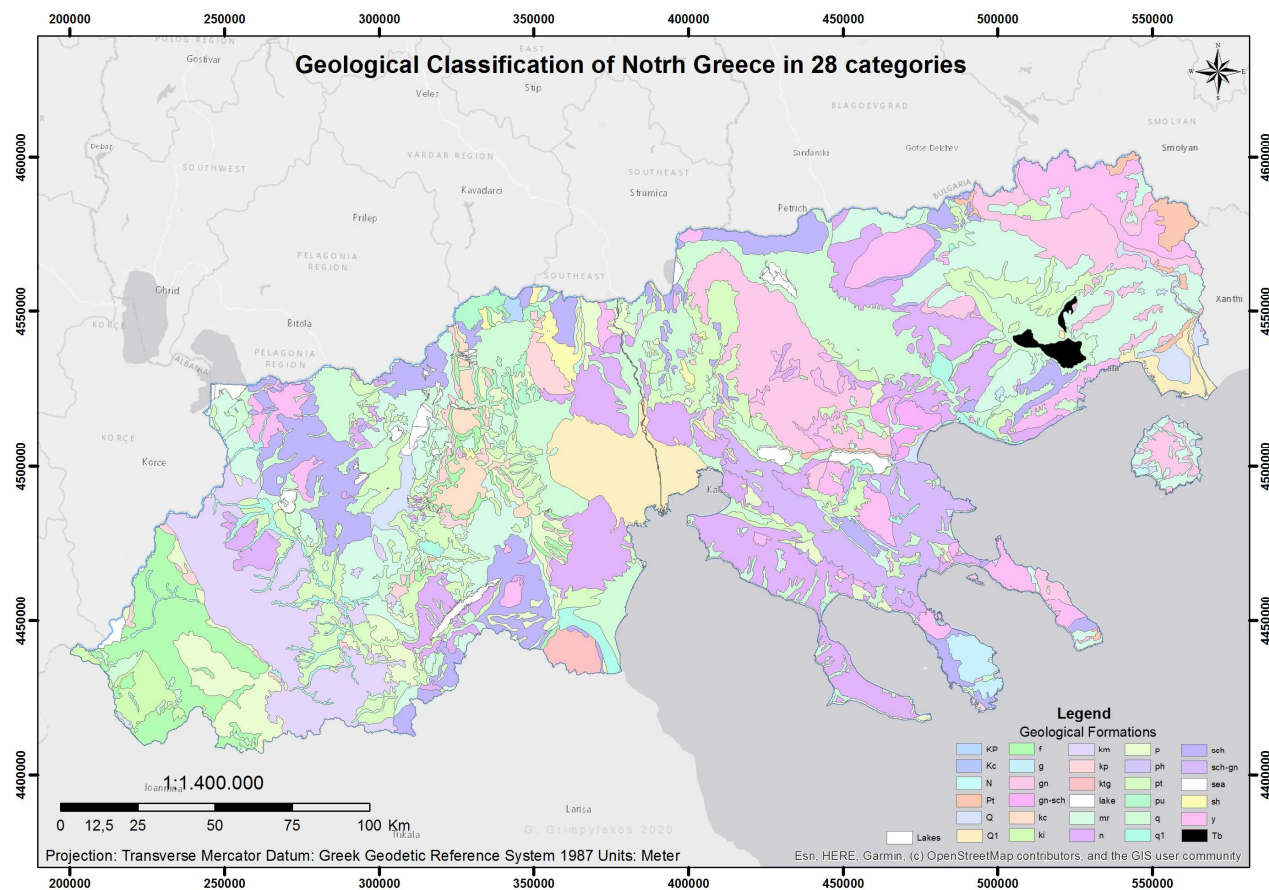


Figure 15G28a – North Greece (MAC). Geological classification in twenty eight main categories according to IGME geological mapping and Grimpylakos, cell size 50 meters.

Geological Coverage of Watershed in 28 main categories									Macedonia Area	36290,46	100,00
Formation	Area (km2)	%	Formation	Area (km2)	%	Formation	Area (km2)	%	Formation	Area (km2)	%
q	5089,50	14,02	p	1572,97	4,33	ki	288,98	0,80	KP	41,49	0,11
mr	4093,00	11,28	f	1504,77	4,15	Pt	272,19	0,75	N	15,06	0,04
n	3995,51	11,01	Q1	1321,61	3,64	pu	243,05	0,67	ph	6,64	0,02
pt	3125,56	8,61	Sch-gn	1258,50	3,47	Sh	236,19	0,65	Kc	0,77	0,00
gn	2829,99	7,80	q1	634,22	1,75	g	218,44	0,60	lake	407,36	1,12
sch	2672,33	7,36	kp	498,99	1,37	gn-sch	195,95	0,54	sea	149,16	0,41
y	2217,04	6,11	Q	450,38	1,24	ktg	191,87	0,53			
km	2127,98	5,86	kc	364,62	1,00	Tb	139,81	0,39	Overall	36163,94	99,65

Figure 15G28b – North Greece Watershed (MAC). Geological classification in twenty eight main categories, according to IGME geological mapping, and the corresponding area coverage.



SECTION 3

XRD ANALYSIS OF RIVER BED SEDIMENTS AT SAMPLING SITES OF NORTHERN GREECE

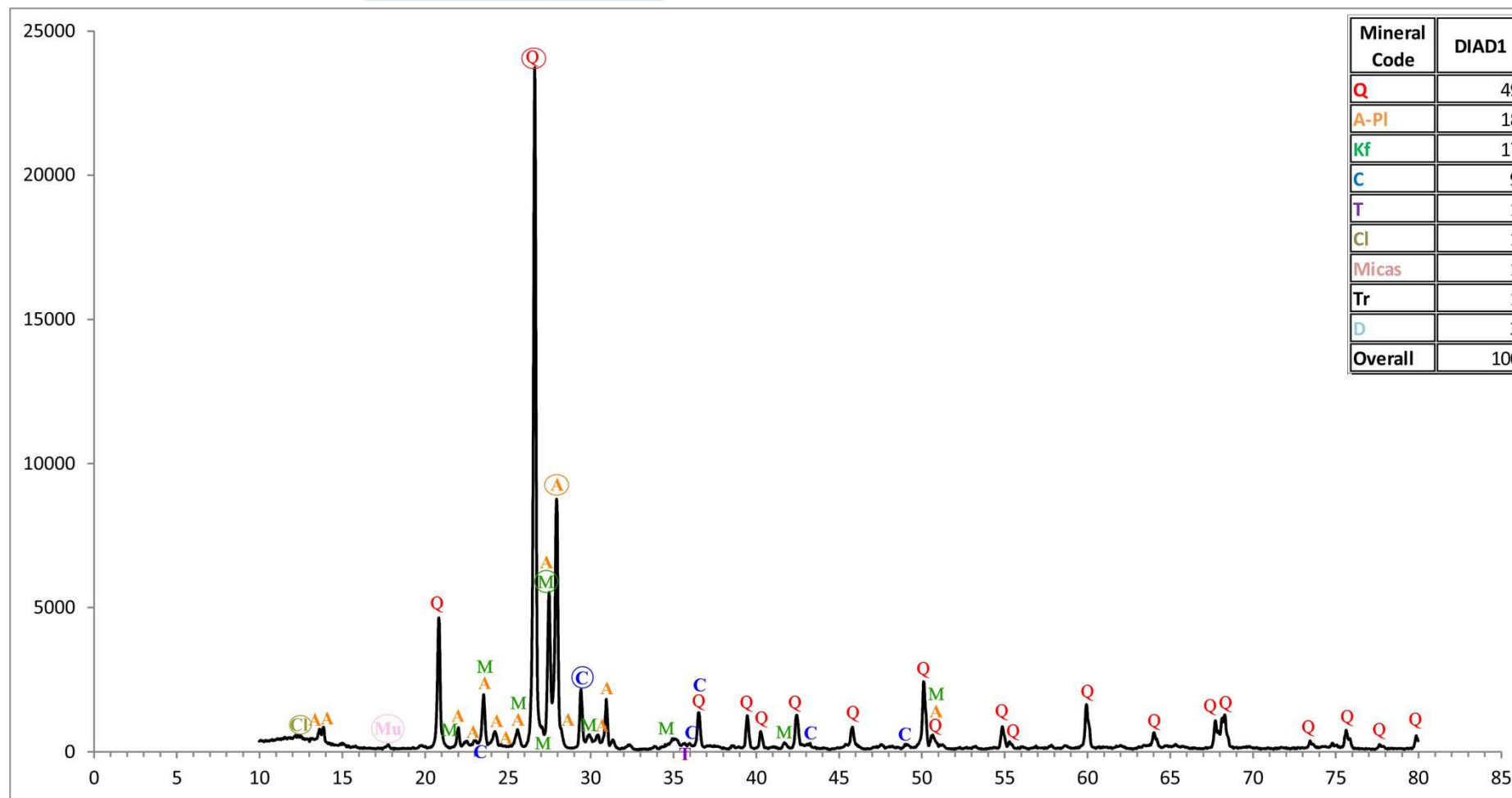


Chart 1a XRD – (DIAD1): Diavolorema XRD analysis (Demokritos). Sample collected from right side of river bed sediment on 23/06/2010.

Sample identification: DIAA3

9-Apr-2013 11:19

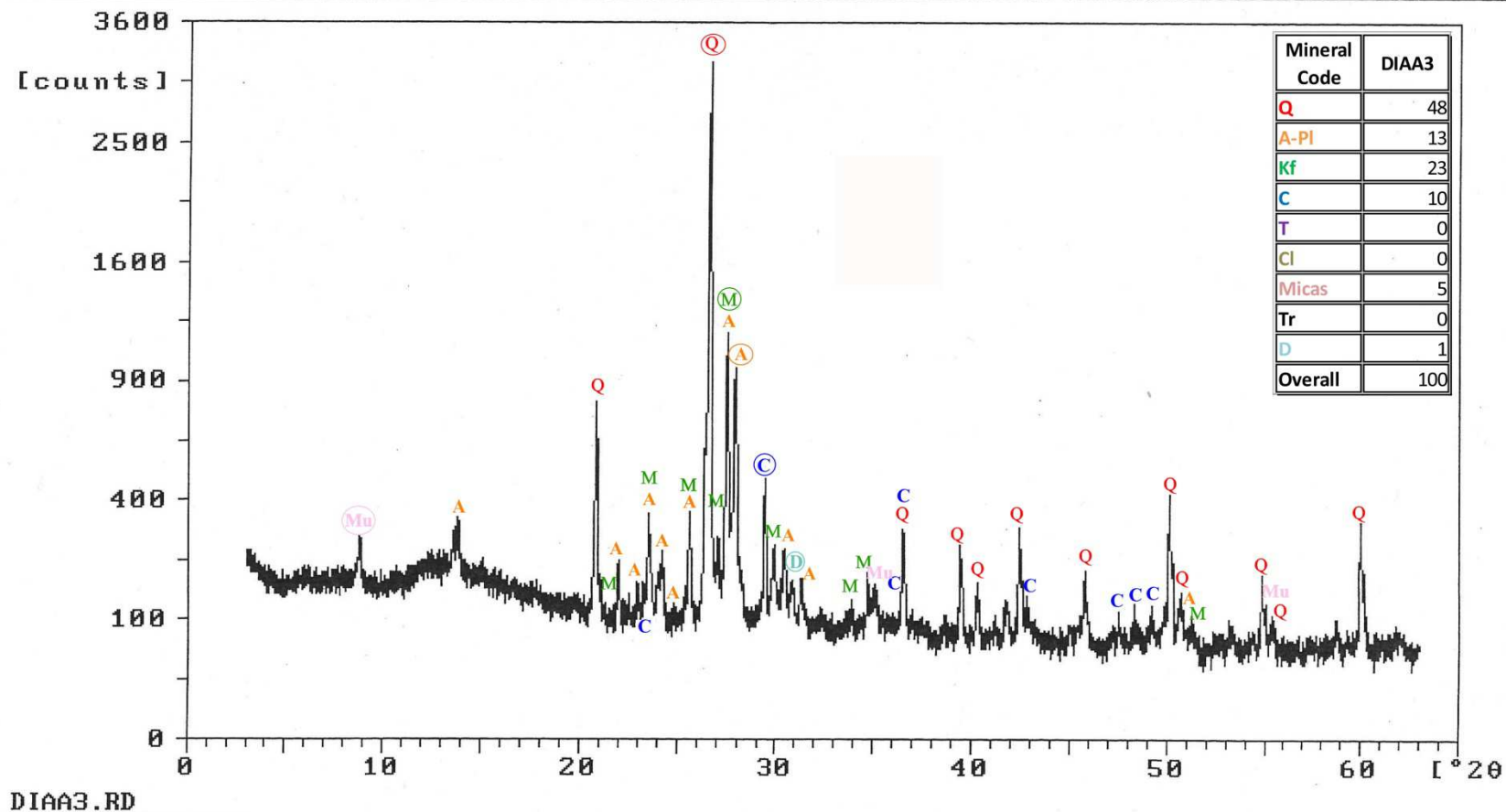


Chart 1b XRD – (DIAA3): Diavolorema XRD analysis (GMO-AUTH). Sample collected from right side of river bed sediment on 26/05/2011.

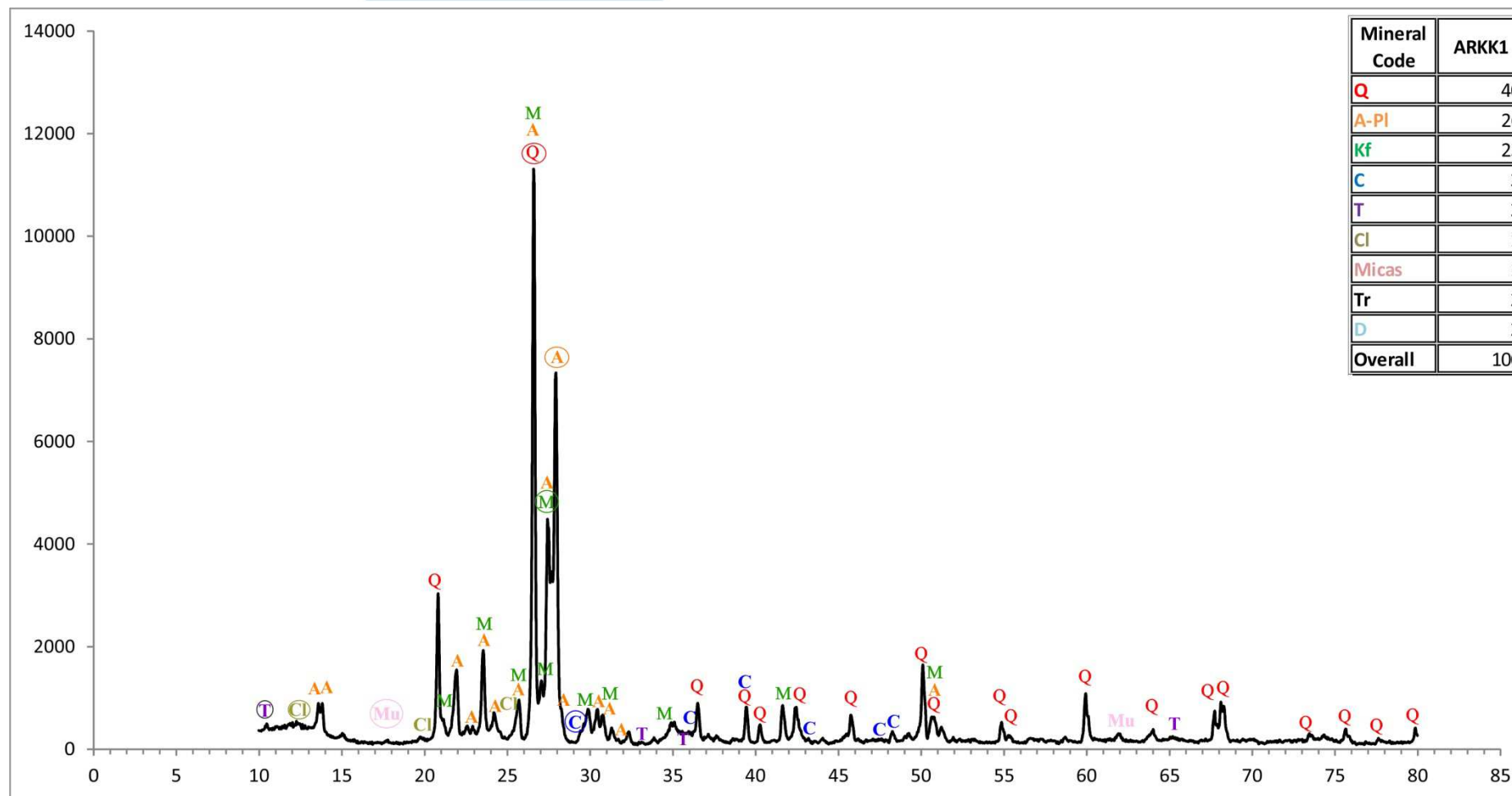


Chart 2a XRD (ARKK1) – Arkoudorema XRD analysis (Demokritos). Sample collected from center of the river bed sediment on 23/06/2010.

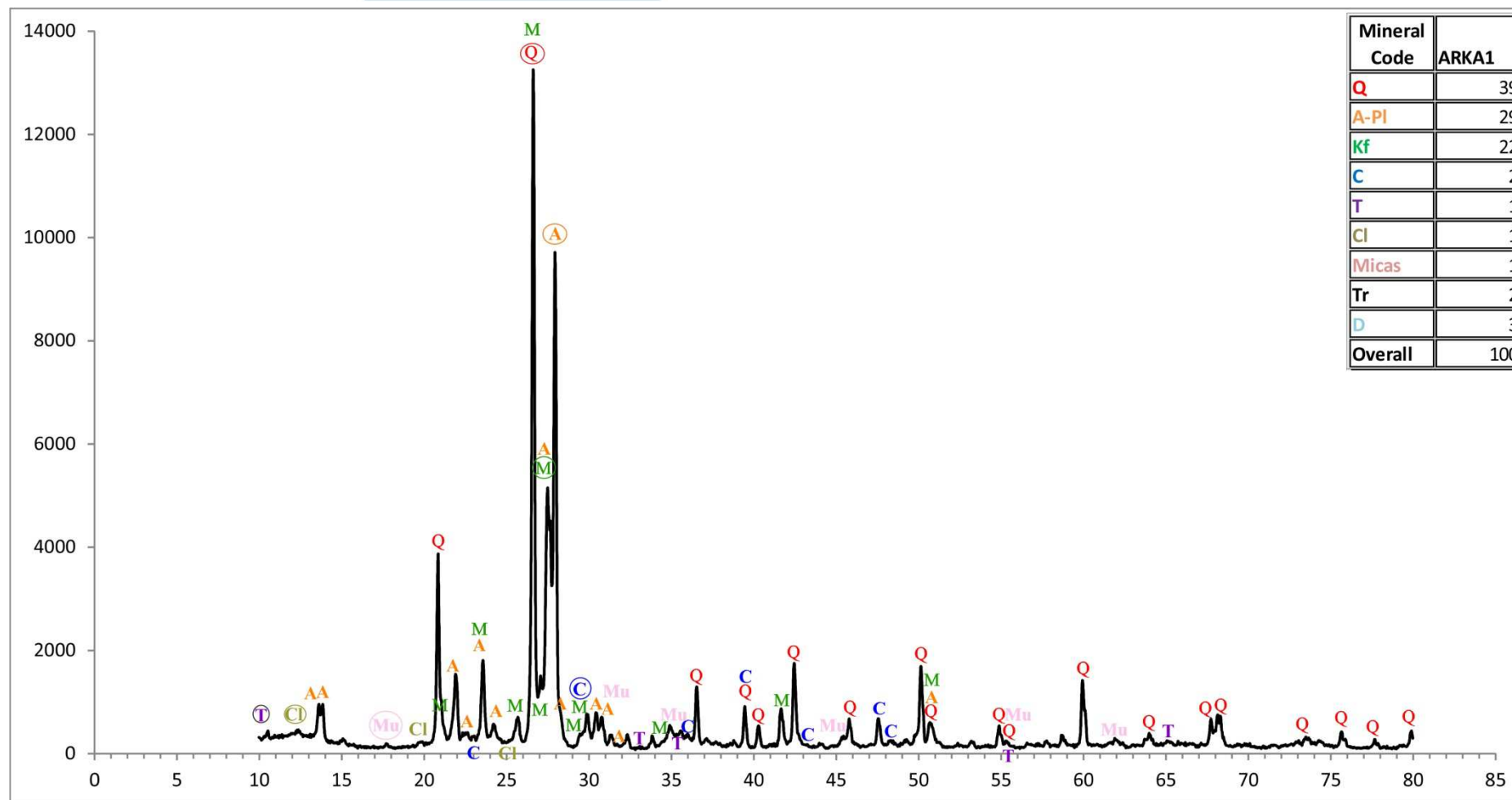


Chart 2b XRD (ARKA1) – Arkoudorema XRD analysis (Demokritos). Sample collected from left of the river bed sediment on 23/06/2010.

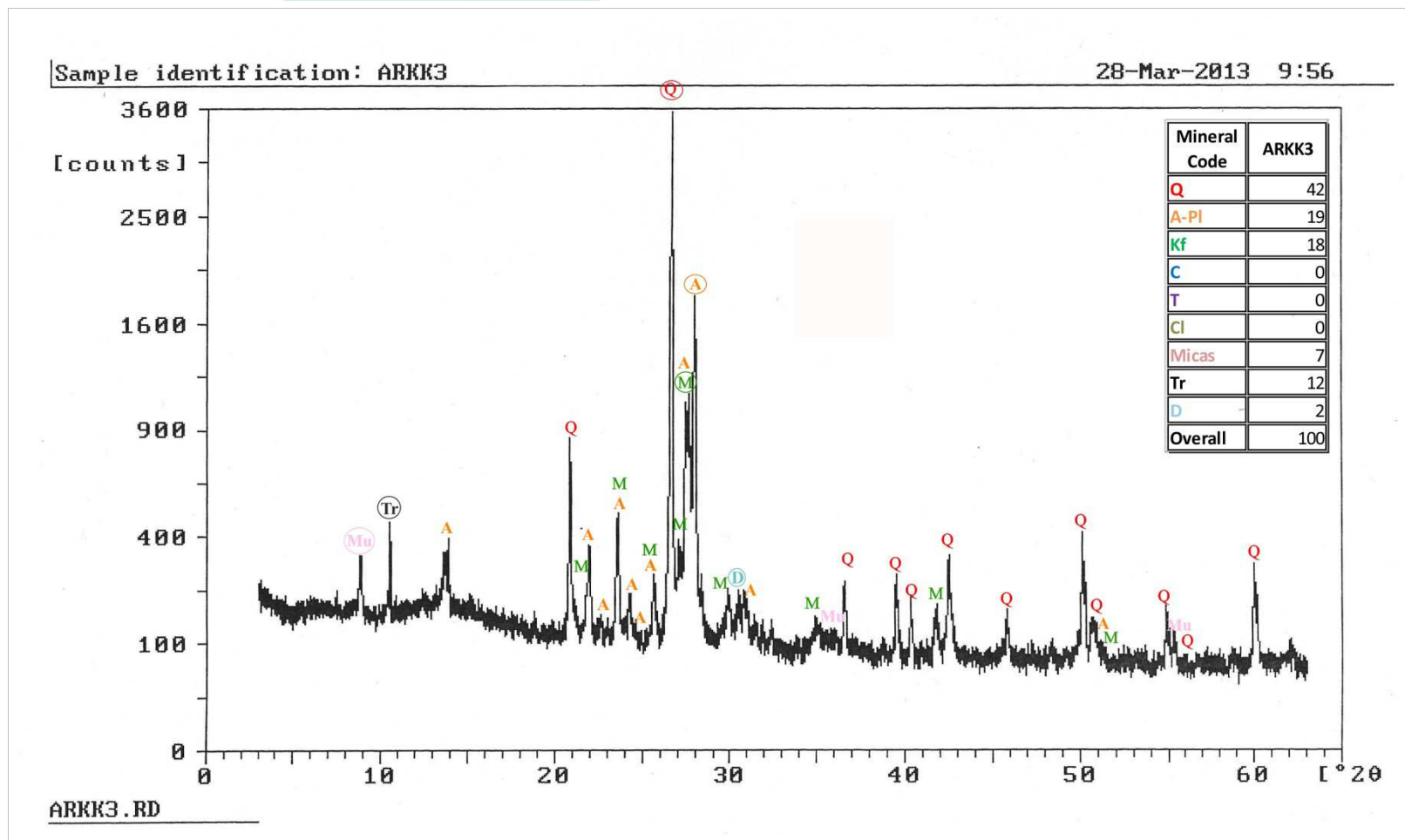


Chart 2c XRD (ARKK3) – Arkoudorema XRD analysis (GMO-AUTH). Sample collected from center of the river bed sediment on 26/05/2011.

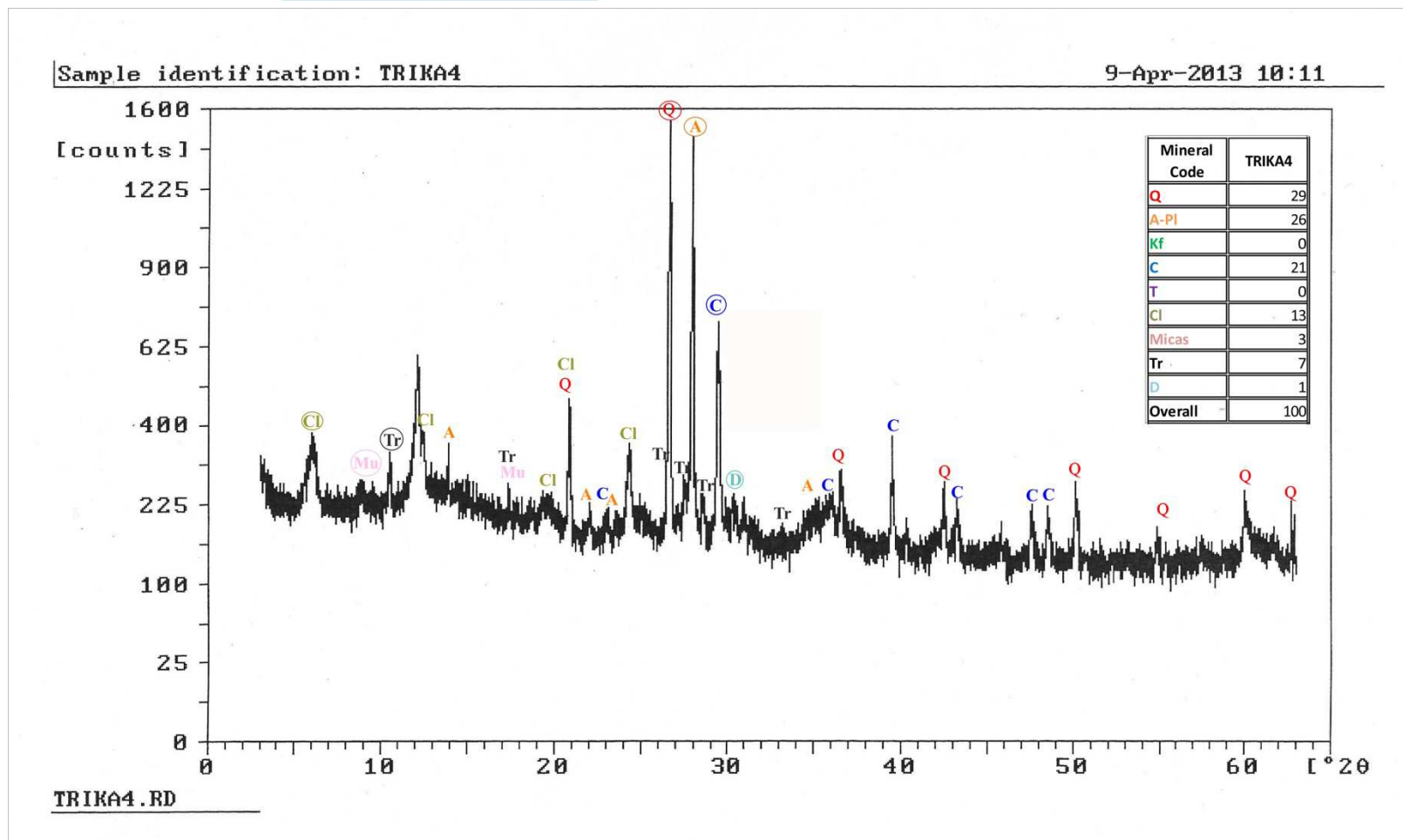


Chart 3 XRD (TRIKA4) – Trikomo XRD analysis (GMO-AUTH). Sample collected from left side of the river bed sediment on 29/05/2010.

Sample identification: ELEFA4

27-Mar-2013 11:42

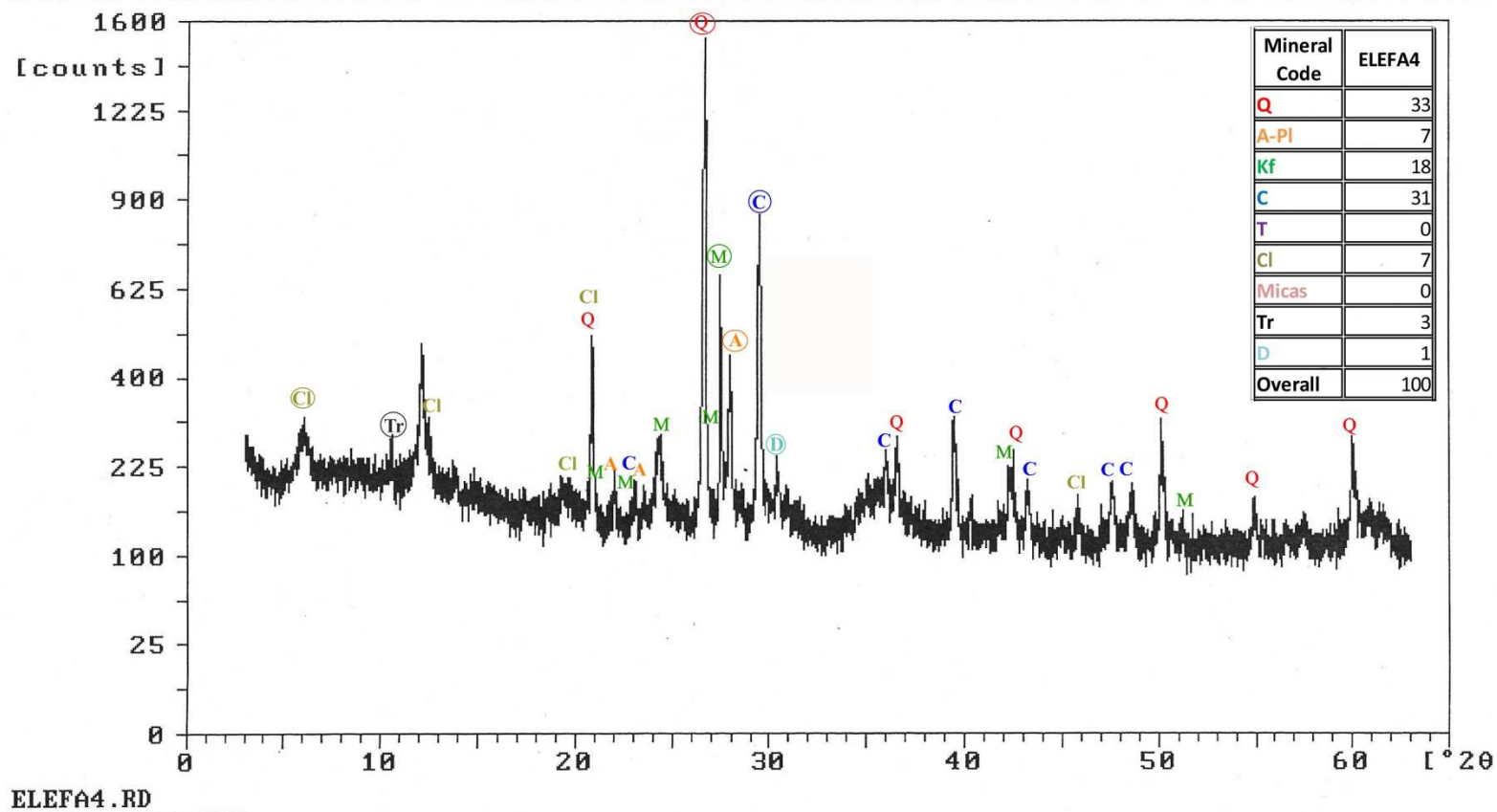


Chart 4 XRD (ELEFA4) – Eleftherochori XRD analysis (GMO-AUTH). Sample collected from left side of river bed sediment on 29/05/2010.

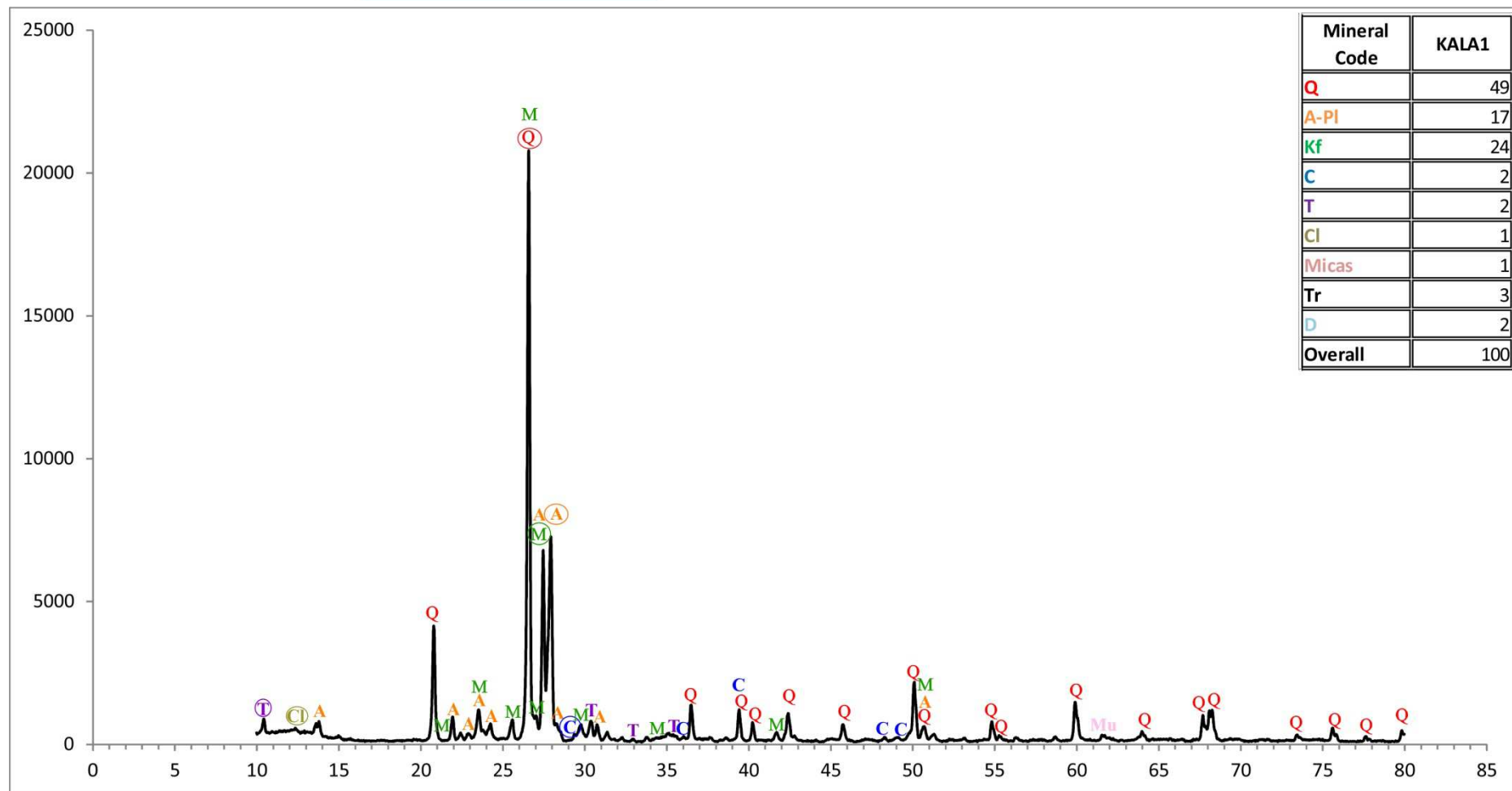


Chart 5a XRD (KALA1) – Mavrolakas XRD analysis (Demokritos). Sample collected from left side of the river bed sediment on 02/6/2010.

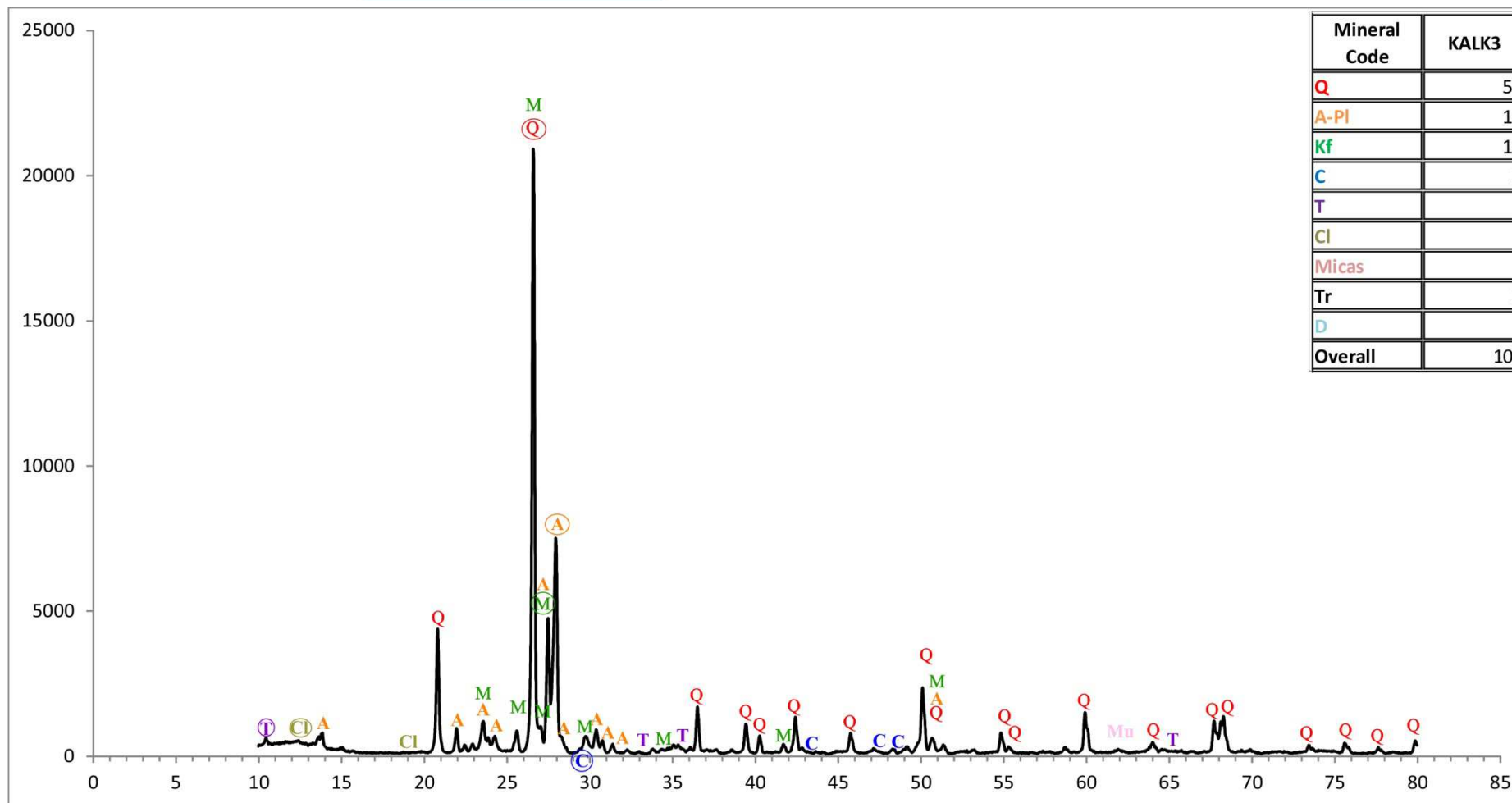


Chart 5b XRD (KALK3) – Mavrolakas XRD analysis (Demokritos). Sample collected from center of the river bed sediment on 27/05/2010.

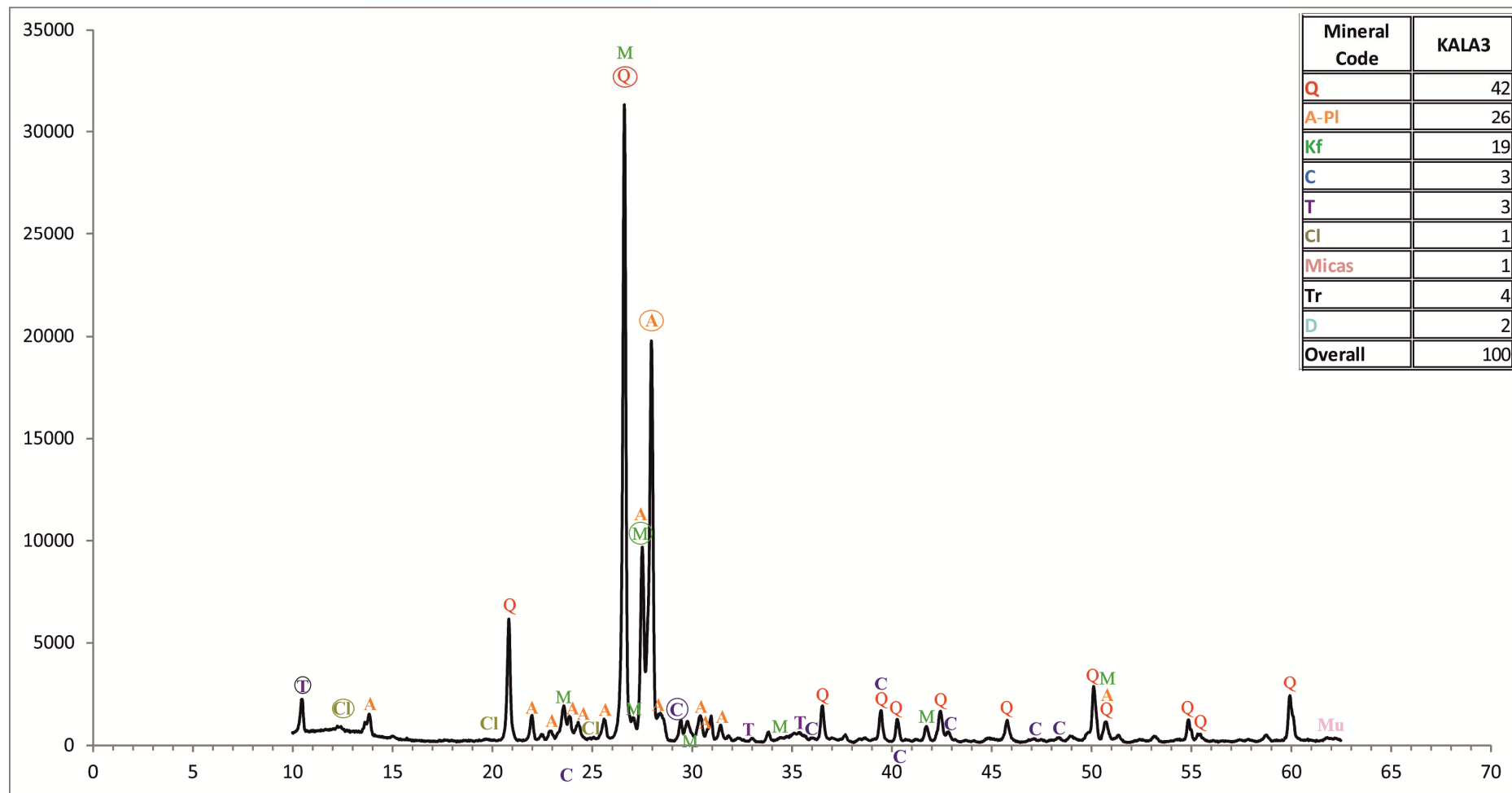


Chart 5c XRD (KALA3) – Mavrolakas XRD analysis (Demokritos). Sample collected from left side of the river bed sediment on 27/05/2010.

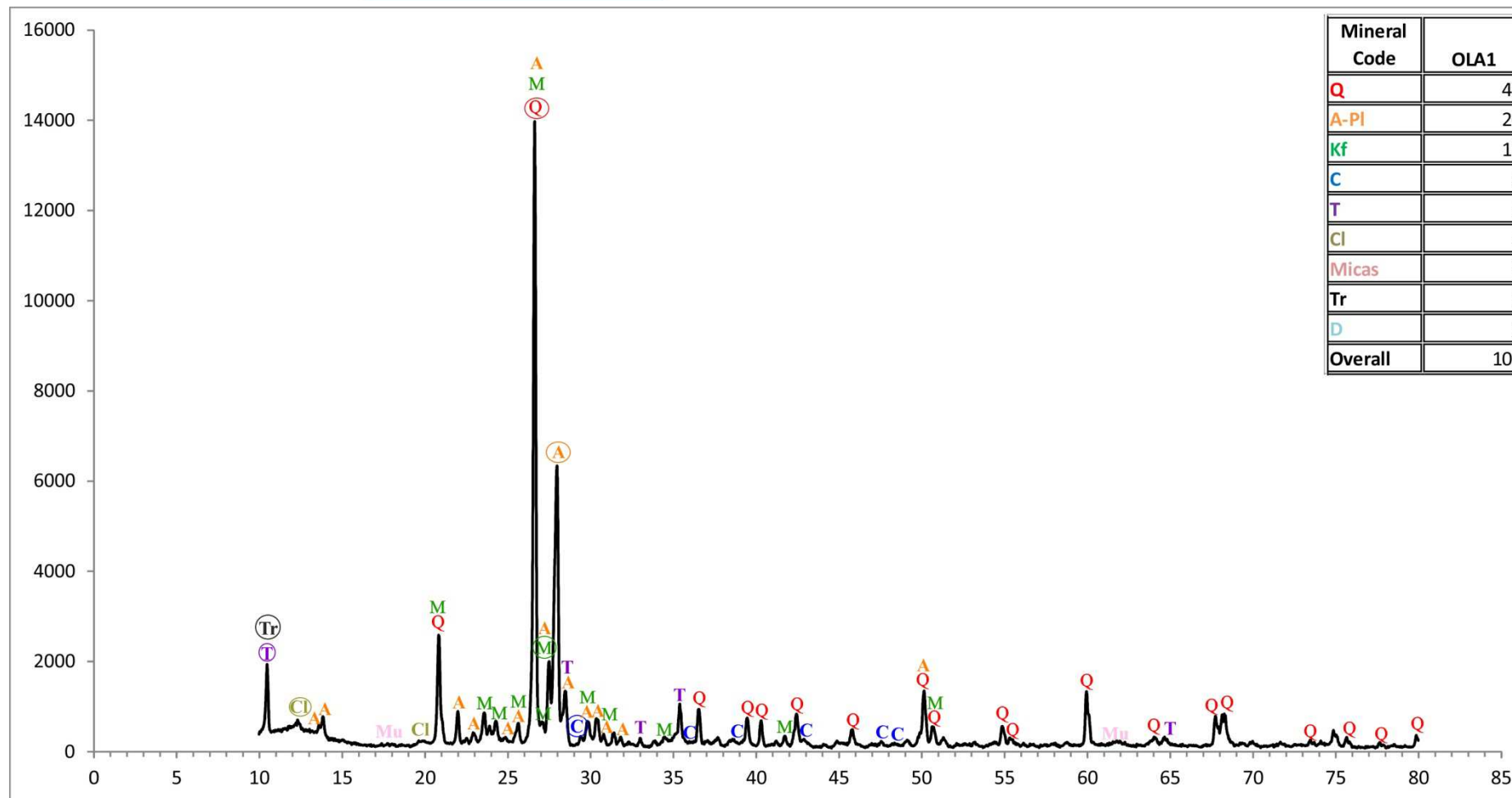


Chart 6 XRD (OLA1) – Kipouristra XRD analysis (Demokritos). Sample collected from left side of the river bed sediment 01/06/2010.

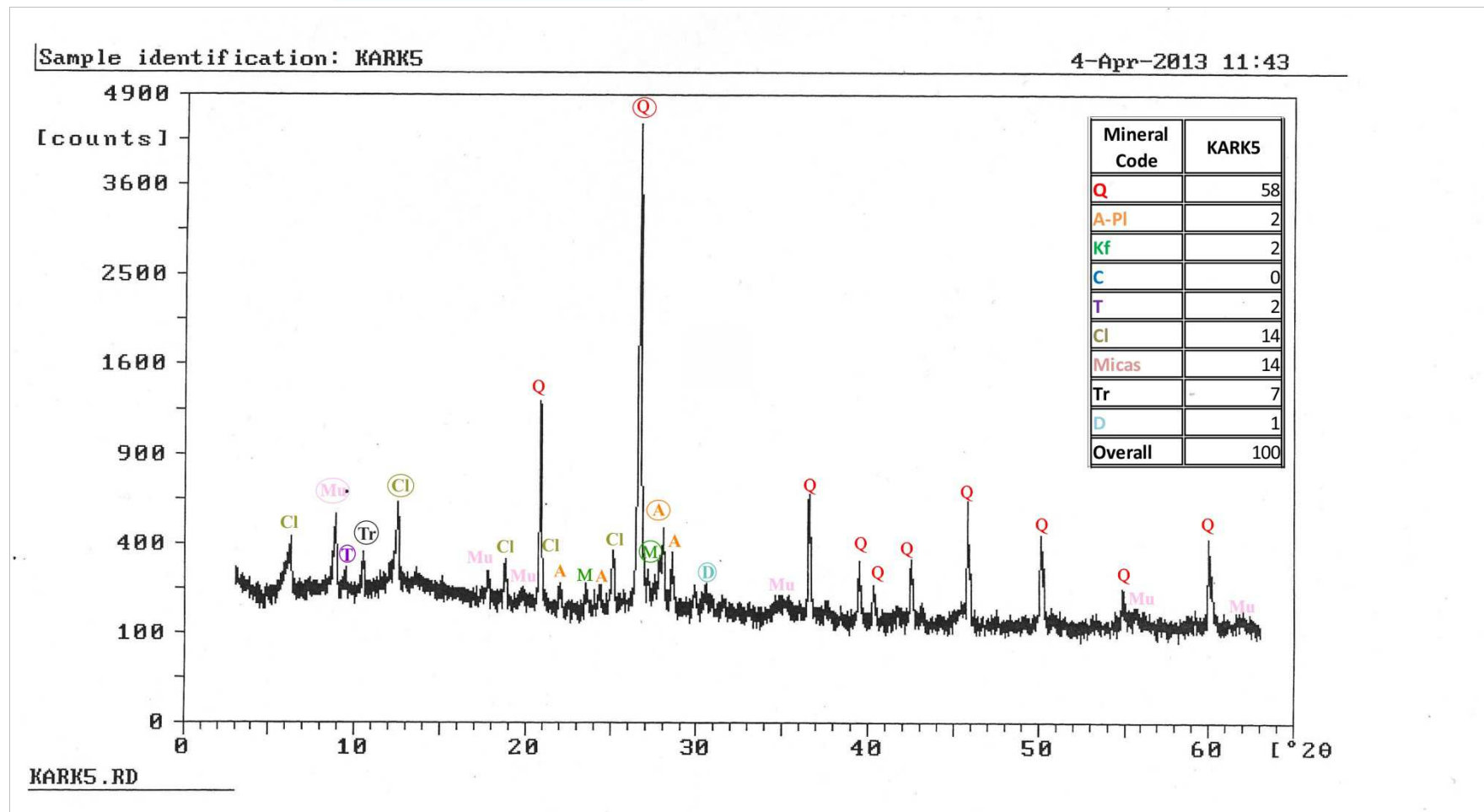


Chart 7 XRD (KARK5) – Karolakas XRD analysis (GMO-AUTH). Sample collected from center of the river bed sediment on 10/01/2013.

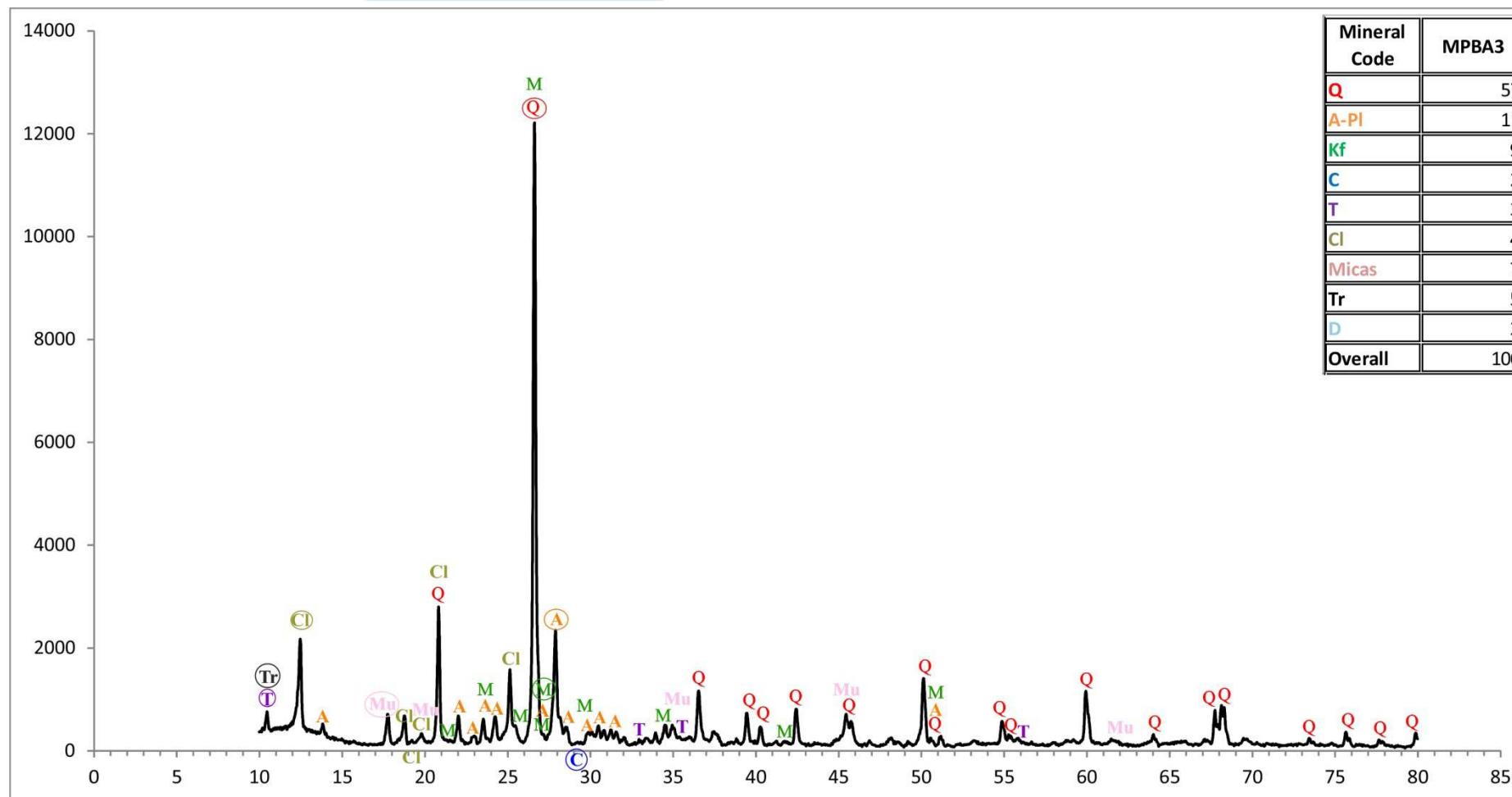


Chart 8a XRD (MPBA3) – Megali Panagia XRD analysis . Sample collected from left side of the river bed sediment on 25/03/2011.

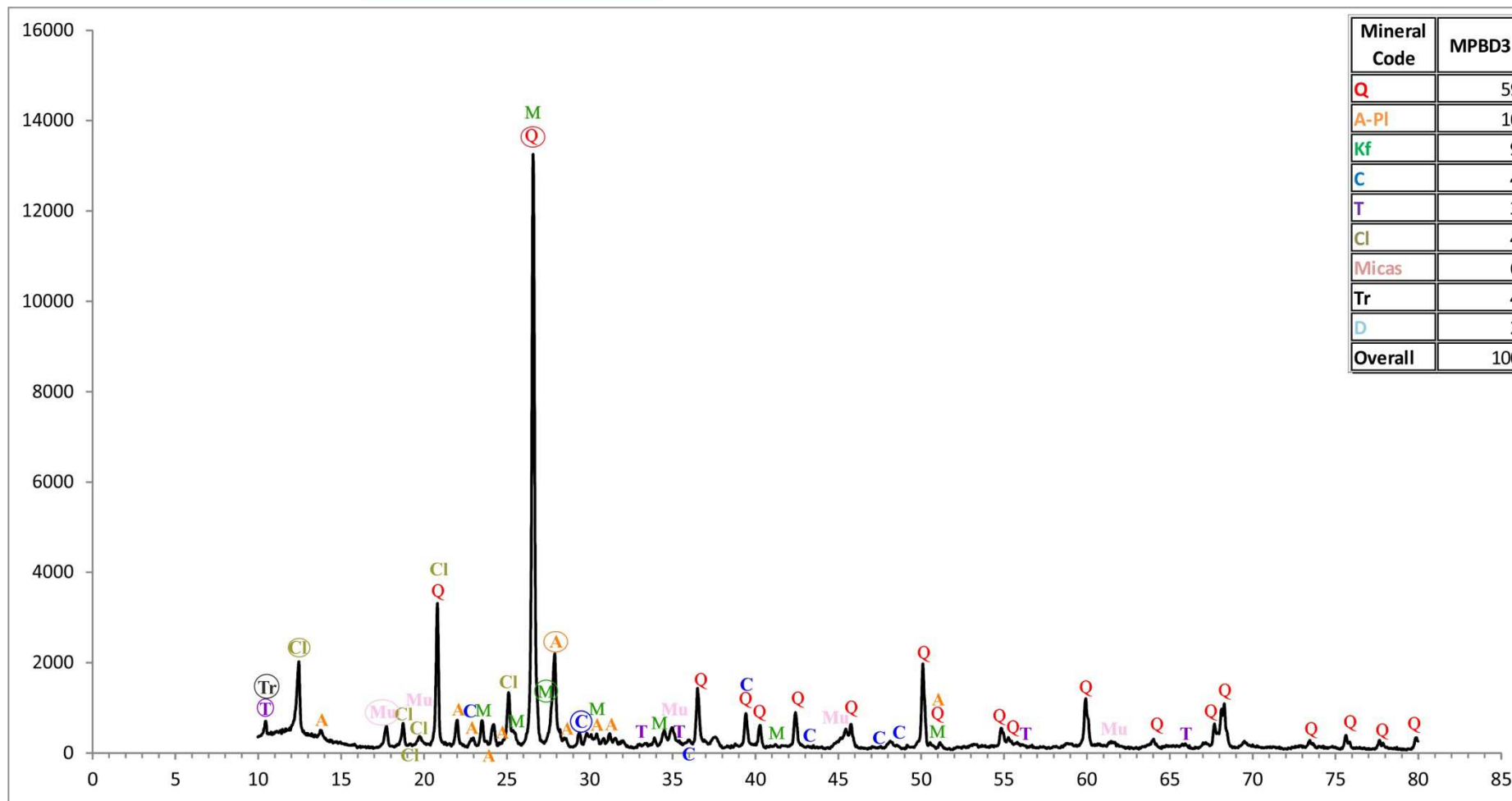


Chart 8b XRD (MPBD3) – Megali Panagia XRD analysis (Demokritos). Sample collected from right side of river bed sediment on 25/03/2011.

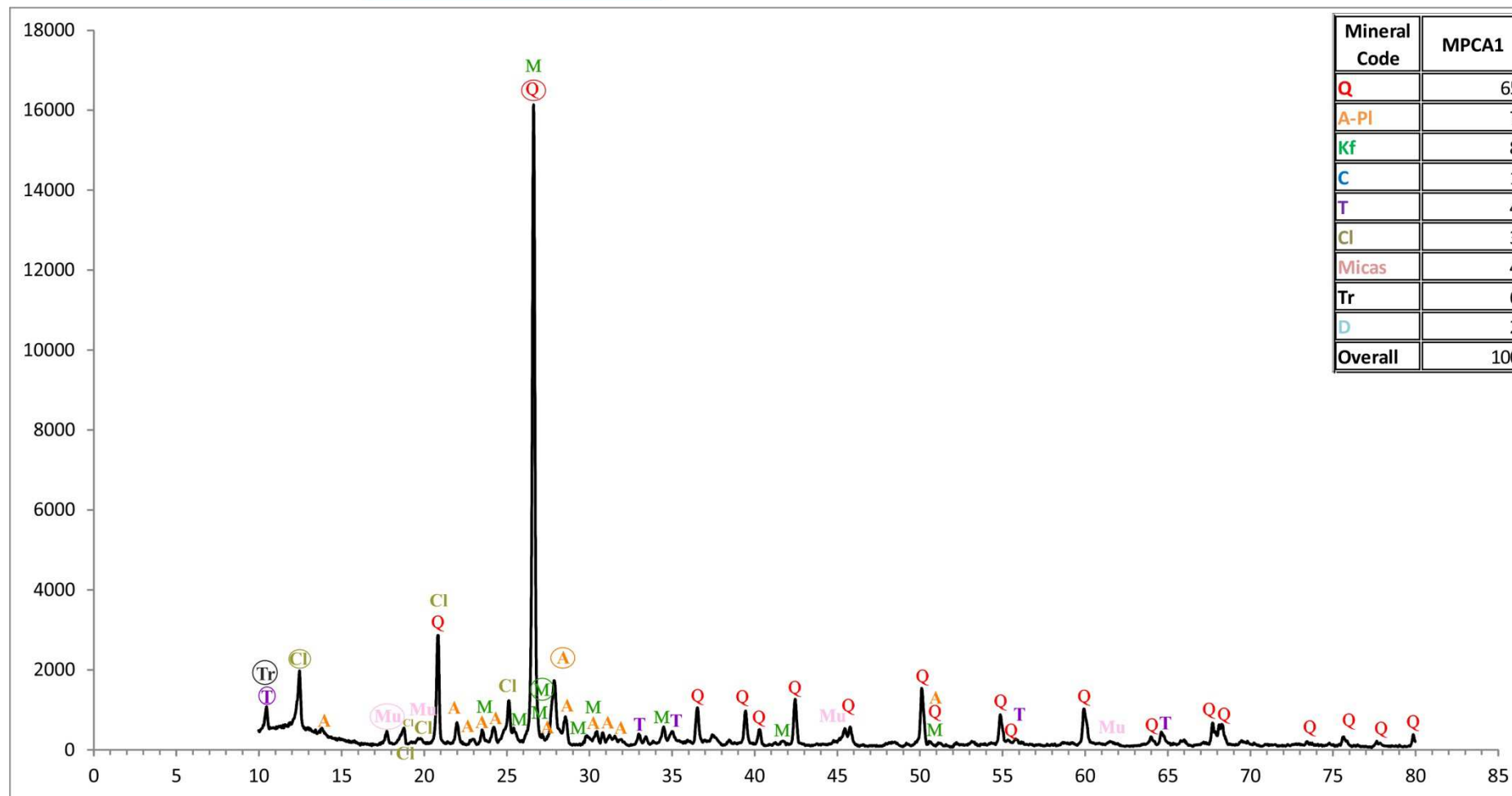


Chart 9a XRD (MPCA1) – Skouries XRD analysis (Demokritos). Sample collected from left side of river bed sediment on 28/05/2010.

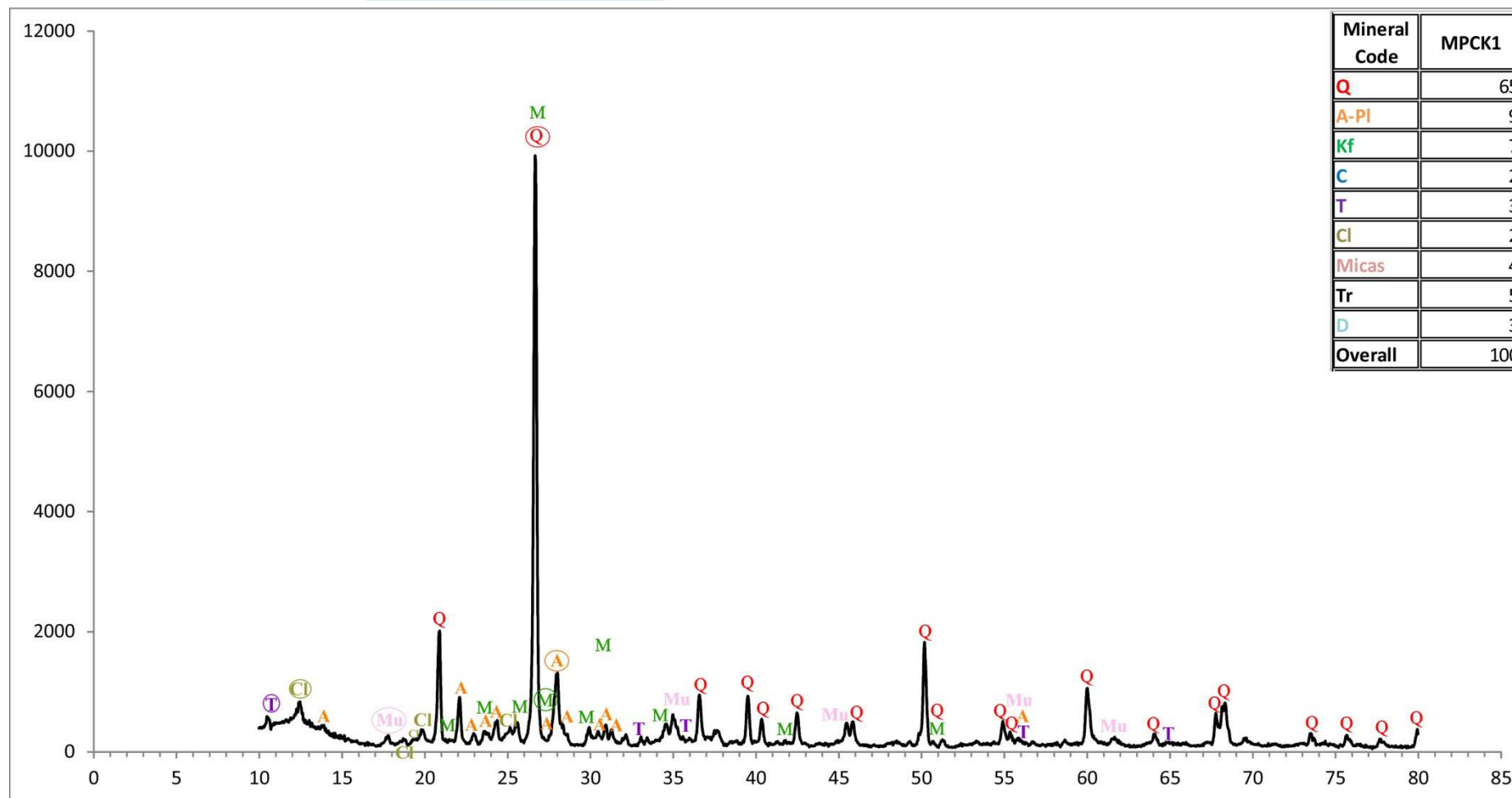


Chart 9b XRD (MPCK1) – Skouries XRD analysis (Demokritos). Sample collected from center side of river bed sediment on 28/05/2010.

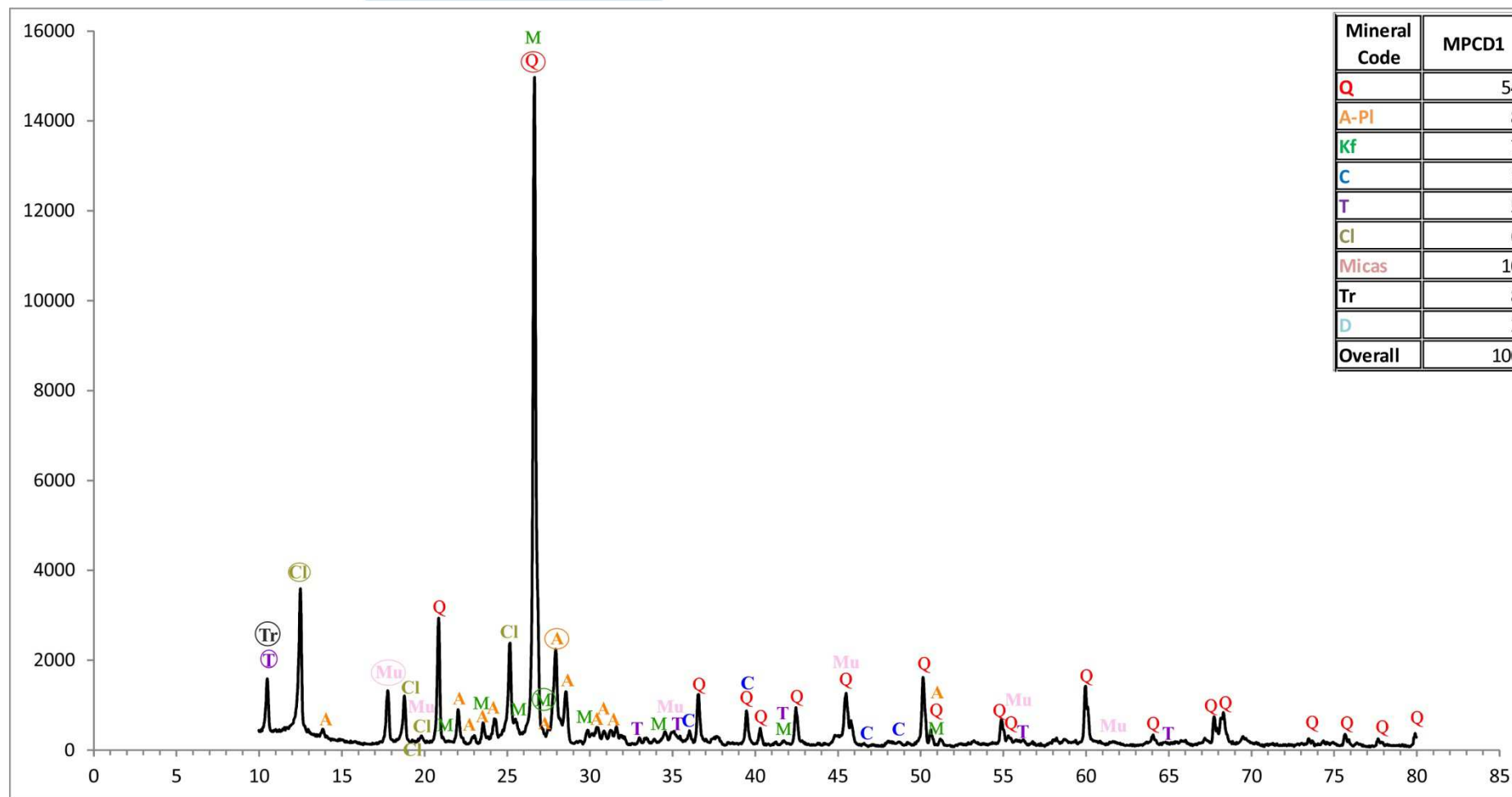


Chart 9c XRD (MPCD1) – Skouries XRD analysis (Demokritos). Sample collected from right side of the river bed sediment on 28/05/2010.

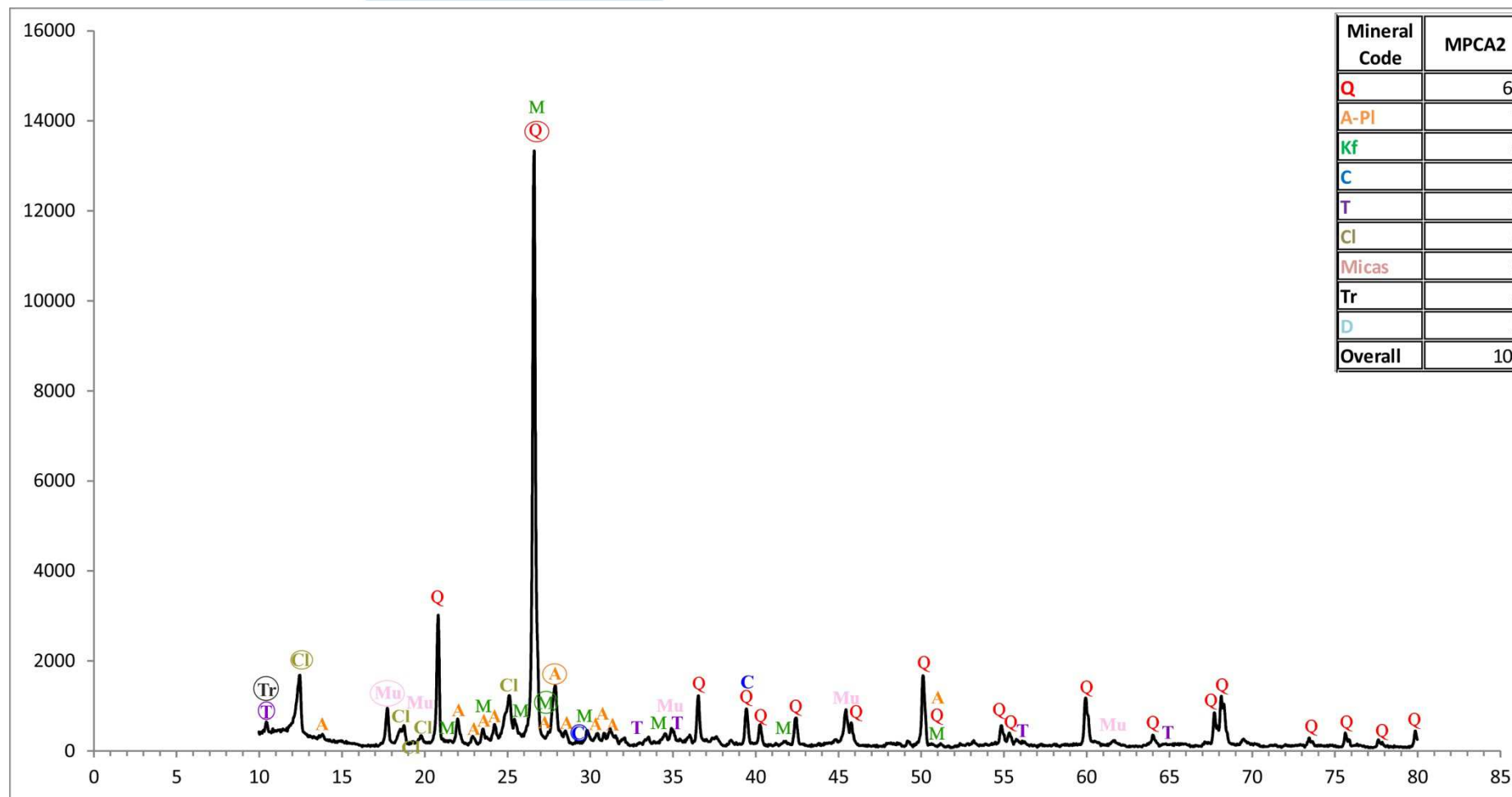


Chart 9d XRD (MPCA2) – Skouries XRD analysis (Demokritos). Sample collected from left side of the river bed sediment on 21/09/2010.

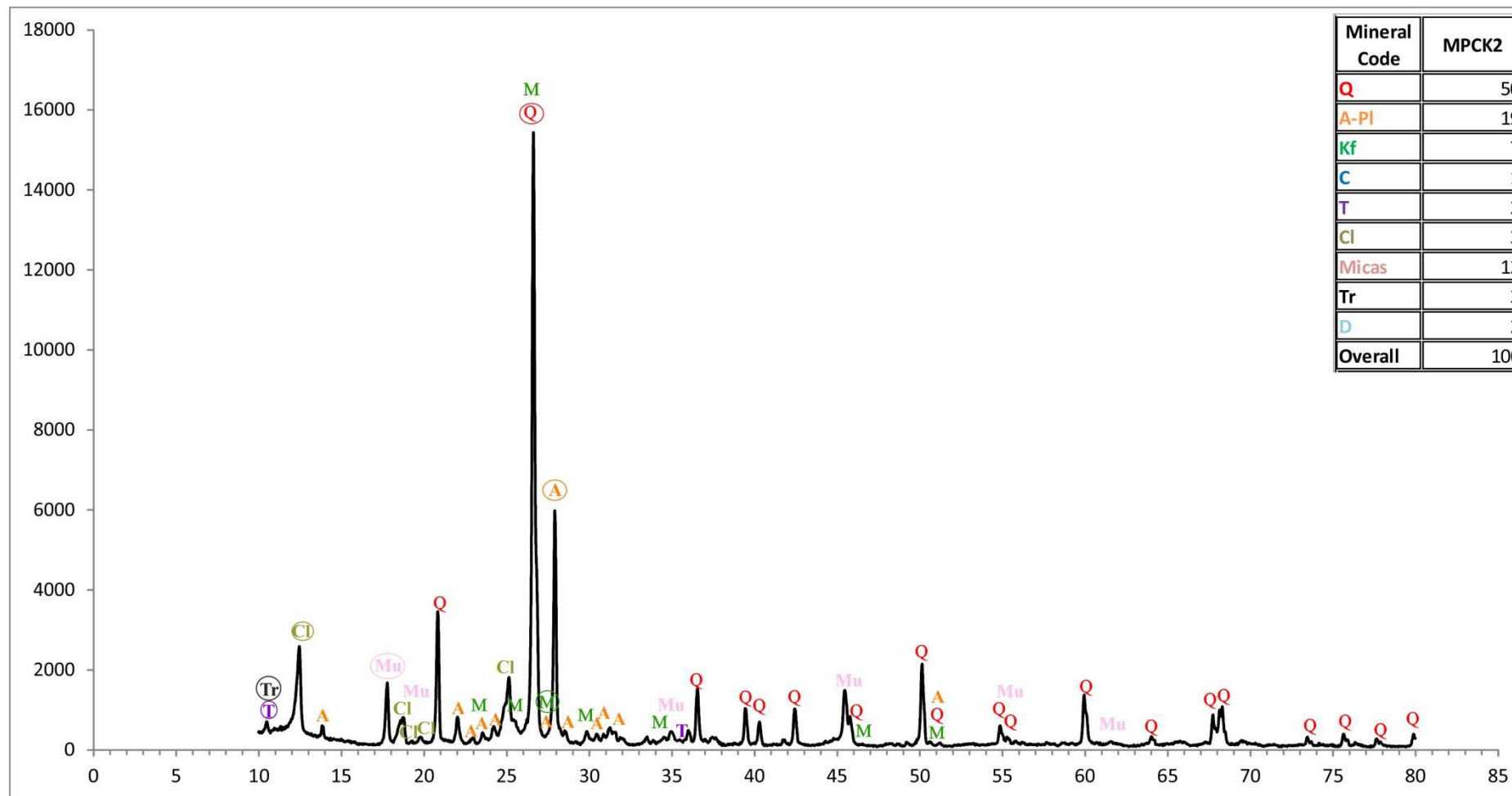


Chart 9e XRD (MPCK2) – Skouries XRD analysis (Demokritos). Sample collected from center of the river bed sediment on 21/09/2010.

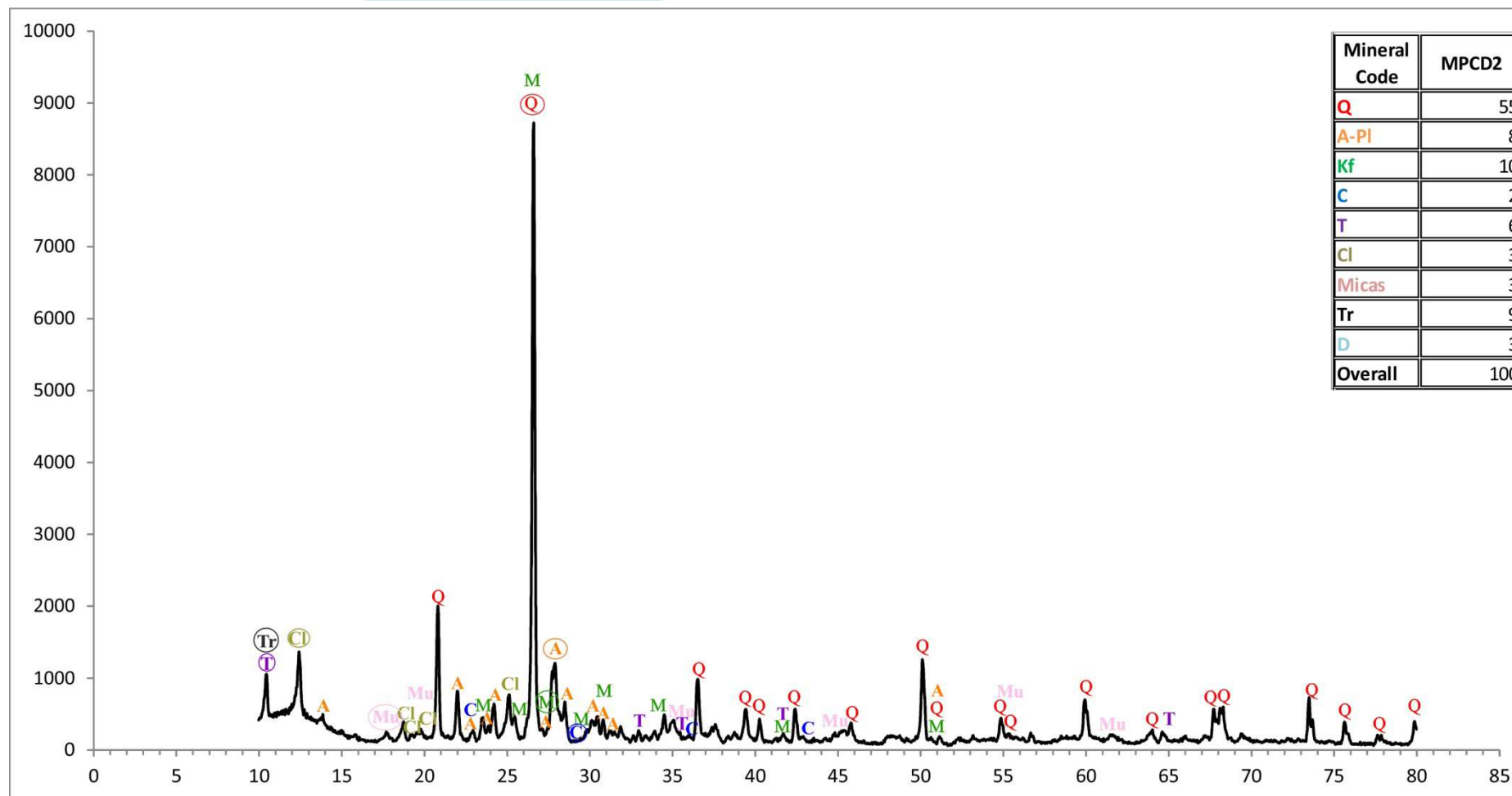


Chart 9f XRD (MPCD2) – Skouries XRD analysis (Demokritos). Sample collected from right side of the river bed sediment on 21/09/2010.

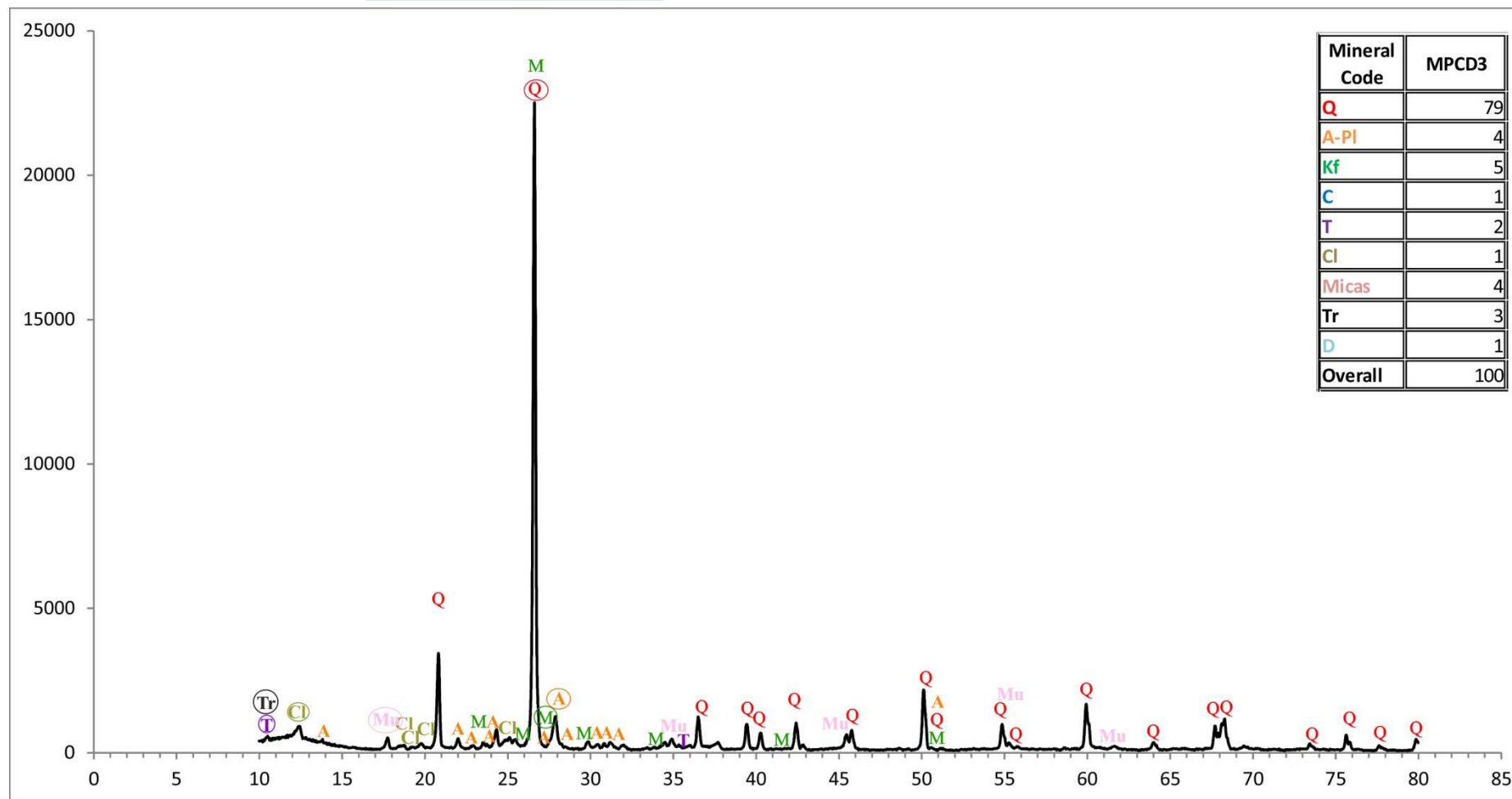


Chart 9g XRD (MPCD3) – Skouries XRD analysis (Demokritos). Sample collected from right side of the river bed sediment on 25/03/2011.

Sample identification: KOKK5

28-Mar-2013 10:47

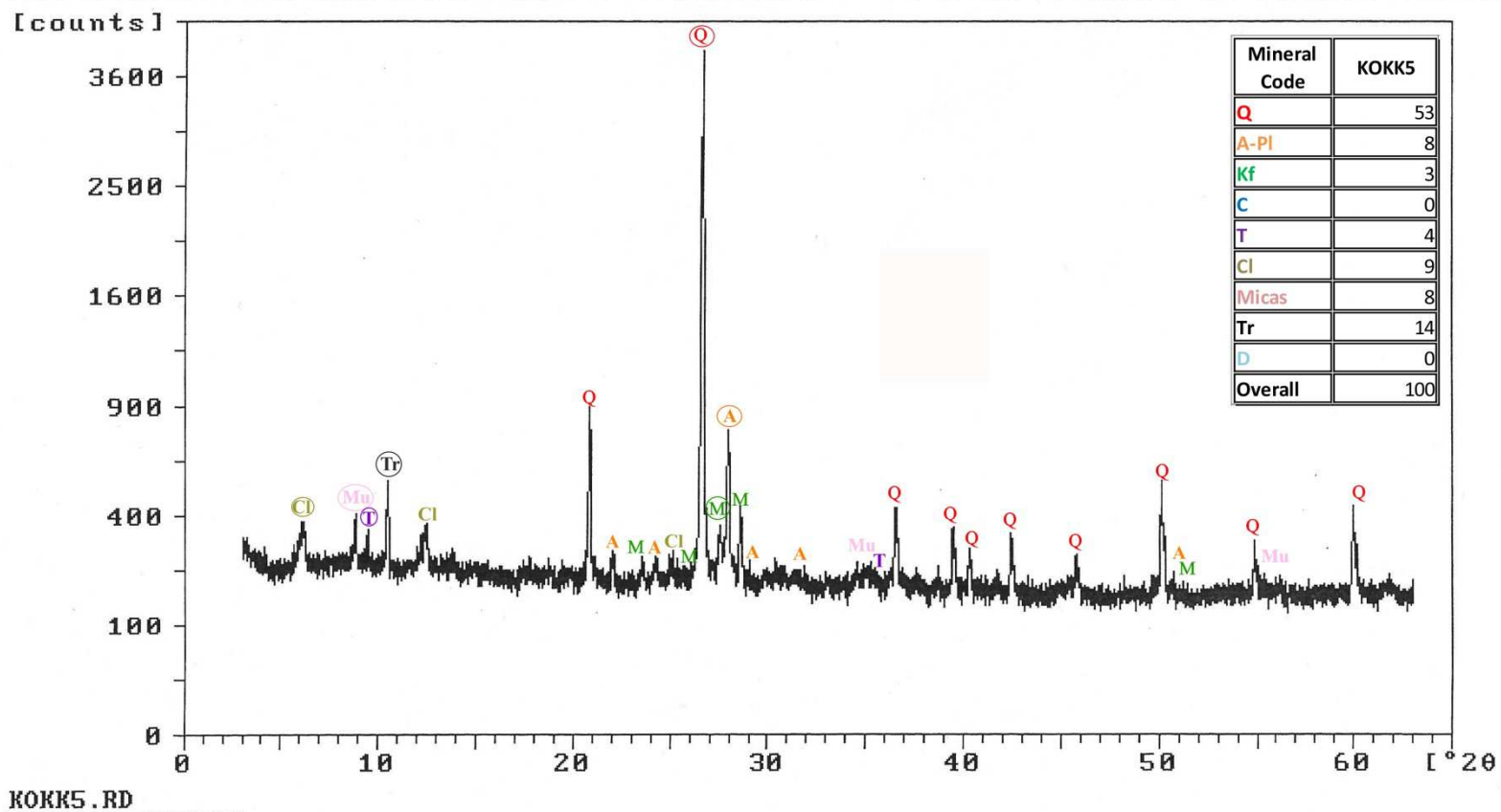


Chart 10 XRD (KOKK5) – Kokkinolakas XRD analysis (GMO-AUTH). Sample collected from center of the river bed sediment on 10/01/2013.

Sample identification: EKMK5

29-Mar-2013 10:35

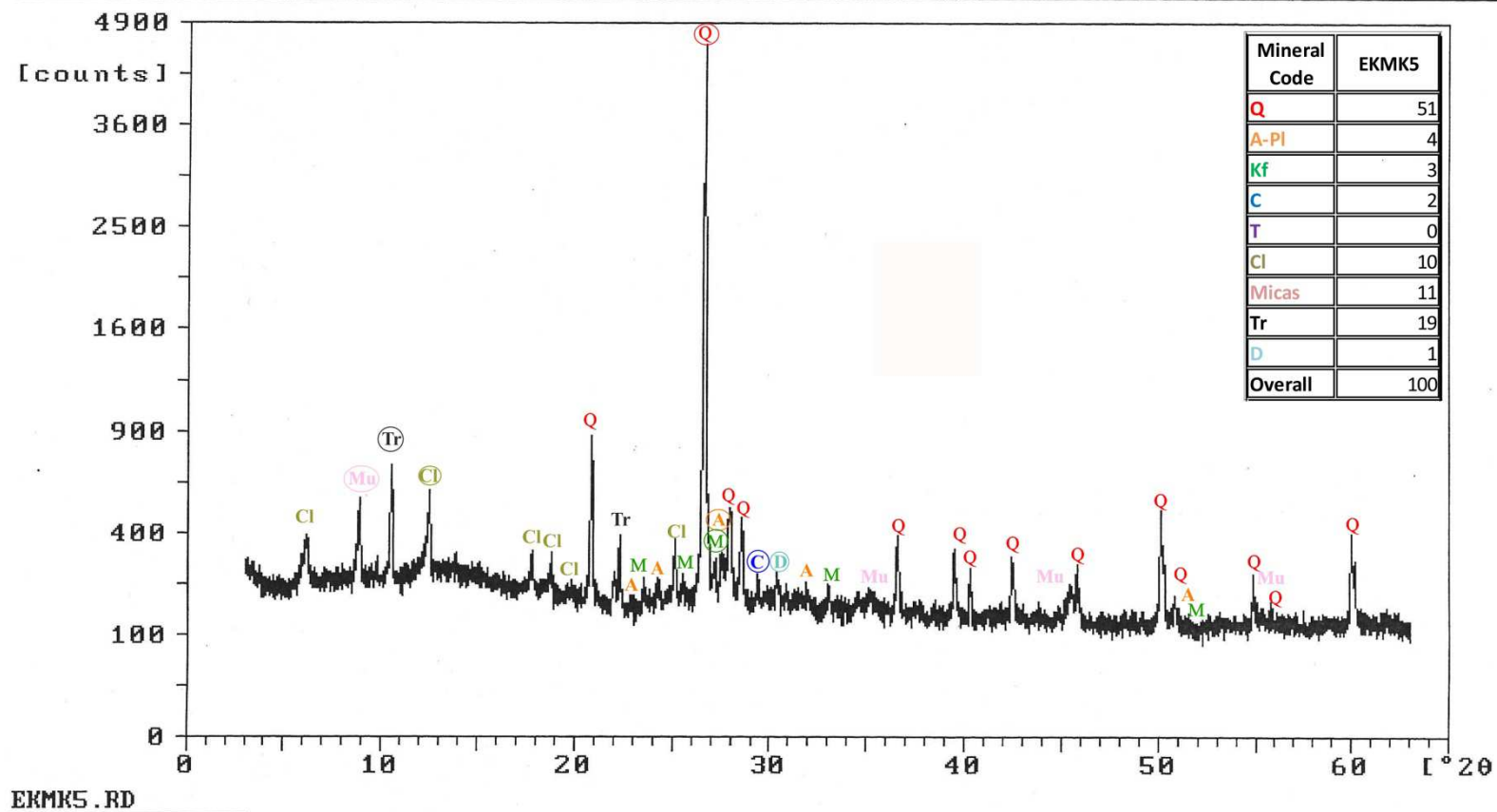


Chart 11 XRD – (EKMK5) – Ekklesiastikoi Muli XRD analysis (GMO-AUTH). Sample collected from center of river bed sediment, 10/01/2013.

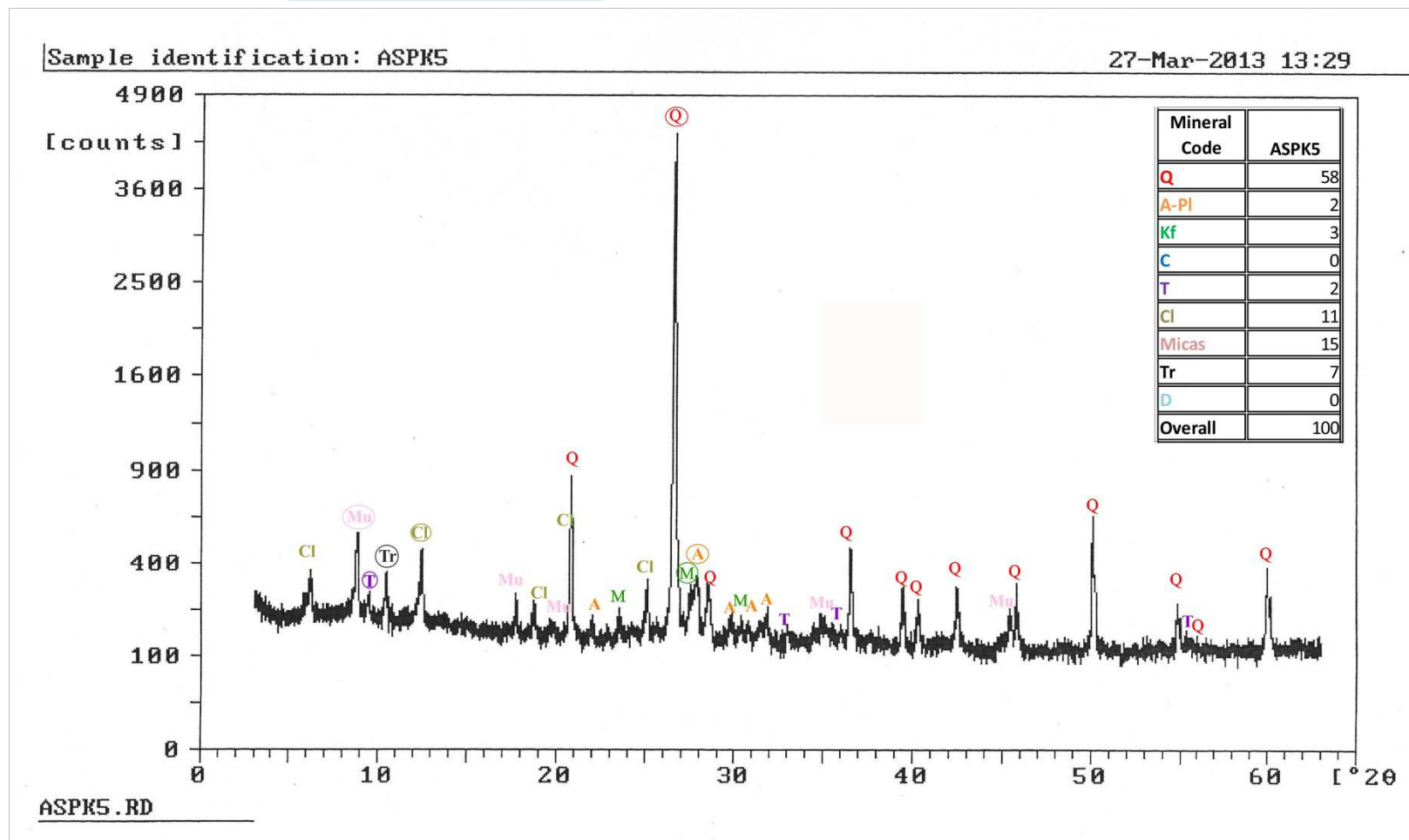


Chart 12 XRD (ASPK5) – Asprolakkas XRD analysis(GMO-AUTH). Sample collected from center of the river bed sediment on 10/01/2013.

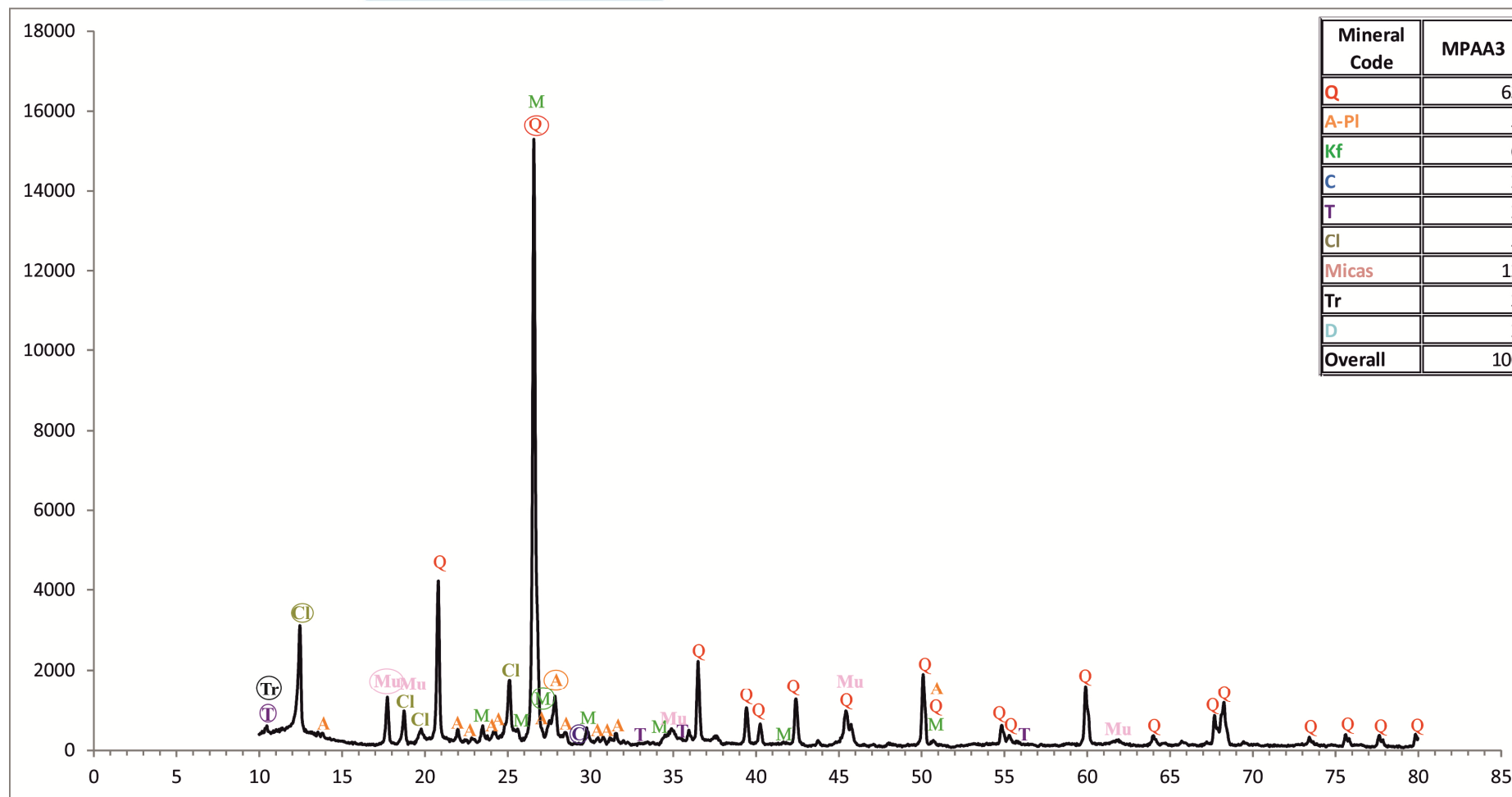


Chart 13a XRD (MPAA3) – Megali Panagia XRD analysis (Demokritos). Sample collected from left side of river bed sediment on 25/03/2011.

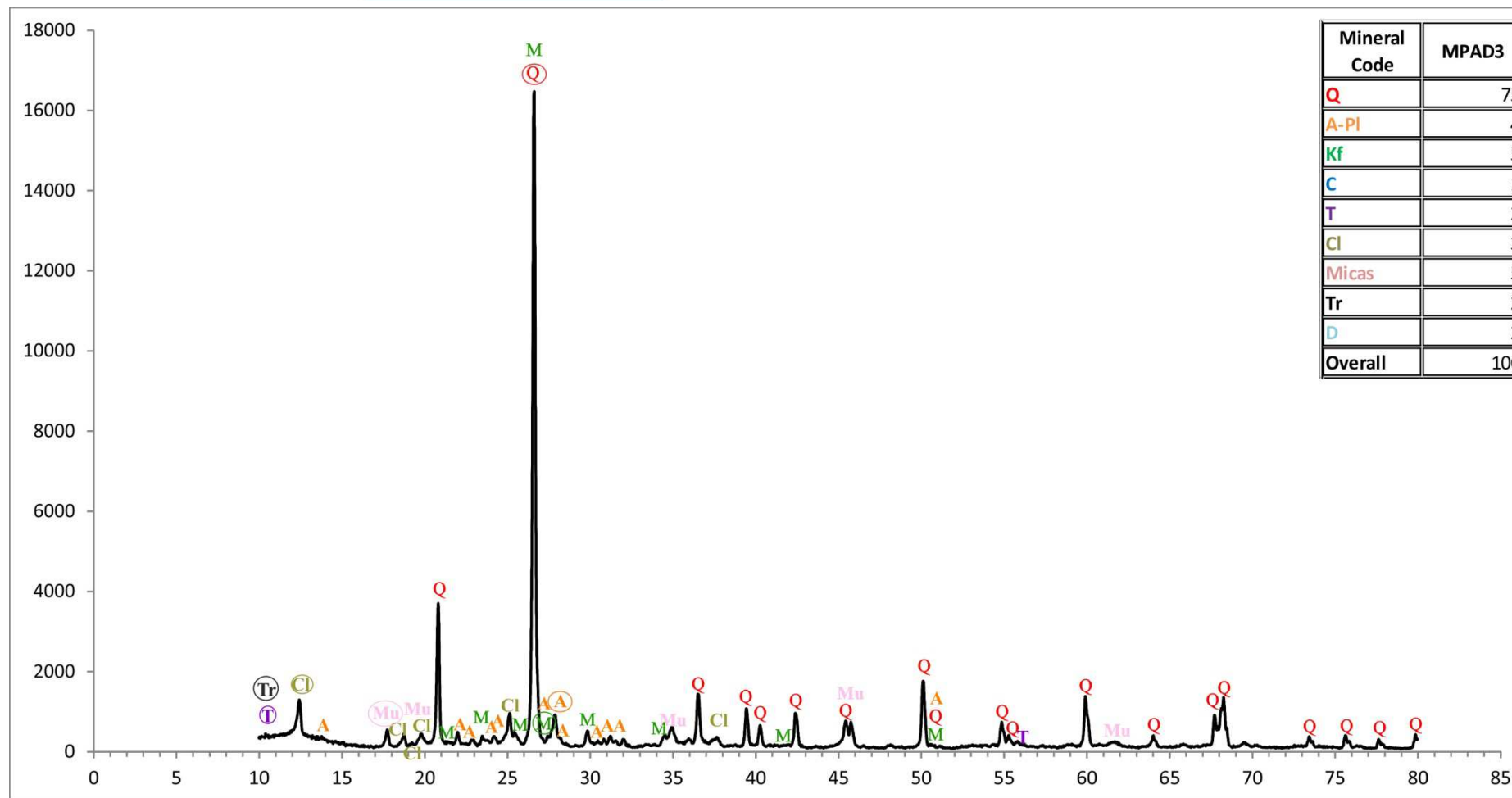


Chart 13b XRD (MPAD3) – Megali Panagia XRD analysis (Demokritos). Sample collected from right side of river bed sediment on 25/03/2011.

Sample identification: MPDK5

28-Mar-2013 13:36

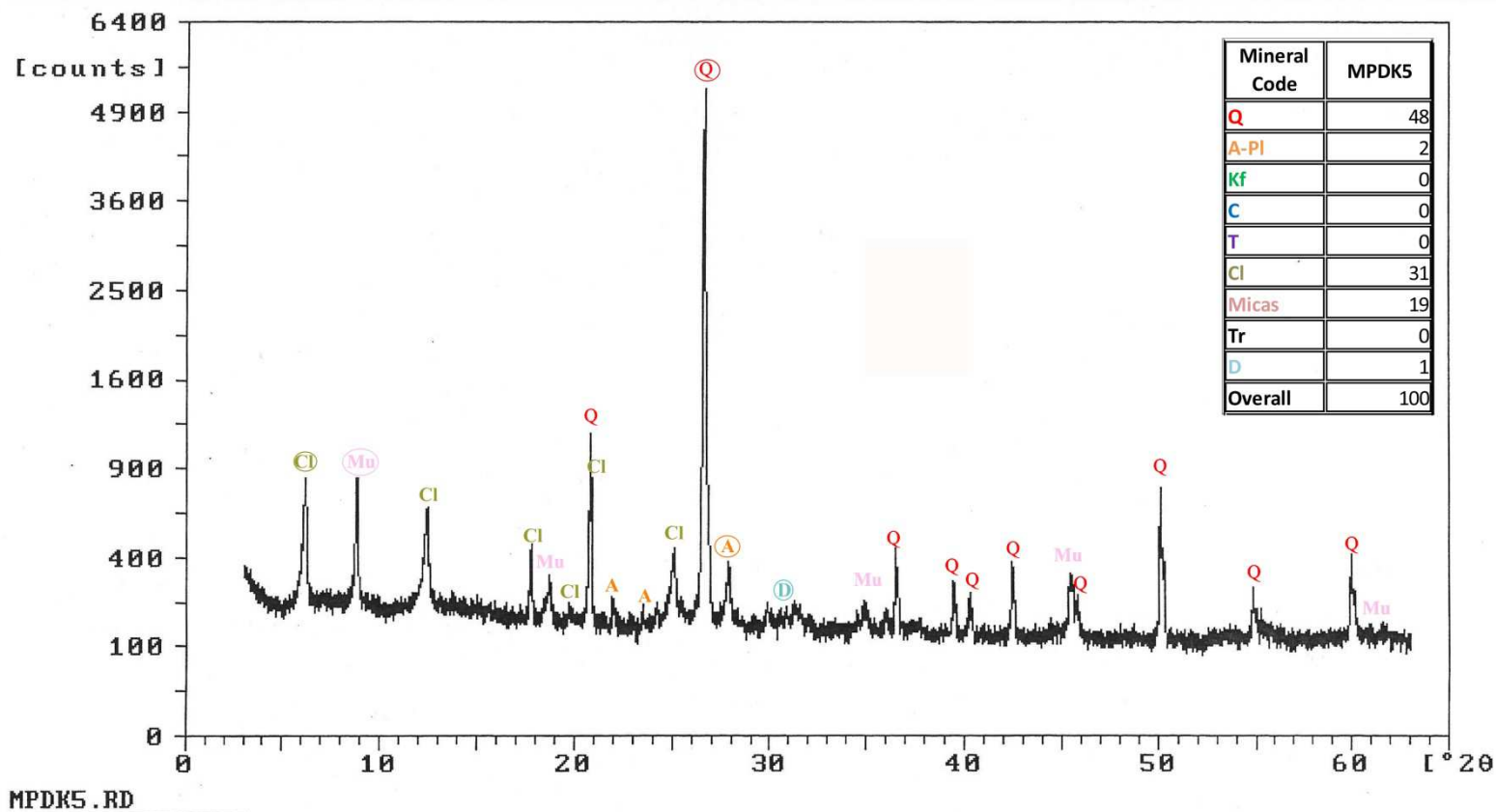


Chart 14 XRD (MPDK5) – Skouries XRD analysis. Sample collected from center of the river bed sediment on 27/05/2010.



SECTION 4

GEOLOGICAL MAPS, WITH THE S6GG GEOLOGICAL CLASSIFICATION, OF STUDYING SITES AND NORTH GREECE IN 6 CLASSES AT SCALE 1:50.000

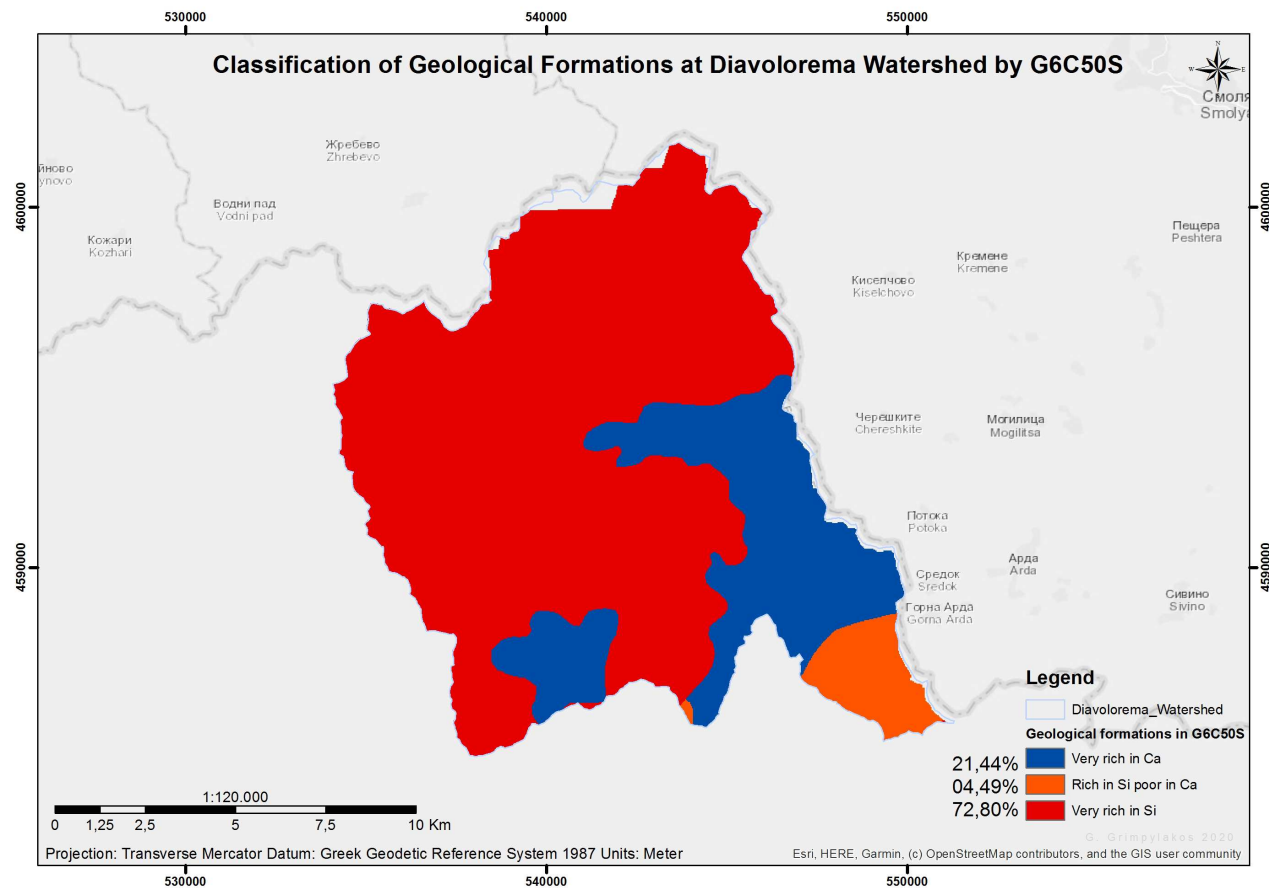


Figure 1G6 – Diavolorema Watershed (DIA). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

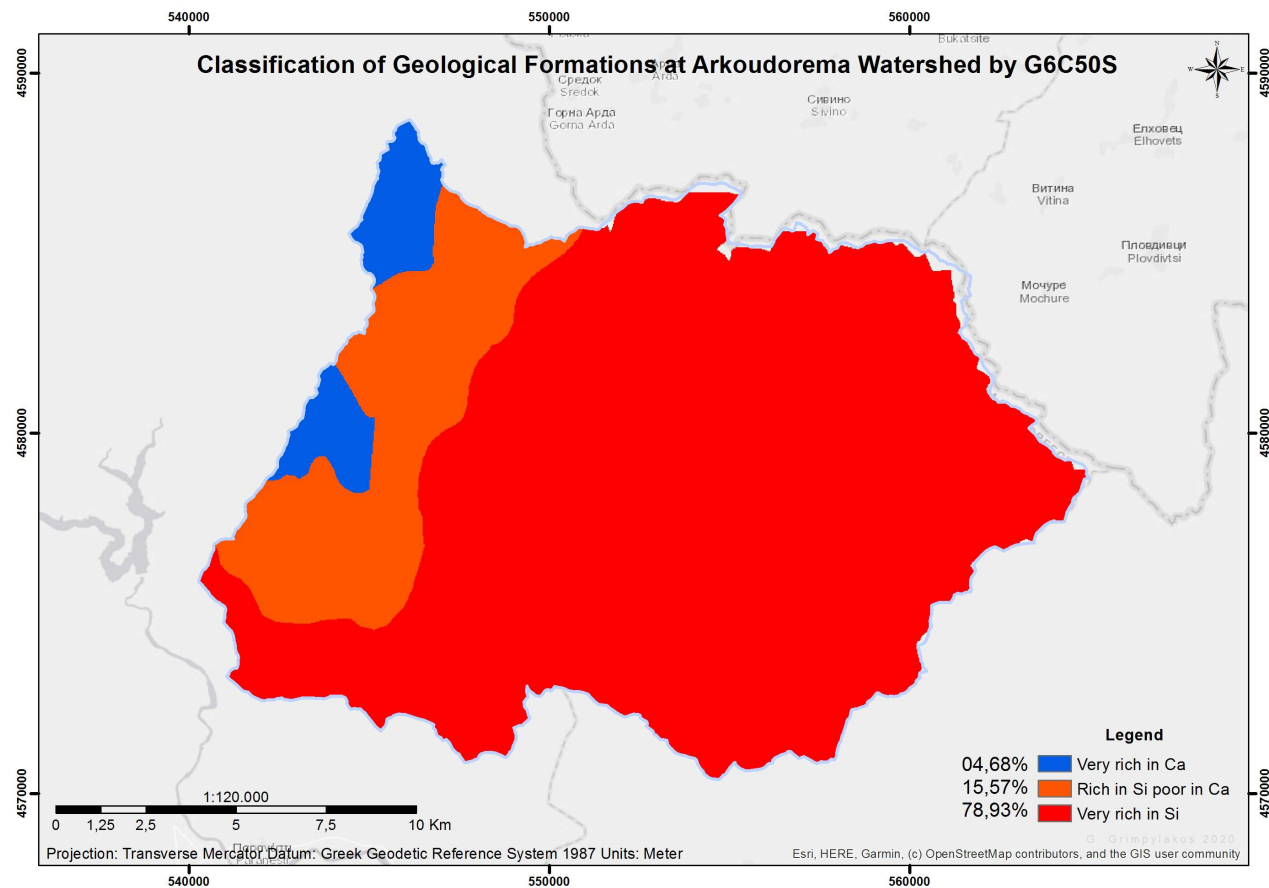


Figure 2G6 – Arkoudorema Watershed (ARK). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

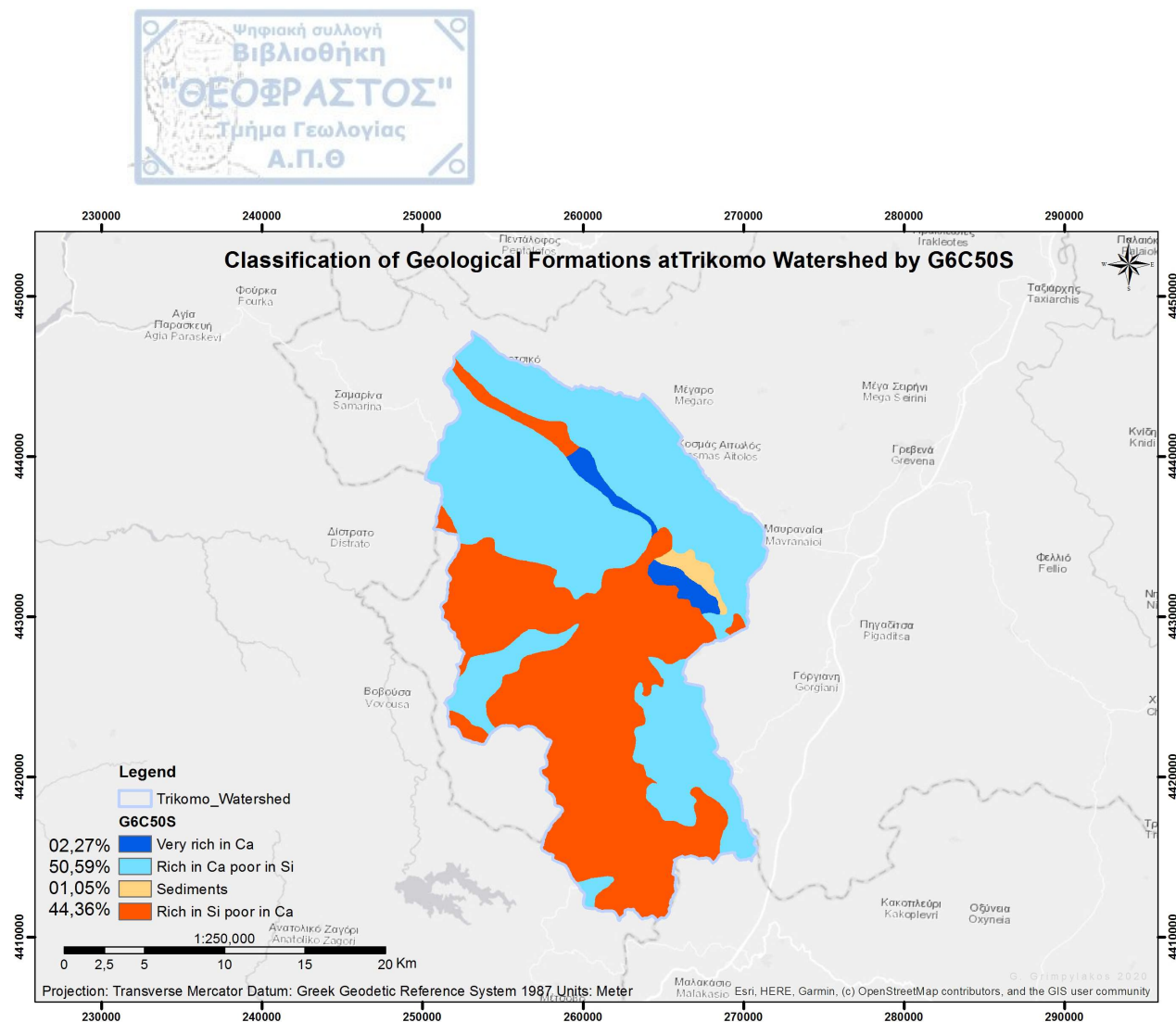


Figure 3G6 – Trikomo Watershed (TRIK). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

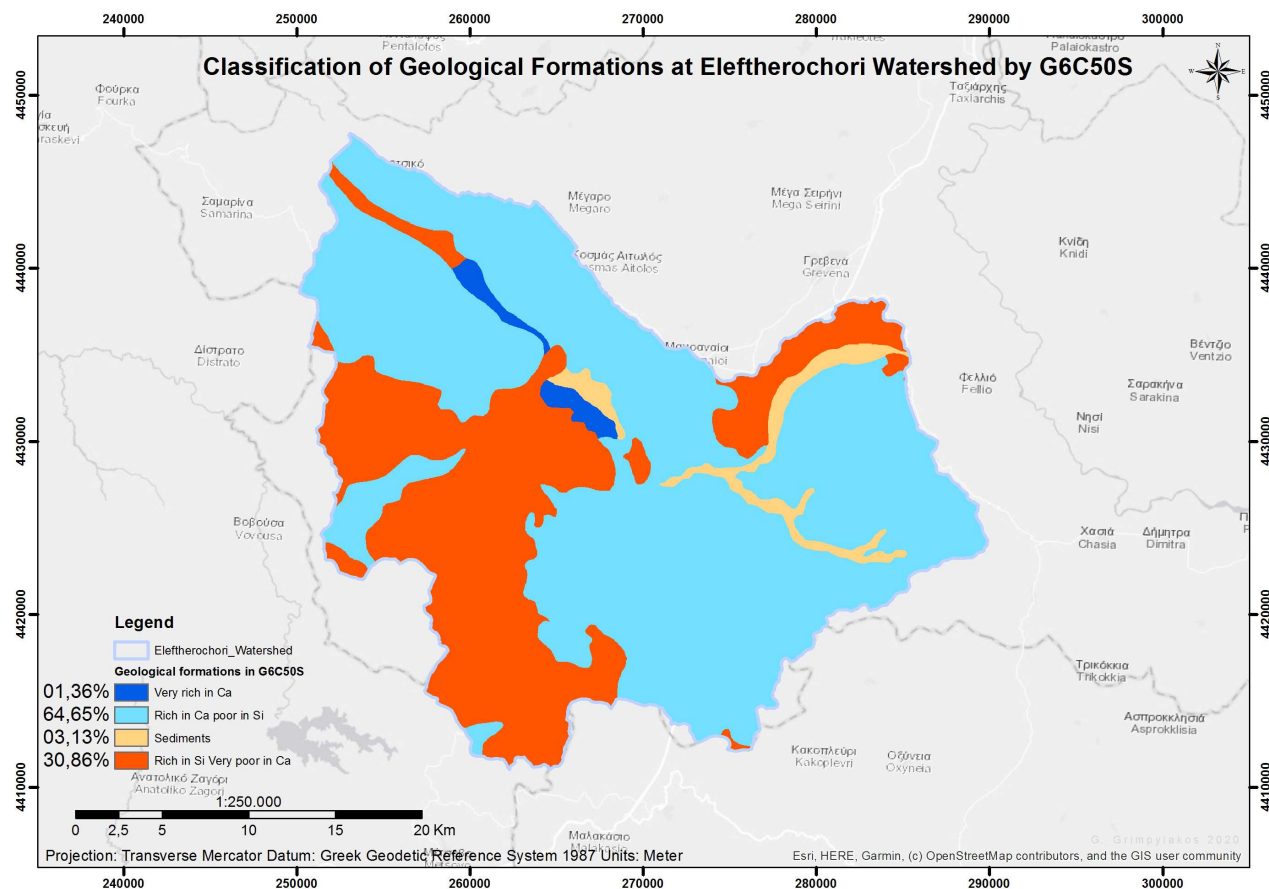


Figure 4G6 – Eleftherochori Watershed (ELEF). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

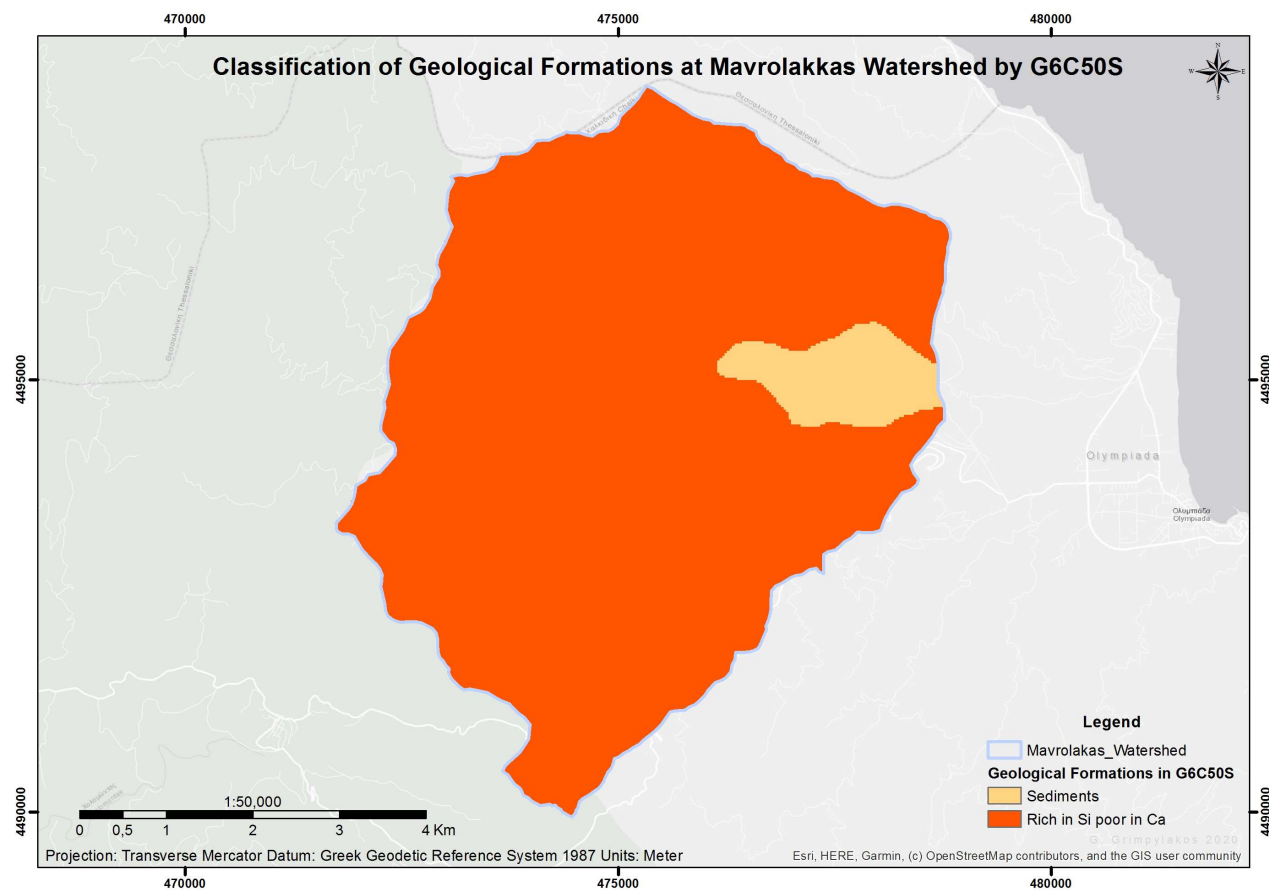


Figure 5G6 – Mavrolakkas Watershed (KAL). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

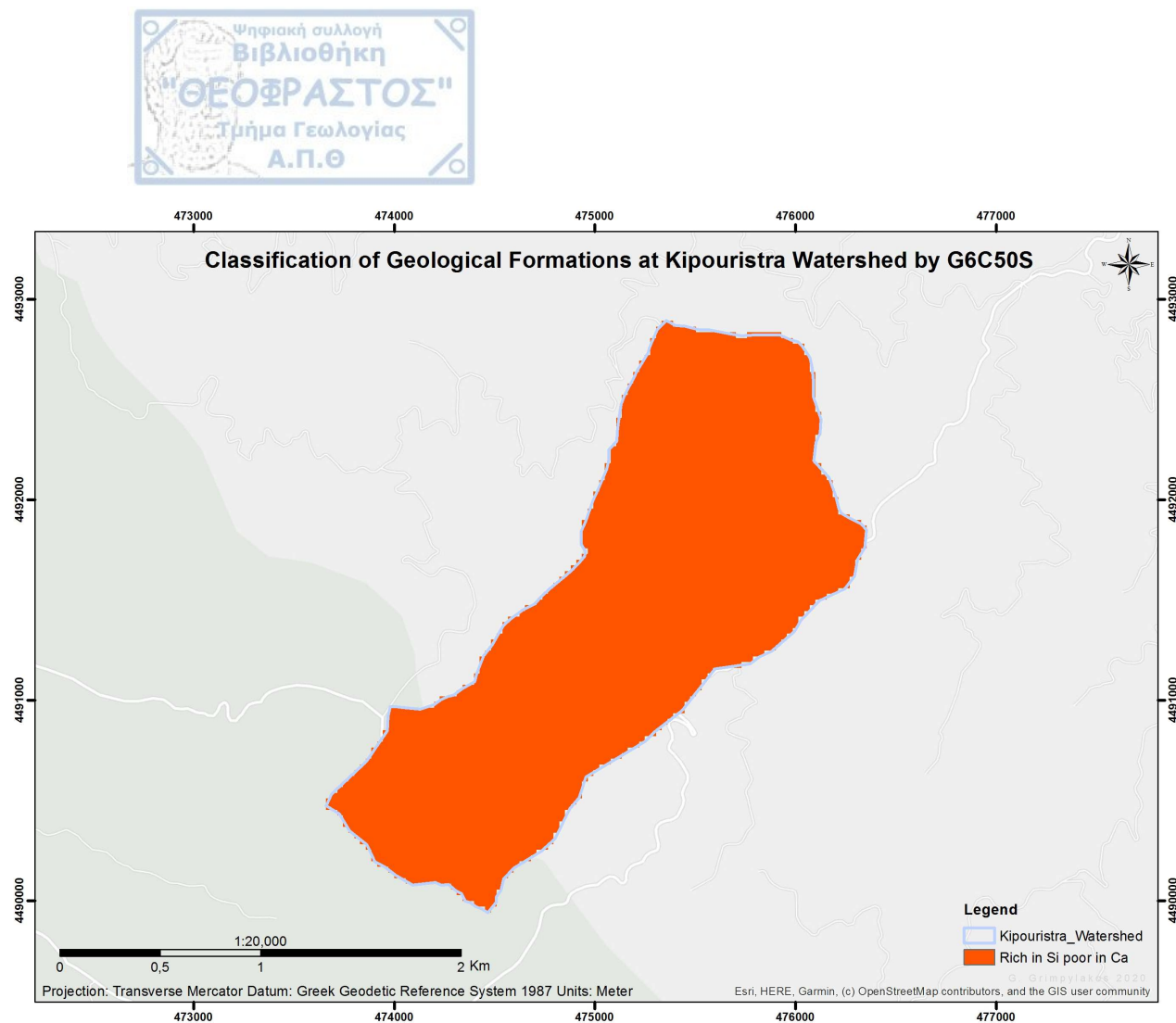


Figure 6G6 – Kipouristra Watershed (OL). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

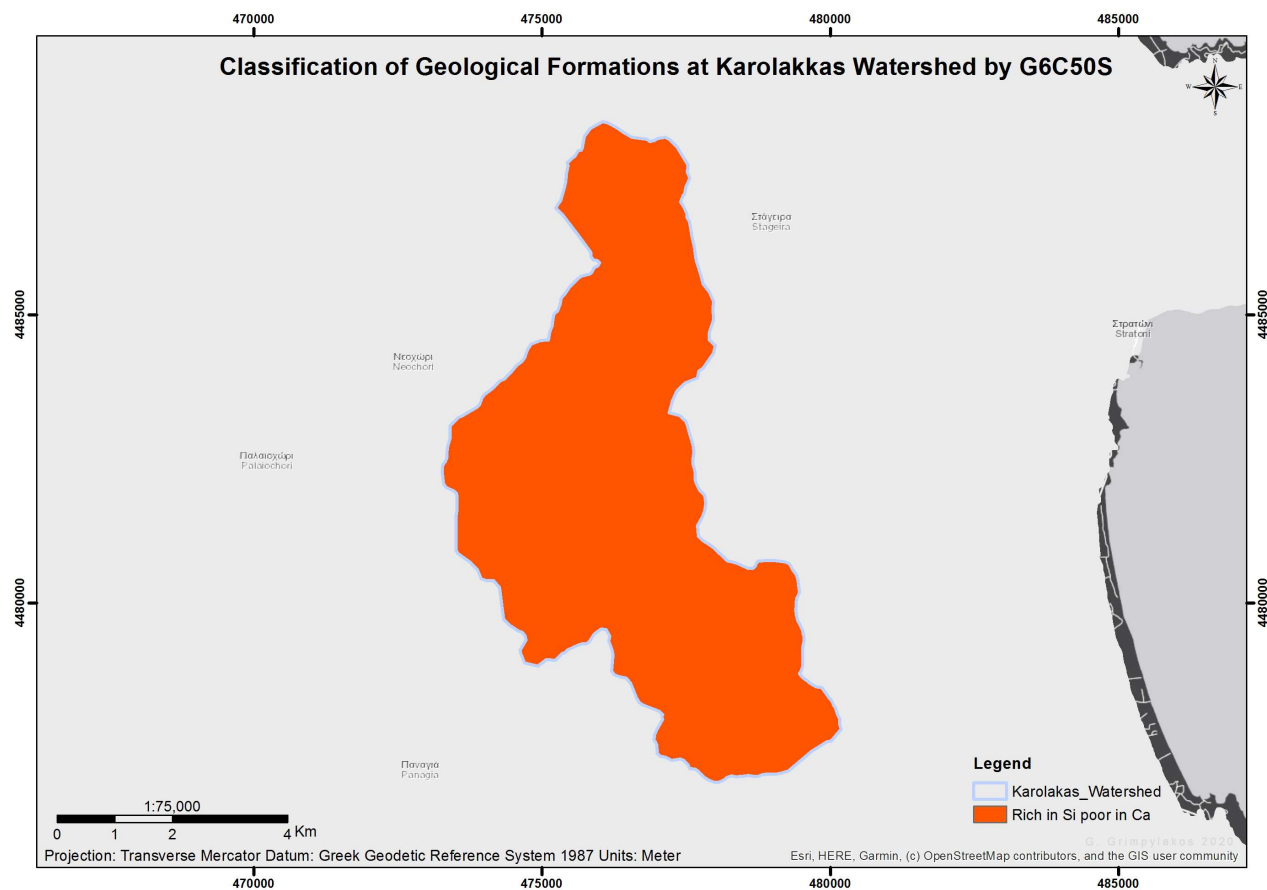


Figure 7G6 – Karolakkas Watershed (KAR). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

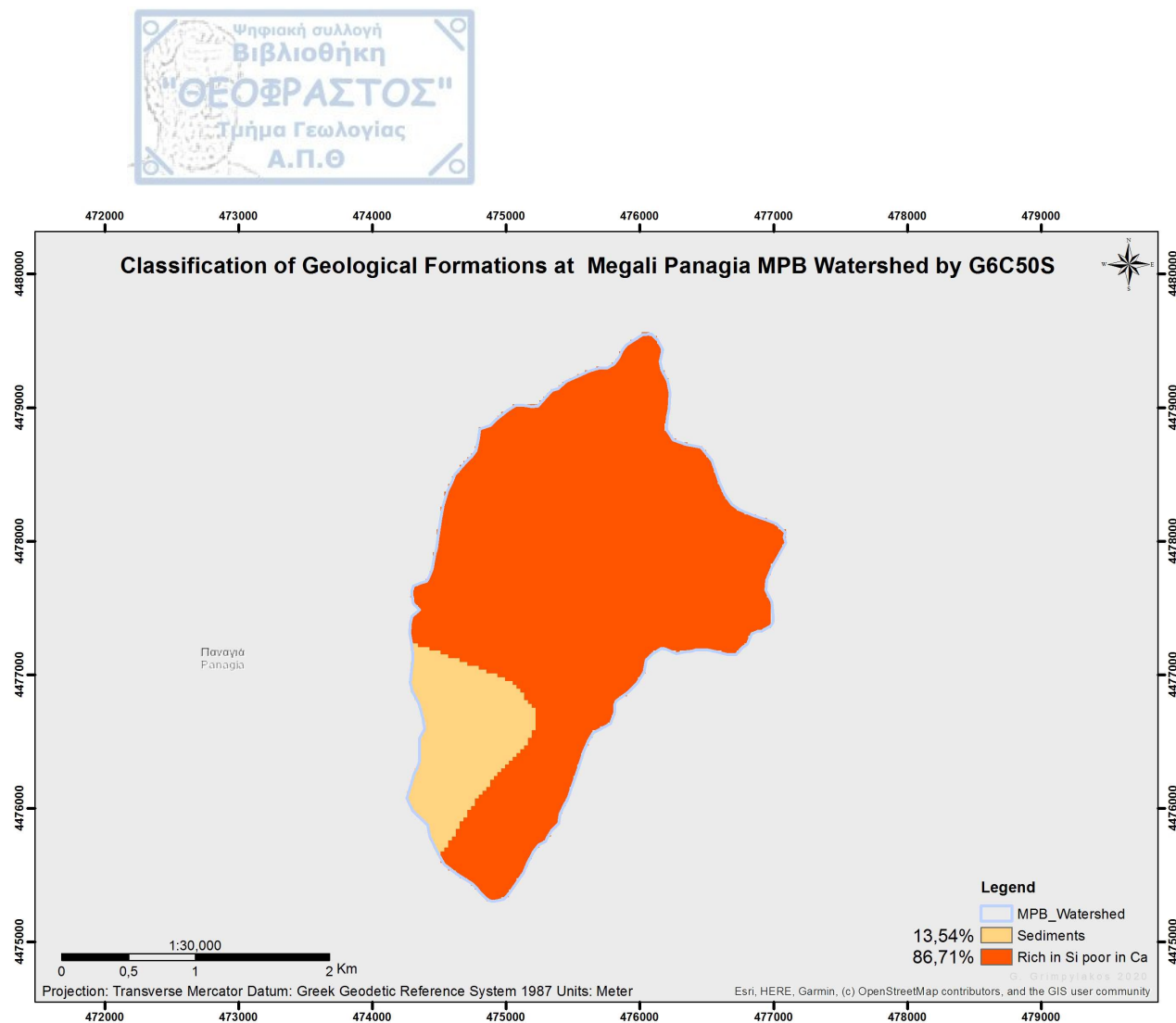


Figure 8G6 – Megali Panagia Watershed (MPB). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

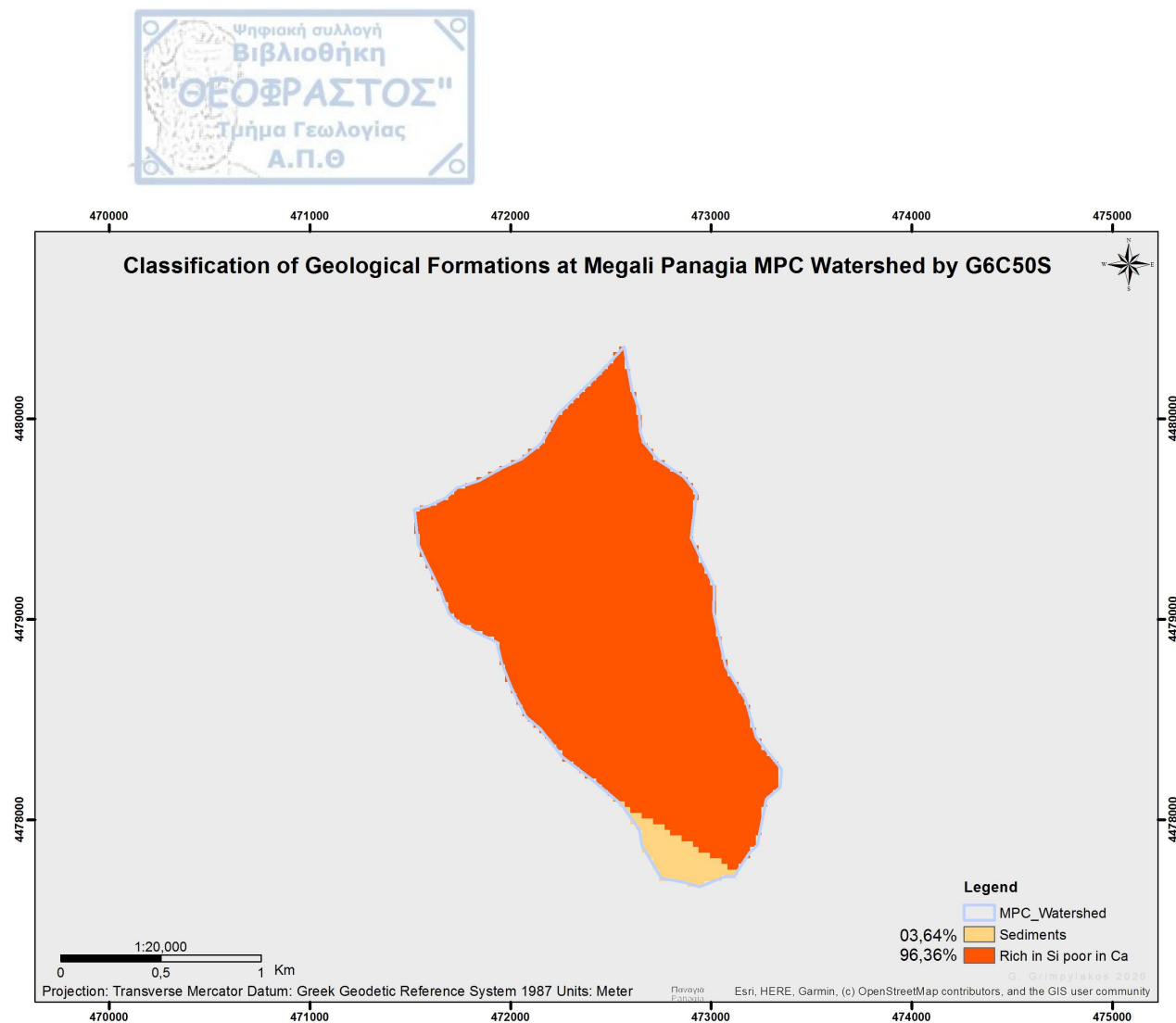


Figure 9G6 – Skouries Watershed (MPC). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

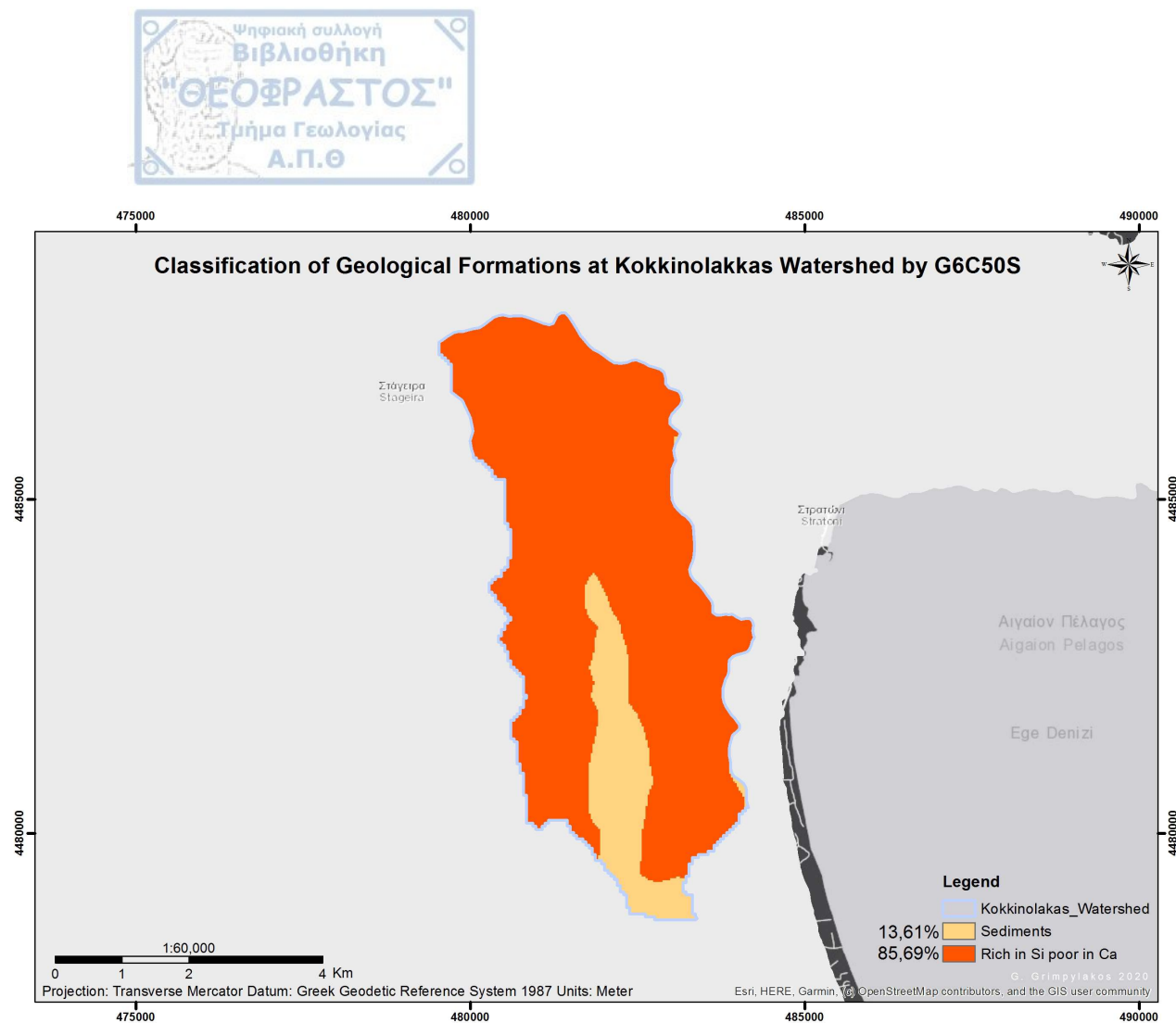


Figure 10G6 – Kokkinolakkas Ierissos Watershed (KOK). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

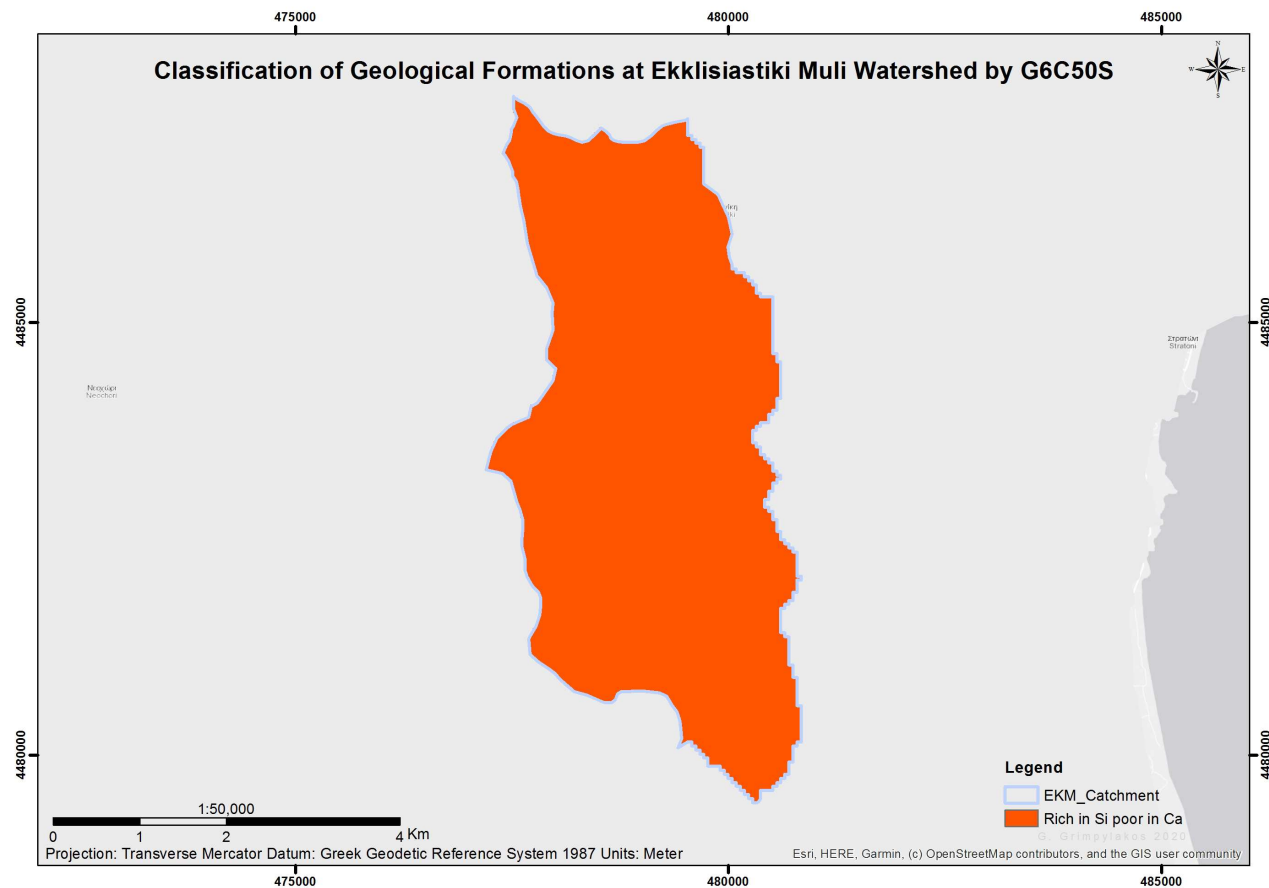


Figure 11G6 – Ekklesiastikoi Muli Ierissos Watershed (EKM). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

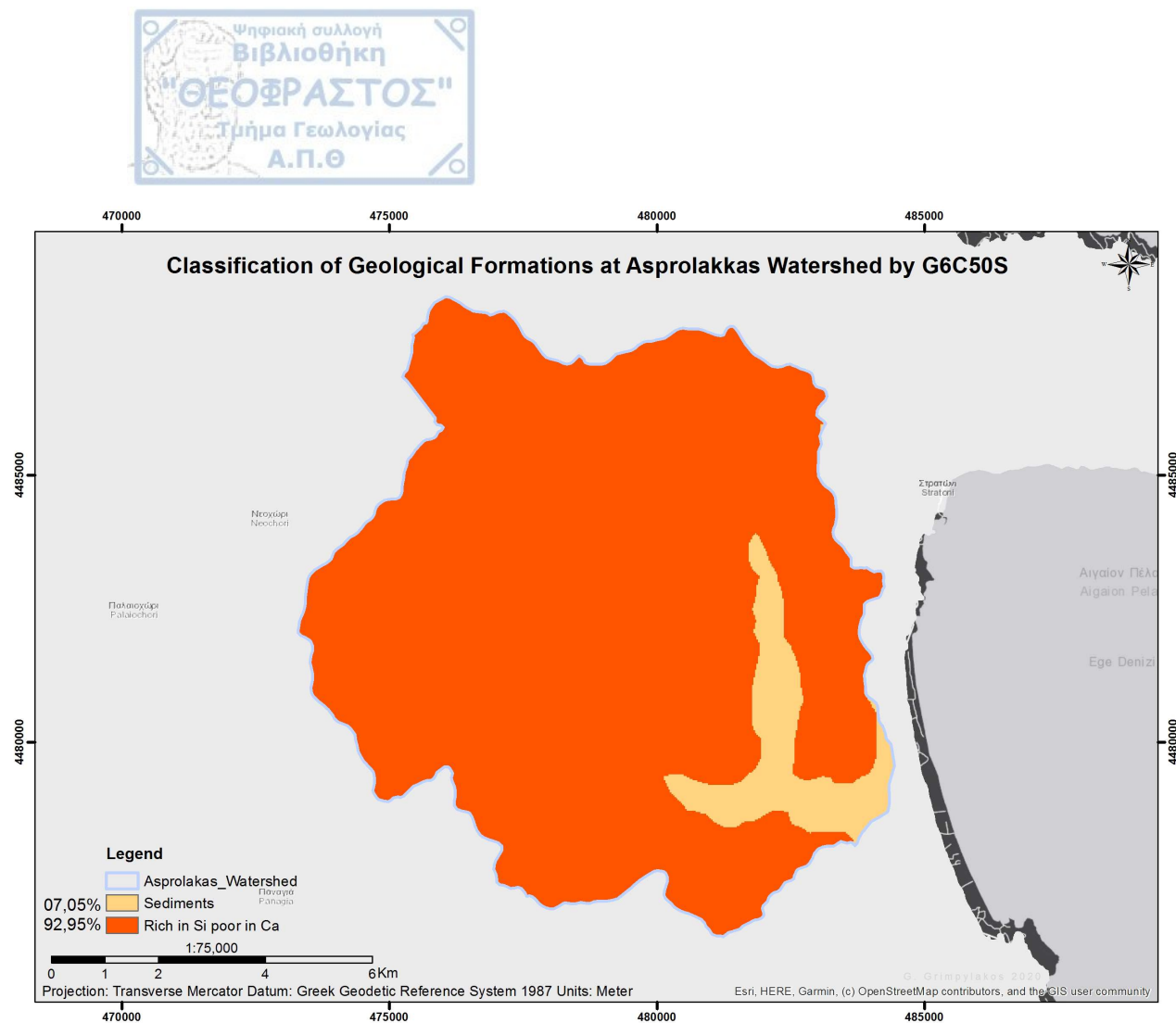


Figure 12G6 – Asprolakkas Watershed (ASPR). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

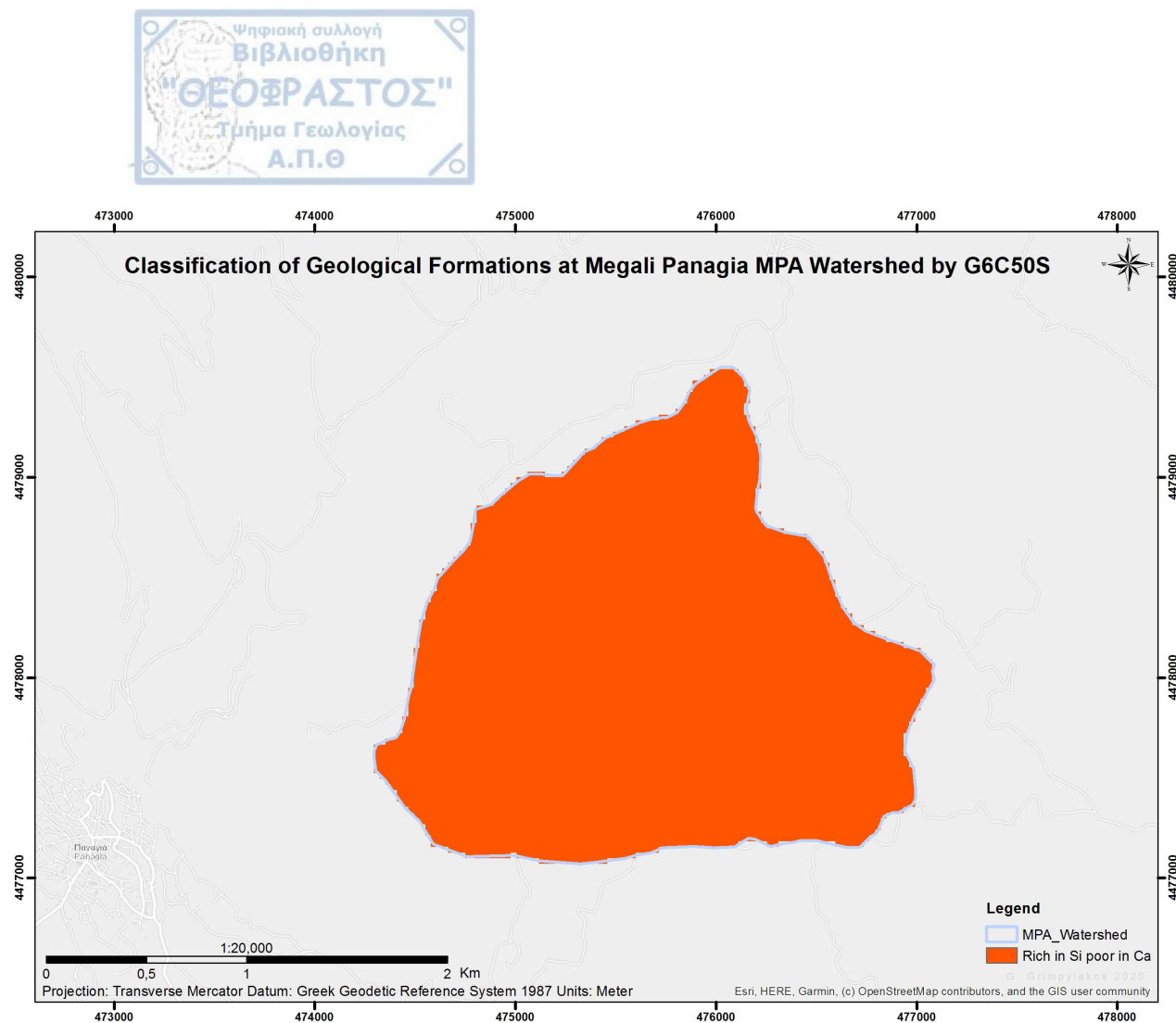


Figure 13G6 – Megali Panagia Watershed (MPA). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

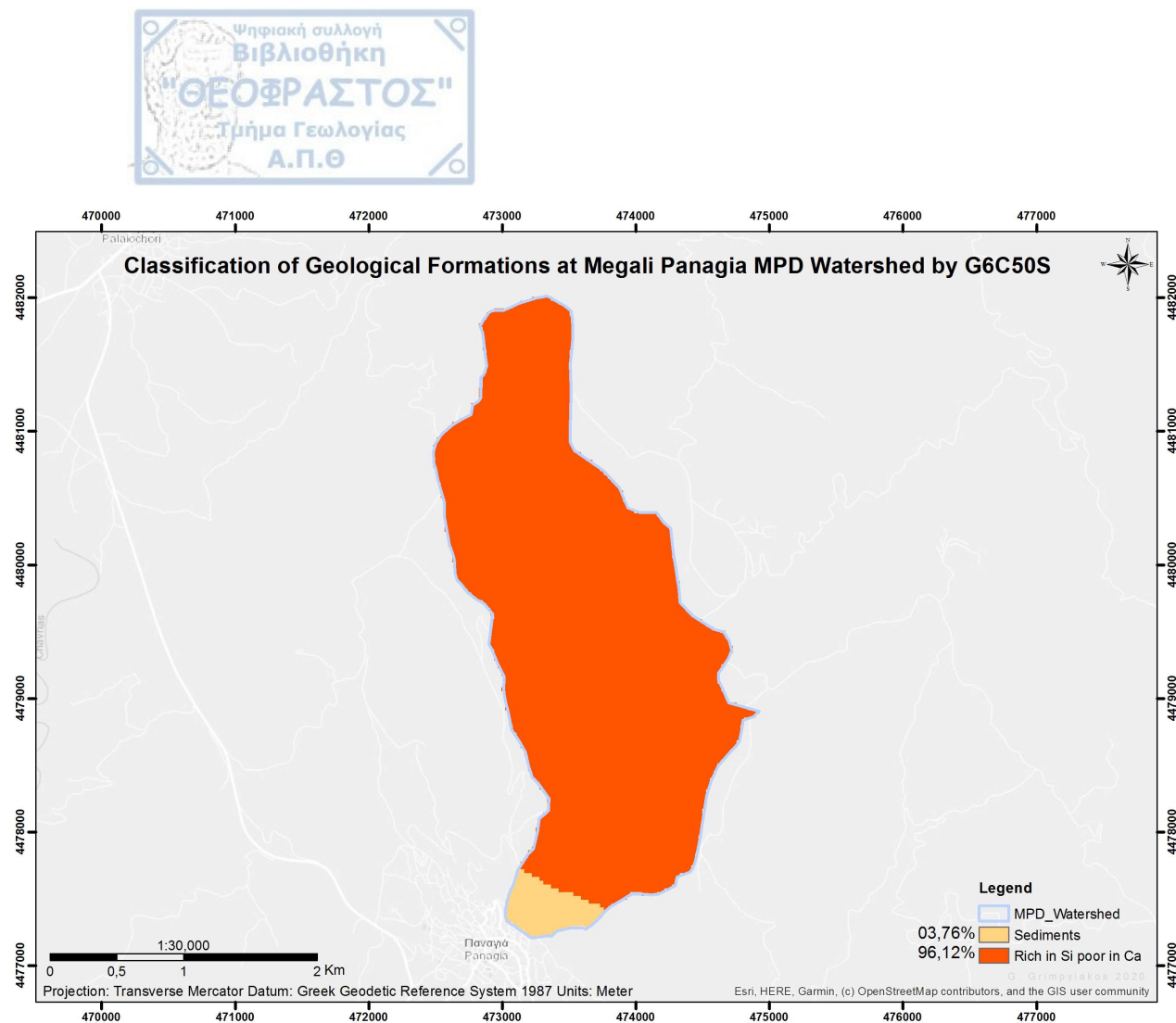


Figure 14G6 – Skouries Watershed (MPD). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

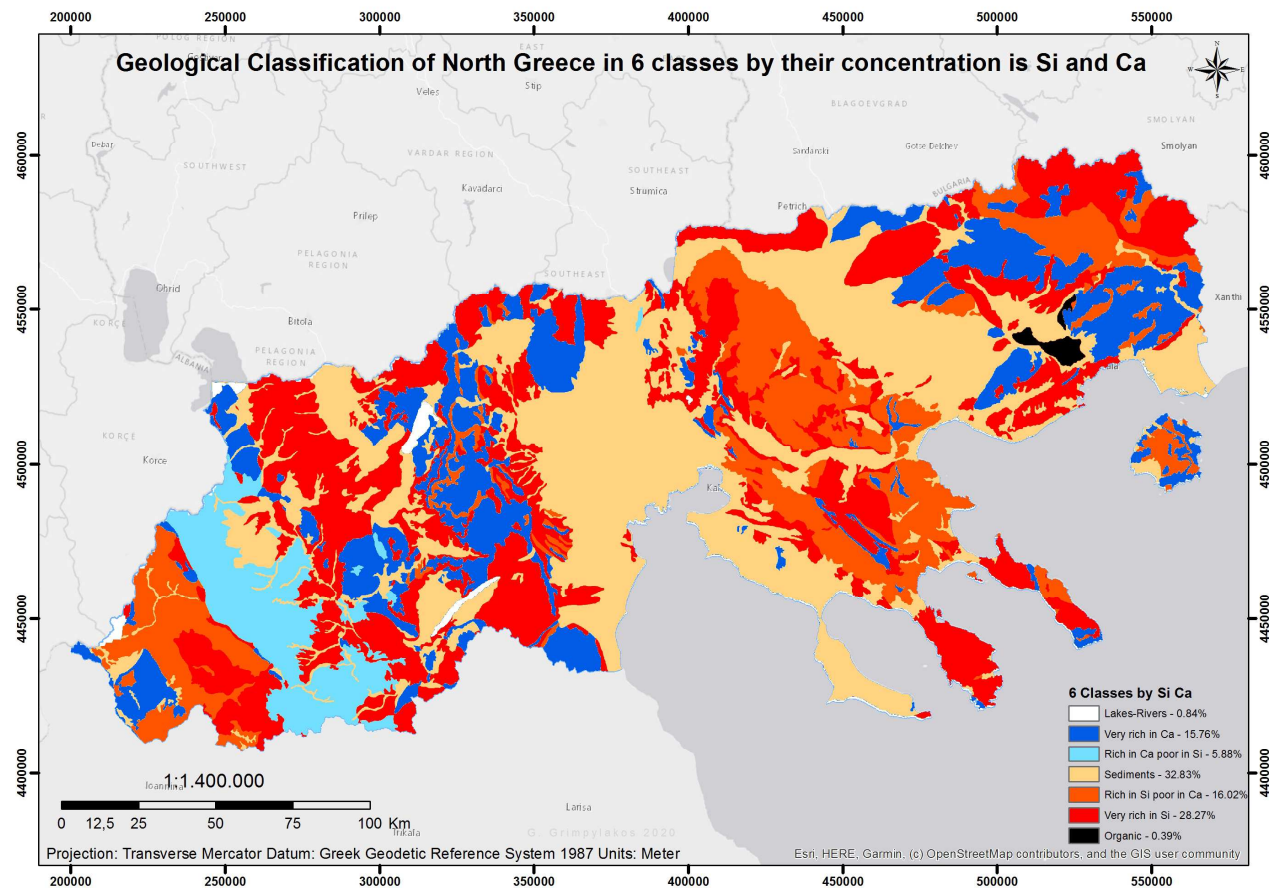


Figure 15G6a – Macedonia Watershed (MAC). Classification of geology in six classes according to Ca and Si concentration, cell size 50 meters (Grimpylakos 2017).

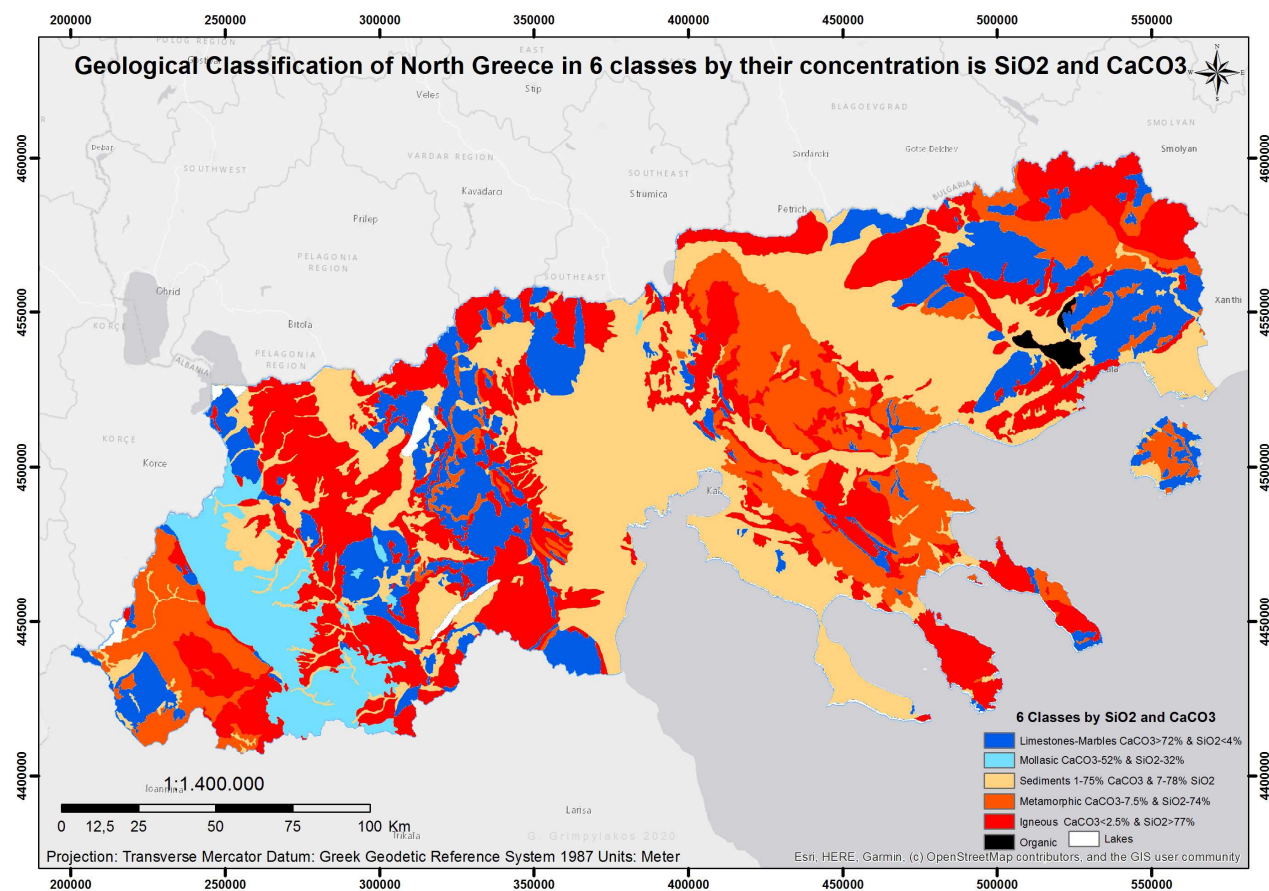


Figure 15G6b – Macedonia Watershed (MAC). Classification of geology in six classes according to CaCO₃ and SiO₂ estimated concentration, cell size 50 meters.



APPENDIX II

HYDROMORPHOLOGICAL AND SEDIMENTOLOGICAL ANALYSIS



SECTION 1

**DIGITIZED HYDROGRAPHIC NETWORK
DERIVED FROM TOPOGRAPHIC MAPS AT
SCALE 1:50.000**

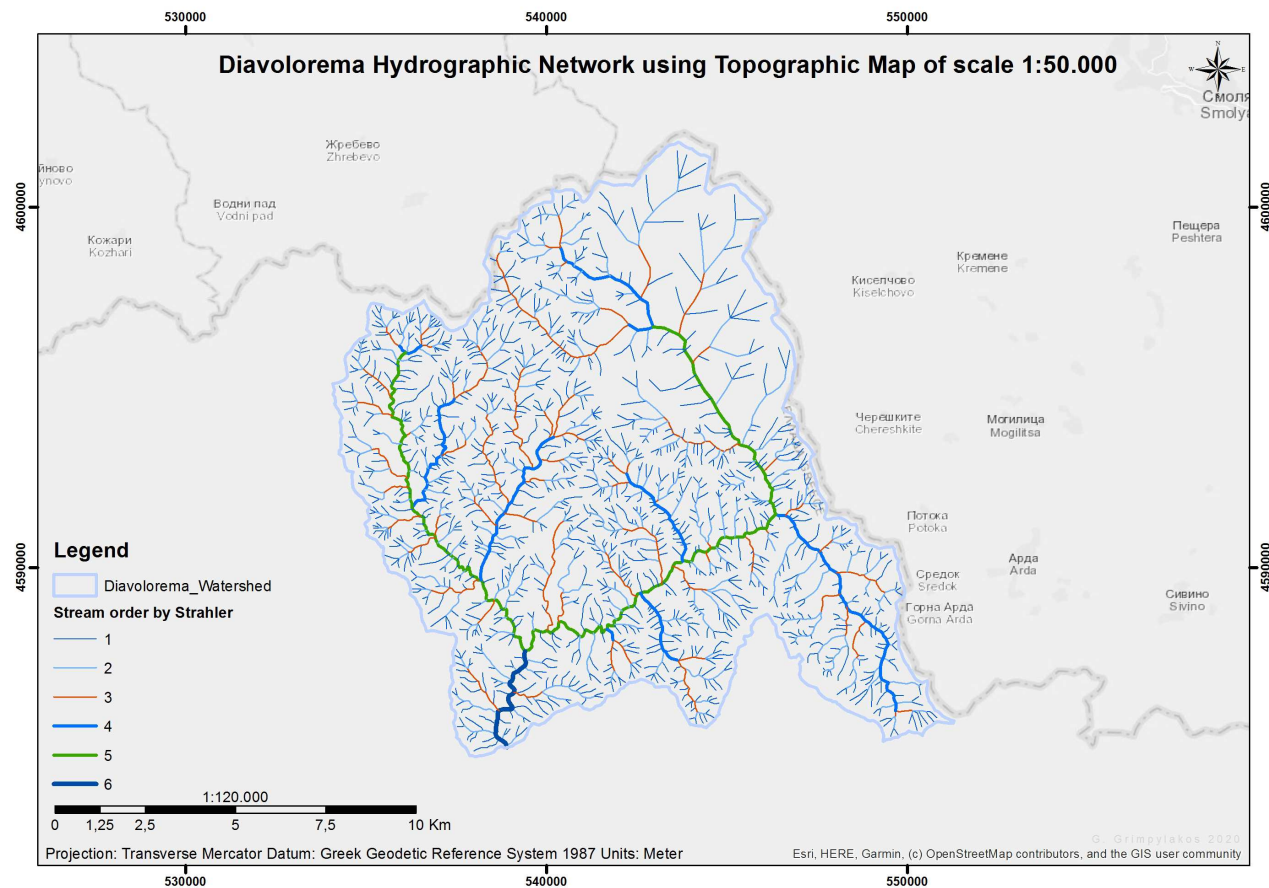


Figure 1HNT – Diavolorema’s watershed and hydrographic network digitized on topographic maps of scale 1:50.000.

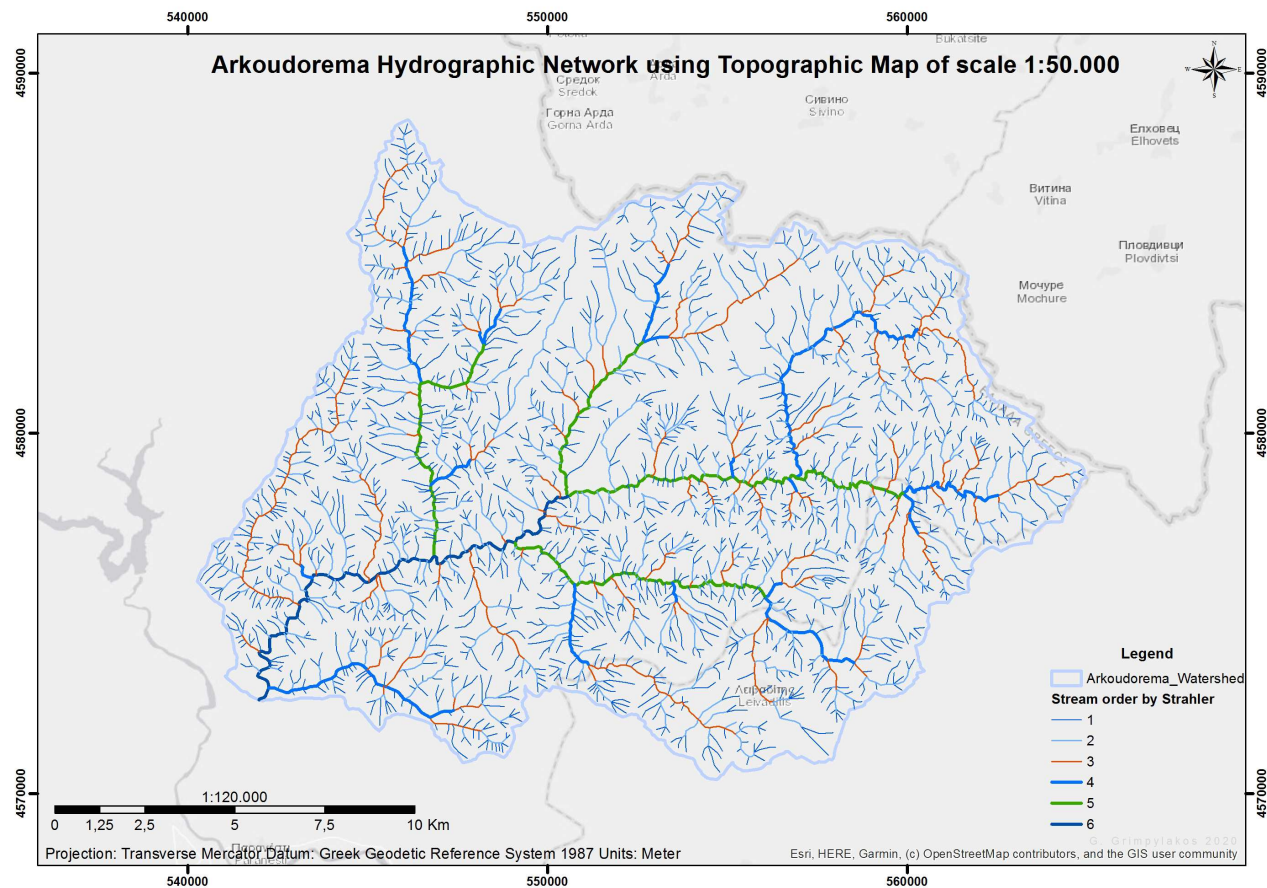


Figure 2HNT – Arkoudorema’s watershed and hydrographic network digitized on topographic maps of scale 1:50.000.

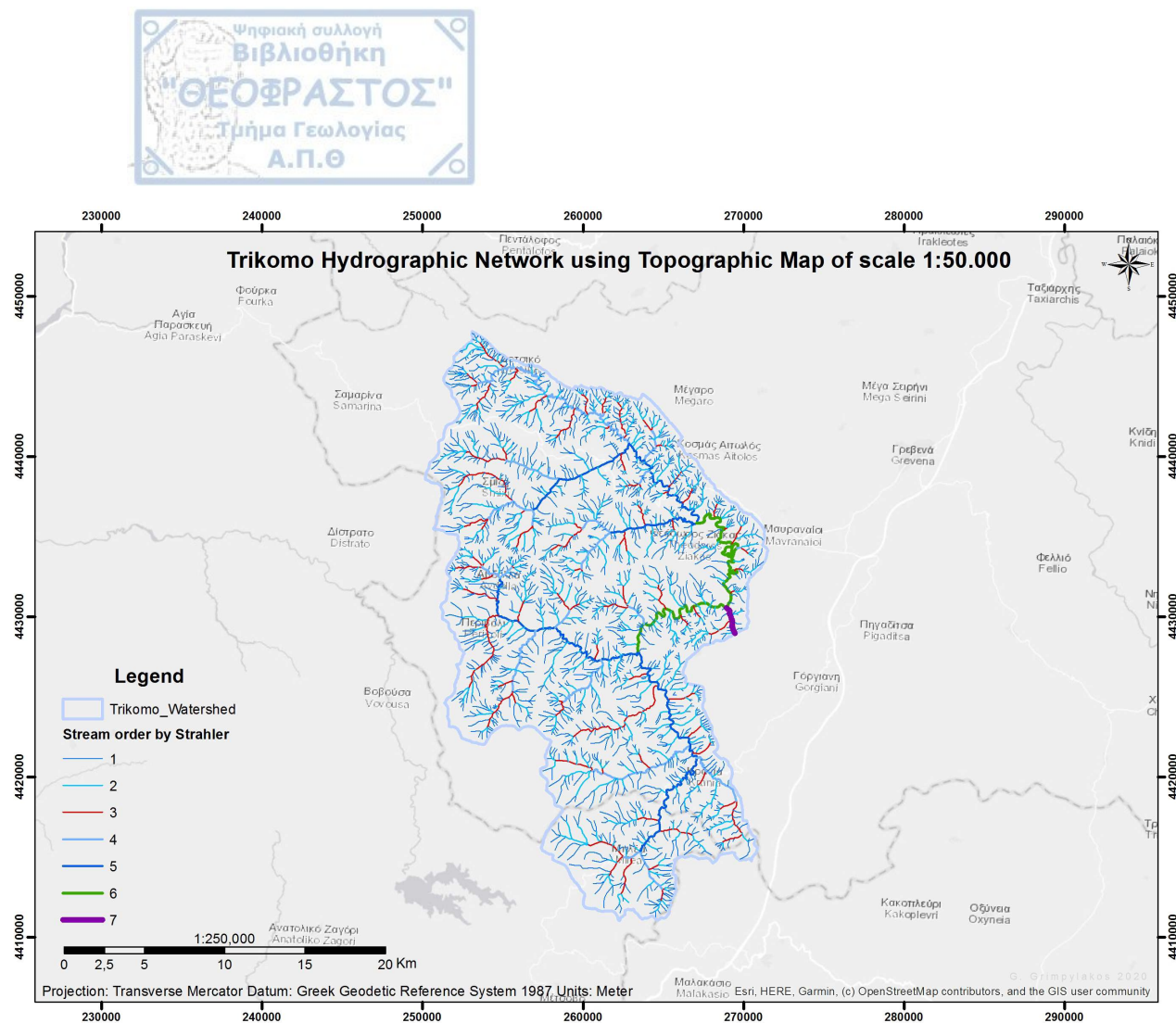


Figure 3HNT – Trikomo’s watershed and hydrographic network digitized on topographic maps of scale 1:50.000.

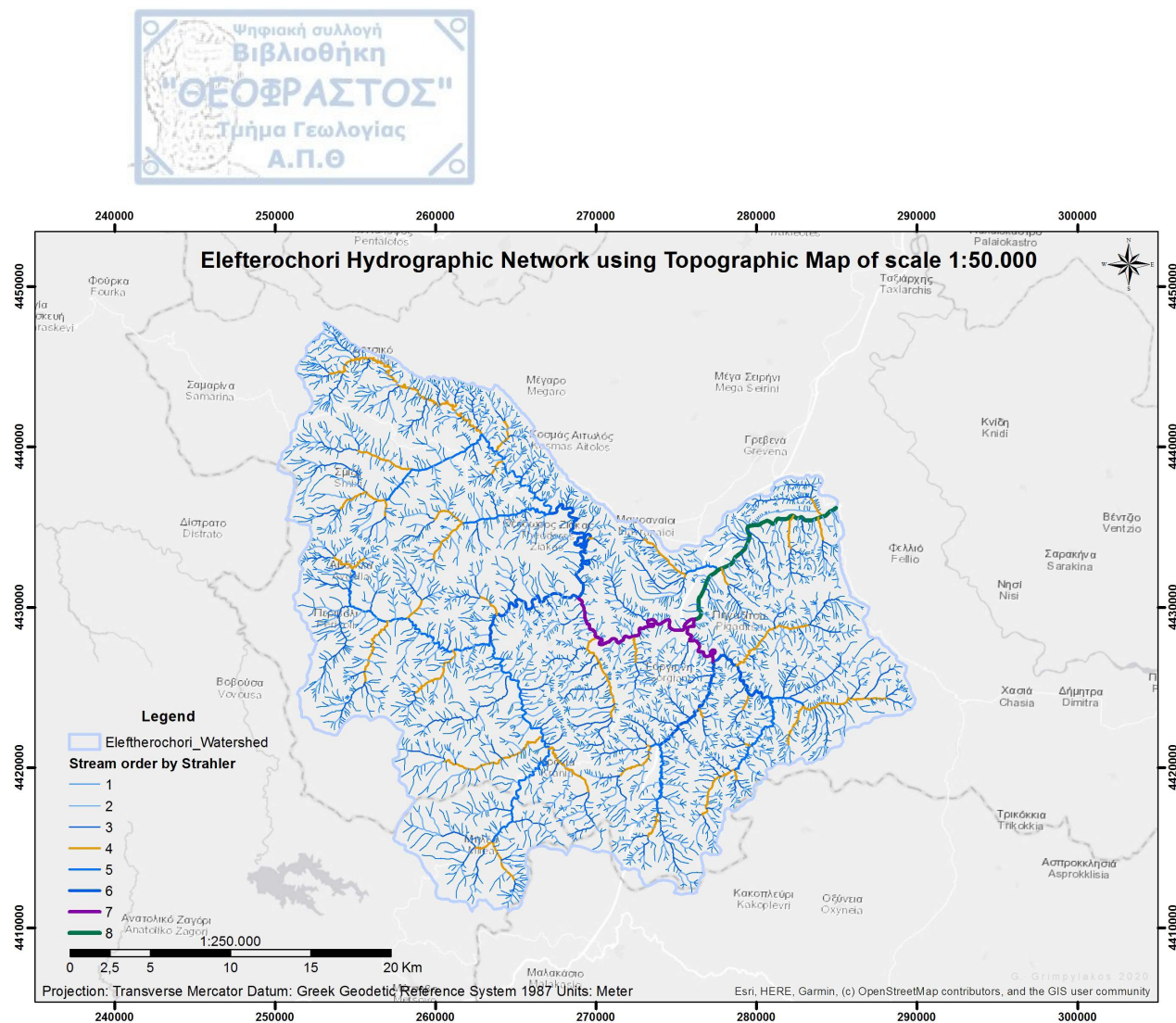


Figure 4HNT – Eleftherochori watershed and hydrographic network digitized on topographic maps of scale 1:50.000.

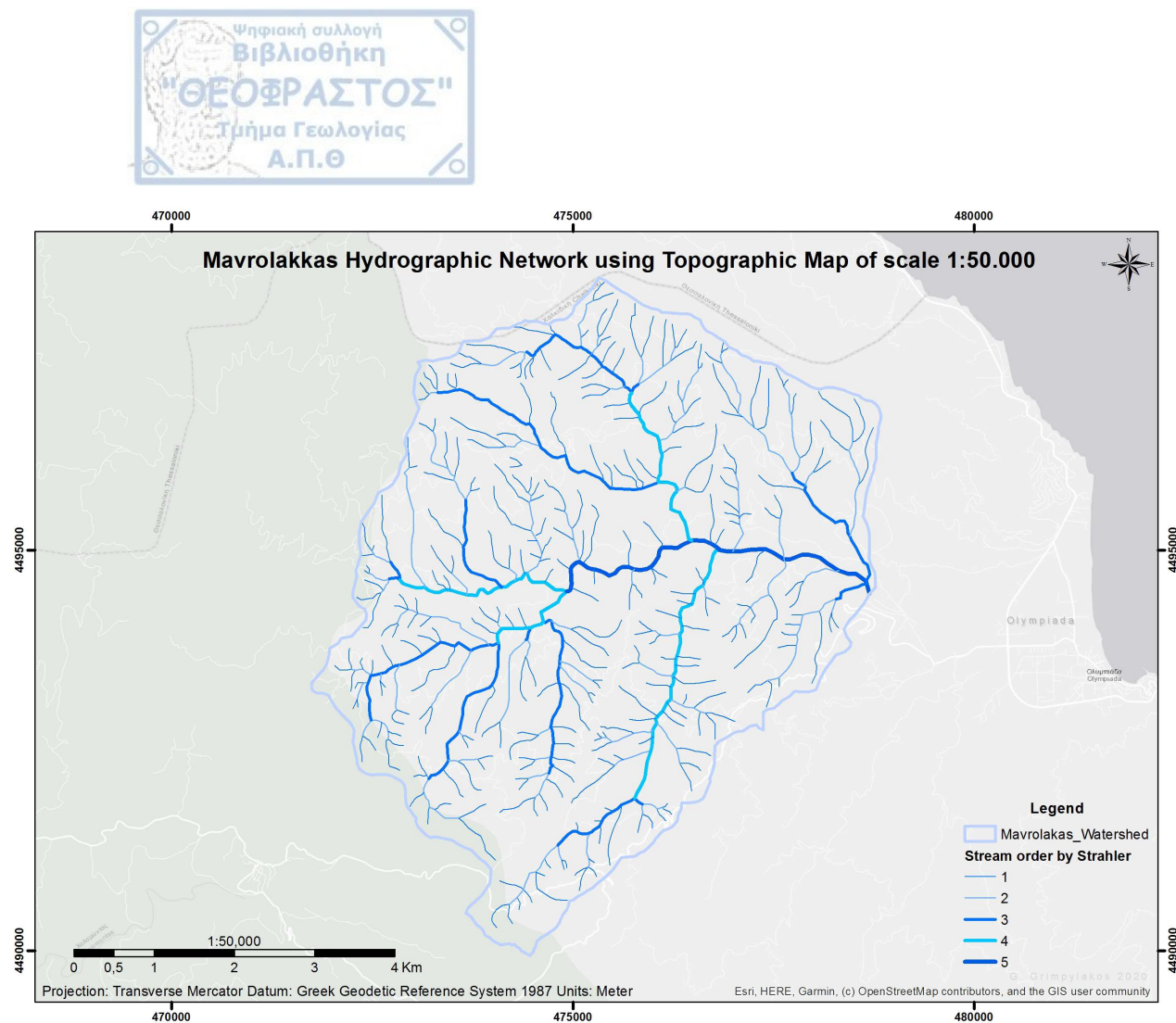


Figure 5HNT – Mavrolakas watershed and hydrographic network digitized on topographic maps of scale 1:50.000.

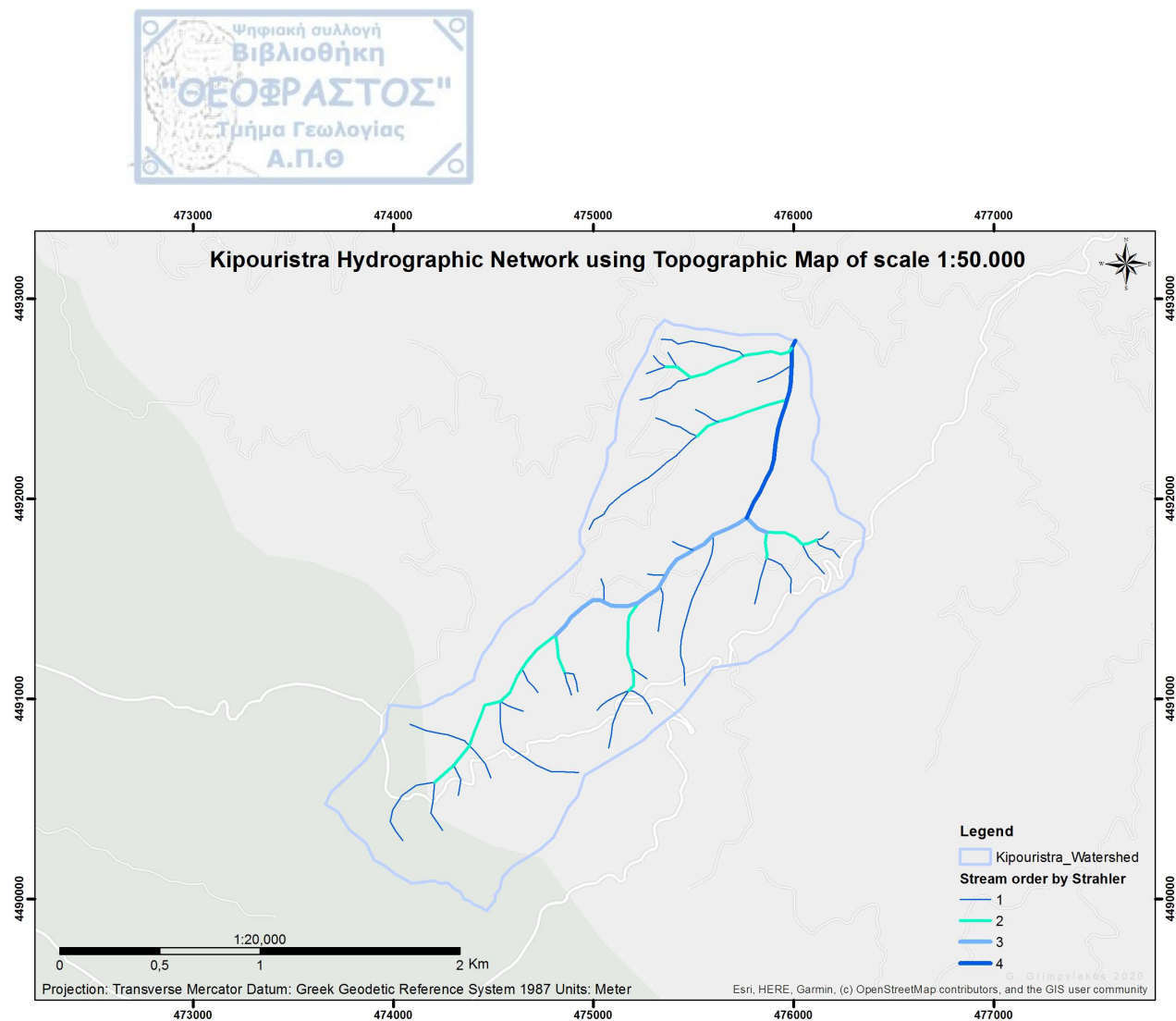


Figure 6HNT – Kipouristra watershed and hydrographic network digitized on topographic maps of scale 1:50.000.

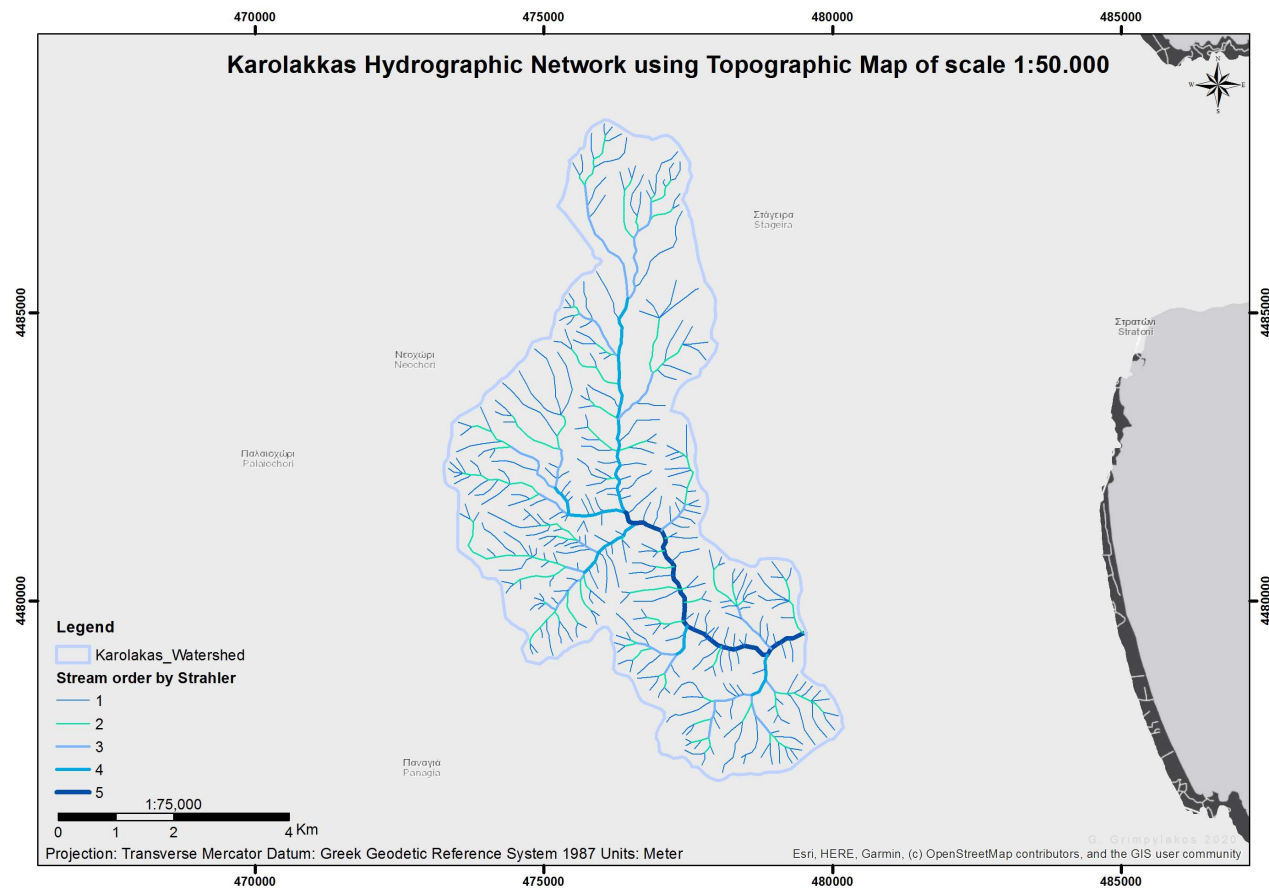


Figure 7HNT – Karolakas watershed and hydrographic network digitized on topographic maps of scale 1:50.000.

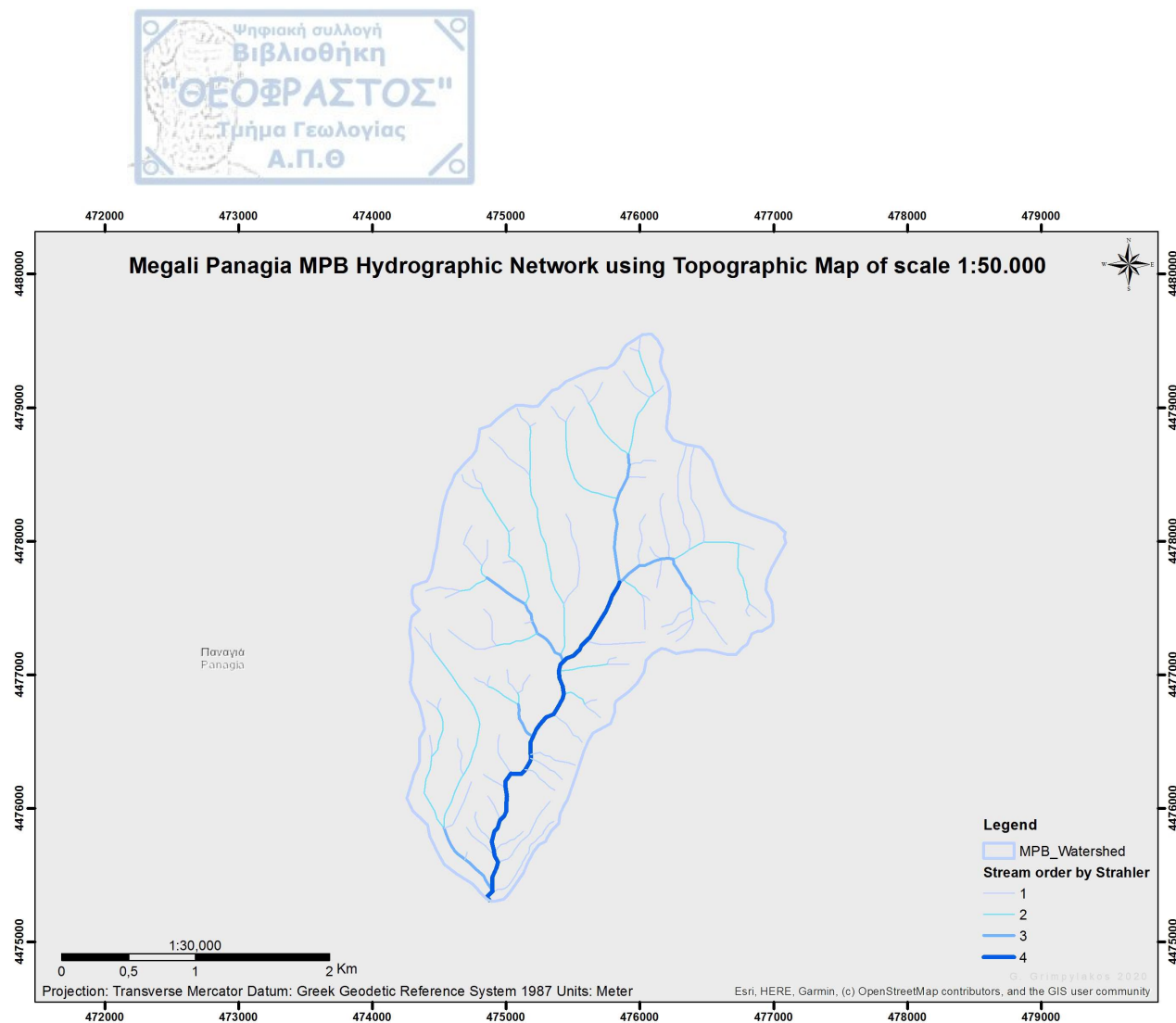


Figure 8HNT – Megali Panagia Watershed (MPB) and hydrographic network digitized on topographic maps of scale 1:50.000.

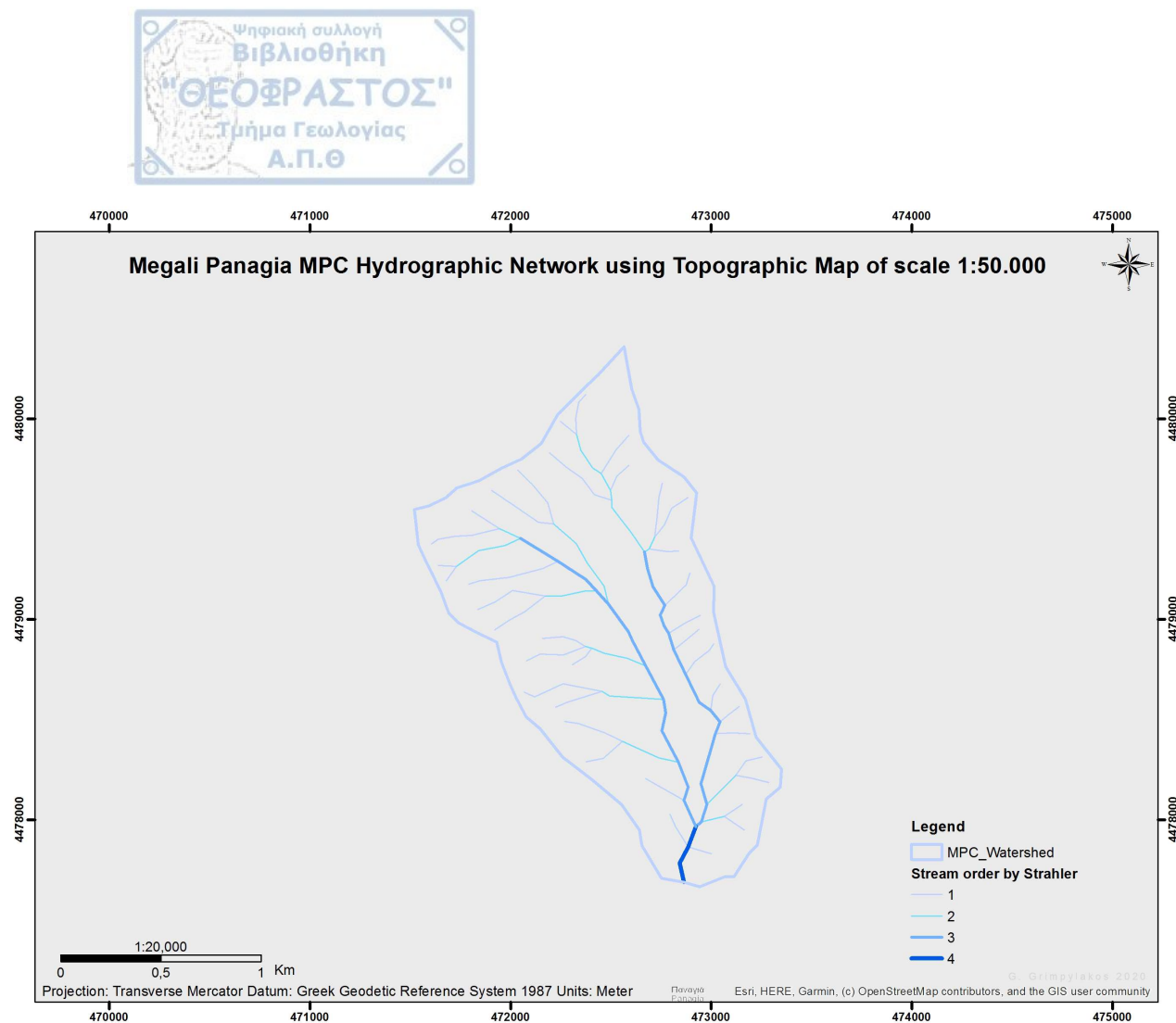


Figure 9HNT – Skouries Watershed (MPC) and hydrographic network digitized on topographic maps of scale 1:50.000.

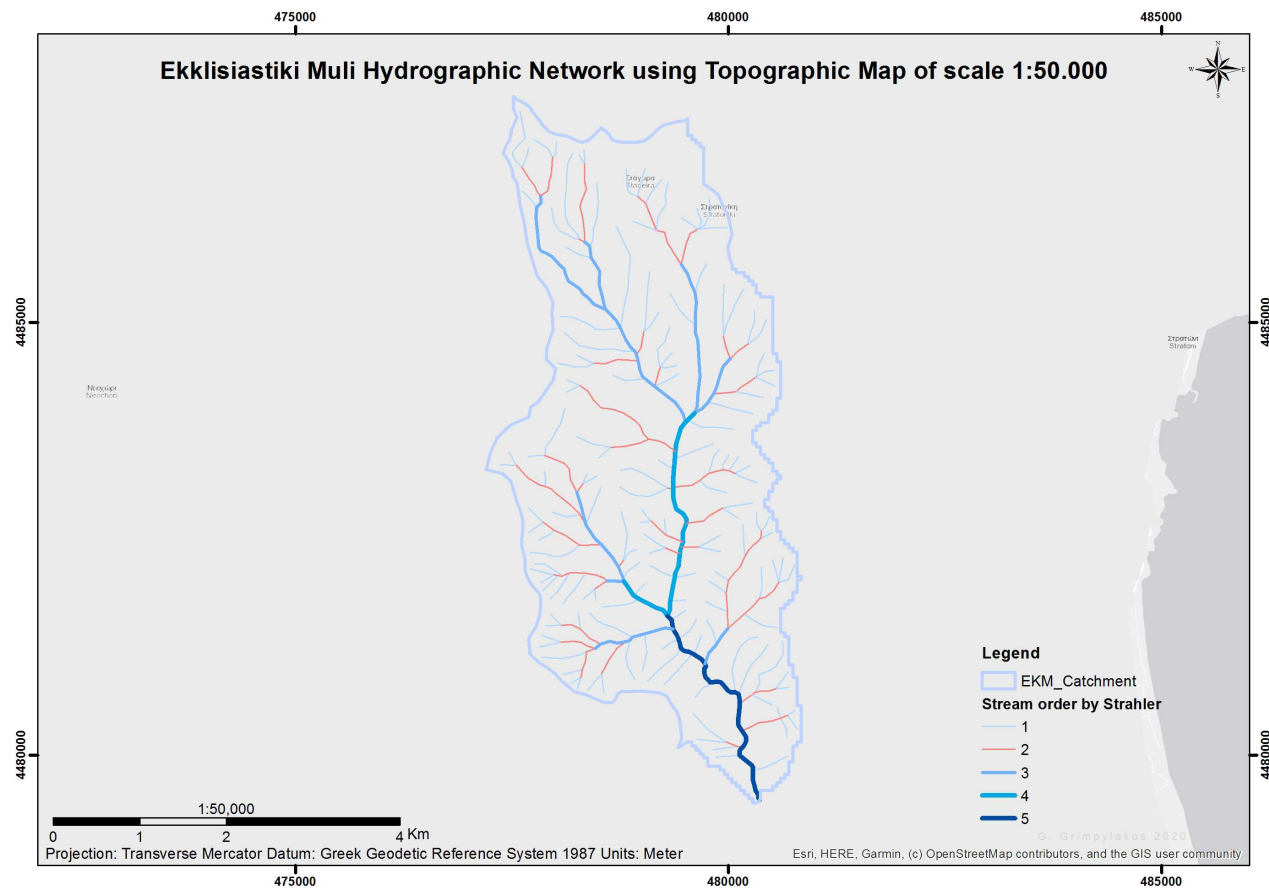


Figure 11HNT – Ekklesiastikoi Muli Ierissos Watershed (EKM) and hydrographic network digitized on topographic maps of scale 1:50.000.

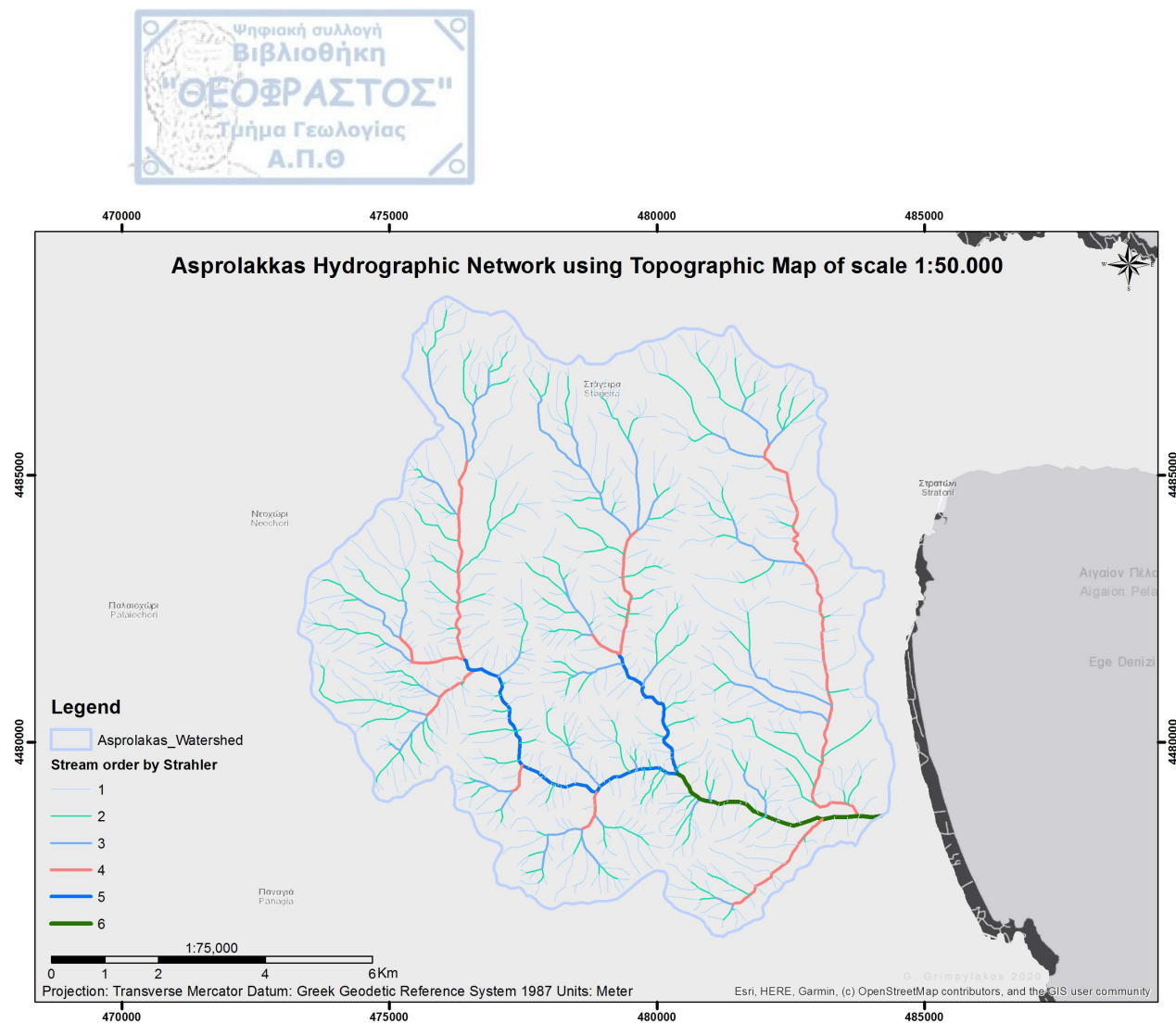


Figure 12HNT – Asprolakkas Watershed (ASPR) and hydrographic network digitized on topographic maps of scale 1:50.000.

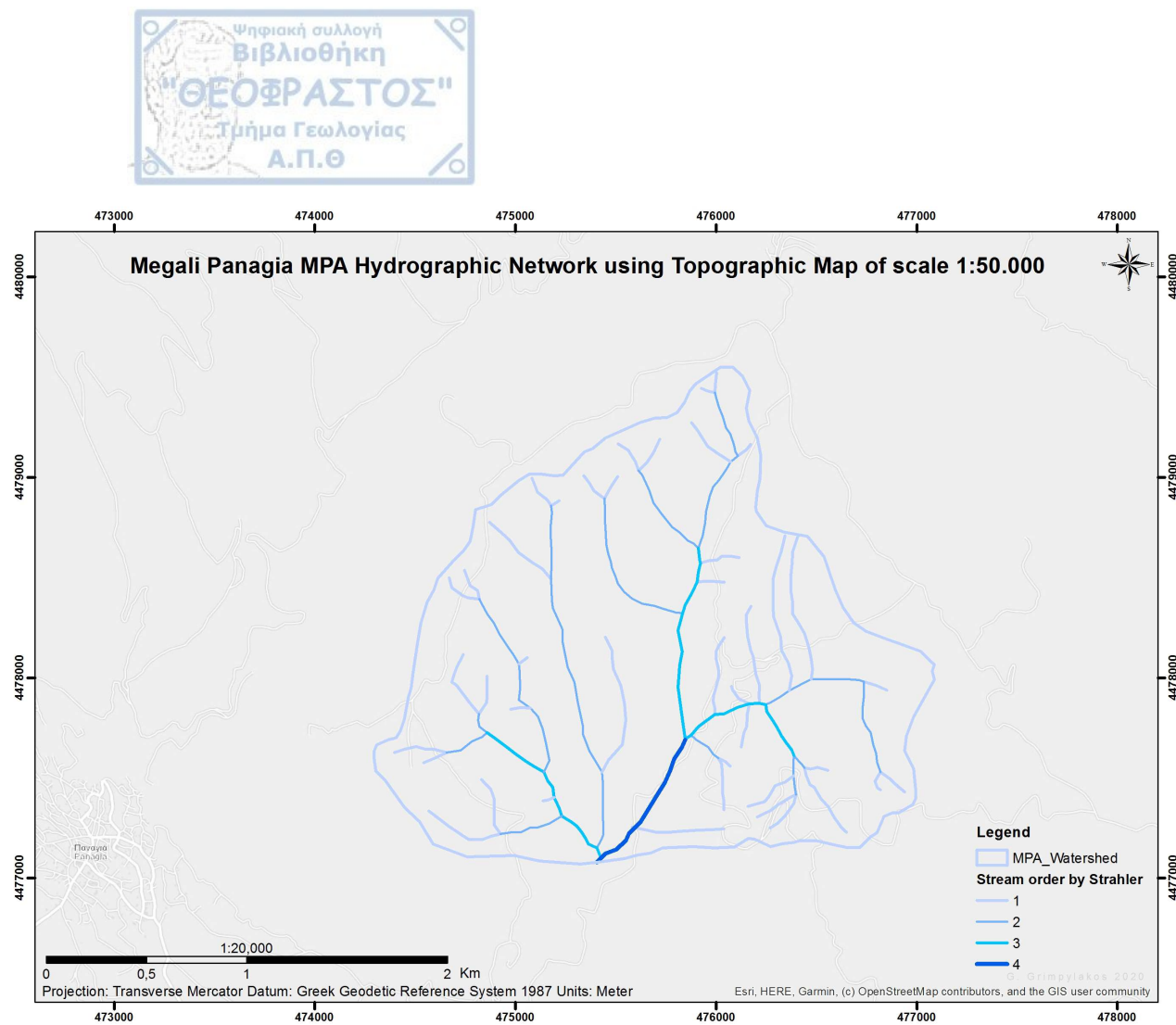


Figure 13HNT – Megali Panagia Watershed (MPA) and hydrographic network digitized on topographic maps of scale 1:50.000.

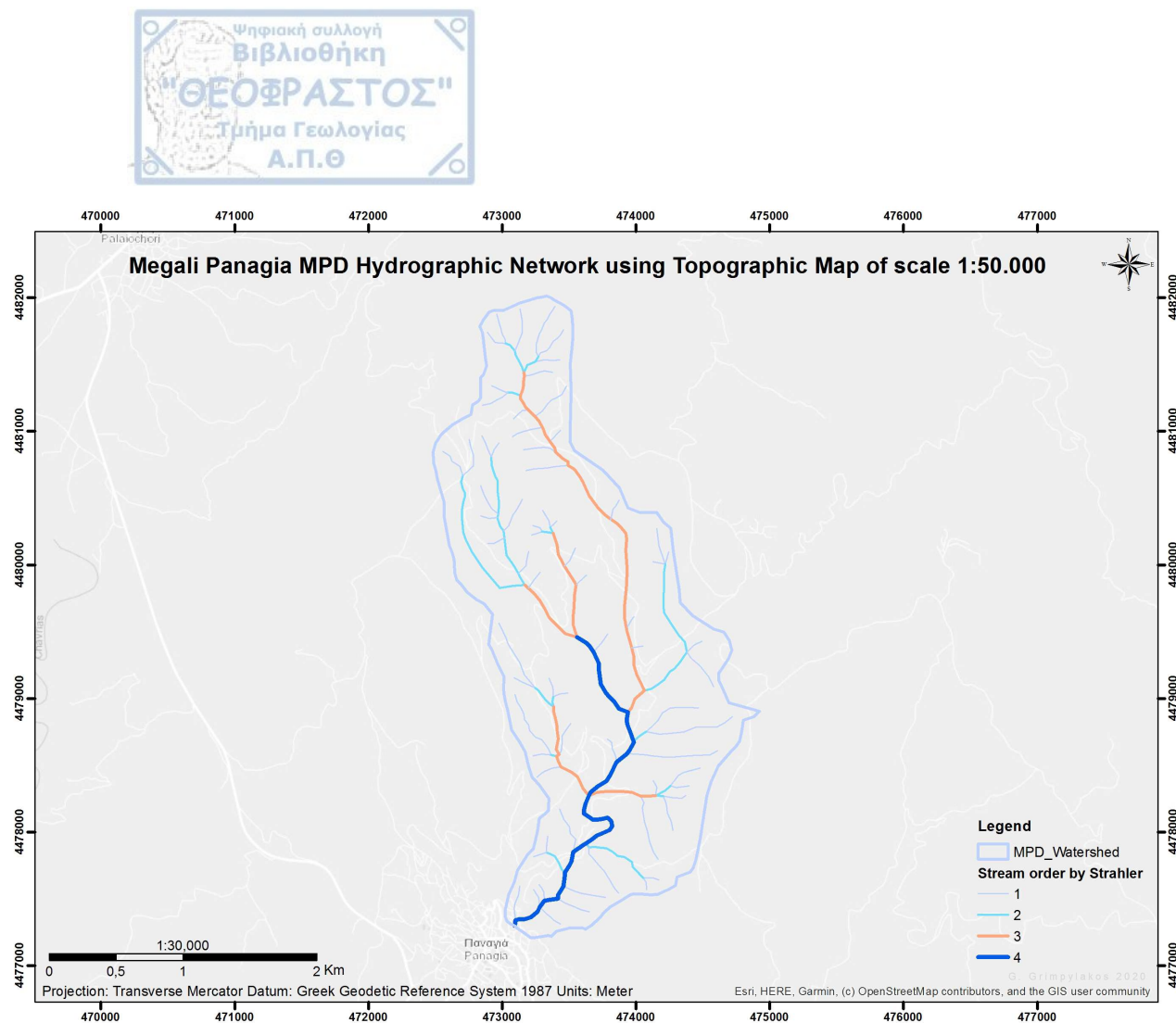


Figure 14HNT – Skouries Watershed (MPD) and hydrographic network digitized on topographic maps of scale 1:50.000.



SECTION 2

**DIGITIZED HYDROGRAPHIC NETWORK
DERIVED FROM DEM (ASTER 28,3X28,3M
CELL SIZE) SUBTRACTING 1ST AND 2ND
CLASS**

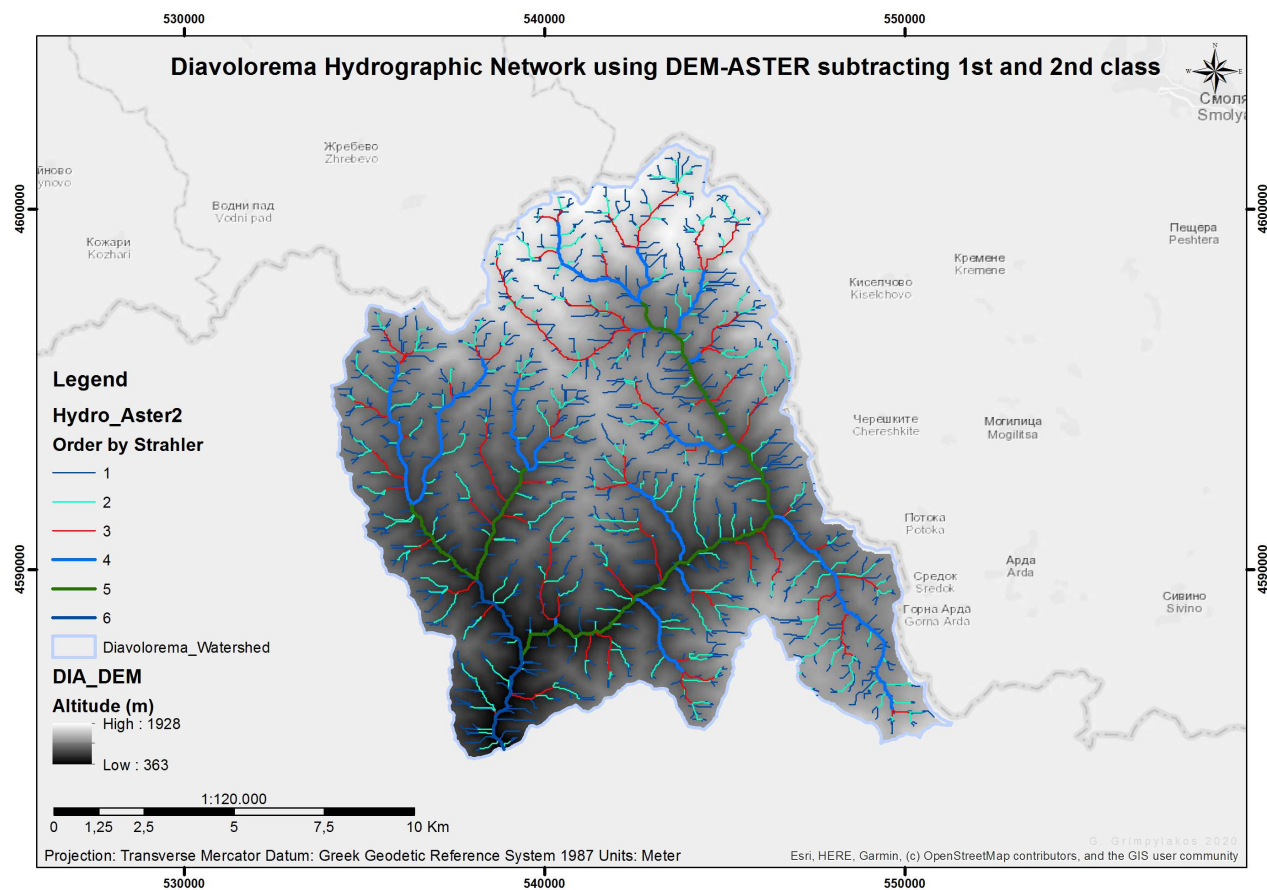


Figure 1HNA28 – Diavolorema Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class. Order by Strahler.

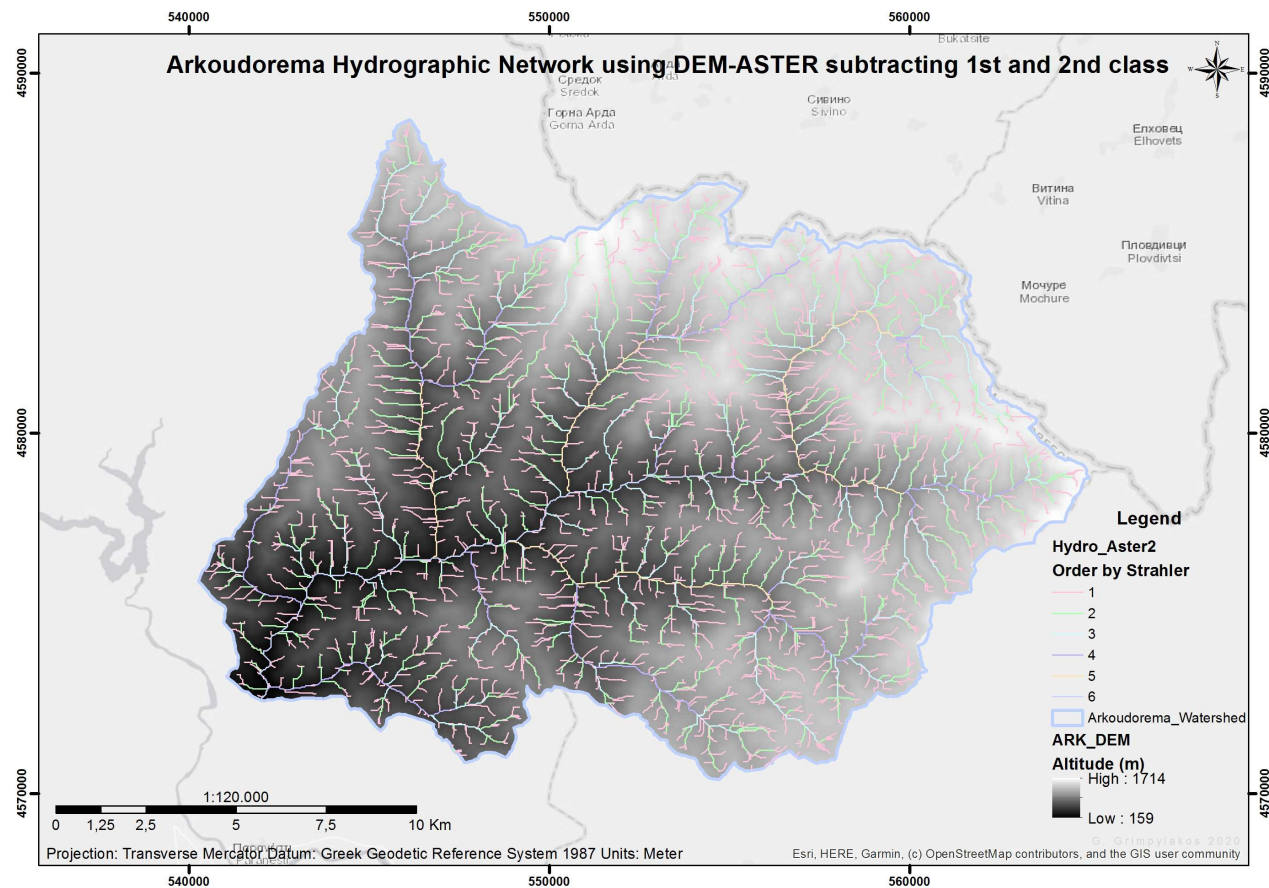


Figure 2HNA28 – Arkoudorema Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class. Order by Strahler.

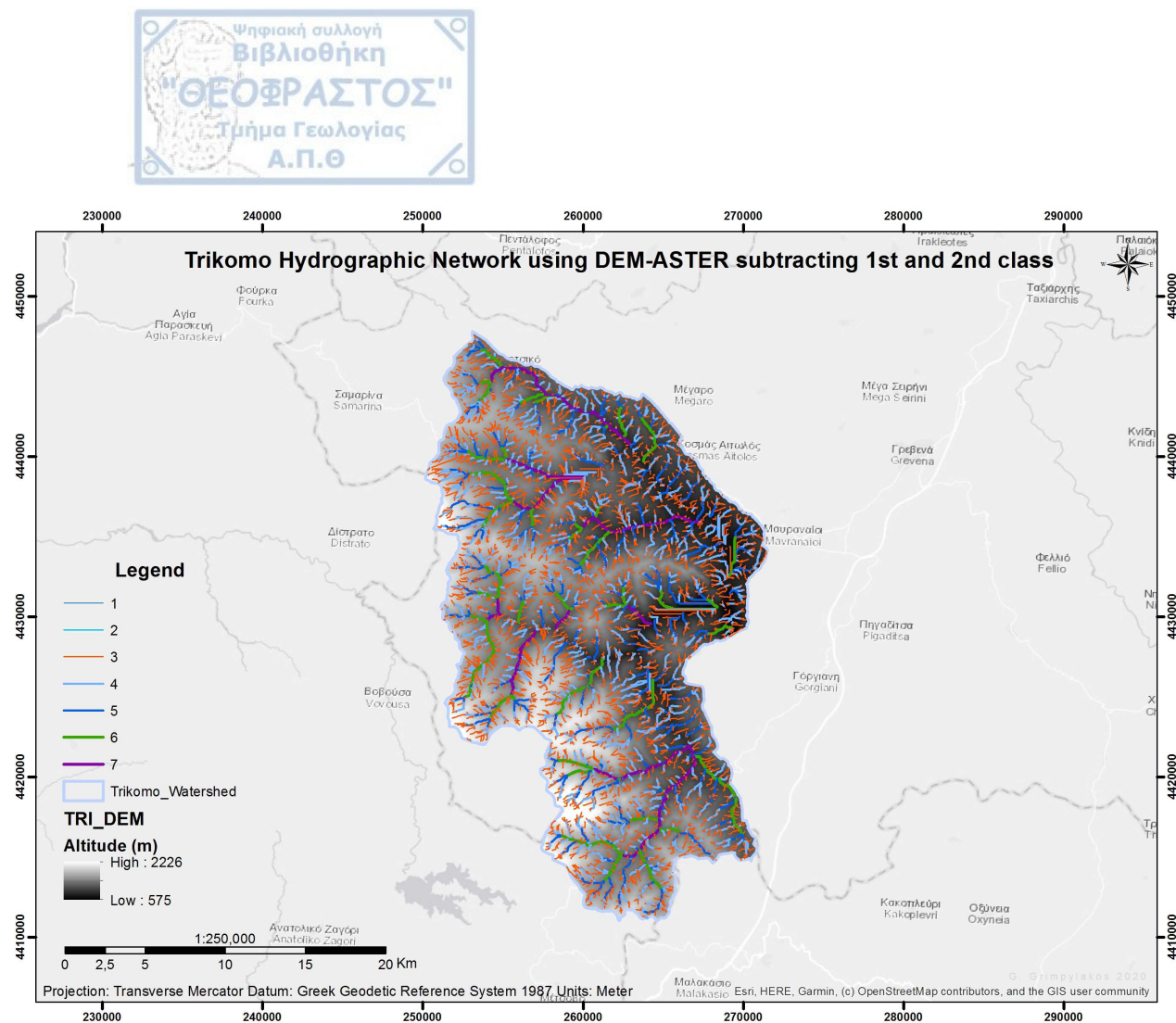


Figure 3HNA28 – Trikomo Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class. Order by Strahler.

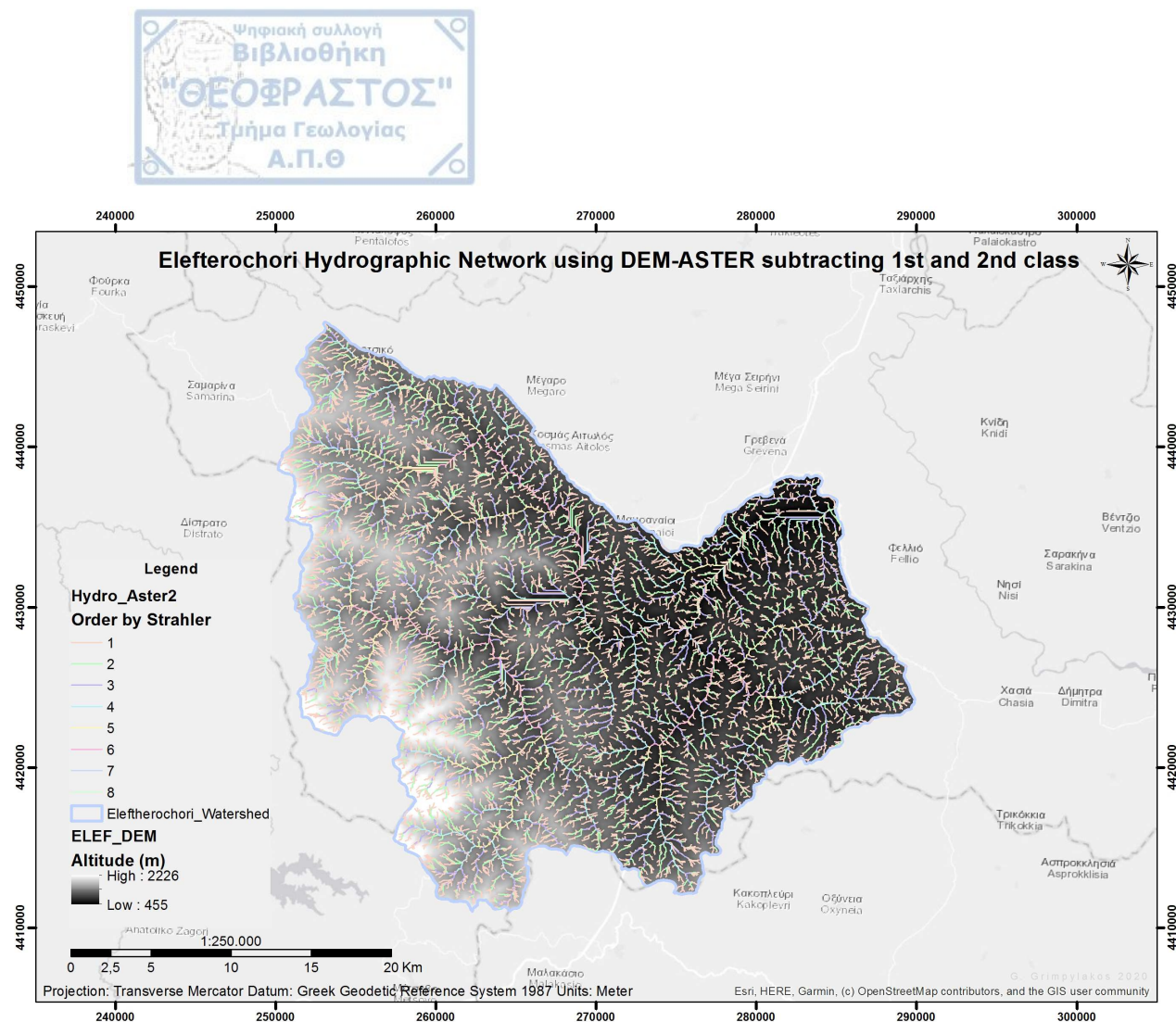


Figure 4HNA28 – Eleftherochori Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class. Order by Strahler.

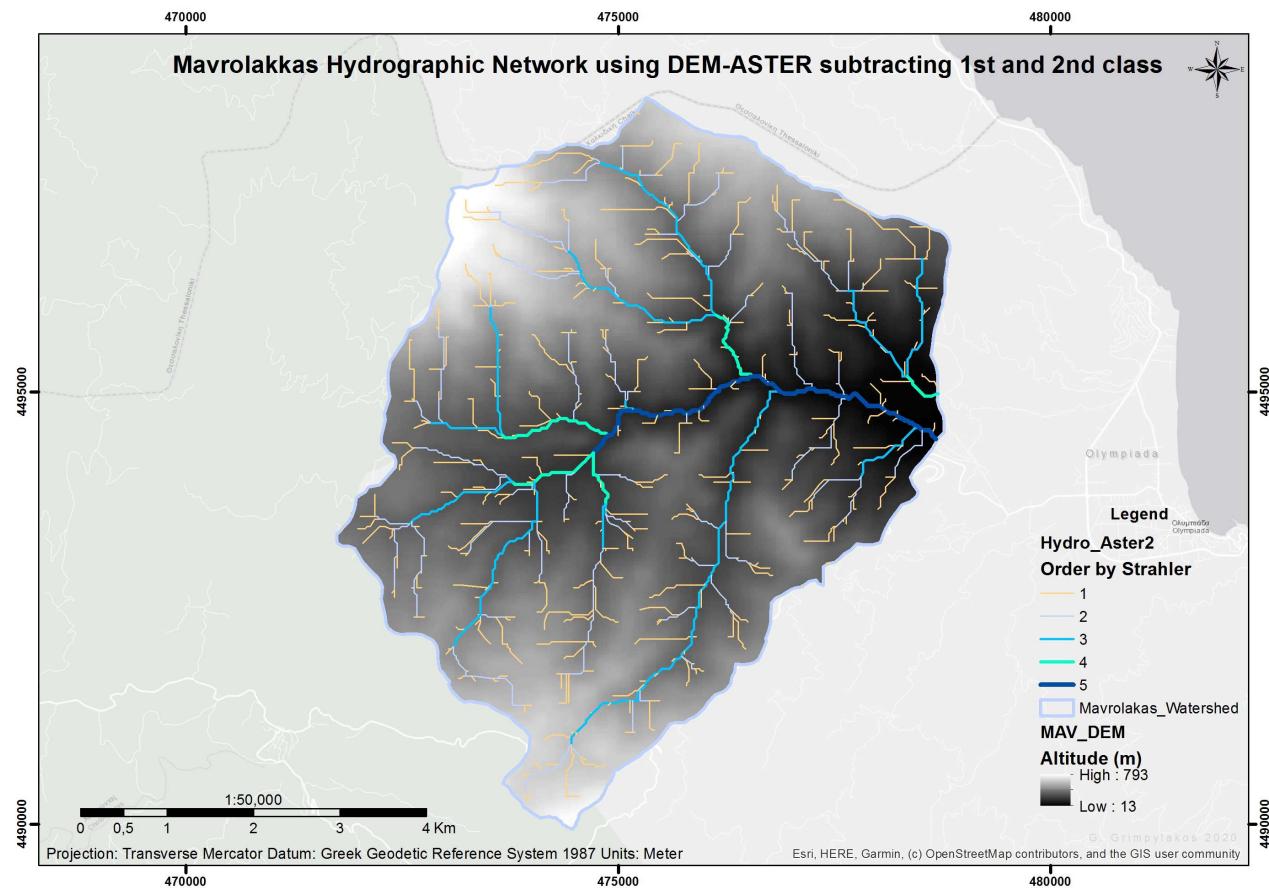


Figure 5HNA28 – Mavrolakkas Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class. Order by Strahler.

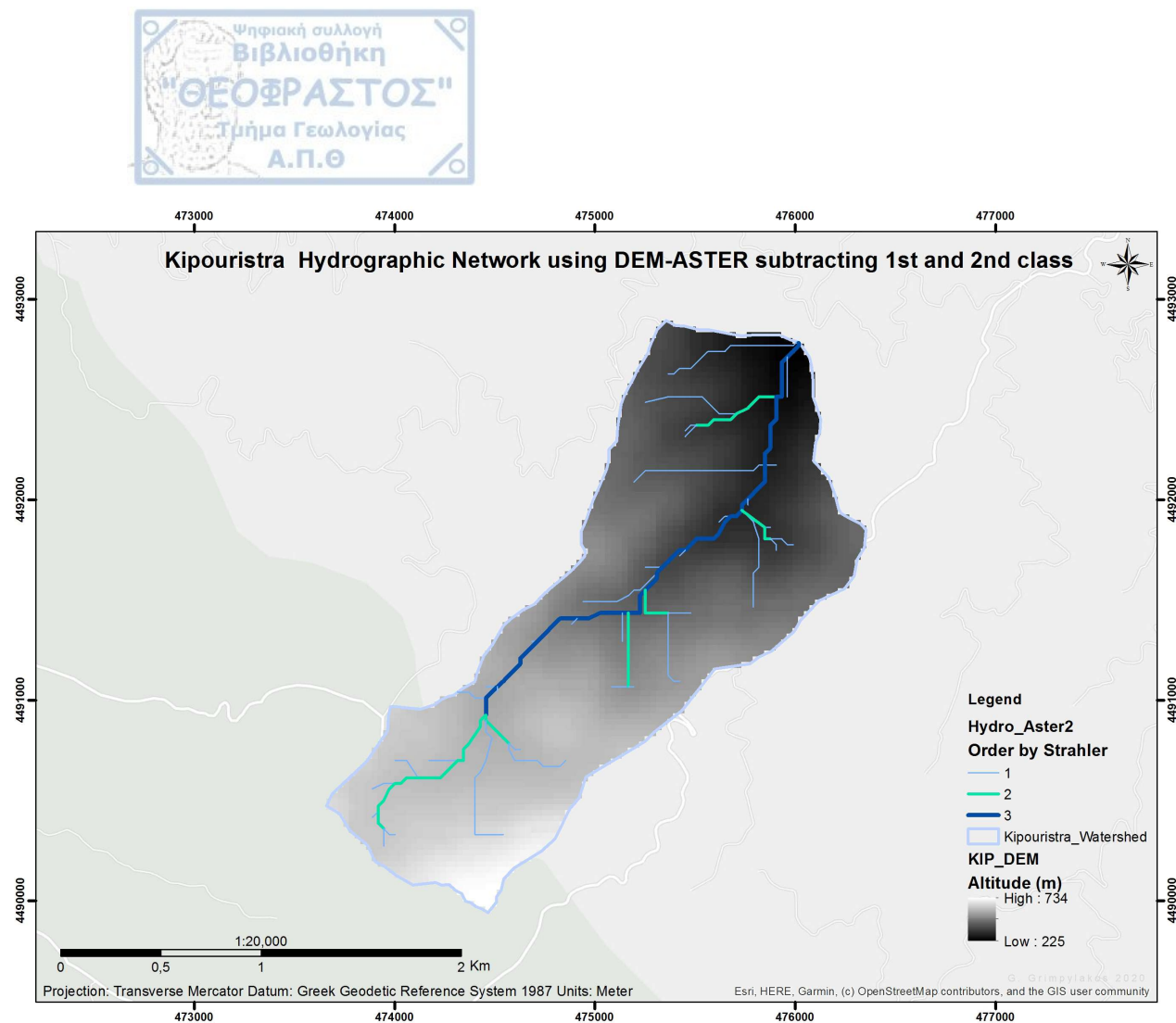


Figure 6HNA28a – Kipouristra Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class. Order by Strahler.

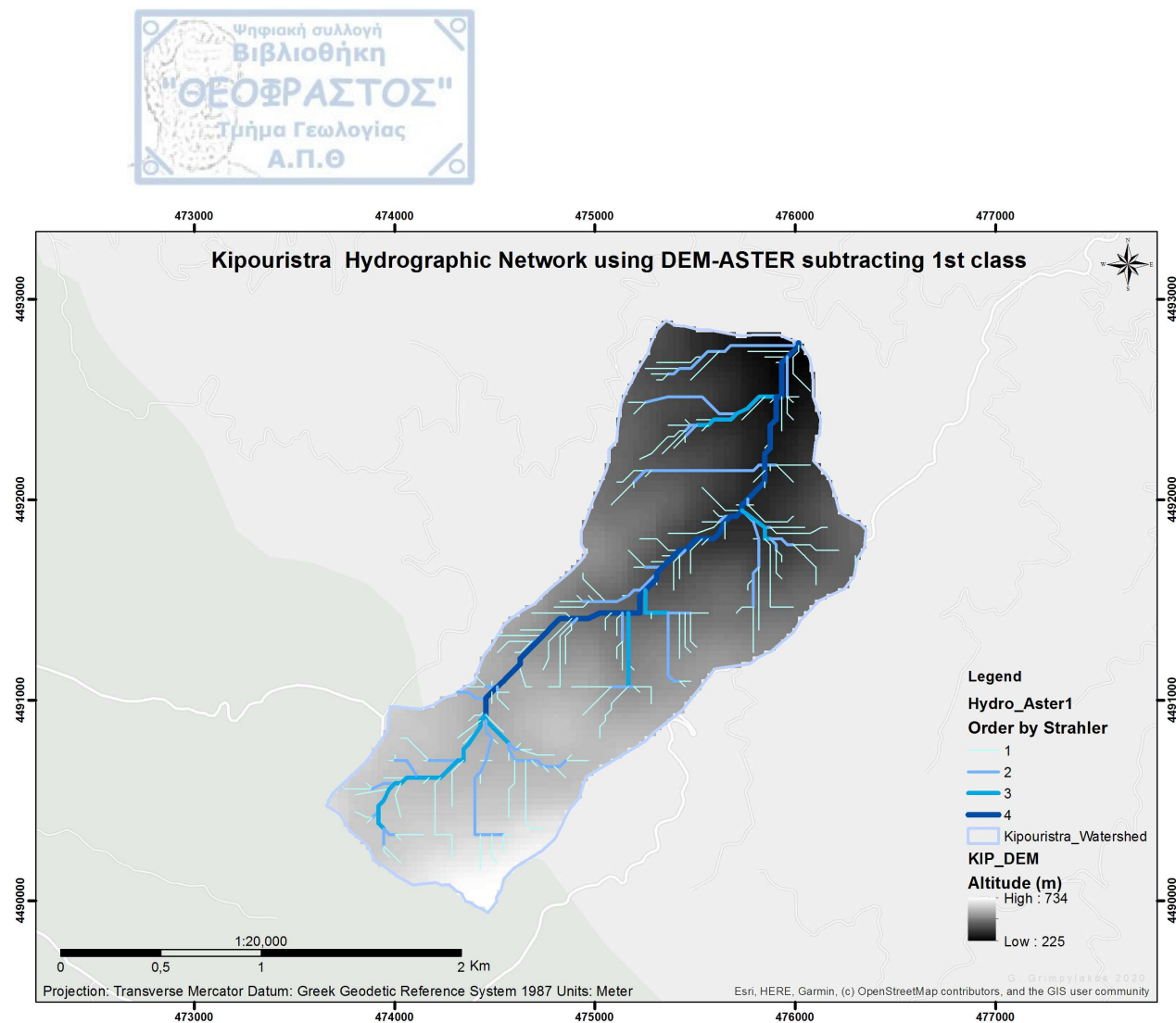


Figure 6HNA28b – Kipouristra Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st class. Order by Strahler.

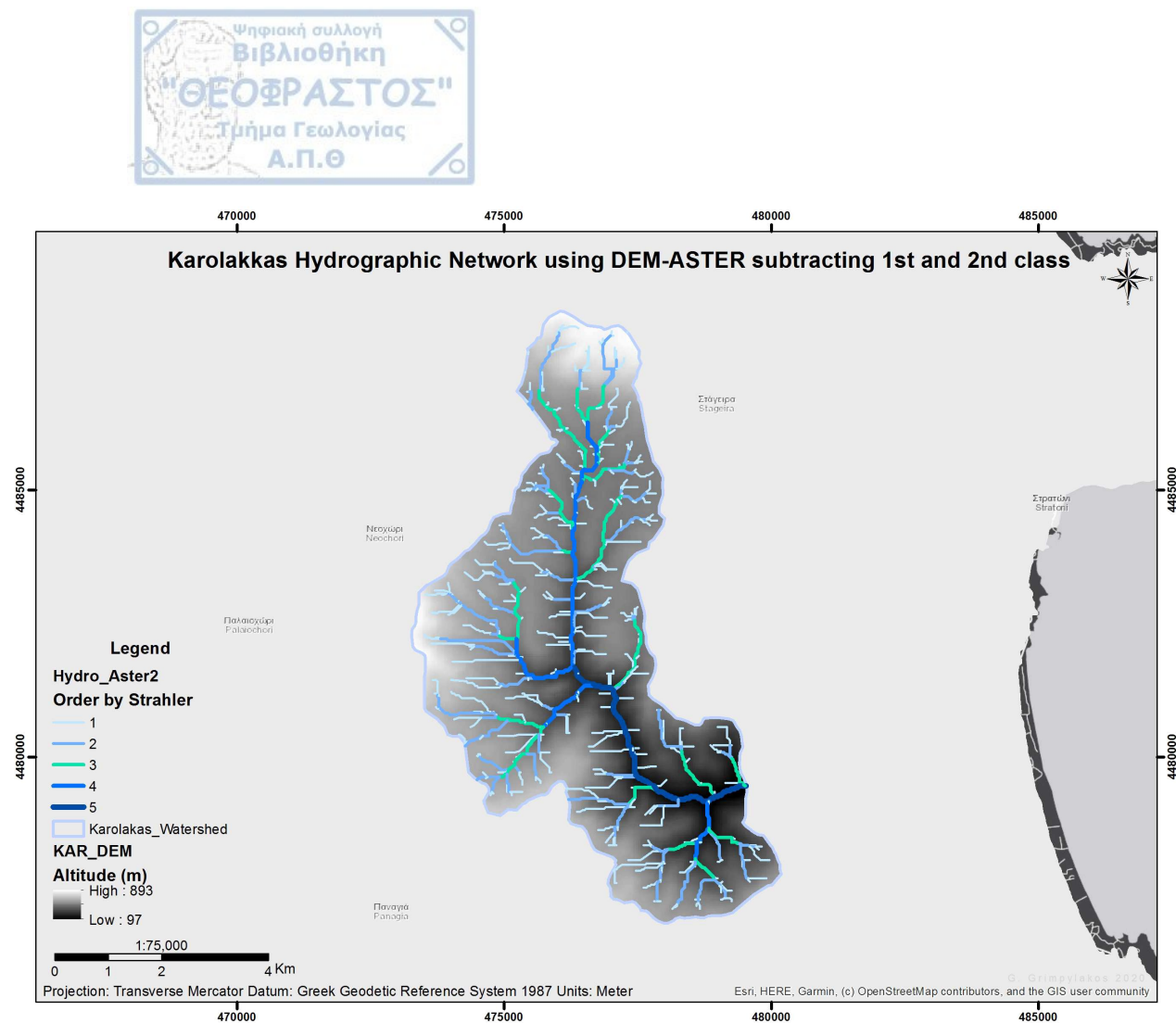


Figure 7HNA28 – Karolakas Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class. Order by Strahler.

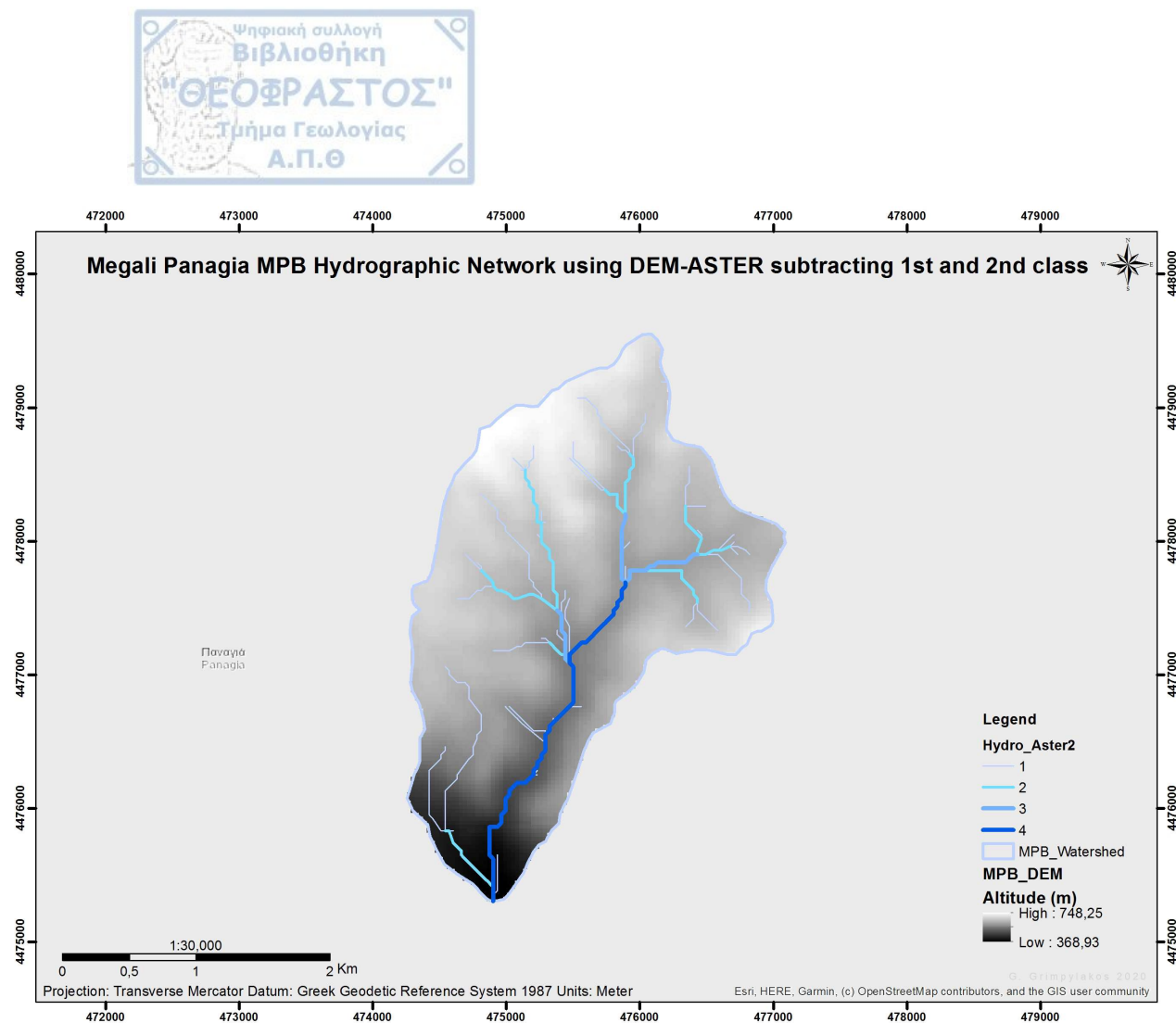


Figure 8HNA28 – Megali Panagia Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class.
Order by Strahler.

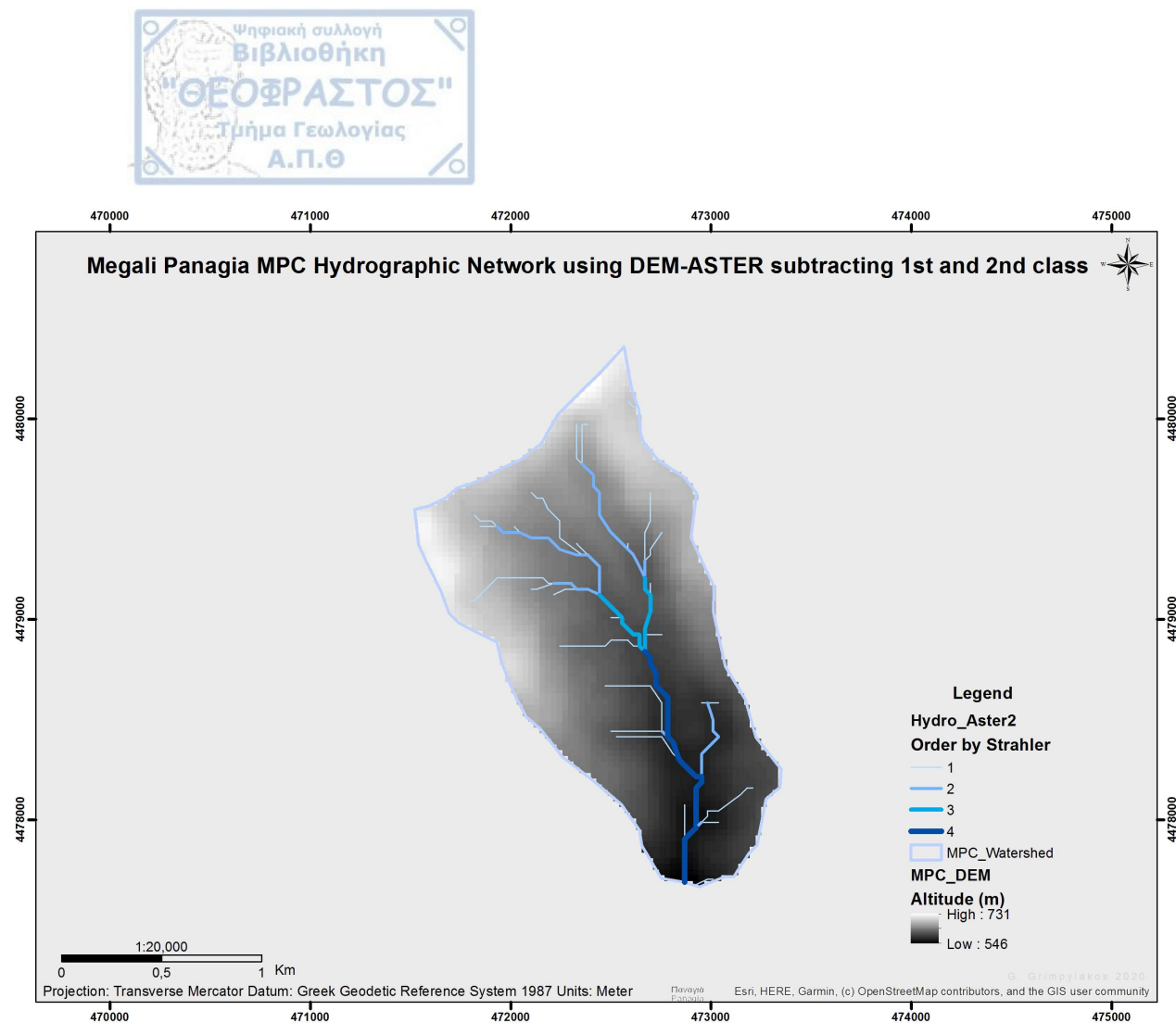


Figure 9HNA28 – Skouries (MPC) Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class.
Order by Strahler.

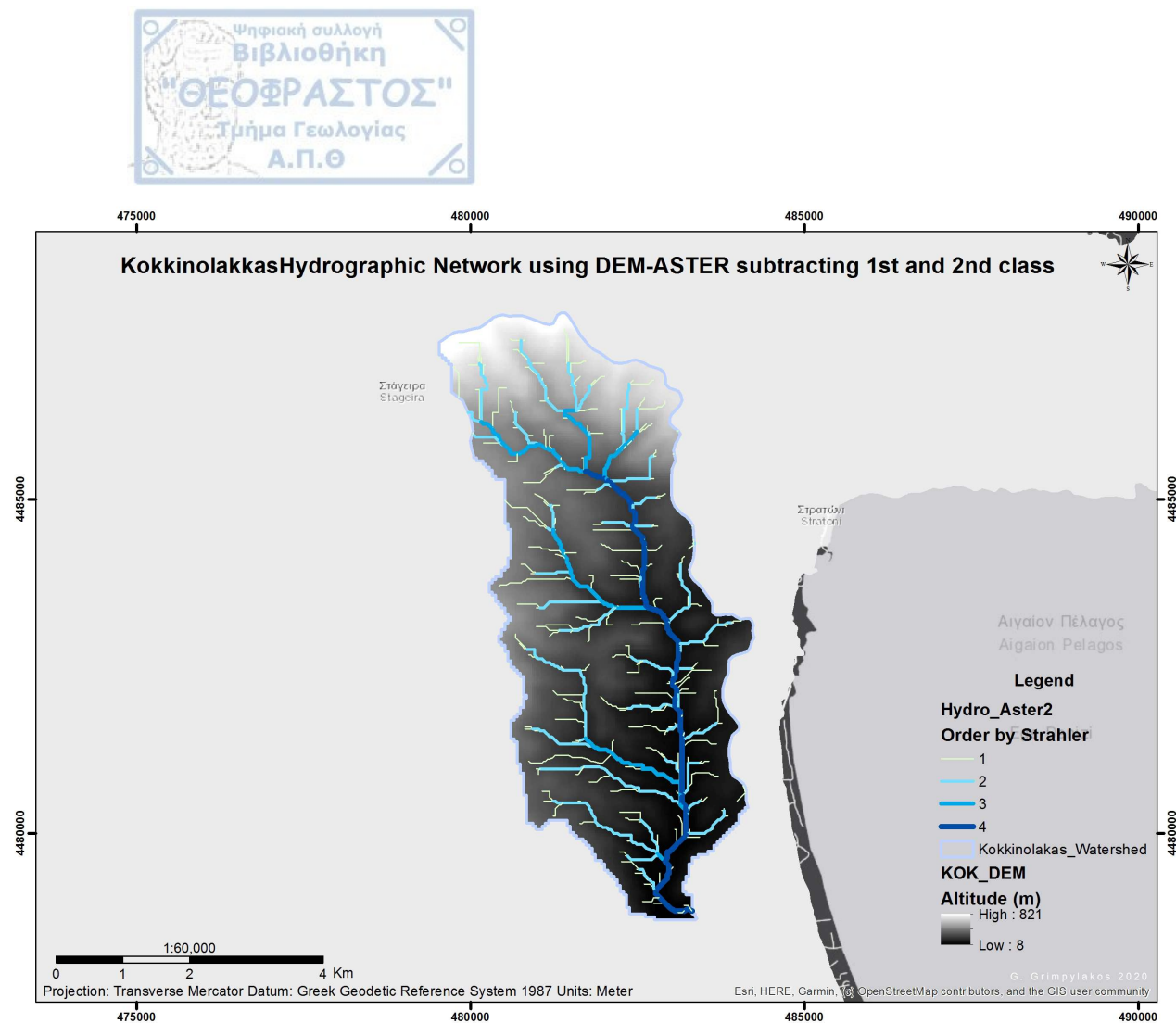


Figure 10HNA28 – Kokkinolakkas Ierissos (KOK) Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class. Order by Strahler.

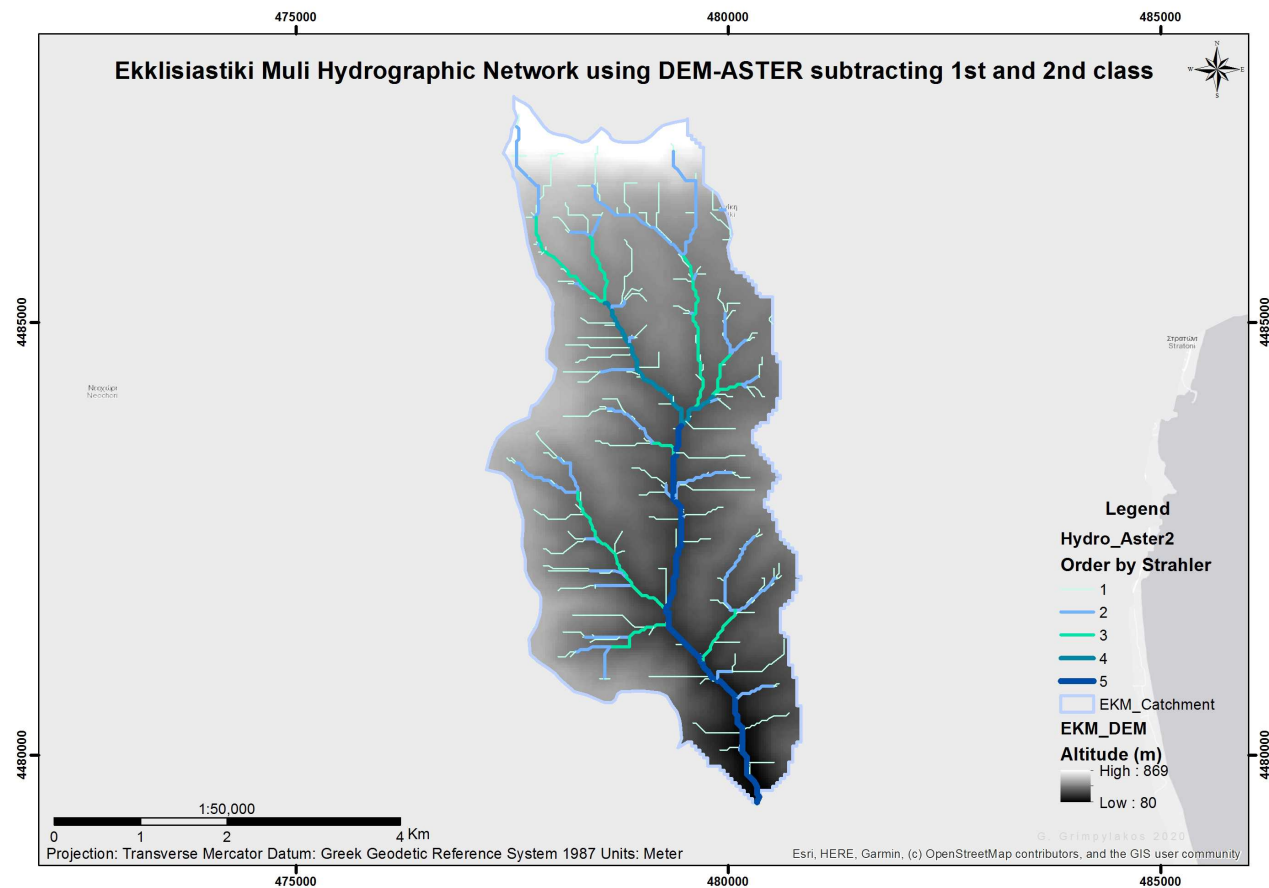


Figure 11HNA28 – Ekklesiastikoi Muli Ierissos (EKM) Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class. Order by Strahler.

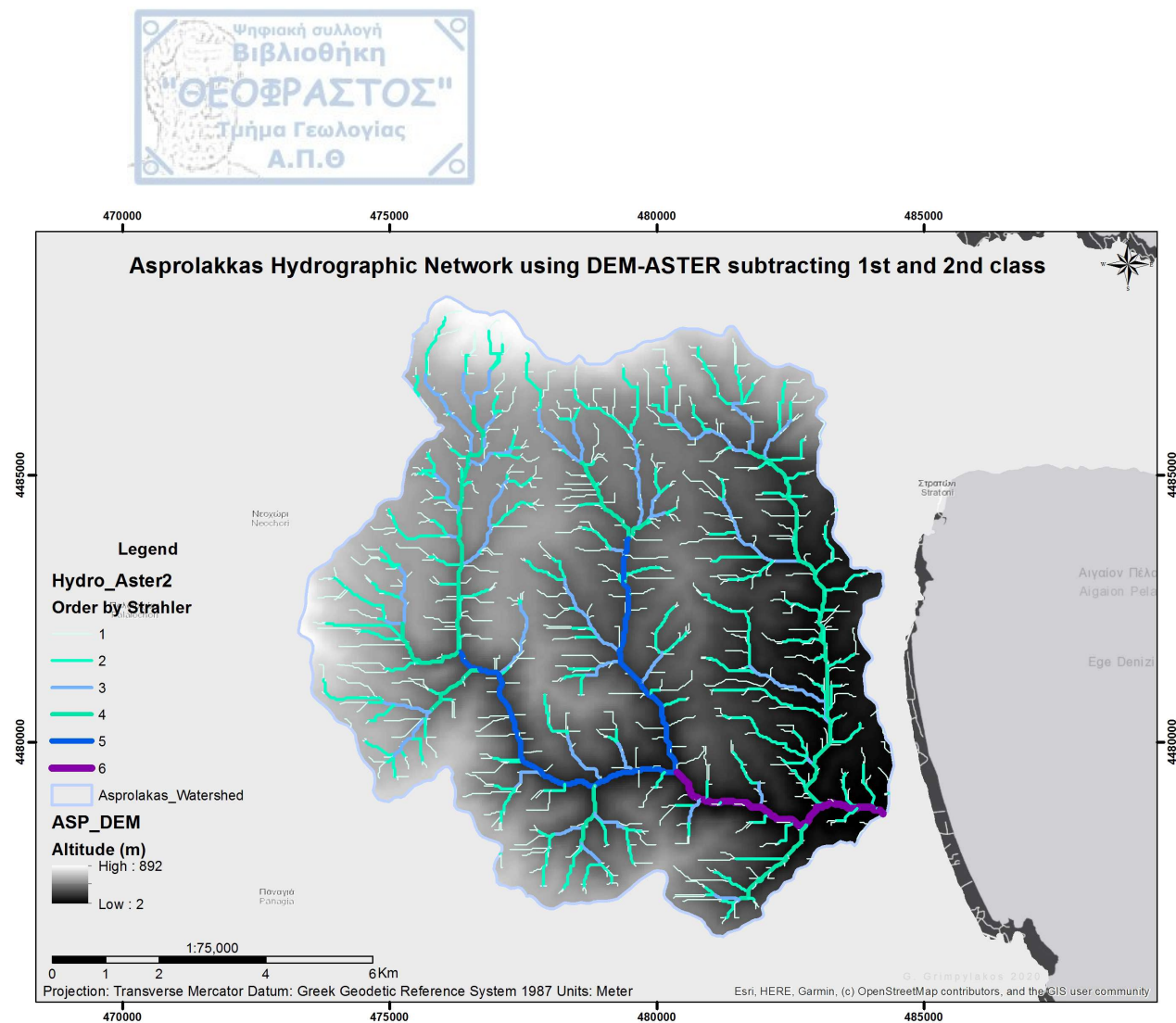


Figure 12HNA28 – Asprolakkas (ASPR) Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class. Order by Strahler.

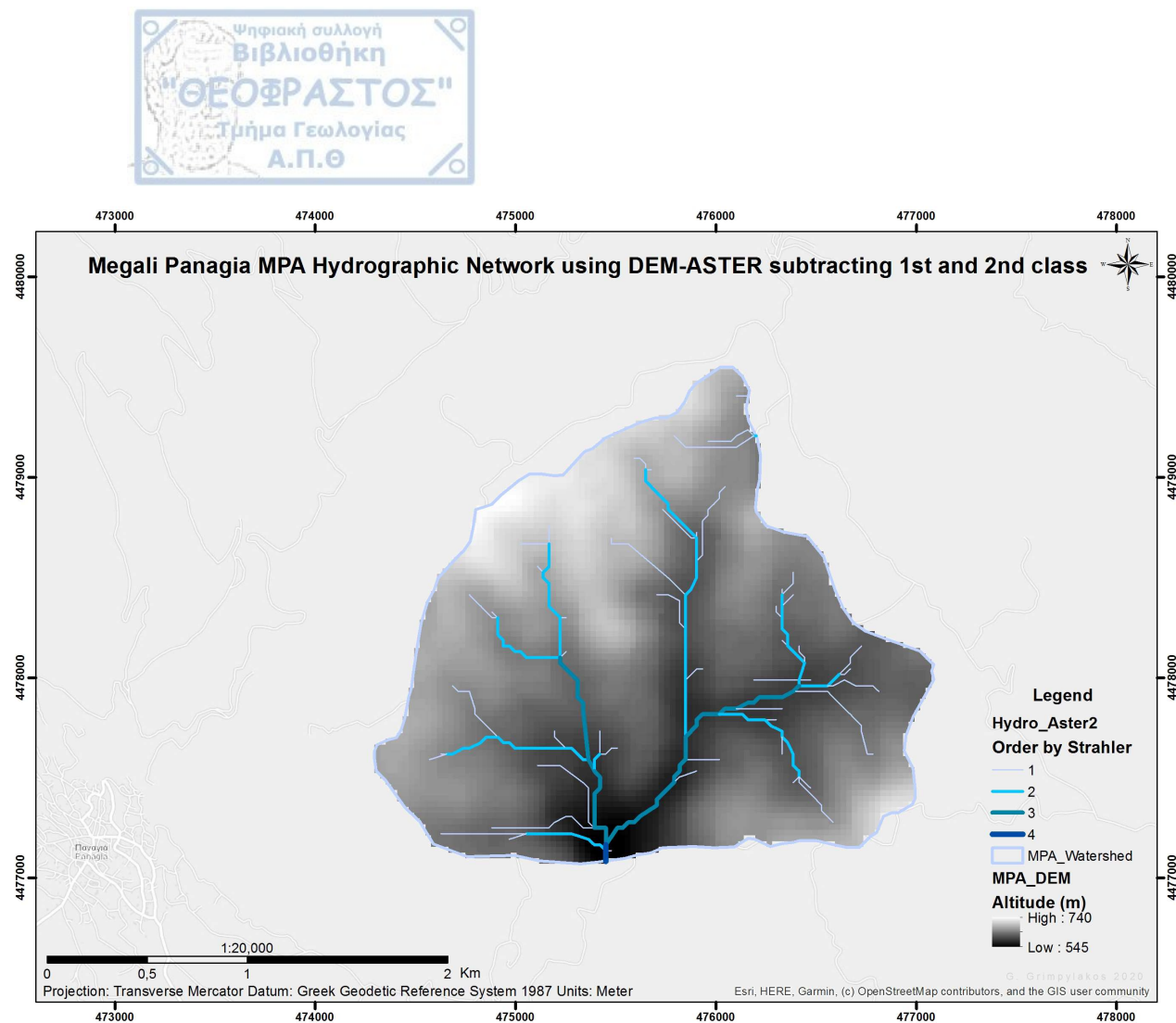


Figure 13HNA28 – Megali Panagia MPA). Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class. Order by Strahler.

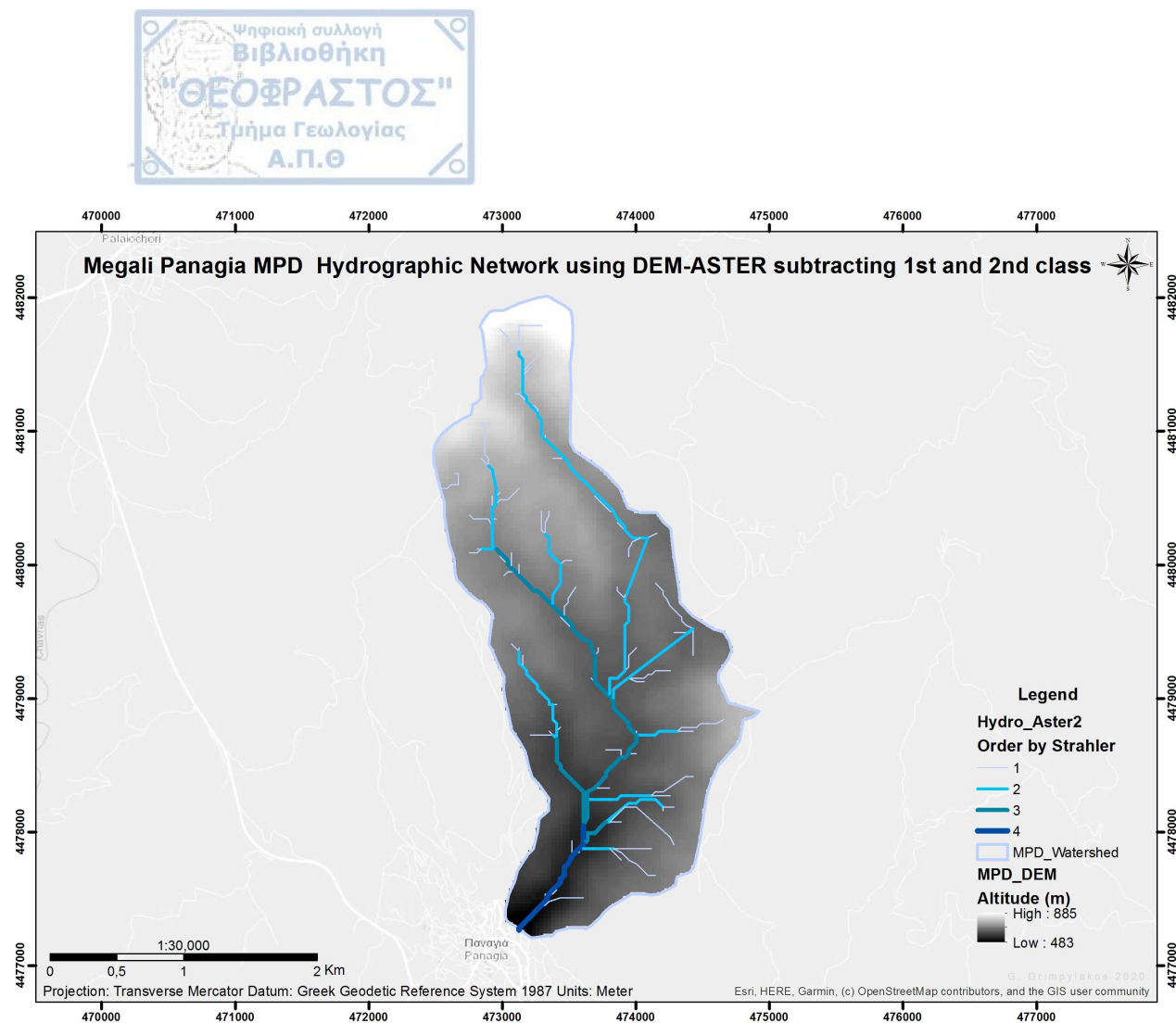


Figure 14HNA28 – Skouries Watershed (MPD) Hydrographic Network and Watershed derived from DEM (ASTER 28,3x28,3m cell size) subtracting 1st and 2nd class. Order by Strahler.



SECTION 3

HYDROMORPHOLOGICAL PARAMETERS OF EACH SAMPLING SITE OF NORTHERN GREECE

Diavolorema		
	Hydromorphological Parameter	Using Aster
Morphometric	Catchment Size (km ²)	165,65
	Total river length (km)	642,91
	Perimeter (km)	71,78
	Mean Elevation (m)	1129,77
	Min Elevation (m)	36
	Max Elevation (m)	1928
Geomorphological	Drainage density	3,88
	Order by Strahler	6
	Order by Shreve	30189
	Hypsometry Index	0,49
Meteorological	P (mm)	686,99
	P-E (mm)	378,37
Hydrological	Giandotti flood Qm 1 year	3,38
	Giandotti flood Qm 10 year	3,60
	Giandotti flood Qm 50 year	14,86
	Giandotti flood Qm 100 year	16,89
	Surface Runoff (hm ³)	53,39
	Categorization	2
Sedimentological	Sediment Name	Moderately Sorted Medium Sand Very Fine Gravelly Very Coarse Sand
	Textural name	Sand to Gravelly Sand

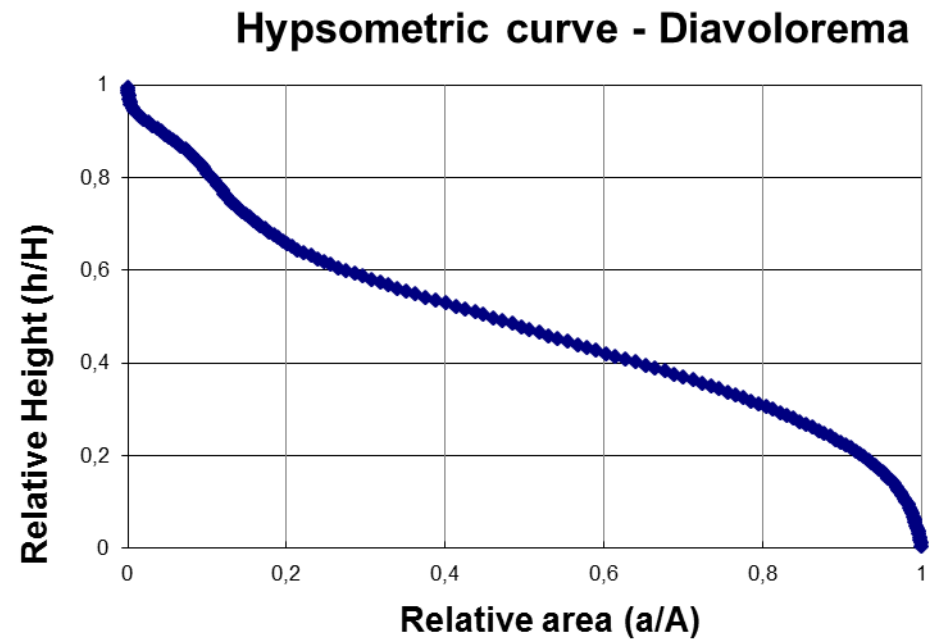


Table 1 (DIA) – Diavolorema Hydromorphological parameters and Hypsometric curve.

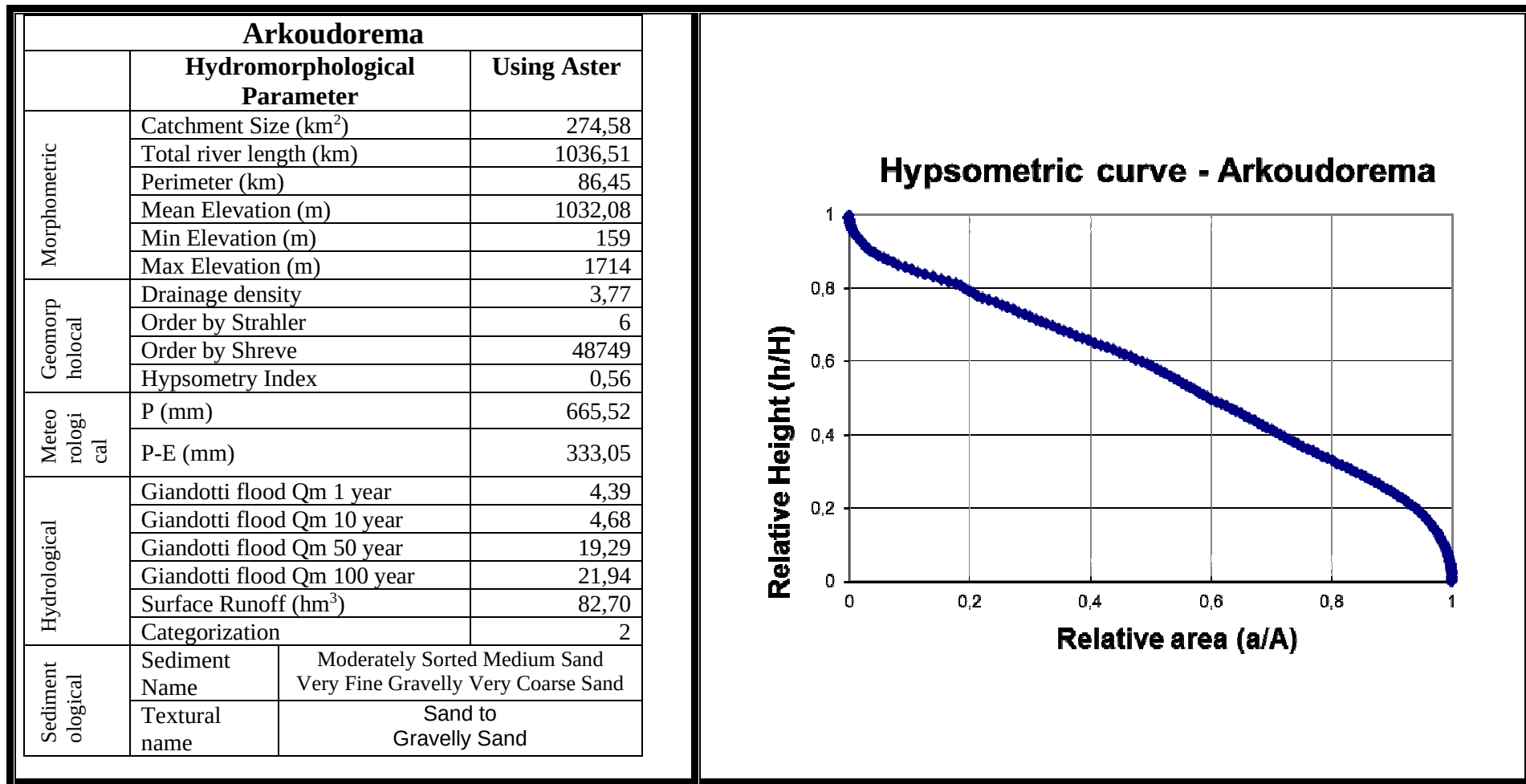


Table 2 (ARK) – Arkoudorema Hydromorphological parameters and Hypsometric curve.

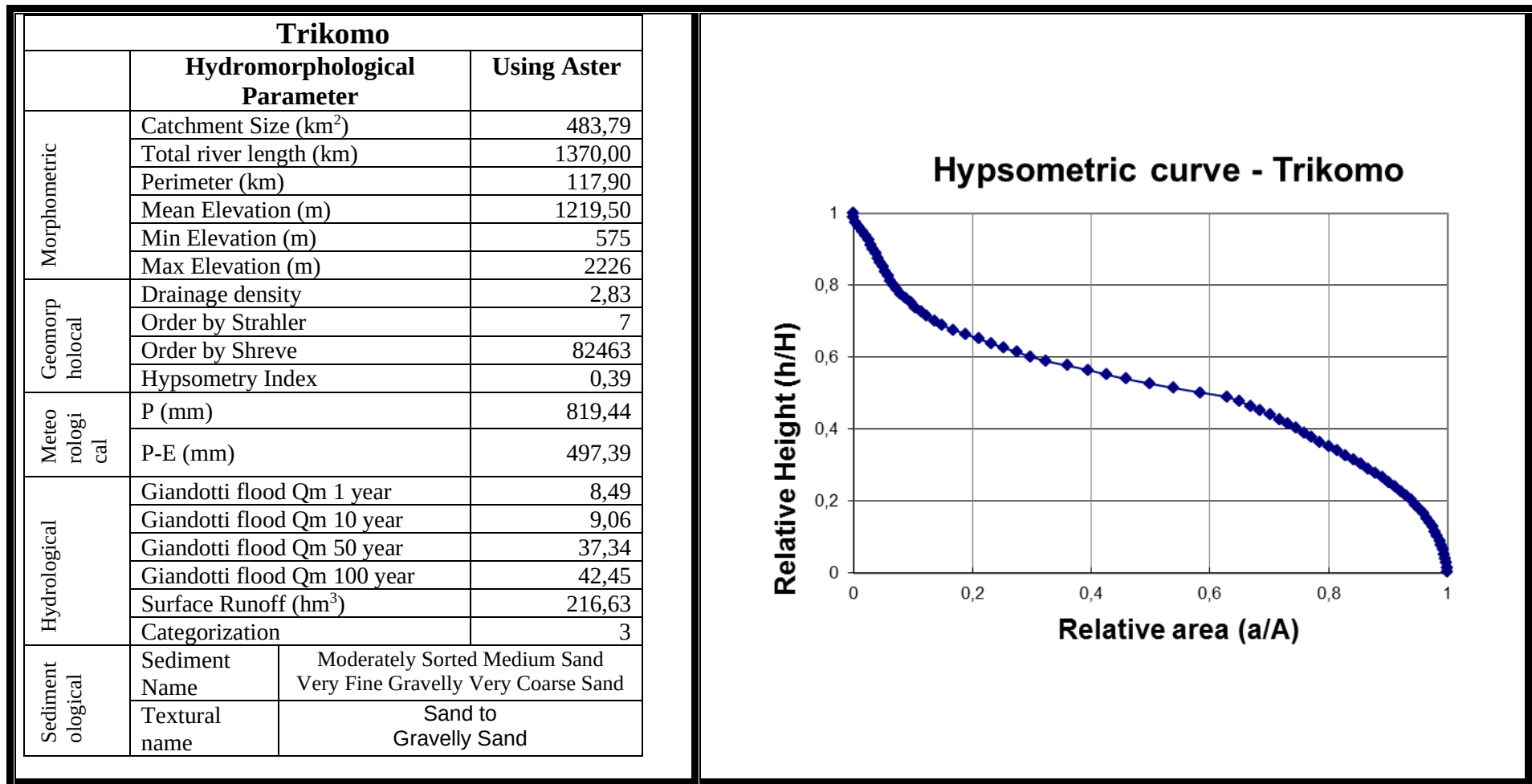


Table 3 (TRIK) – Trikomo Hydromorphological parameters and Hypsometric curve.

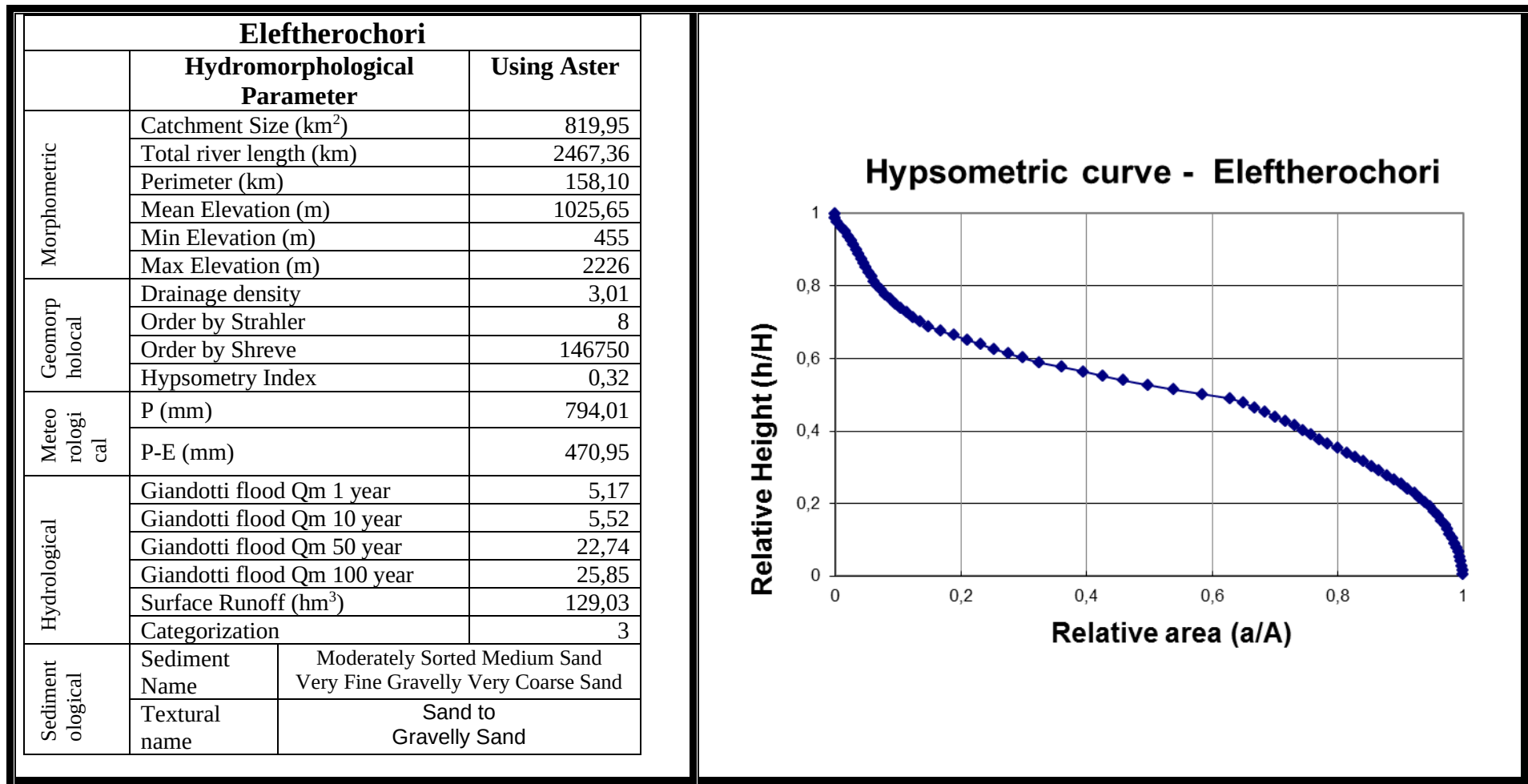


Table 4 (ELEF) – Eleftherochori Hydromorphological parameters and Hypsometric curve.

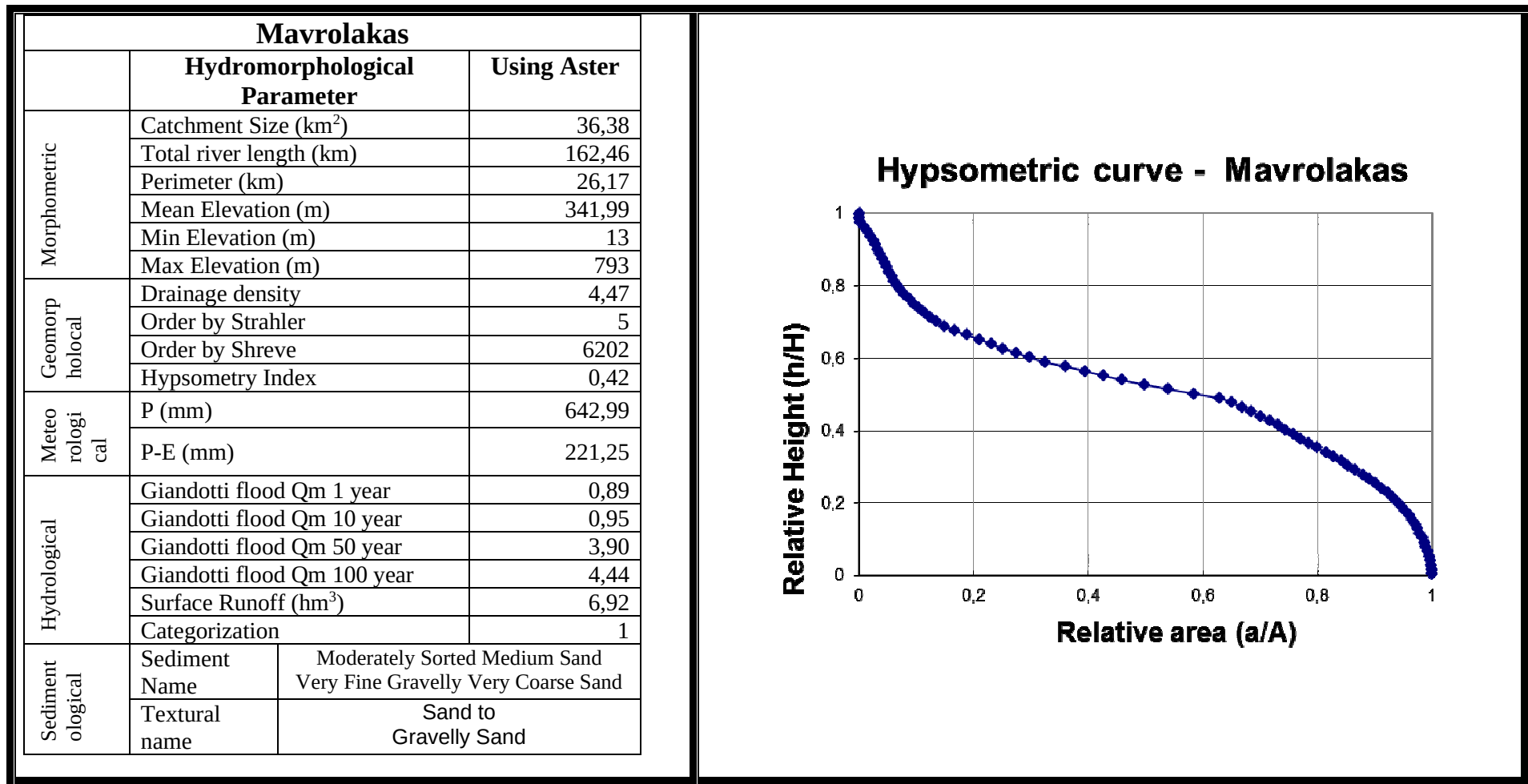


Table 5 (KAL) – Mavrolakas Hydromorphological parameters and Hypsometric curve.

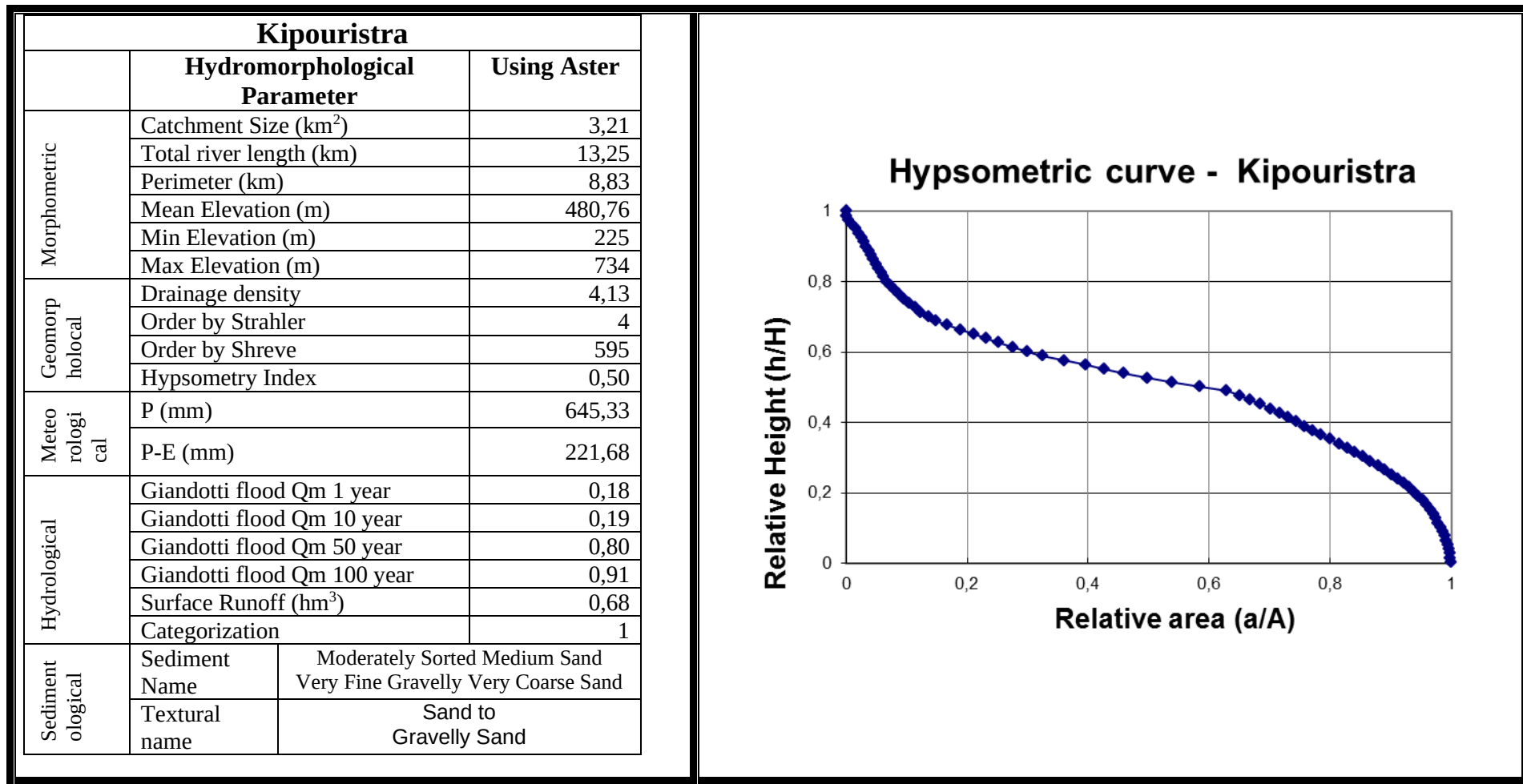


Table 6 (OLA) – Kipouristra Hydromorphological parameters and Hypsometric curve.

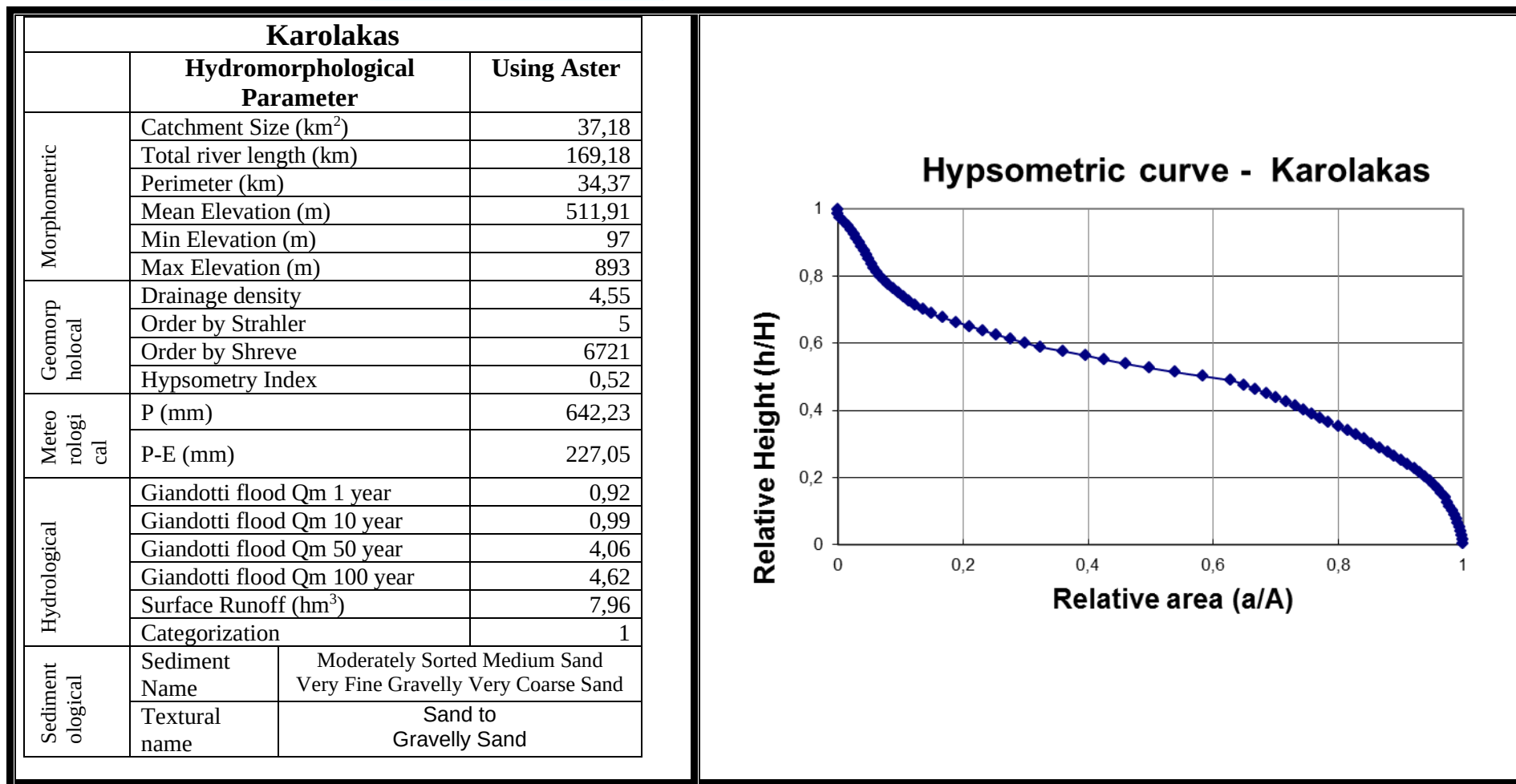


Table 7 (KAR) – Karolakas Hydromorphological parameters and Hypsometric curve.

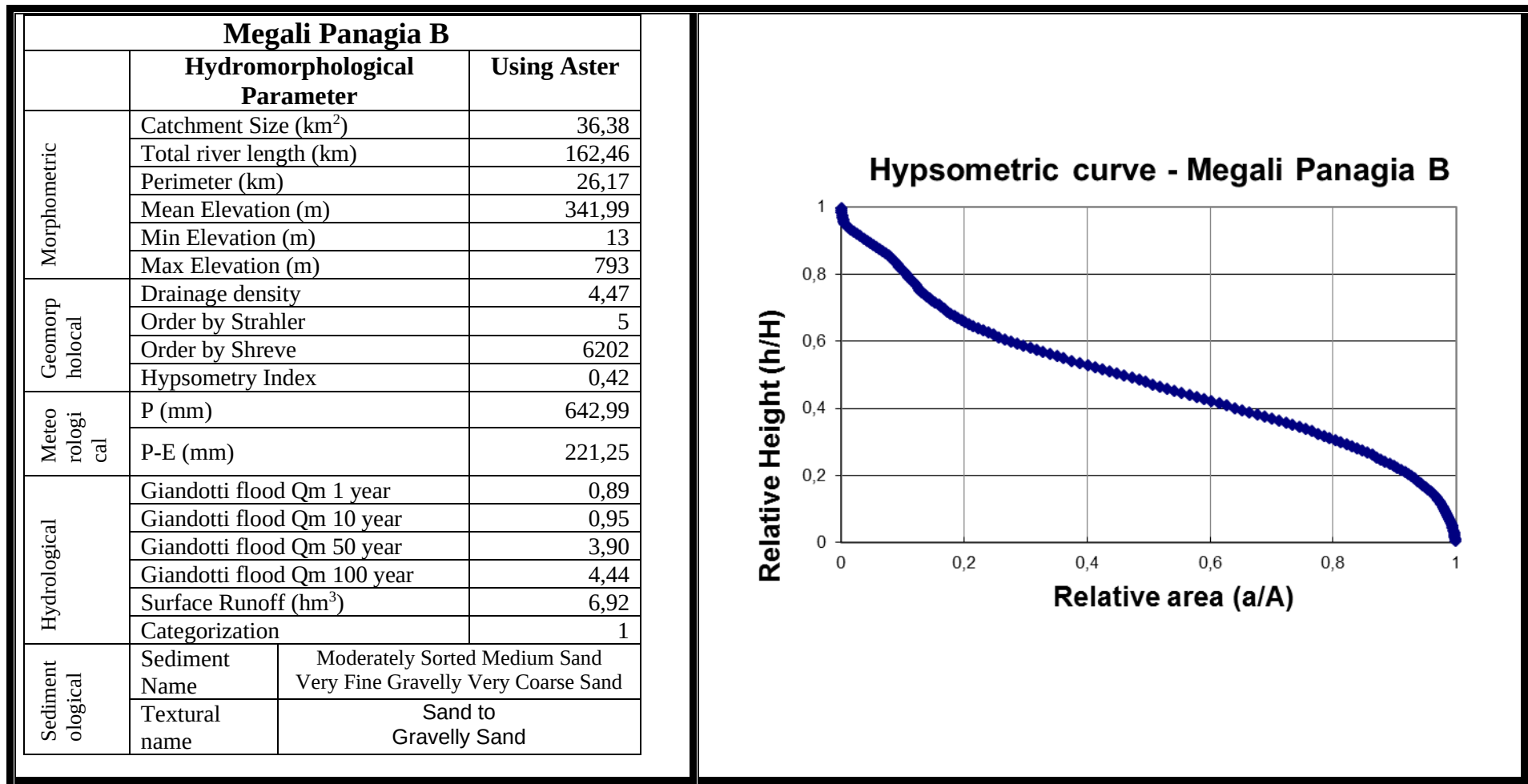


Table 8 (MPB) – Megali Panagia Hydromorphological parameters and Hypsometric curve.

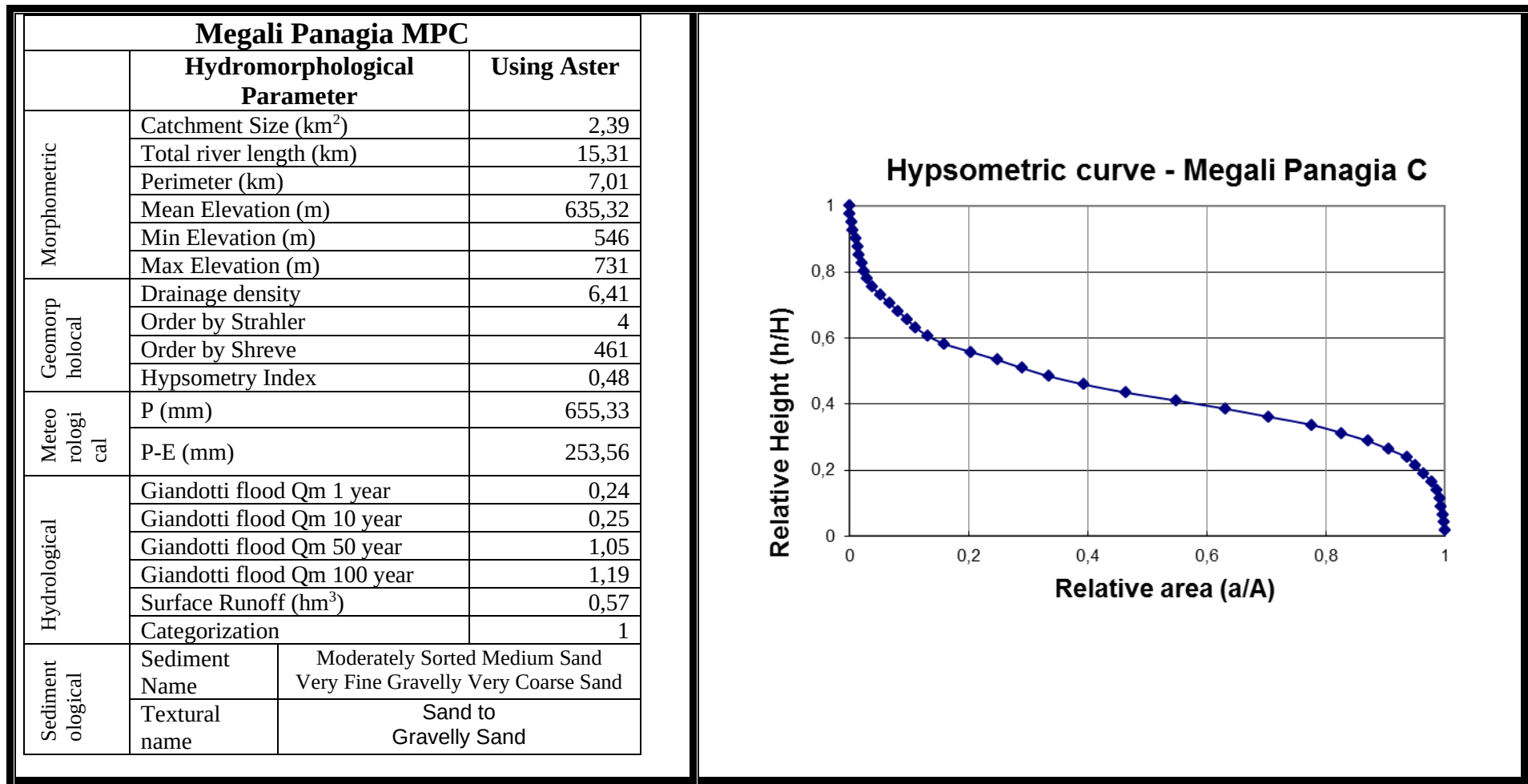


Table 9 (MPC) – Skouries Hydromorphological parameters and Hypsometric curve.

Kokkinolakas		
	Hydromorphological Parameter	Using Aster
Morphometric	Catchment Size (km ²)	24,67
	Total river length (km)	84,04
	Perimeter (km)	28,94
	Mean Elevation (m)	256,29
	Min Elevation (m)	8
	Max Elevation (m)	821
Geomorphological	Drainage density	3,41
	Order by Strahler	4
	Order by Shreve	4666
	Hypsometry Index	0,31
Meteorological	P (mm)	630,99
	P-E (mm)	212,38
Hydrological	Giandotti flood Qm 1 year	0,64
	Giandotti flood Qm 10 year	0,68
	Giandotti flood Qm 50 year	2,81
	Giandotti flood Qm 100 year	3,19
	Surface Runoff (hm ³)	4,93
	Categorization	1
Sedimentological	Sediment Name	Moderately Sorted Medium Sand Very Fine Gravelly Very Coarse Sand
	Textural name	Sand to Gravelly Sand

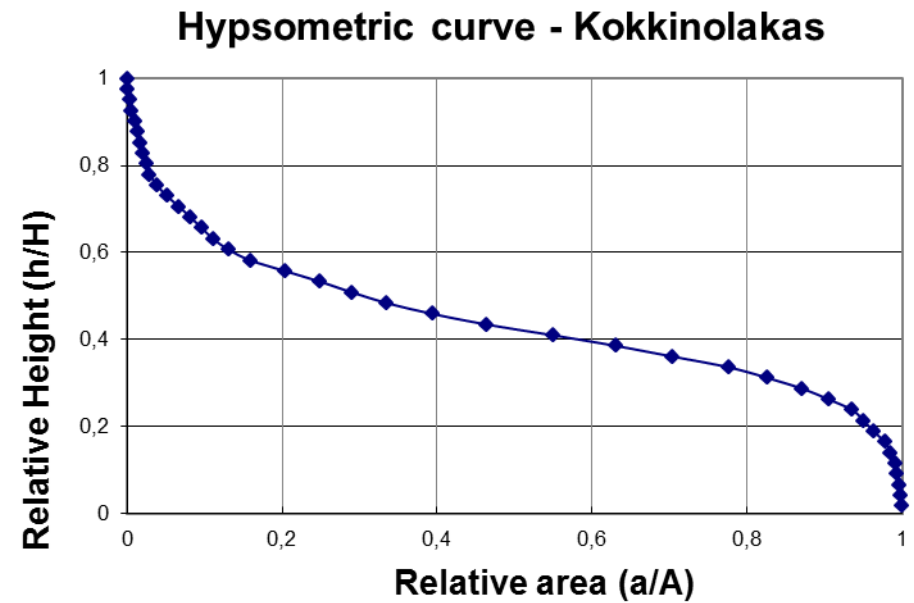


Table 10 (KOK) – Kokkinolakas Hydromorphological parameters and Hypsometric curve.

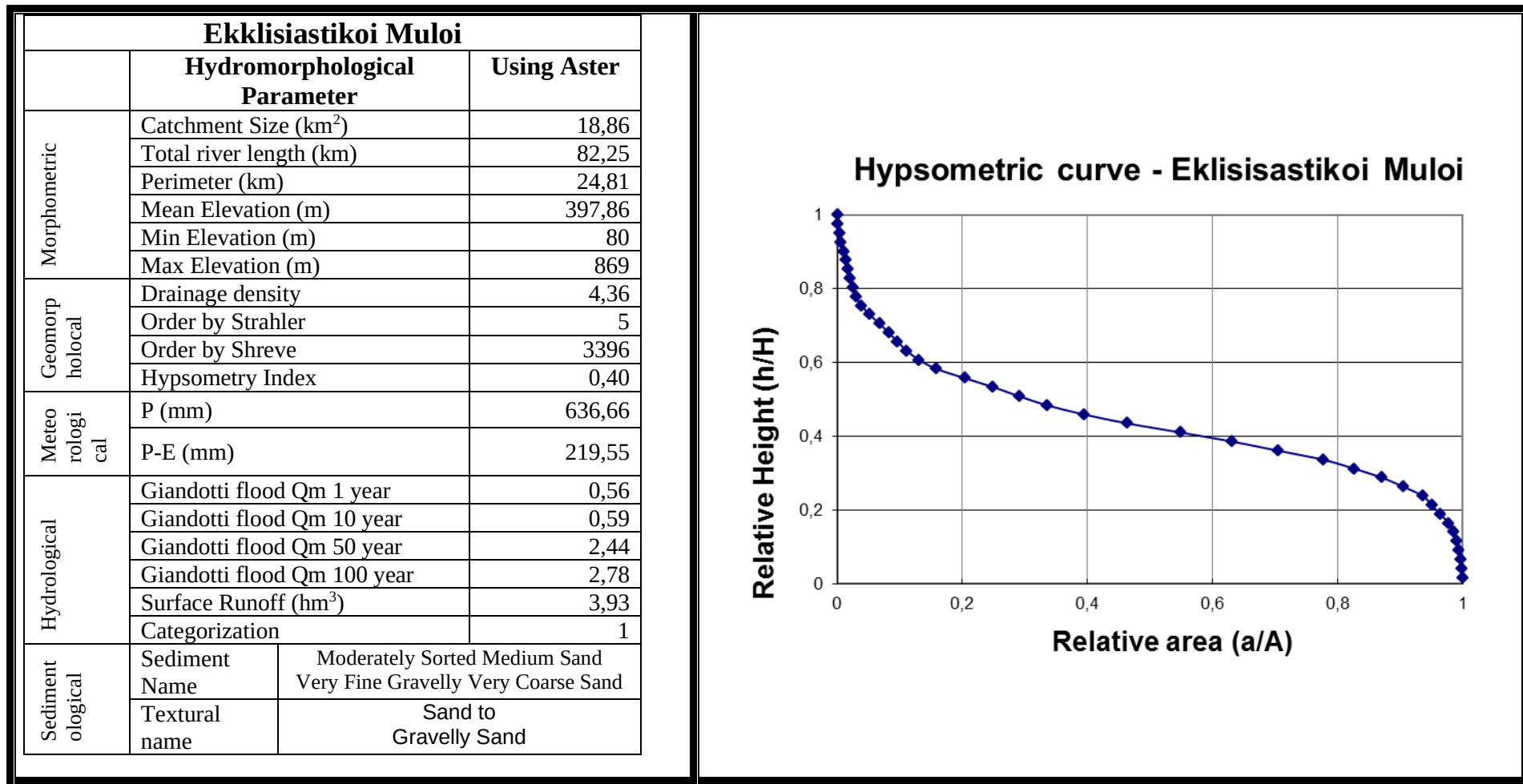


Table 11– (EKM) – Ekklisiastikoi Muli Hydromorphological parameters and Hypsometric curve.

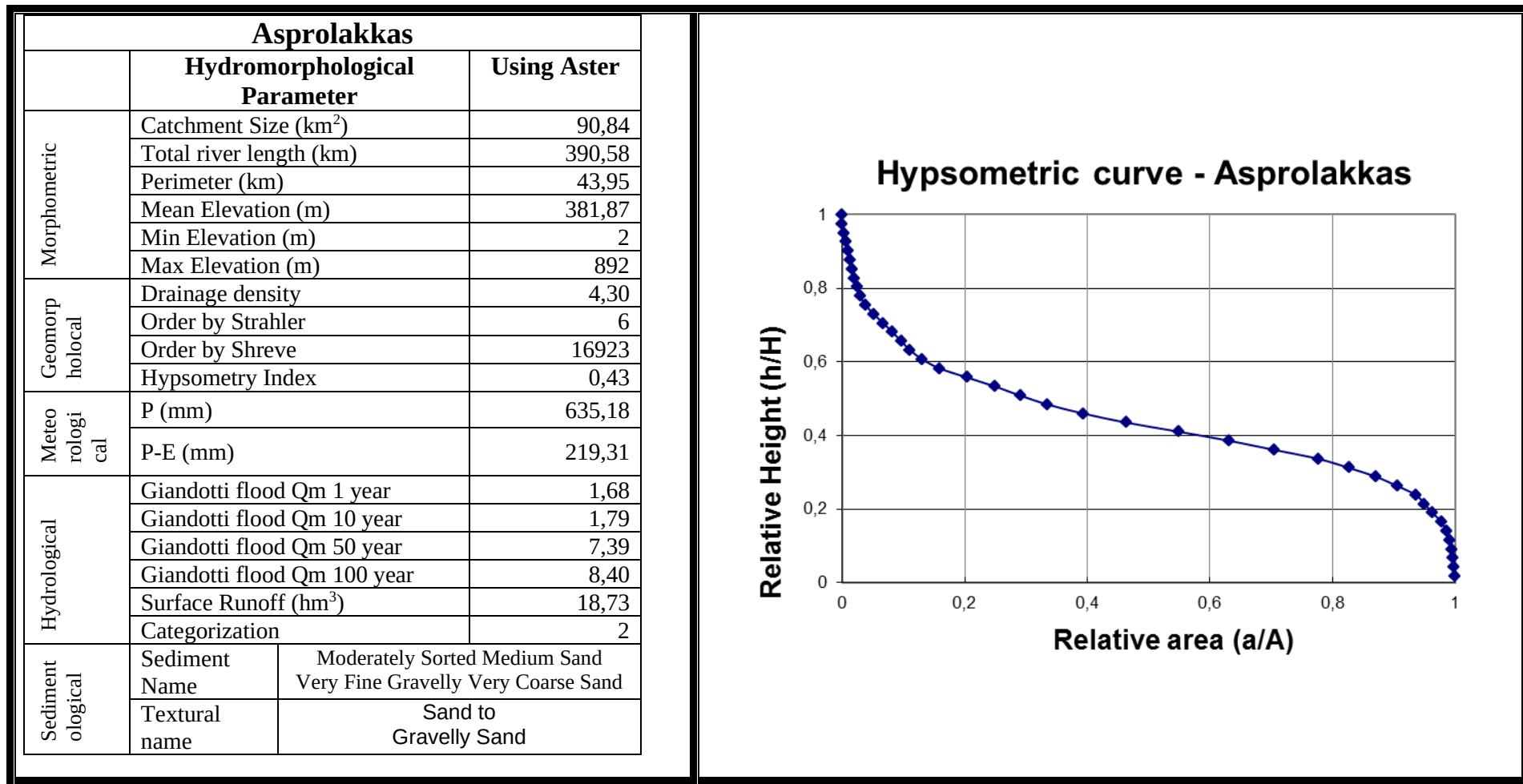


Table 12 (ASP) – Asprolakkas Hydromorphological parameters and Hypsometric curve.

Megali Panagia MPA		
	Hydromorphological Parameter	Using Aster
Morphometric	Catchment Size (km ²)	4,39
	Total river length (km)	20,75
	Perimeter (km)	8,79
	Mean Elevation (m)	646,58
	Min Elevation (m)	545
	Max Elevation (m)	740
Geomorphological	Drainage density	4,73
	Order by Strahler	4
	Order by Shreve	872
	Hypsometry Index	0,52
Meteorological	P (mm)	637,75
	P-E (mm)	234,74
Hydrological	Giandotti flood Qm 1 year	0,37
	Giandotti flood Qm 10 year	0,39
	Giandotti flood Qm 50 year	1,62
	Giandotti flood Qm 100 year	1,85
	Surface Runoff (hm ³)	0,98
	Categorization	1
Sedimentological	Sediment Name	Moderately Sorted Medium Sand Very Fine Gravelly Very Coarse Sand
	Textural name	Sand to Gravelly Sand

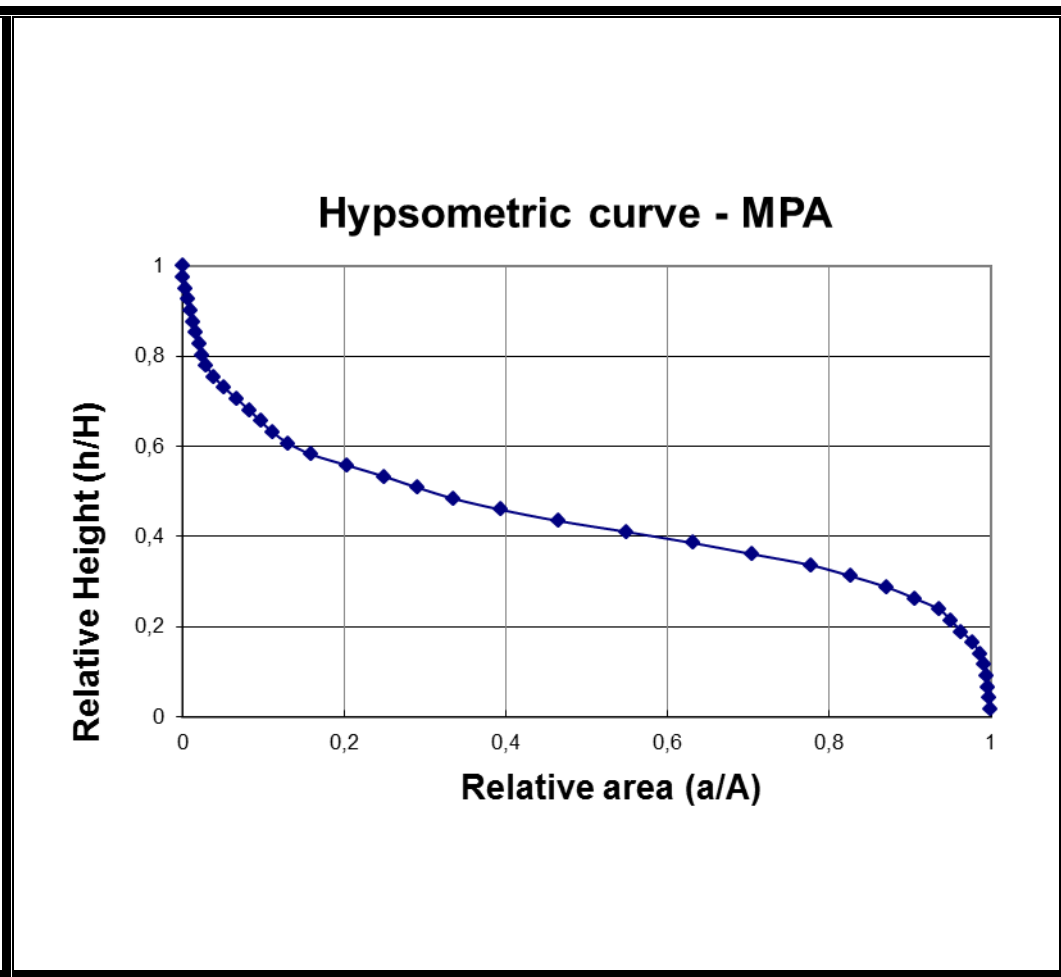


Table 13 (MPA) – Megali Panagia Hydromorphological parameters and Hypsometric curve.

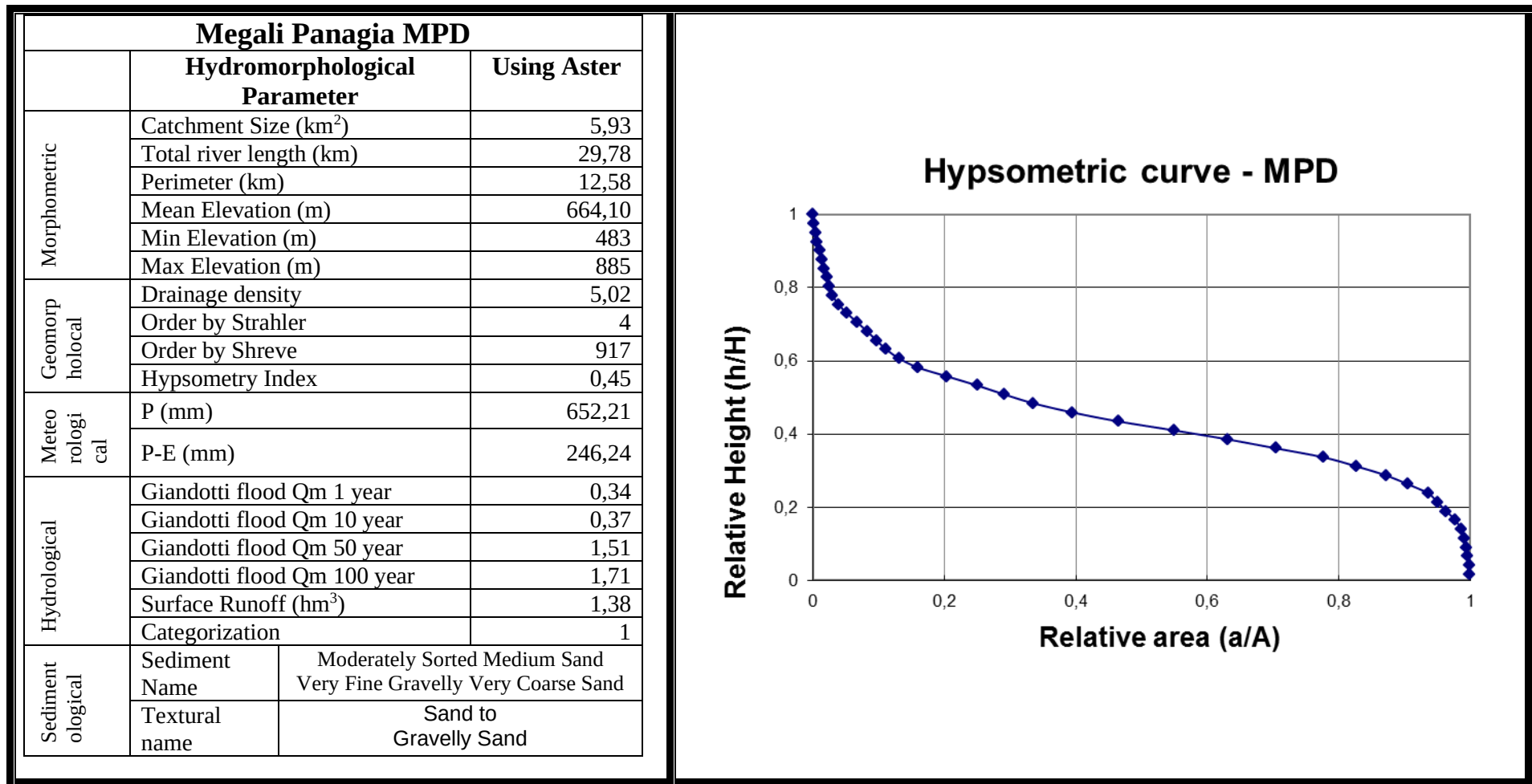


Table 14 (MPD) – Skouries Hydromorphological parameters and Hypsometric curve.



SECTION 4

SEDIMENTOLOGICAL ANALYSIS OF EACH SAMPLING SITE OF NORTHERN GREECE, AT DIFFERENT FLOWING CONDITIONS

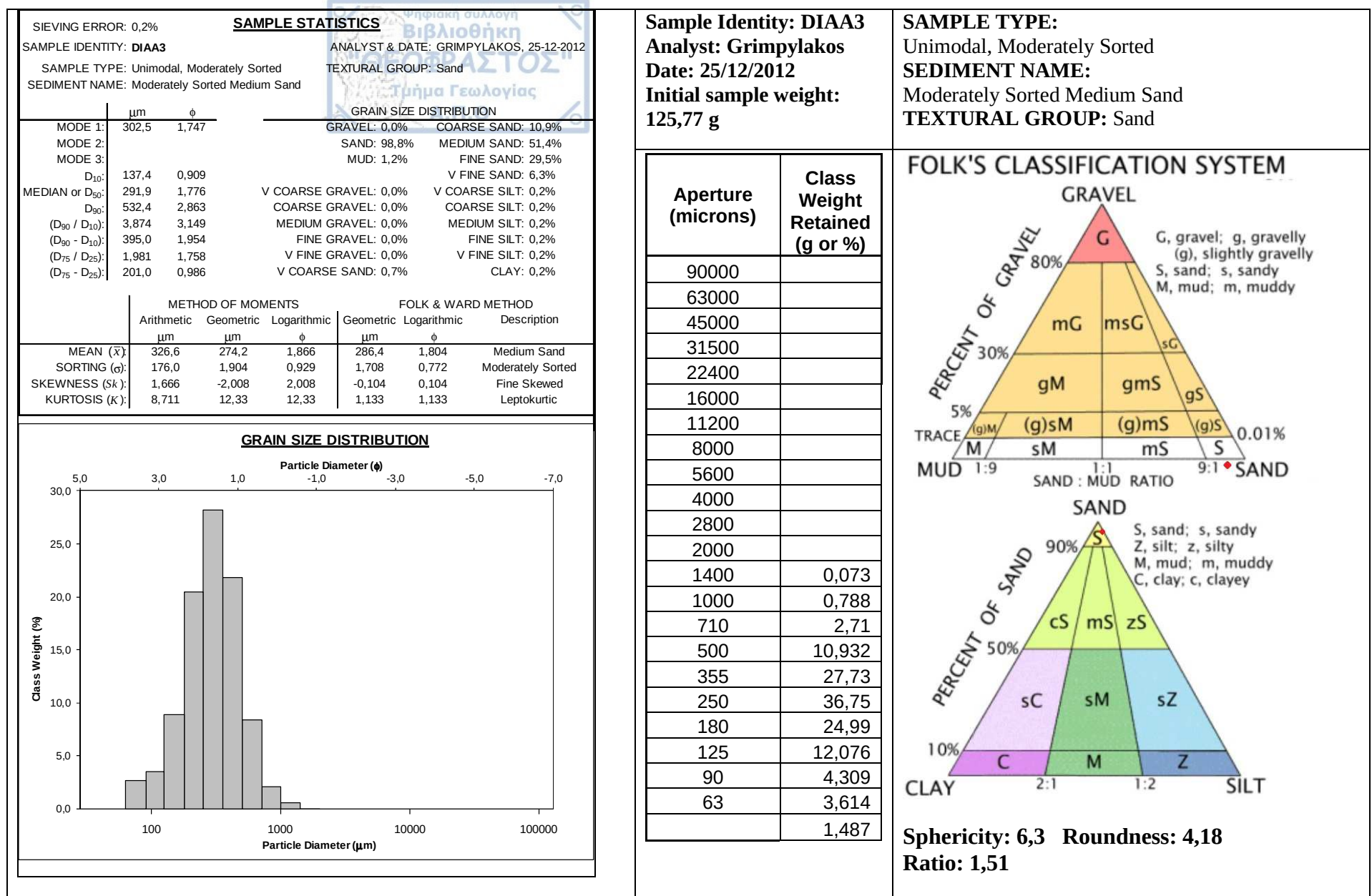


Figure 1SDIAA3 – Diavolorema Sedimentological analysis. Left side High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

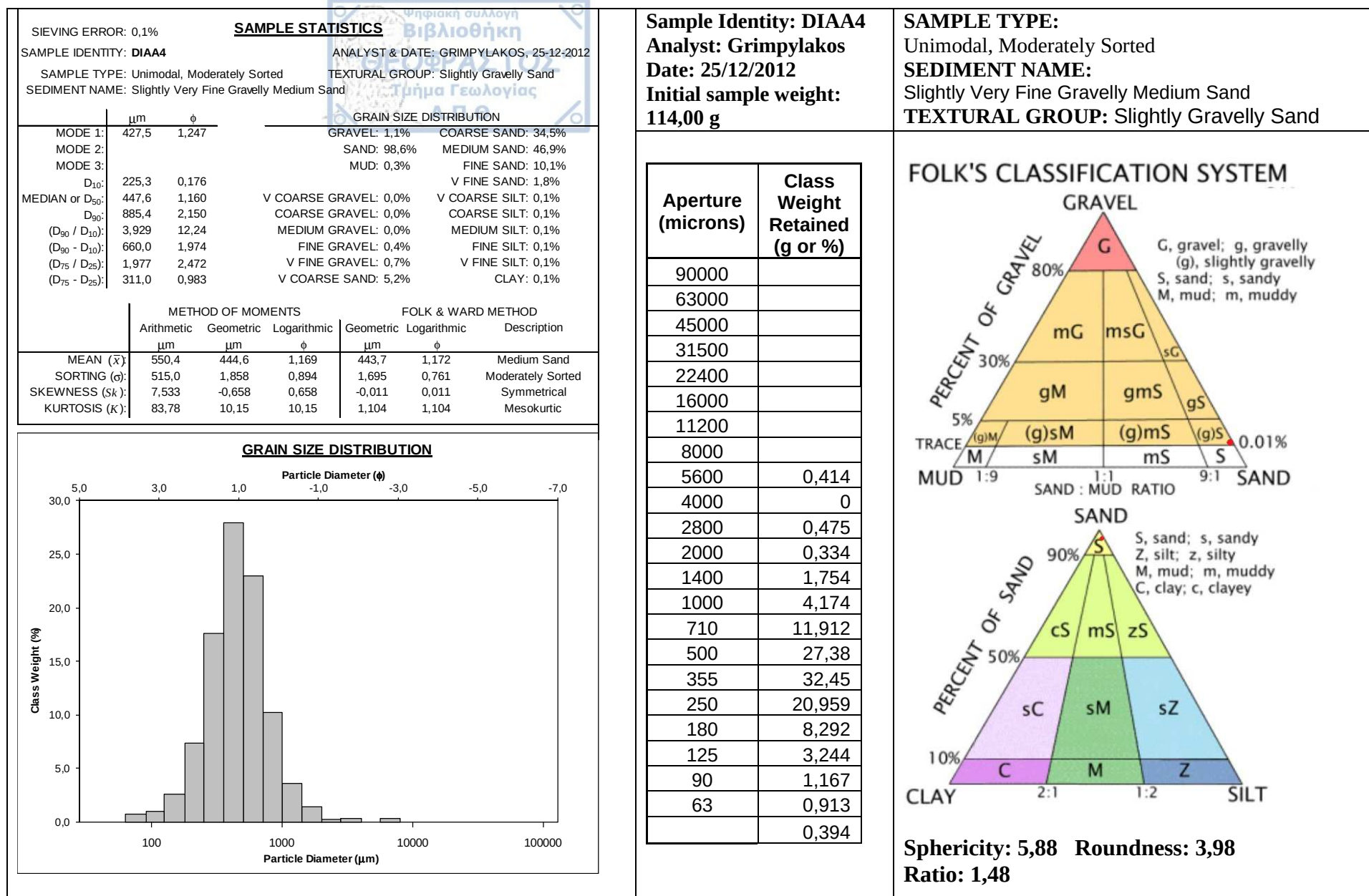


Figure 1SDIAA4 – Diavolorema Sedimentological analysis. Left side Medium-High Flow 26/05/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

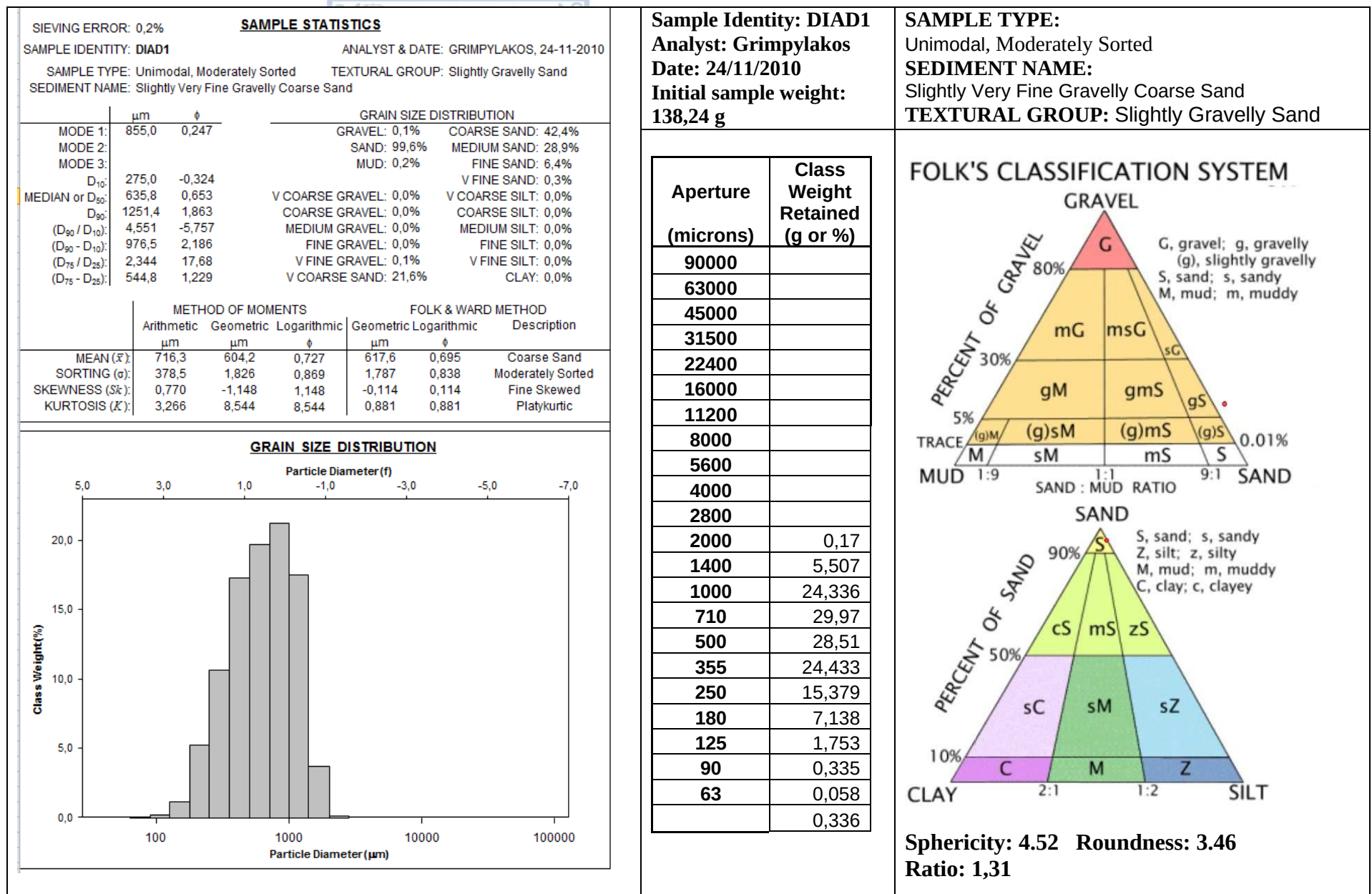


Figure 1SDIAD1 – Diavolorema Sedimentological analysis. Right side Medium Flow 23/06/2010

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

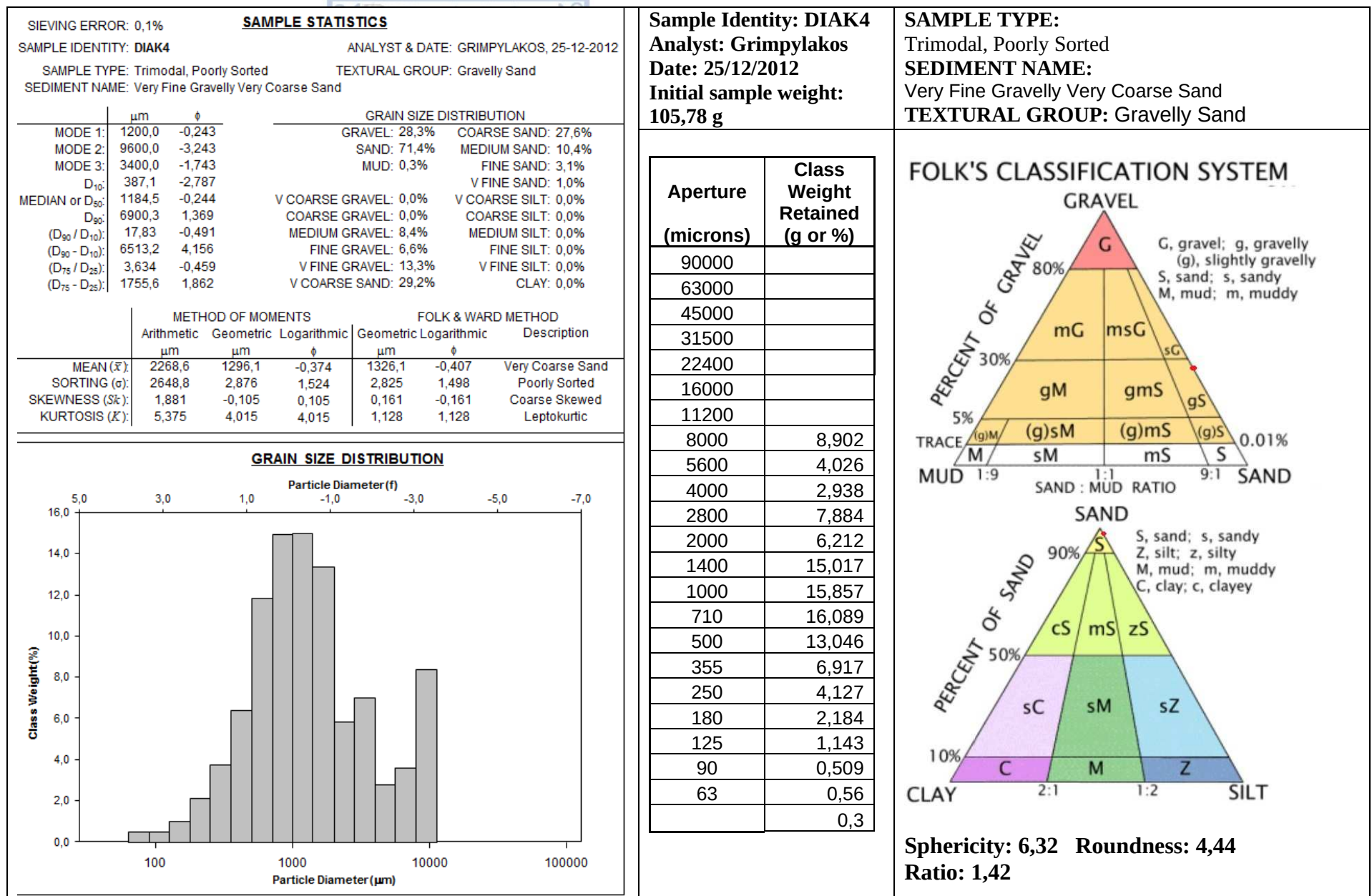


Figure 1SDIAK4 – Diavolorema Sedimentological analysis. Center Medium- High Flow 26/05/2011

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

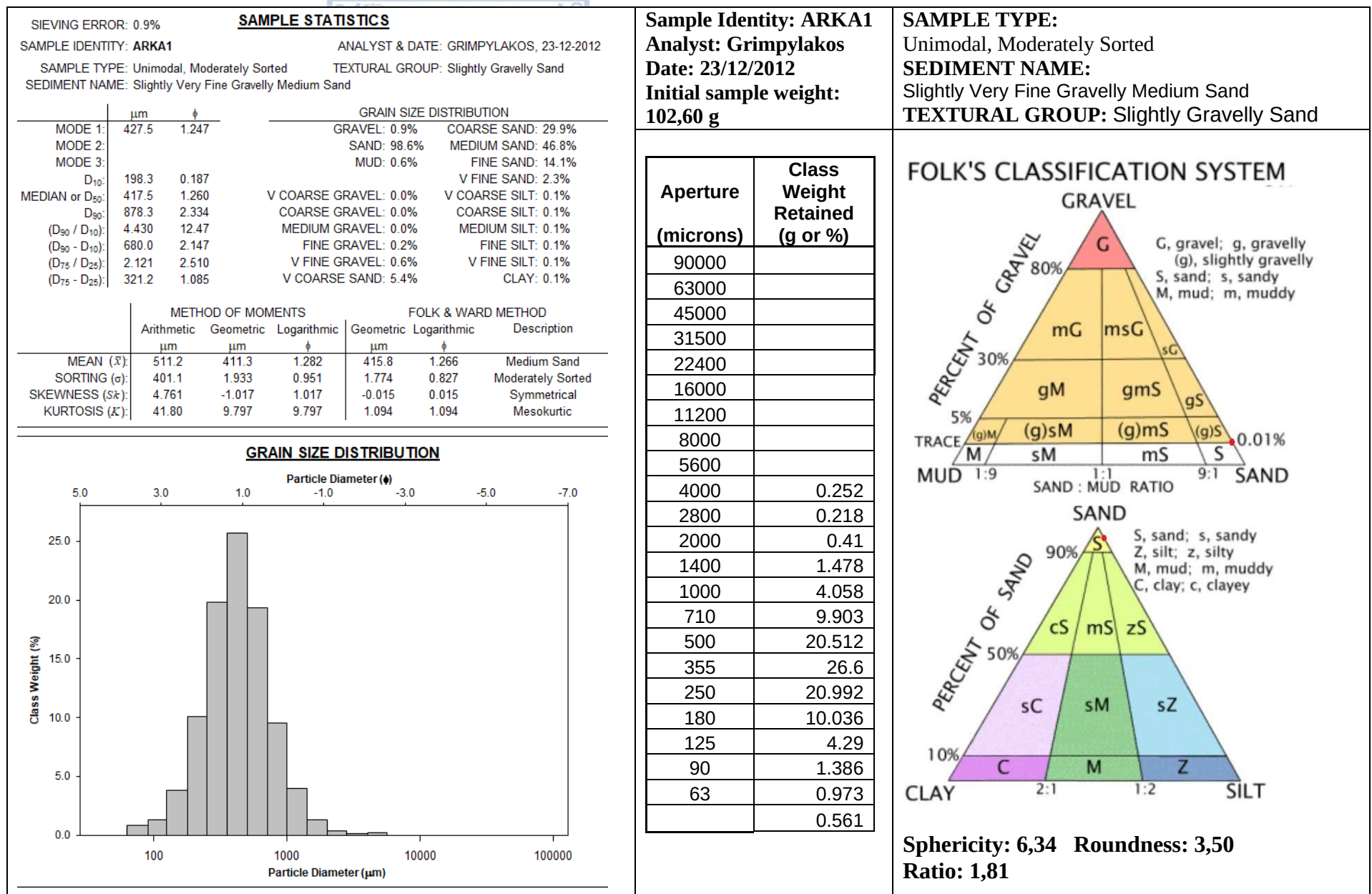


Figure 2SARKA1 - – Arkoudorema Sedimentological analysis. Left Medium - Low Flow 23/06/2010

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

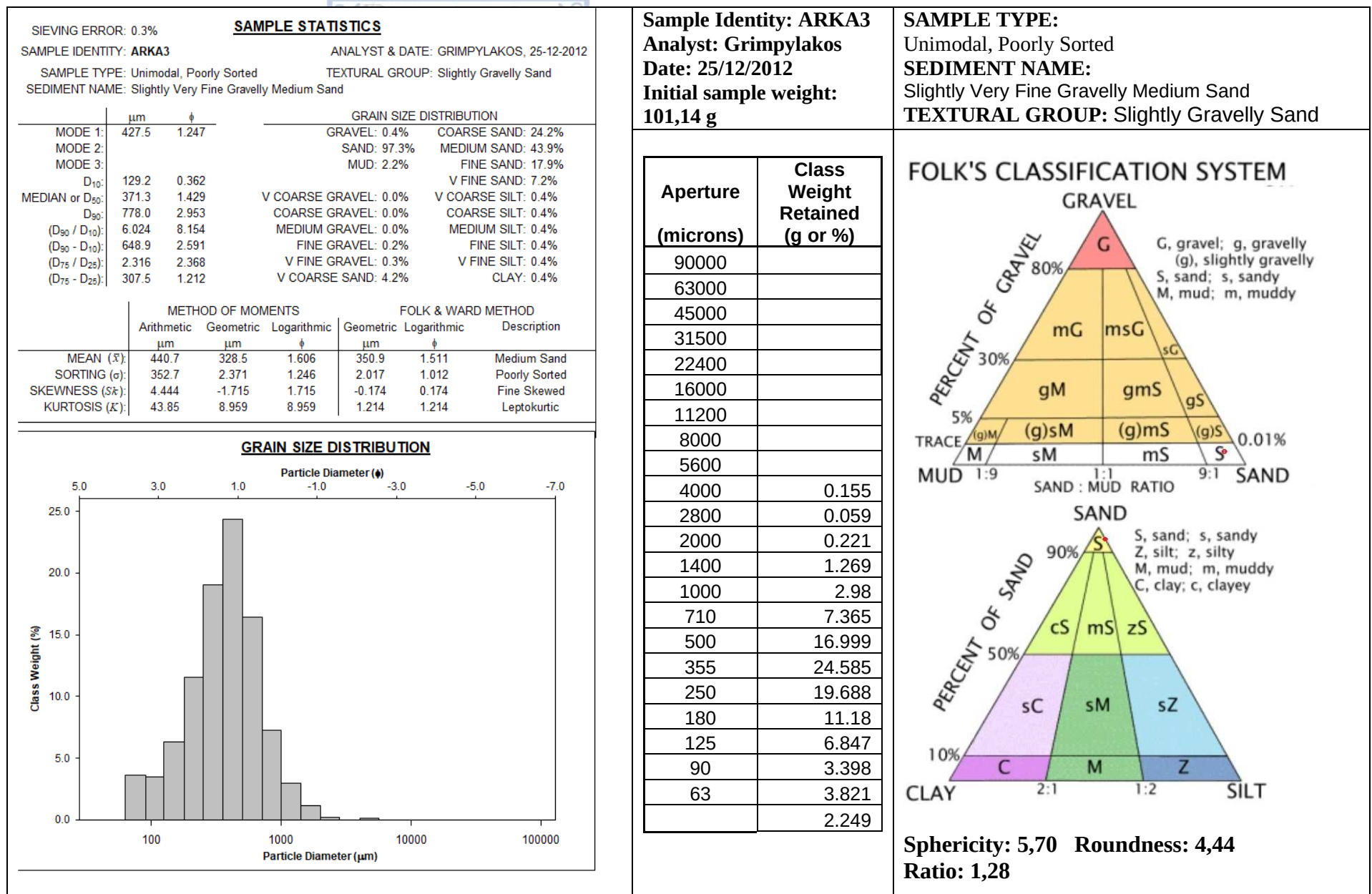


Figure 2SARKA3 - – Arkoudorema Sedimentological analysis. Left High Flow 25/03/2011

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

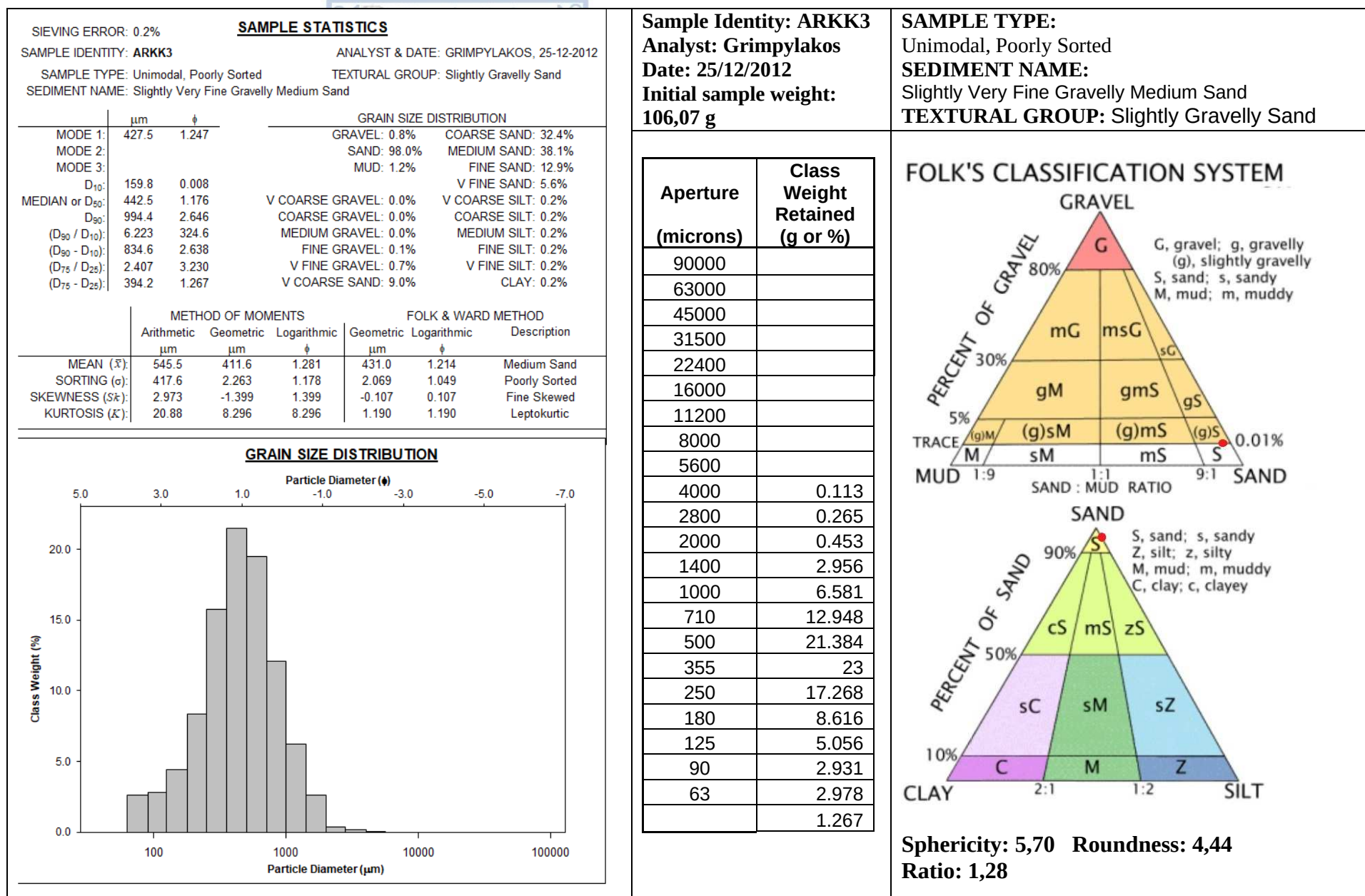


Figure 2SARKK3 - – Arkoudorema Sedimentological analysis. Center High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

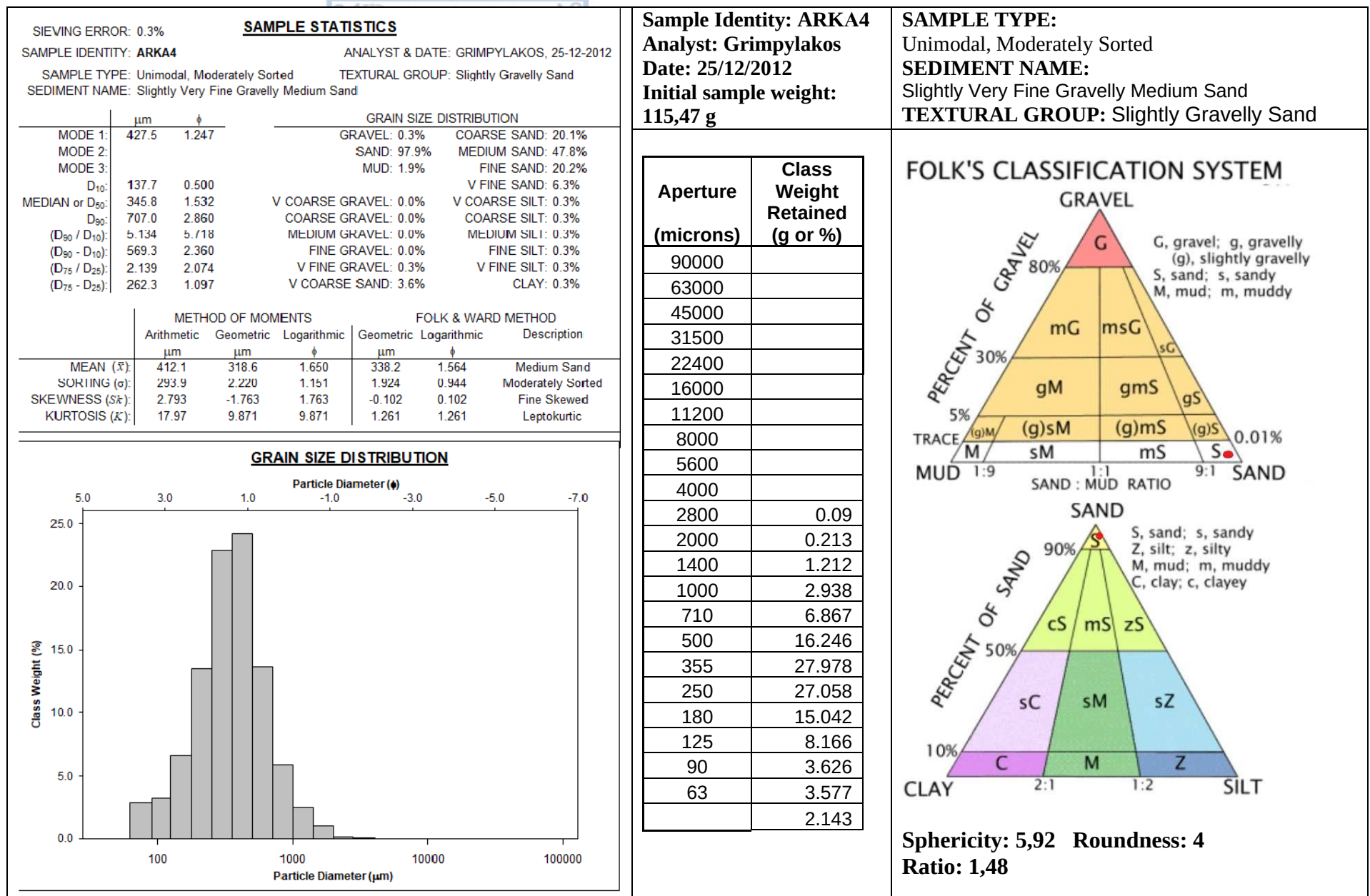


Figure 2SARKA4 - – Arkoudorema Sedimentological analysis. Left Medium-High Flow 26/05/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

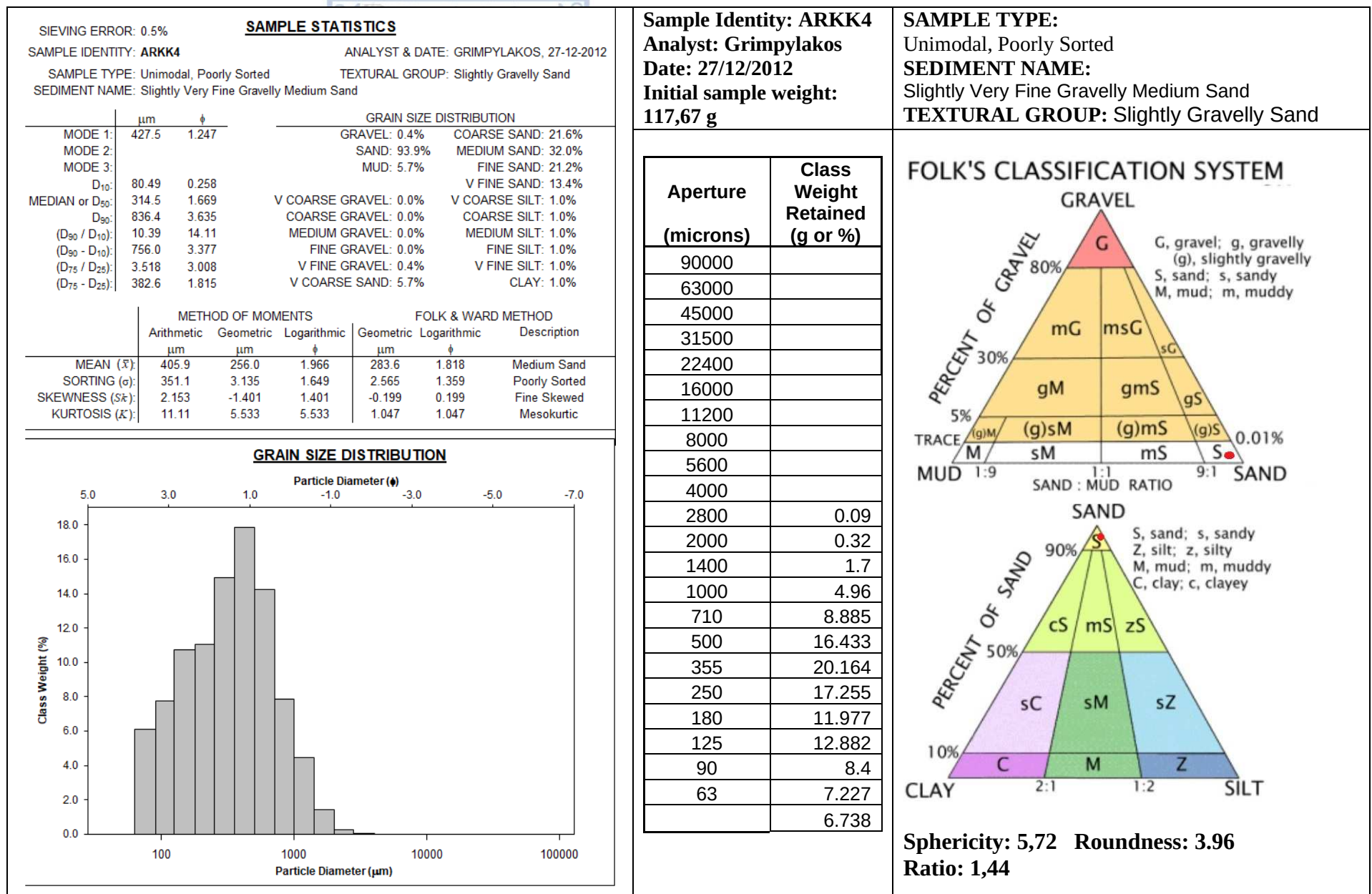


Figure 2SARKK4 - – Arkoudorema Sedimentological analysis. Center Medium-High Flow 26/05/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

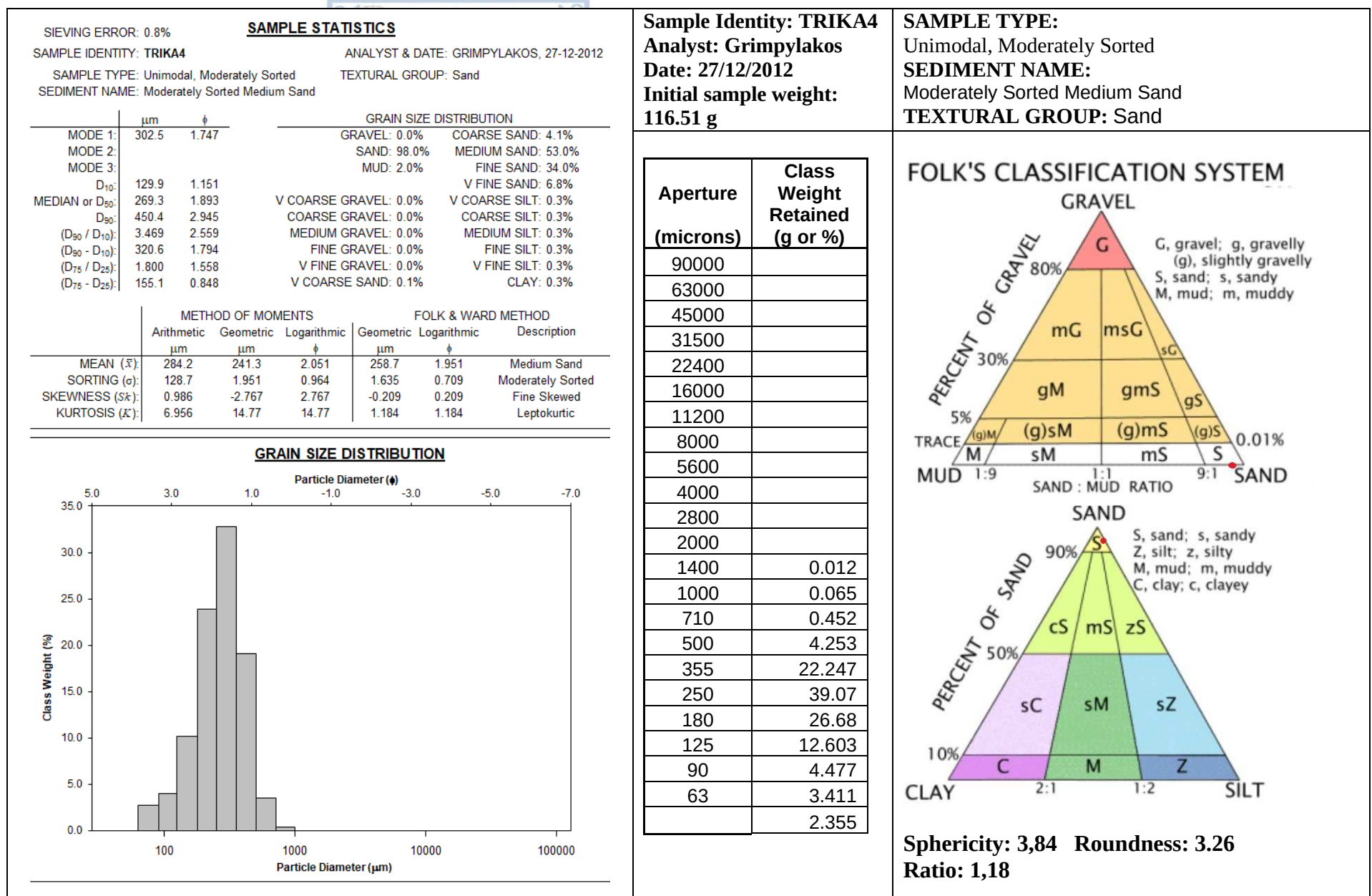


Figure 3STRIKA4 - - Trikomo Sedimentological analysis. Left Medium – High Flow 29/05/2011

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

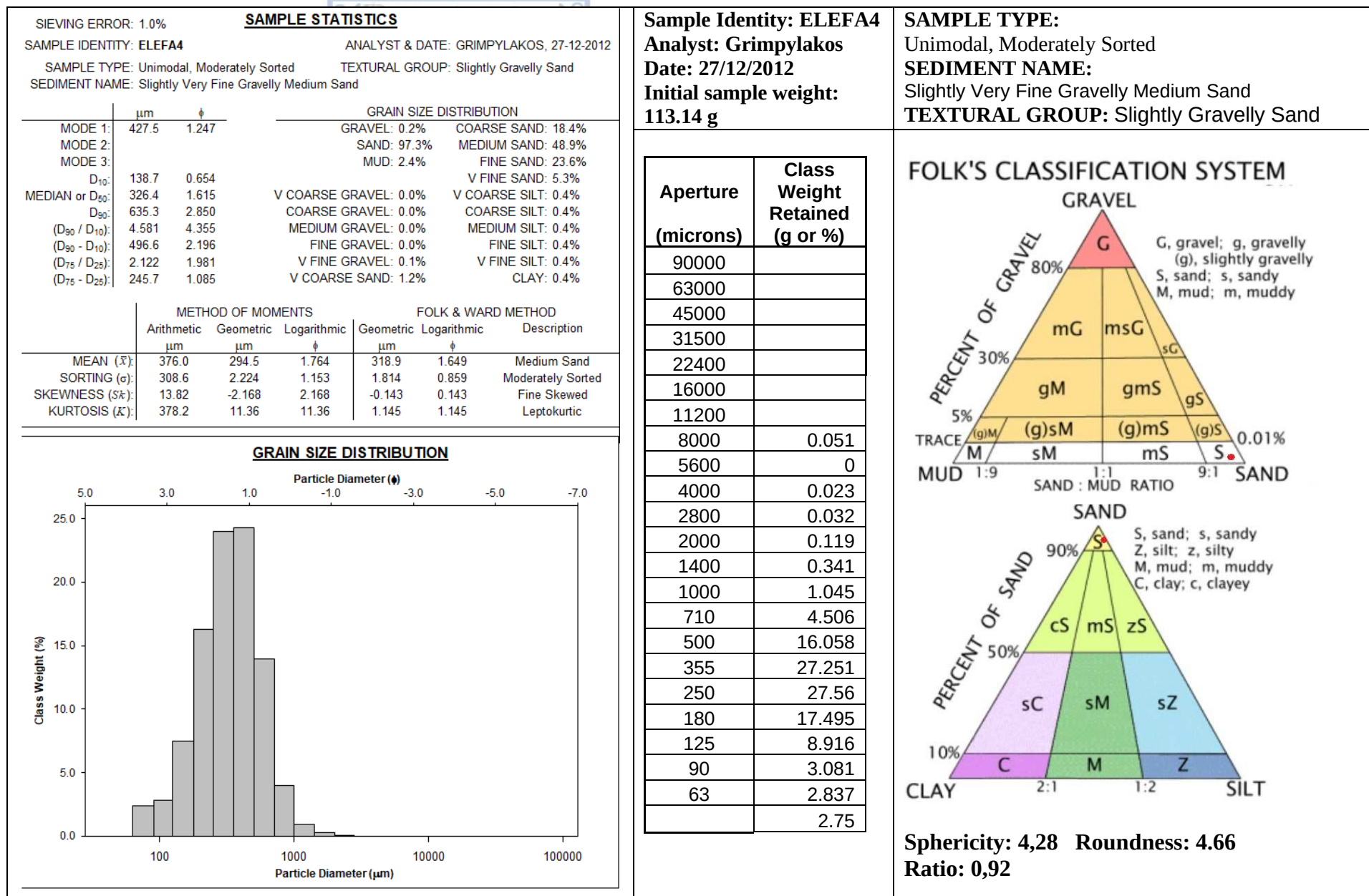
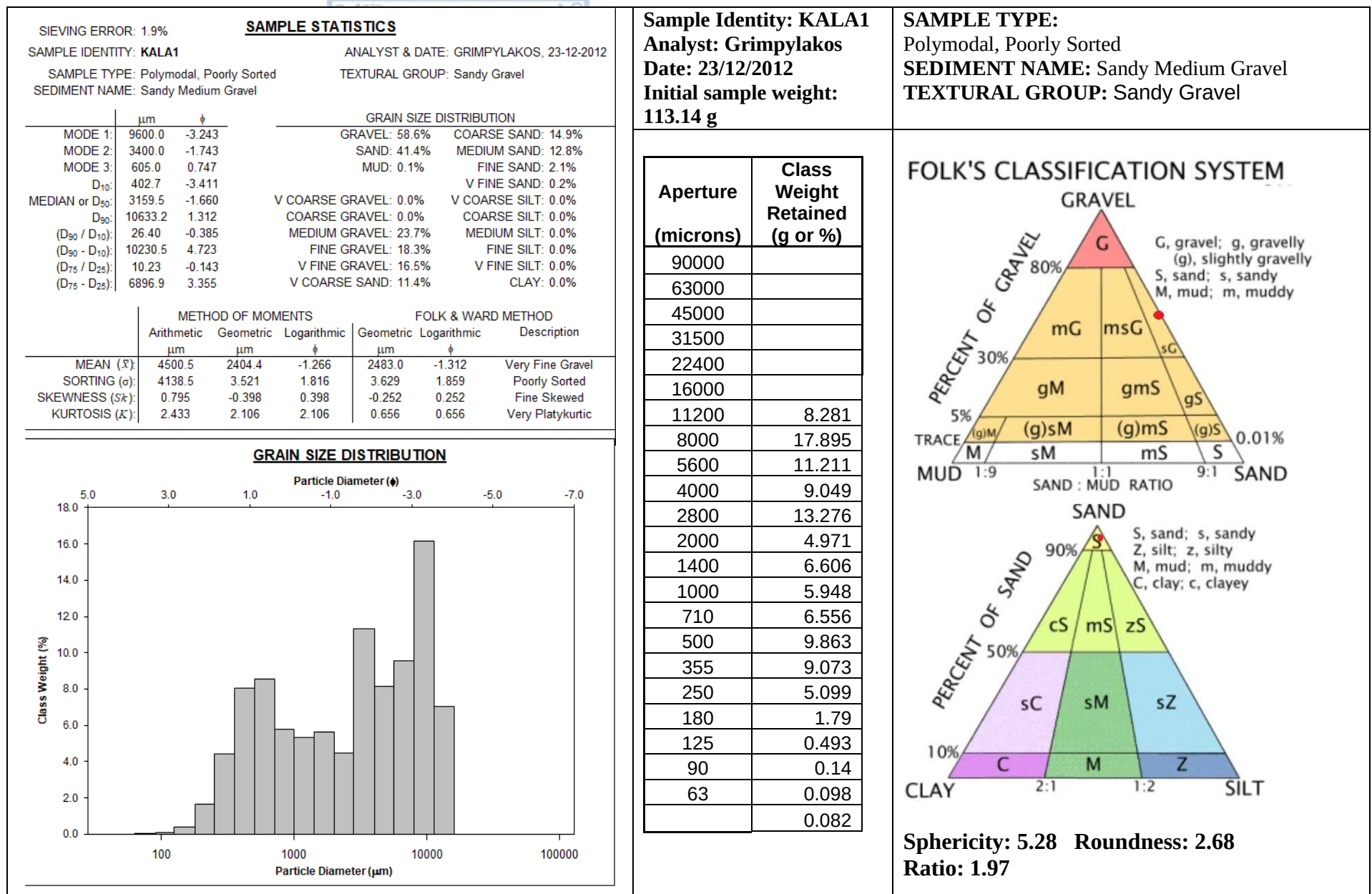


Figure 4SELEFA4 - - Eeelftherochori Sedimentological analysis. Left Medium-High Flow 29/05/2011.

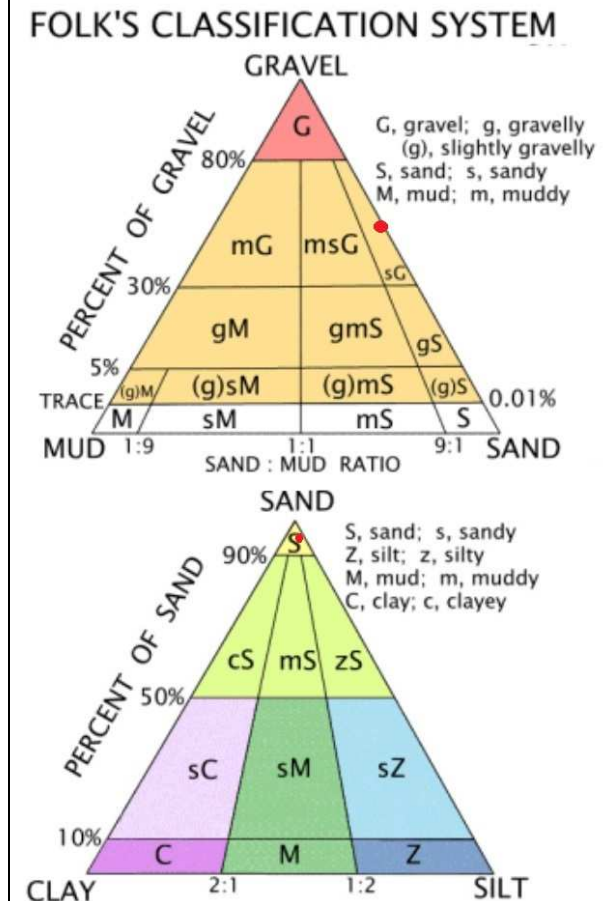
Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.



Sample Identity: KALA1
Analyst: Grimpylakos
Date: 23/12/2012
Initial sample weight: 113.14 g

Aperture (microns)	Class Weight Retained (g or %)
90000	
63000	
45000	
31500	
22400	
16000	
11200	8.281
8000	17.895
5600	11.211
4000	9.049
2800	13.276
2000	4.971
1400	6.606
1000	5.948
710	6.556
500	9.863
355	9.073
250	5.099
180	1.79
125	0.493
90	0.14
63	0.098
	0.082

SAMPLE TYPE:
 Polymodal, Poorly Sorted
SEDIMENT NAME: Sandy Medium Gravel
TEXTURAL GROUP: Sandy Gravel



Sphericity: 5.28 Roundness: 2.68
Ratio: 1.97

Figure 5SKALA1- – Mavrolakkas Sedimentological analysis. Left Medium-Low Flow 02/06/2010.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

SIEVING ERROR: 0.2% **SAMPLE STATISTICS**

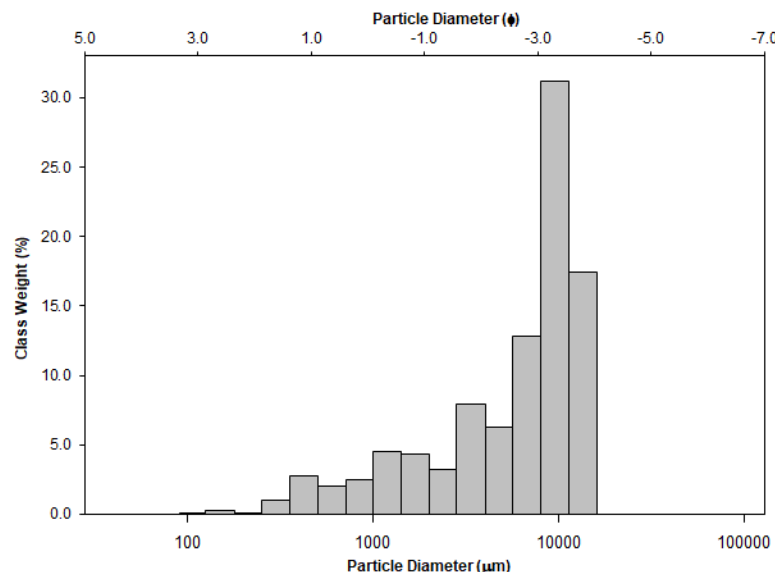
SAMPLE IDENTITY: **KALK1** ANALYST & DATE: GRIMPYLAKOS, 21-12-2012

SAMPLE TYPE: Bimodal, Poorly Sorted TEXTURAL GROUP: Gravel

SEDIMENT NAME: Medium Gravel

			GRAIN SIZE DISTRIBUTION			
MODE 1:	μm	ϕ	GRAVEL: 81.5%		COARSE SAND: 4.7%	
MODE 2:	9600.0	-3.243	SAND: 18.4%		MEDIUM SAND: 4.0%	
MODE 3:	3400.0	-1.743	MUD: 0.0%		FINE SAND: 0.4%	
D ₁₀ :	1059.7	-3.723			V FINE SAND: 0.1%	
MEDIAN or D ₅₀ :	7970.2	-2.995	V COARSE GRAVEL: 0.0%		V COARSE SILT: 0.0%	
D ₉₀ :	13207.0	-0.084	COARSE GRAVEL: 0.0%		COARSE SILT: 0.0%	
(D ₅₀ / D ₁₀):	12.46	0.022	MEDIUM GRAVEL: 49.9%		MEDIUM SILT: 0.0%	
(D ₉₀ - D ₁₀):	12147.3	3.640	FINE GRAVEL: 19.9%		FINE SILT: 0.0%	
(D ₇₅ / D ₂₅):	3.251	0.498	V FINE GRAVEL: 11.7%		V FINE SILT: 0.0%	
(D ₇₅ - D ₂₅):	7237.7	1.701	V COARSE SAND: 9.3%		CLAY: 0.0%	

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic	Geometric	Logarithmic	Geometric	Logarithmic	Description
	μm	μm	ϕ	μm	ϕ	
MEAN ($\bar{x}$):	7311.7	5153.3	-2.365	5376.2	-2.427	Fine Gravel
SORTING (σ):	4347.2	2.742	1.455	2.689	1.427	Poorly Sorted
SKEWNESS (S_k):	-0.088	-1.333	1.333	-0.619	0.619	Very Fine Skewed
KURTOSIS (K):	1.803	4.143	4.143	1.145	1.145	Leptokurtic



Aperture (microns)	Class Weight Retained (g or %)
90000	
63000	
45000	
31500	
22400	
16000	
11200	24.31
8000	40.88
5600	17.801
4000	8.28
2800	11.107
2000	4.235
1400	6.09
1000	6.01
710	3.32
500	2.8
355	3.73
250	1.46
180	0.1
125	0.44
90	0.14
63	0.03
	0.02

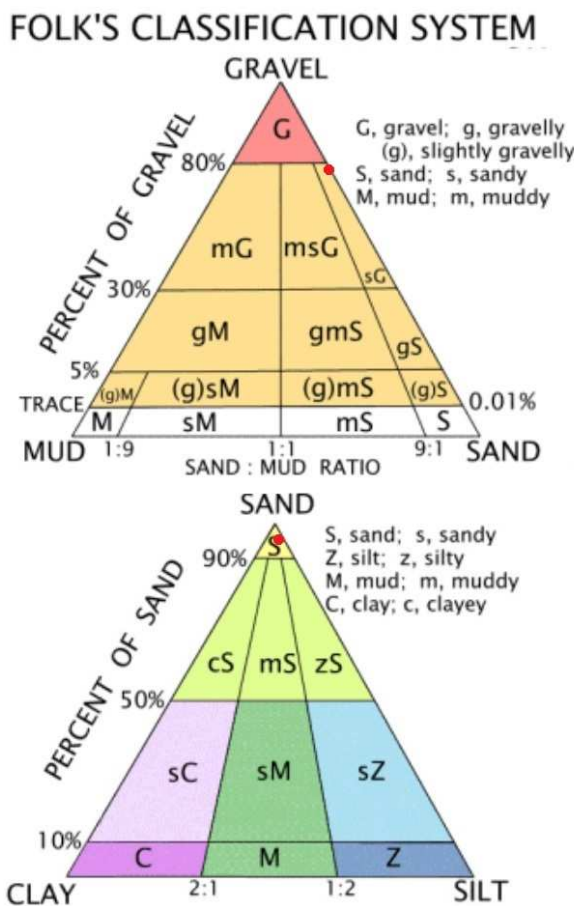
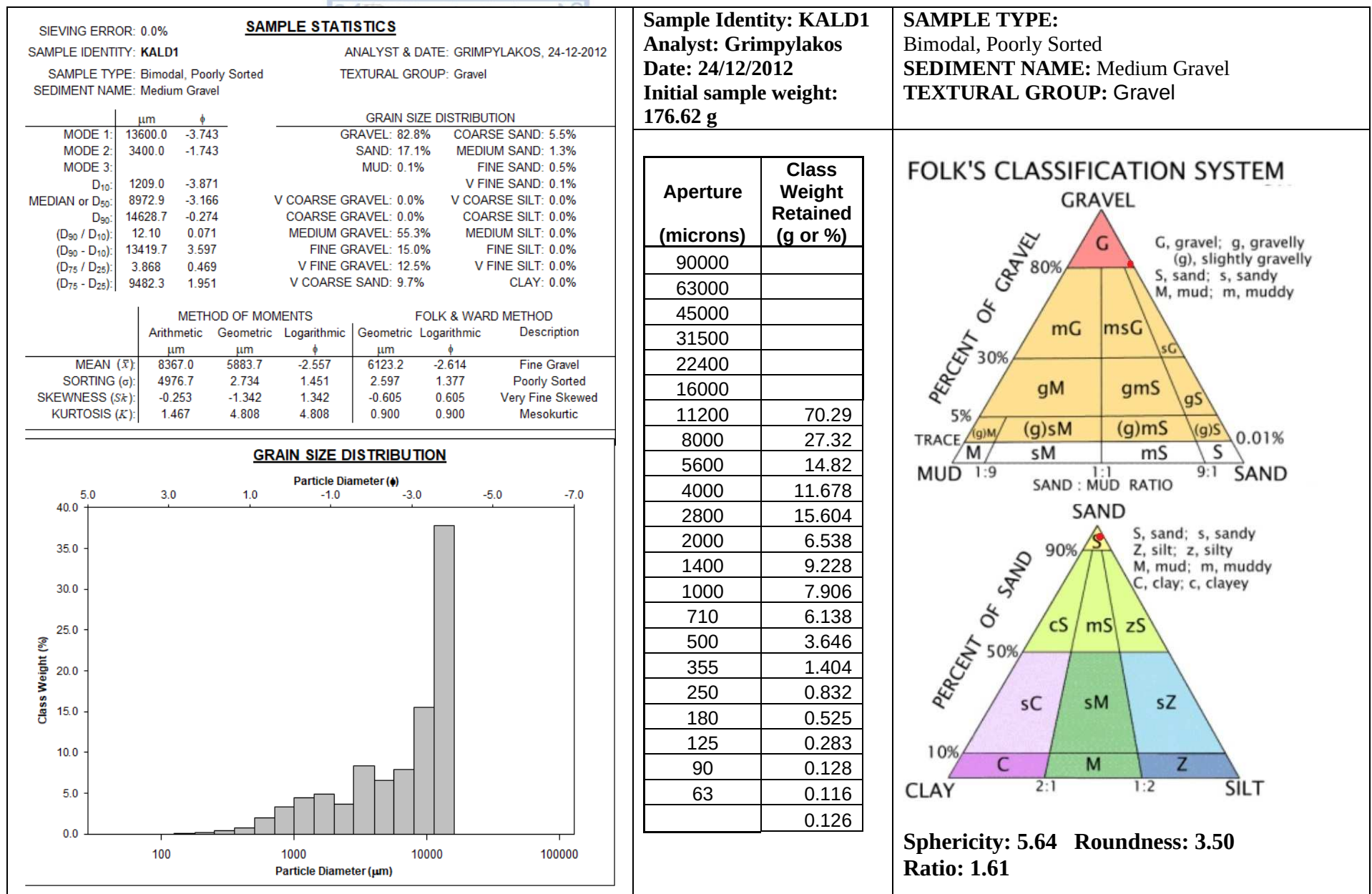


Figure 5SKALK1- – Mavrolakkas Sedimentological analysis. Center Medium-Low Flow 02/06/2010.

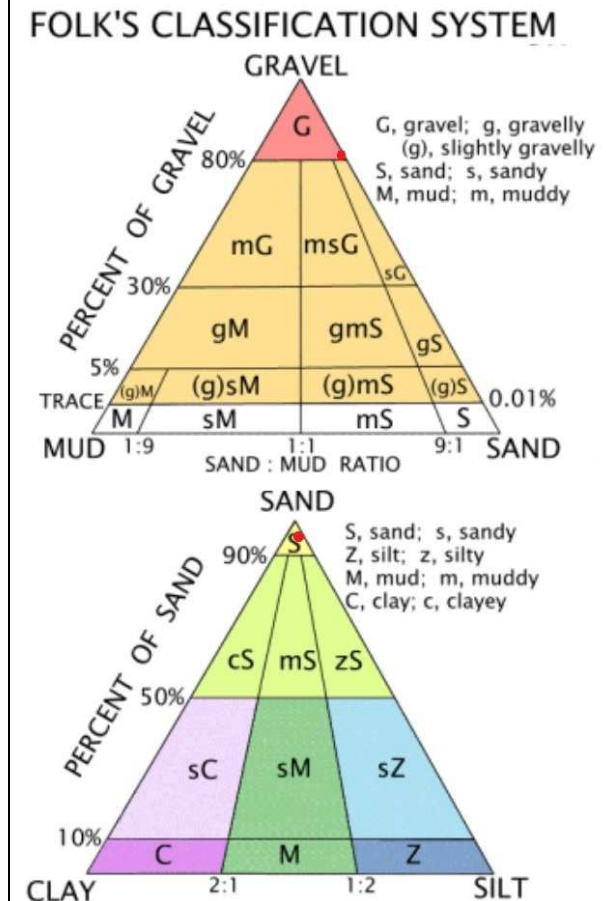
Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.



Sample Identity: KALD1
Analyst: Grimpylakos
Date: 24/12/2012
Initial sample weight: 176.62 g

Aperture (microns)	Class Weight Retained (g or %)
90000	
63000	
45000	
31500	
22400	
16000	
11200	70.29
8000	27.32
5600	14.82
4000	11.678
2800	15.604
2000	6.538
1400	9.228
1000	7.906
710	6.138
500	3.646
355	1.404
250	0.832
180	0.525
125	0.283
90	0.128
63	0.116
	0.126

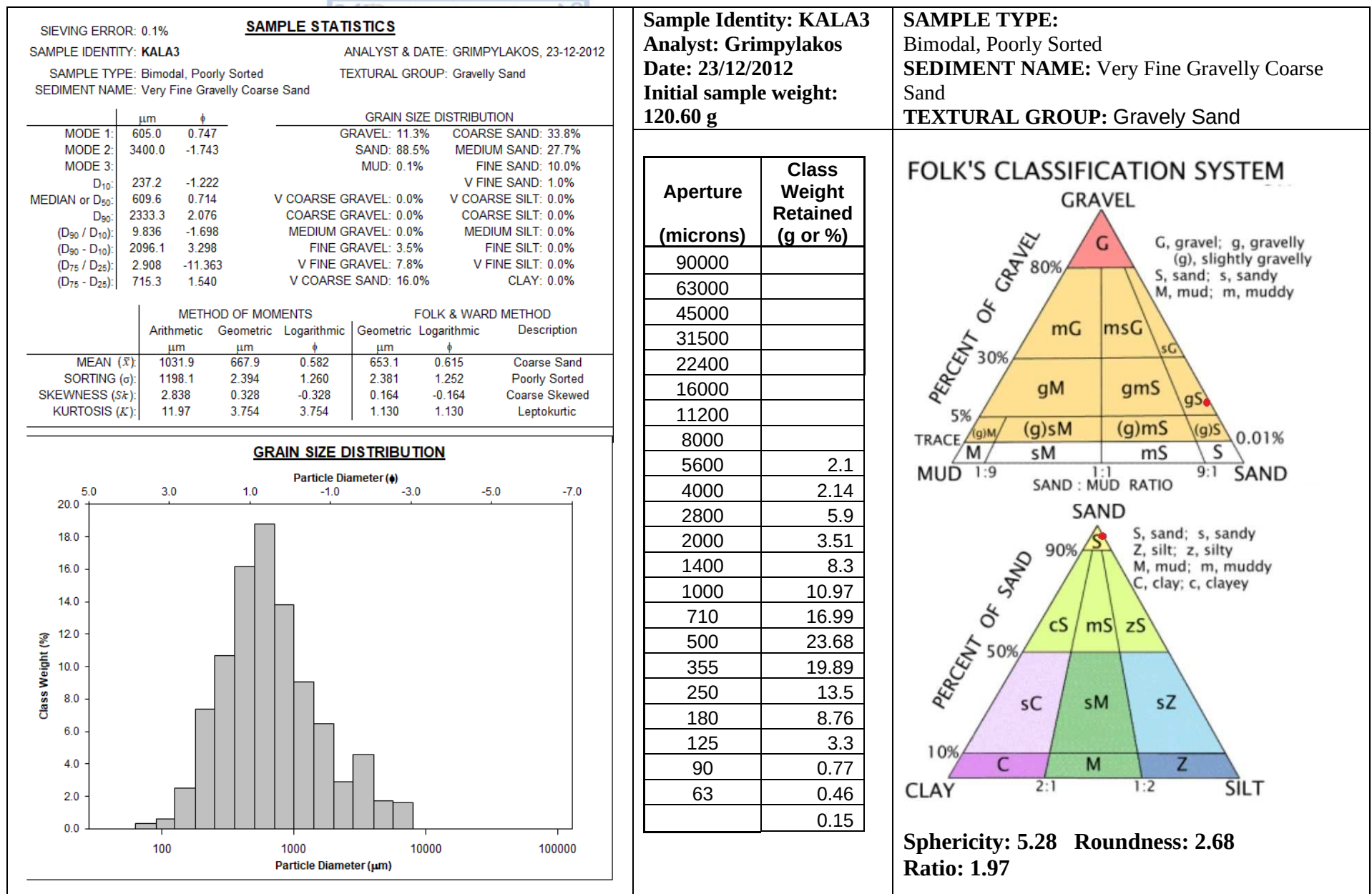
SAMPLE TYPE:
 Bimodal, Poorly Sorted
SEDIMENT NAME: Medium Gravel
TEXTURAL GROUP: Gravel



Sphericity: 5.64 Roundness: 3.50
Ratio: 1.61

Figure 5SKALD1- – Mavrolakkas Sedimentological analysis. Right Medium-Low Flow 02/06/2010.

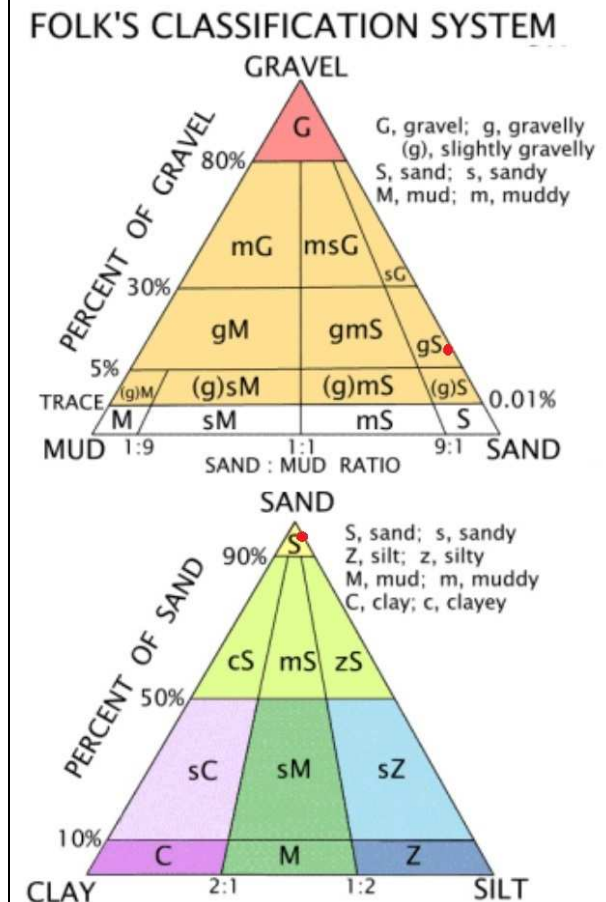
Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.



Sample Identity: KALA3
Analyst: Grimpylakos
Date: 23/12/2012
Initial sample weight: 120.60 g

Aperture (microns)	Class Weight Retained (g or %)
90000	
63000	
45000	
31500	
22400	
16000	
11200	
8000	
5600	2.1
4000	2.14
2800	5.9
2000	3.51
1400	8.3
1000	10.97
710	16.99
500	23.68
355	19.89
250	13.5
180	8.76
125	3.3
90	0.77
63	0.46
	0.15

SAMPLE TYPE:
Bimodal, Poorly Sorted
SEDIMENT NAME: Very Fine Gravelly Coarse Sand
TEXTURAL GROUP: Gravelly Sand



Sphericity: 5.28 Roundness: 2.68
Ratio: 1.97

Figure 5SKALA3- – Mavrolakkas Sedimentological analysis. Left High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

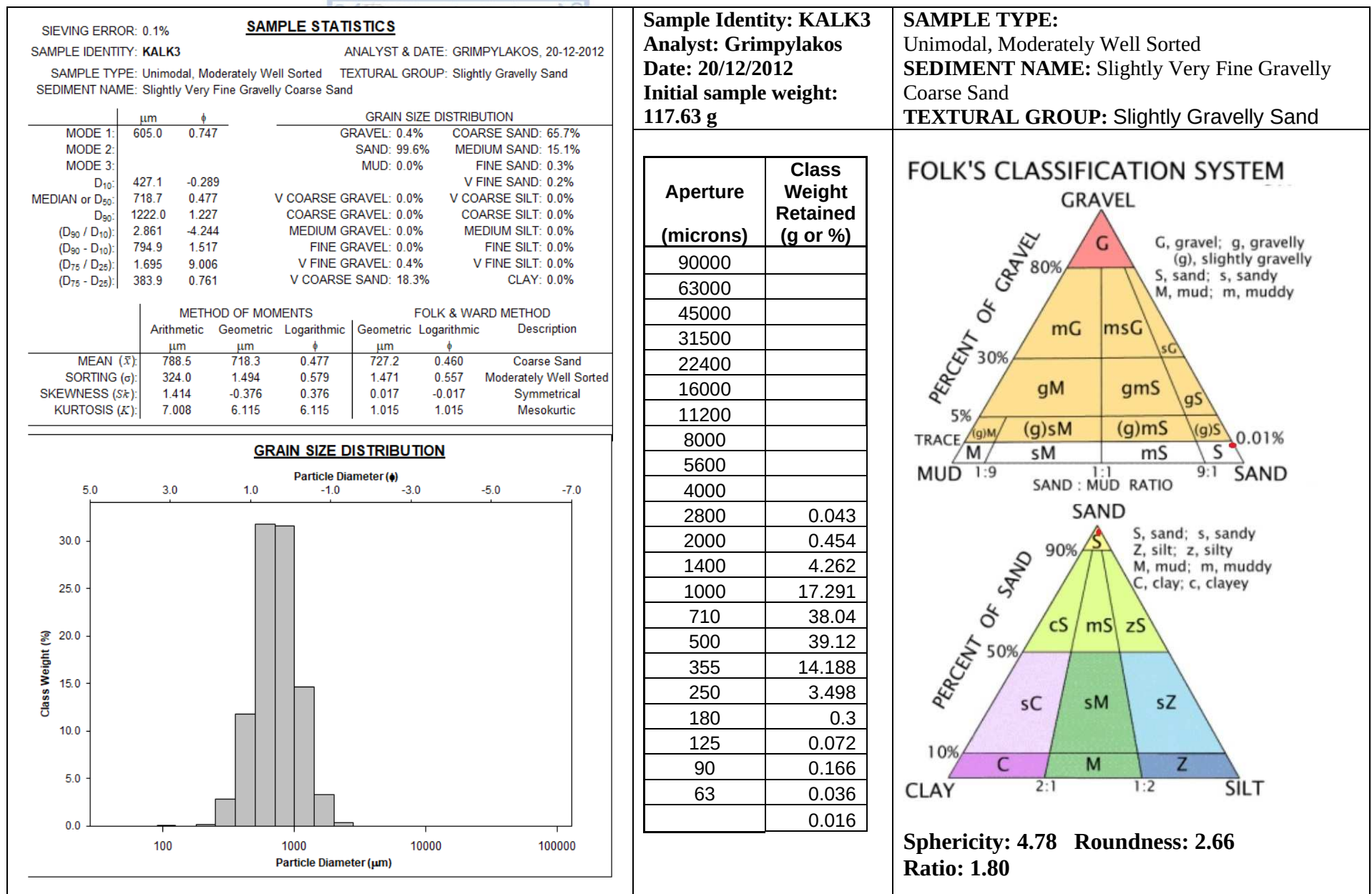


Figure 5SKALK3- – Mavrolakkas Sedimentological analysis. Center High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

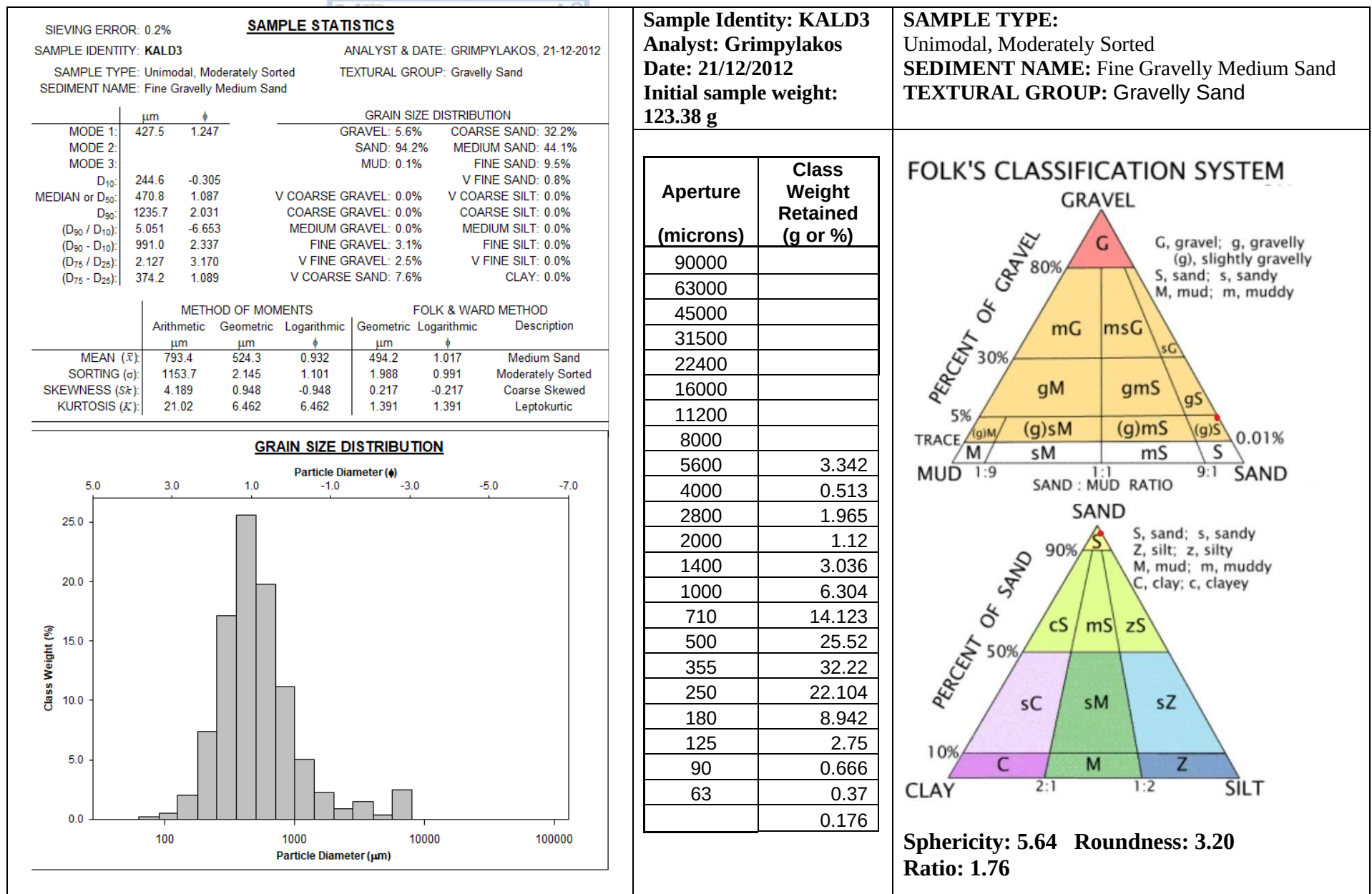


Figure 5SKALD3- – Mavrolakkas Sedimentological analysis. Right High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

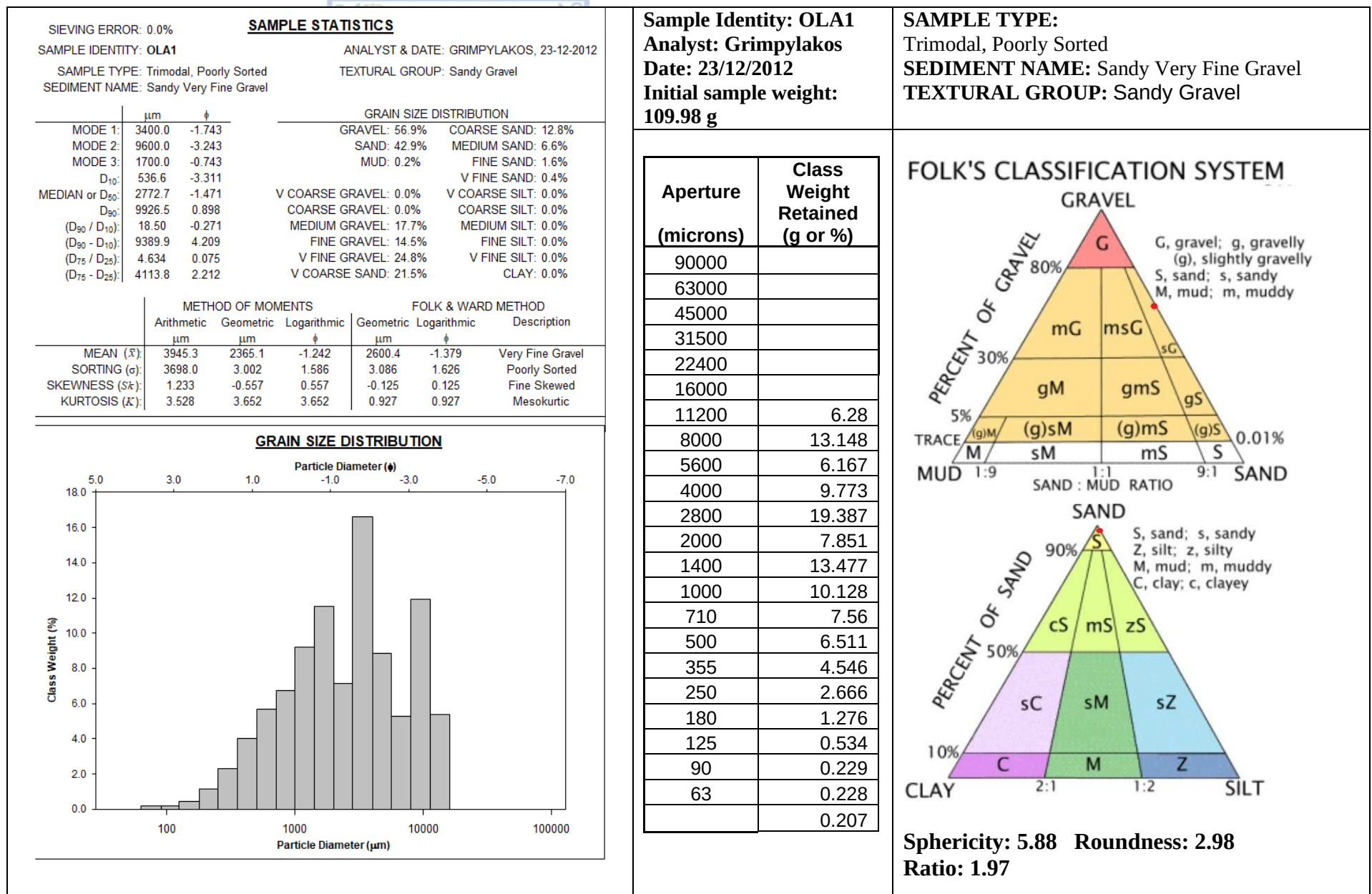
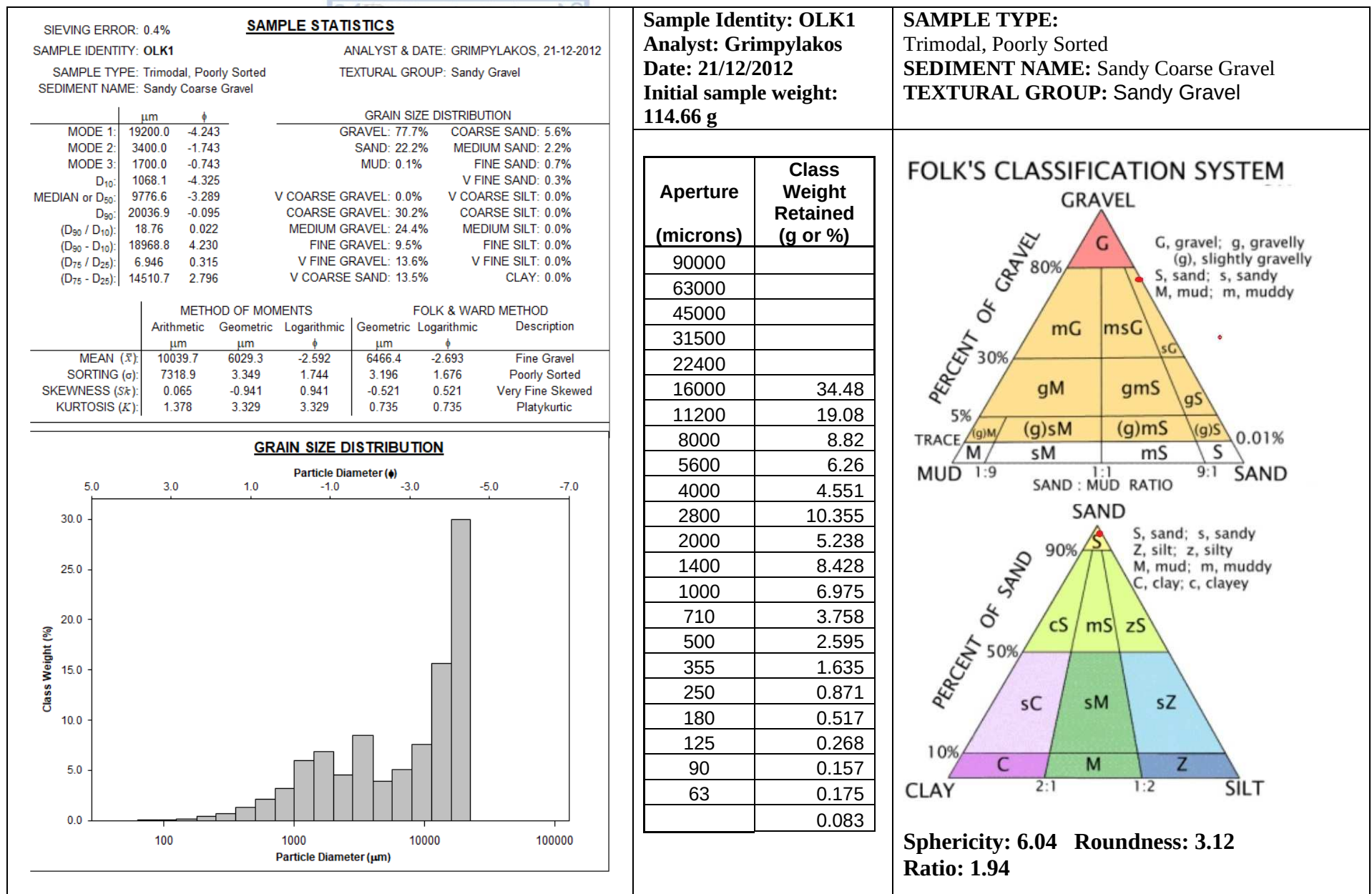


Figure 6SOLA1- – Kipouristra Sedimentological analysis. Left Medium-Low Flow 01/06/2010.

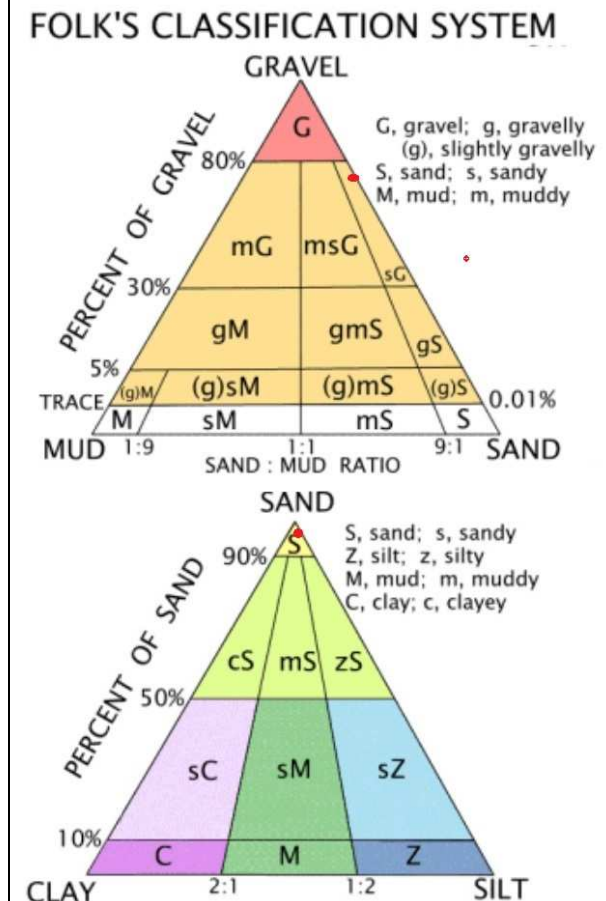
Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.



Sample Identity: OLK1
Analyst: Grimpylakos
Date: 21/12/2012
Initial sample weight: 114.66 g

Aperture (microns)	Class Weight Retained (g or %)
90000	
63000	
45000	
31500	
22400	
16000	34.48
11200	19.08
8000	8.82
5600	6.26
4000	4.551
2800	10.355
2000	5.238
1400	8.428
1000	6.975
710	3.758
500	2.595
355	1.635
250	0.871
180	0.517
125	0.268
90	0.157
63	0.175
	0.083

SAMPLE TYPE:
Trimodal, Poorly Sorted
SEDIMENT NAME: Sandy Coarse Gravel
TEXTURAL GROUP: Sandy Gravel



Sphericity: 6.04 Roundness: 3.12
Ratio: 1.94

Figure 6SOLK1- – Kipouristra Sedimentological analysis. Center Medium-Low Flow 01/06/2010.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

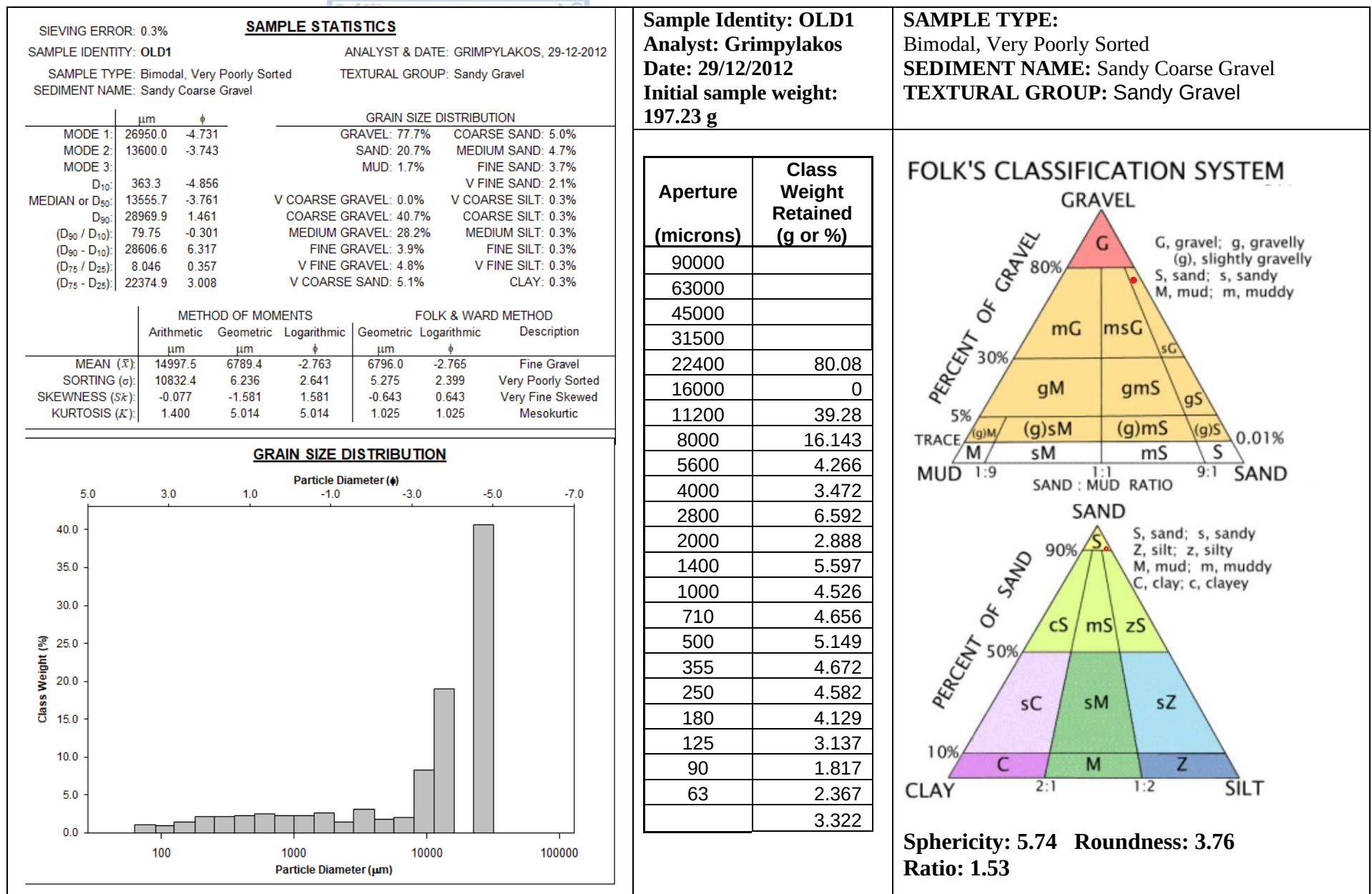


Figure 6SOLD1- – Kipouristra Sedimentological analysis. Right Medium-Low Flow 01/06/2010.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

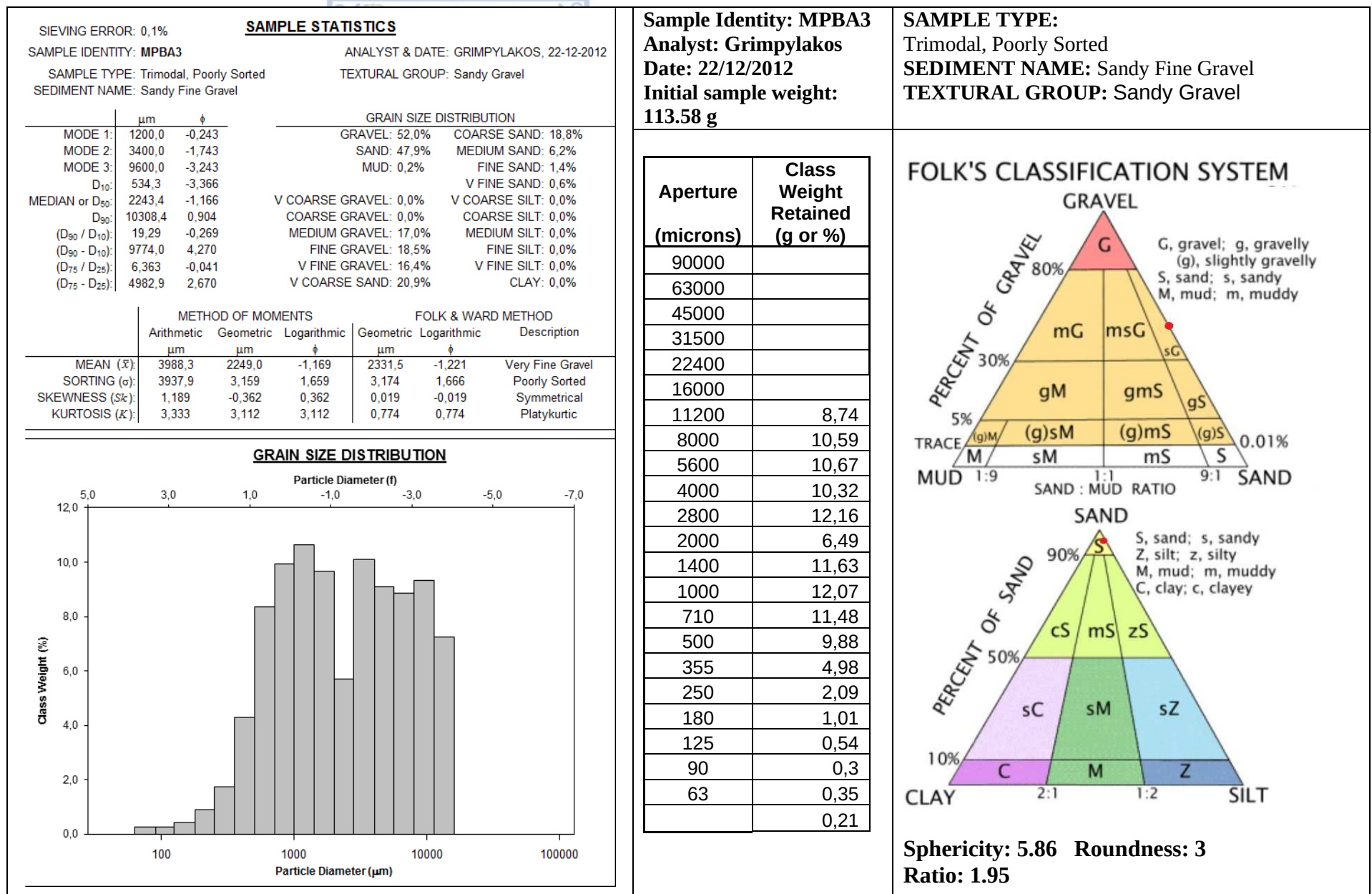


Figure 8SMPBA3- – Megali Panagia Sedimentological analysis. Left High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

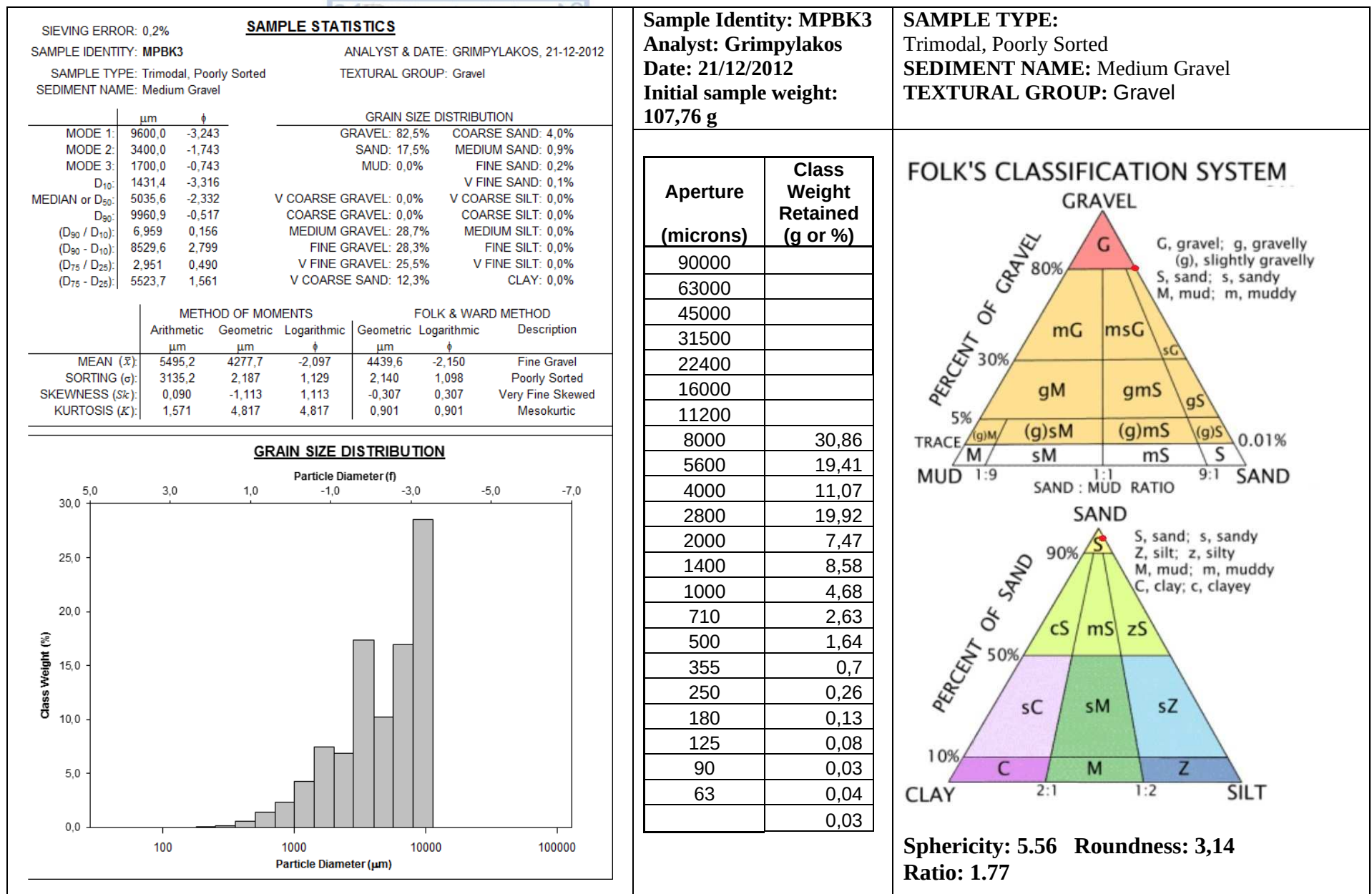


Figure 8MPBK3- – Megali Panagia Sedimentological analysis. Center High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

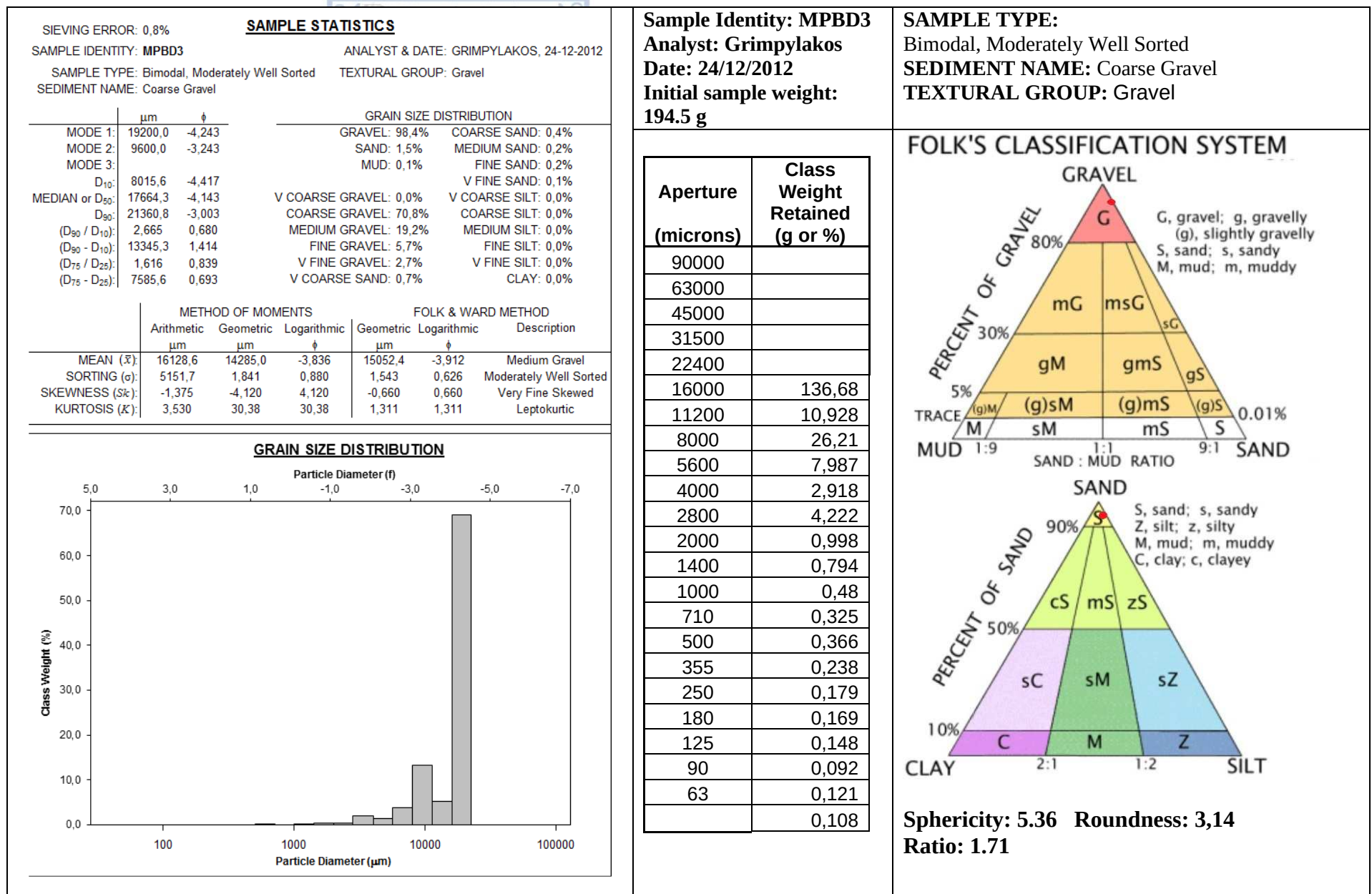


Figure 8SMPBD3- Megali Panagia Sedimentological analysis. Right High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

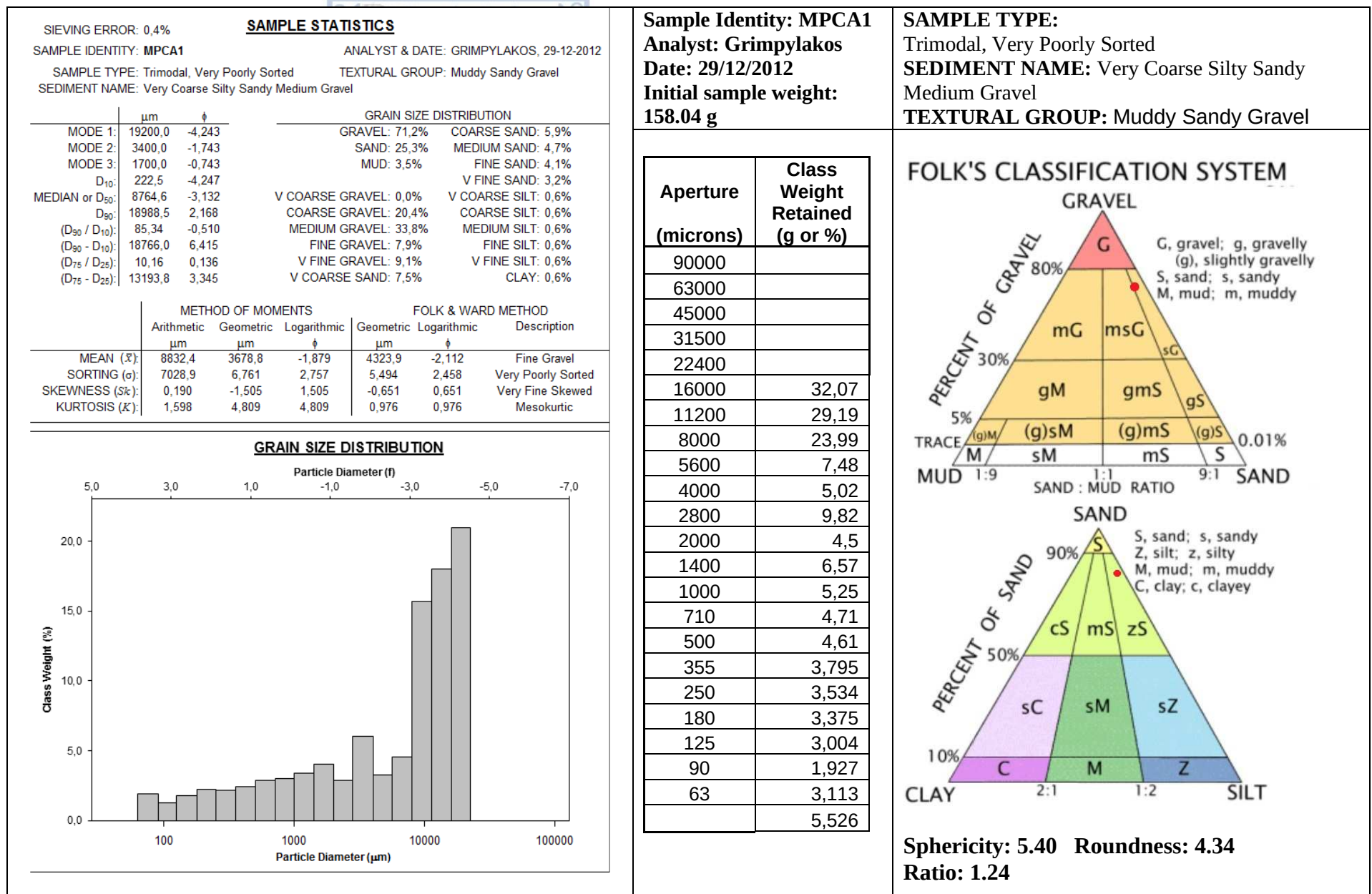


Figure 9SMPCA1- – Skouries Sedimentological analysis. Left Medium-Low Flow 28/05/2010.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

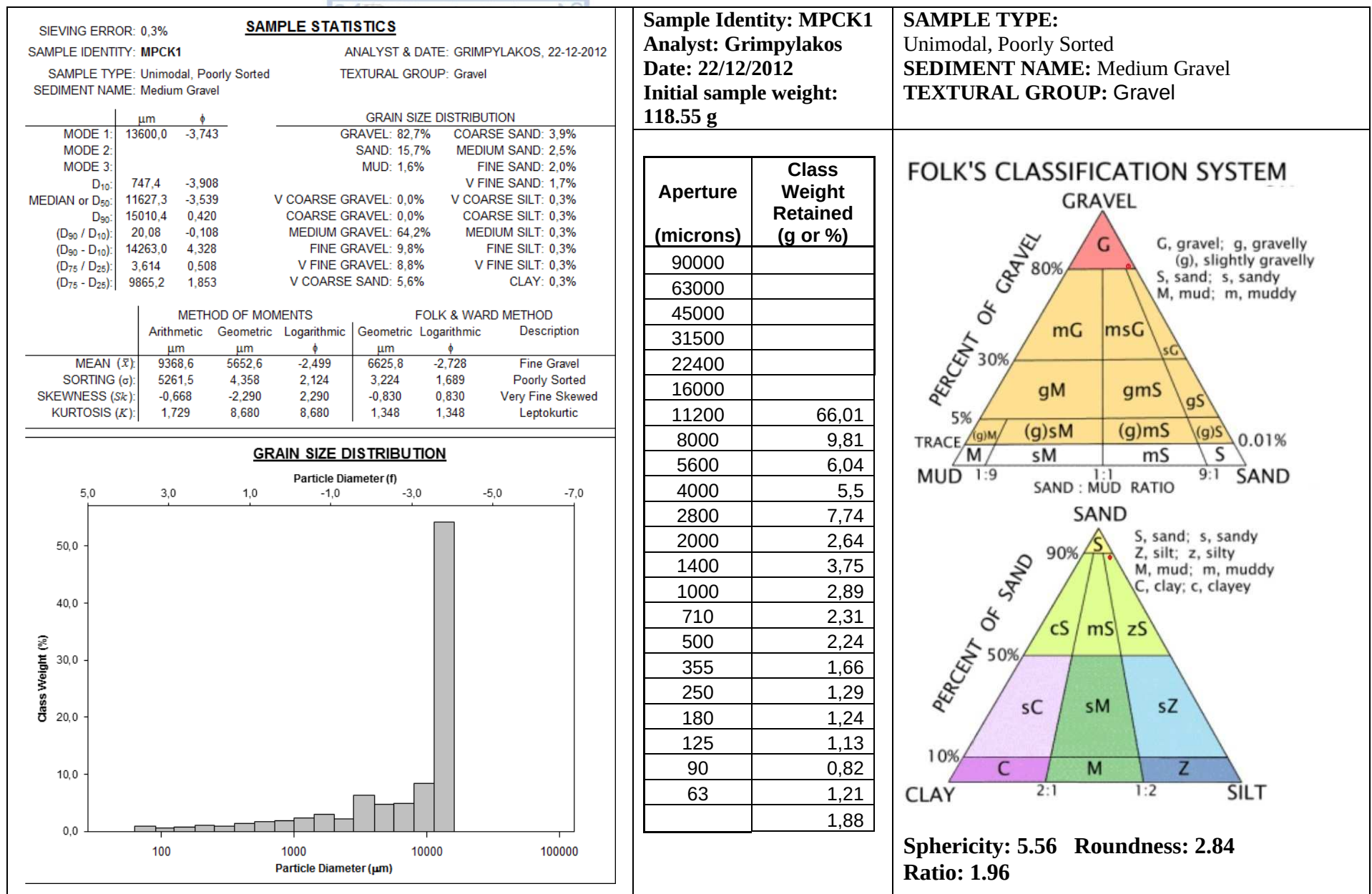


Figure 9SMPC1- – Skouries Sedimentological analysis. Center Medium-Low Flow 28/05/2010.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

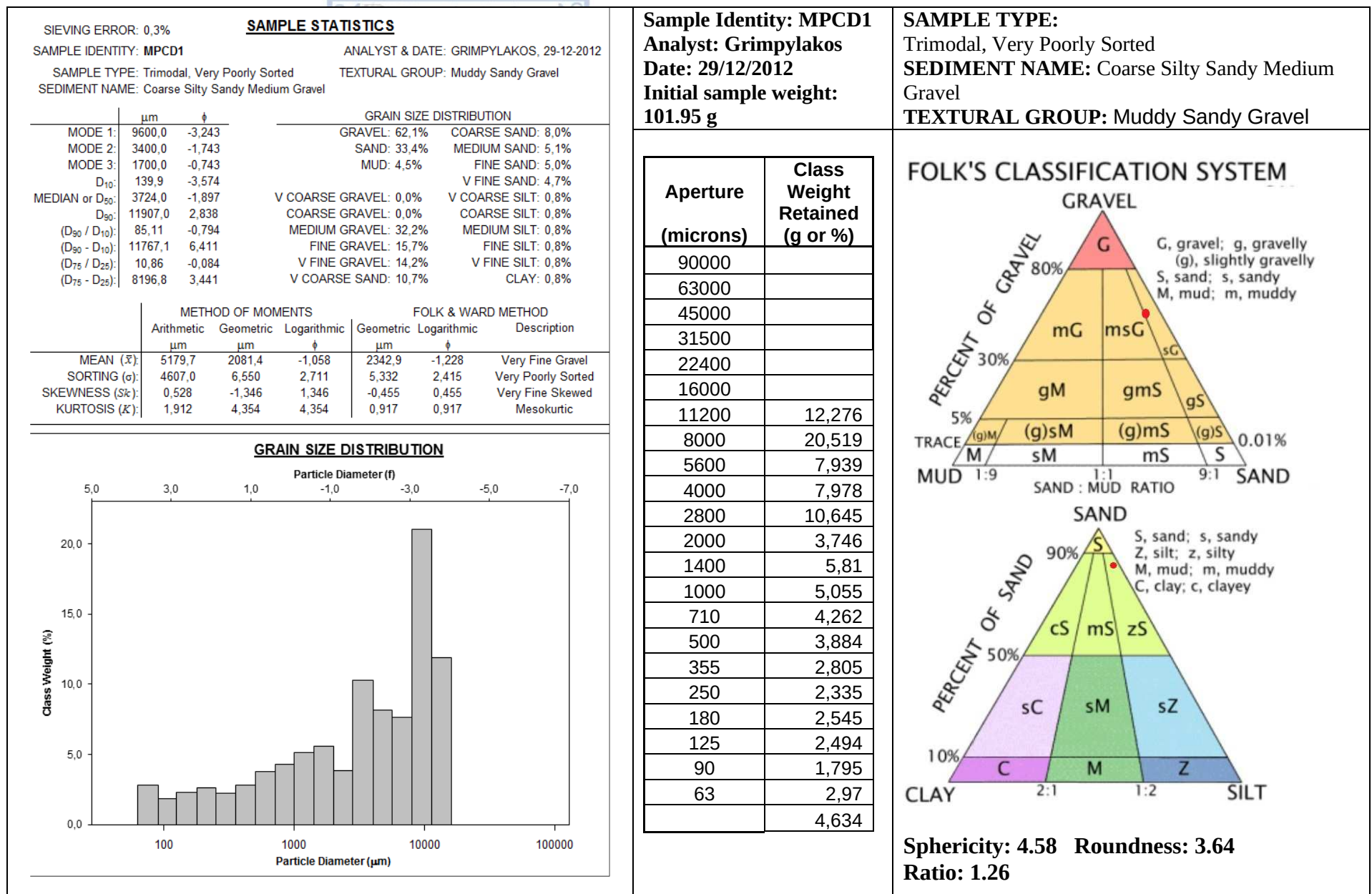
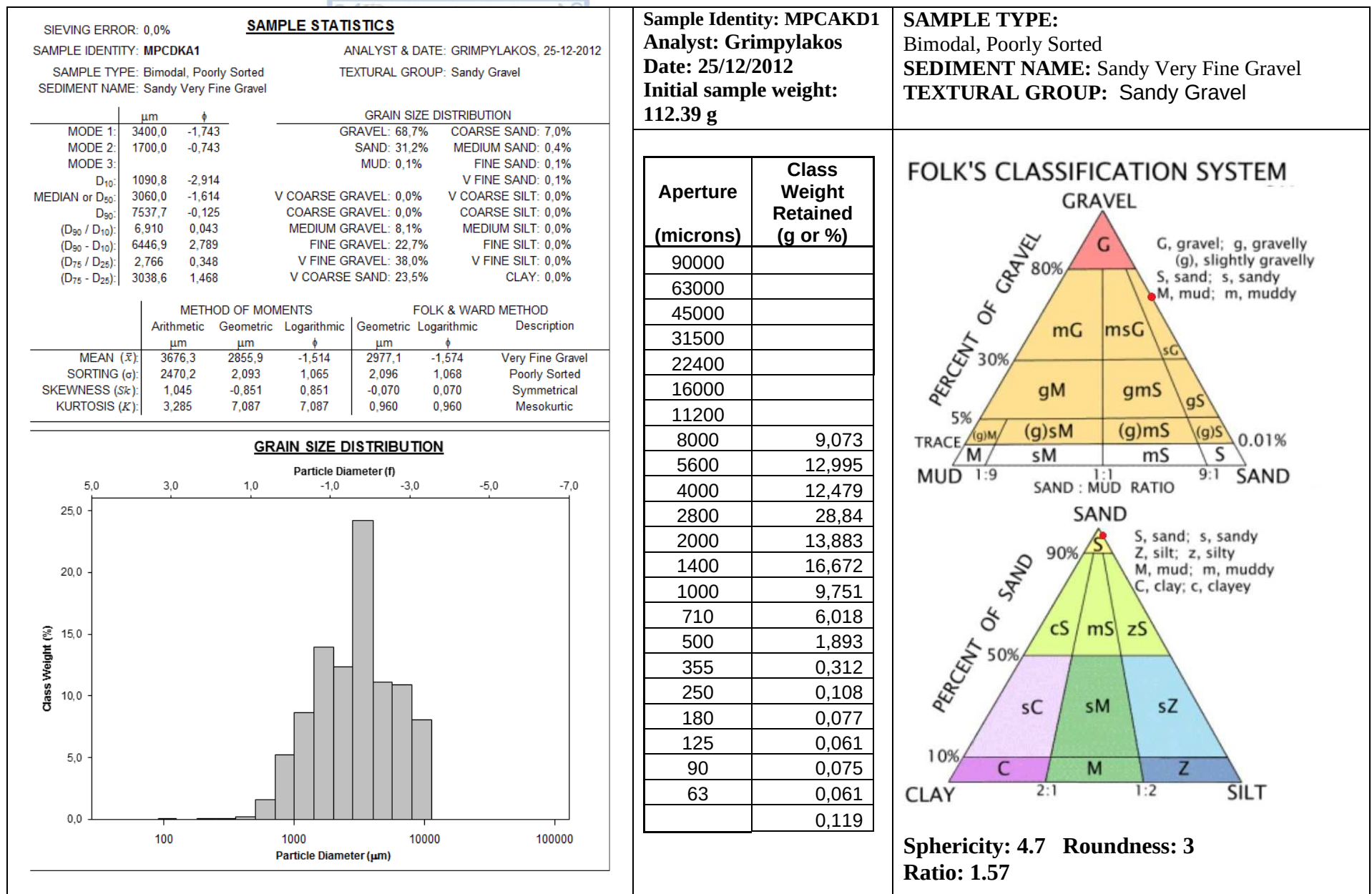


Figure 9SMPCD1- – Skouries Sedimentological analysis. Right Medium-Low Flow 28/05/2010.

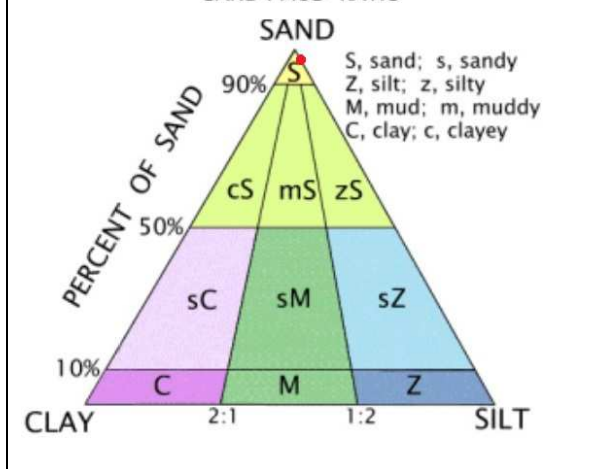
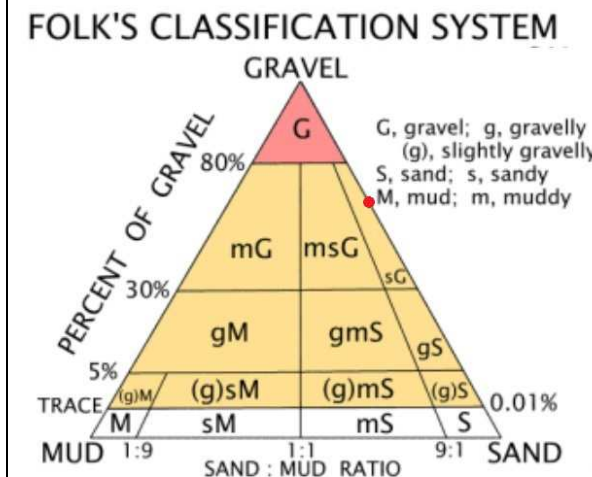
Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.



Sample Identity: MPCAKD1
Analyst: Grimpylakos
Date: 25/12/2012
Initial sample weight: 112.39 g

SAMPLE TYPE:
 Bimodal, Poorly Sorted
SEDIMENT NAME: Sandy Very Fine Gravel
TEXTURAL GROUP: Sandy Gravel

Aperture (microns)	Class Weight Retained (g or %)
90000	
63000	
45000	
31500	
22400	
16000	
11200	
8000	9,073
5600	12,995
4000	12,479
2800	28,84
2000	13,883
1400	16,672
1000	9,751
710	6,018
500	1,893
355	0,312
250	0,108
180	0,077
125	0,061
90	0,075
63	0,061
	0,119



Sphericity: 4.7 Roundness: 3
Ratio: 1.57

Figure 9SMPCAKD1- – Skouries Sedimentological analysis. Left Center Right River bed sediment Medium-Low Flow 28/05/2010.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

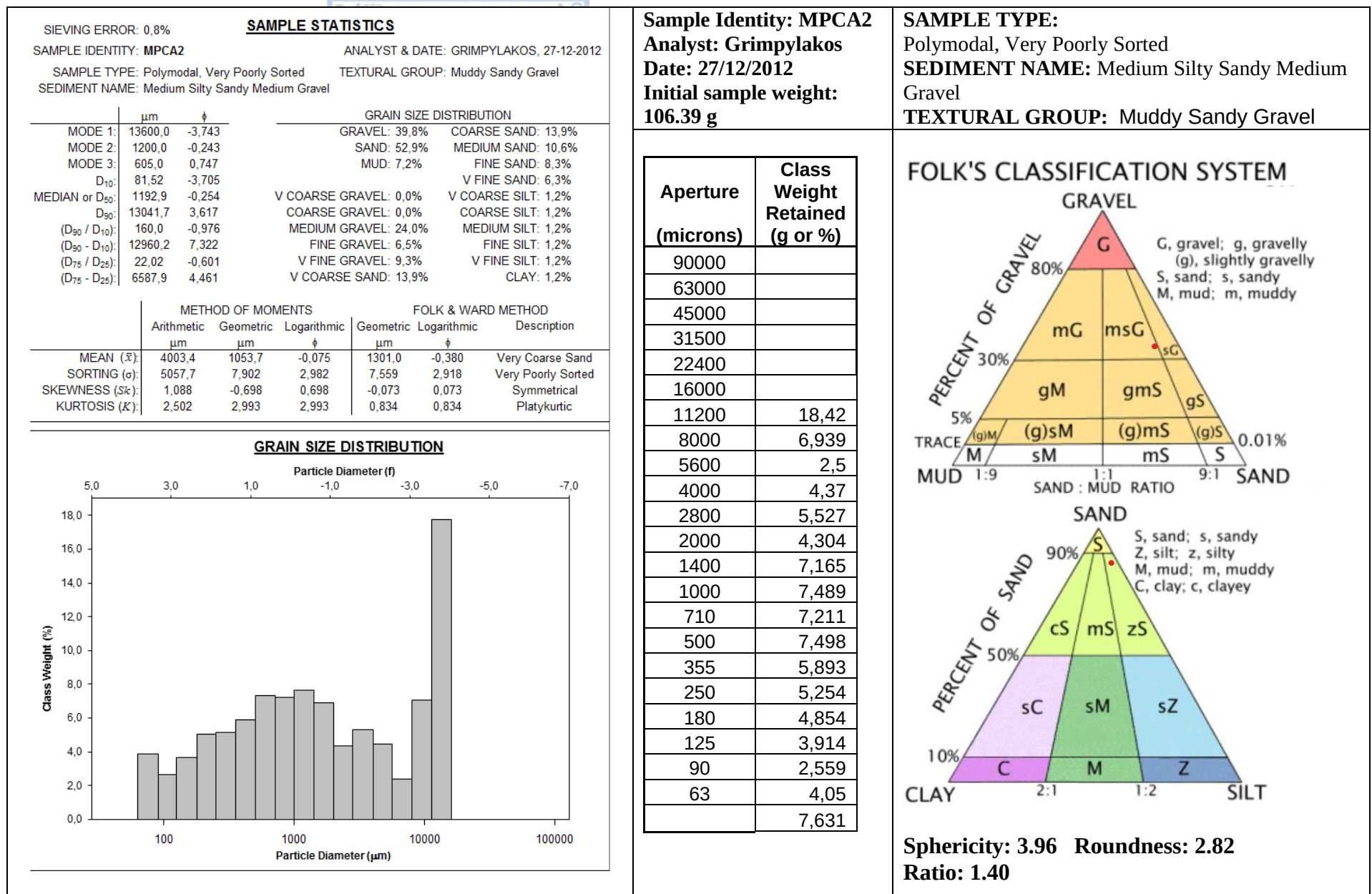


Figure 9SMPCA2- – Skouries Sedimentological analysis. Left Low Flow 21/09/2010.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

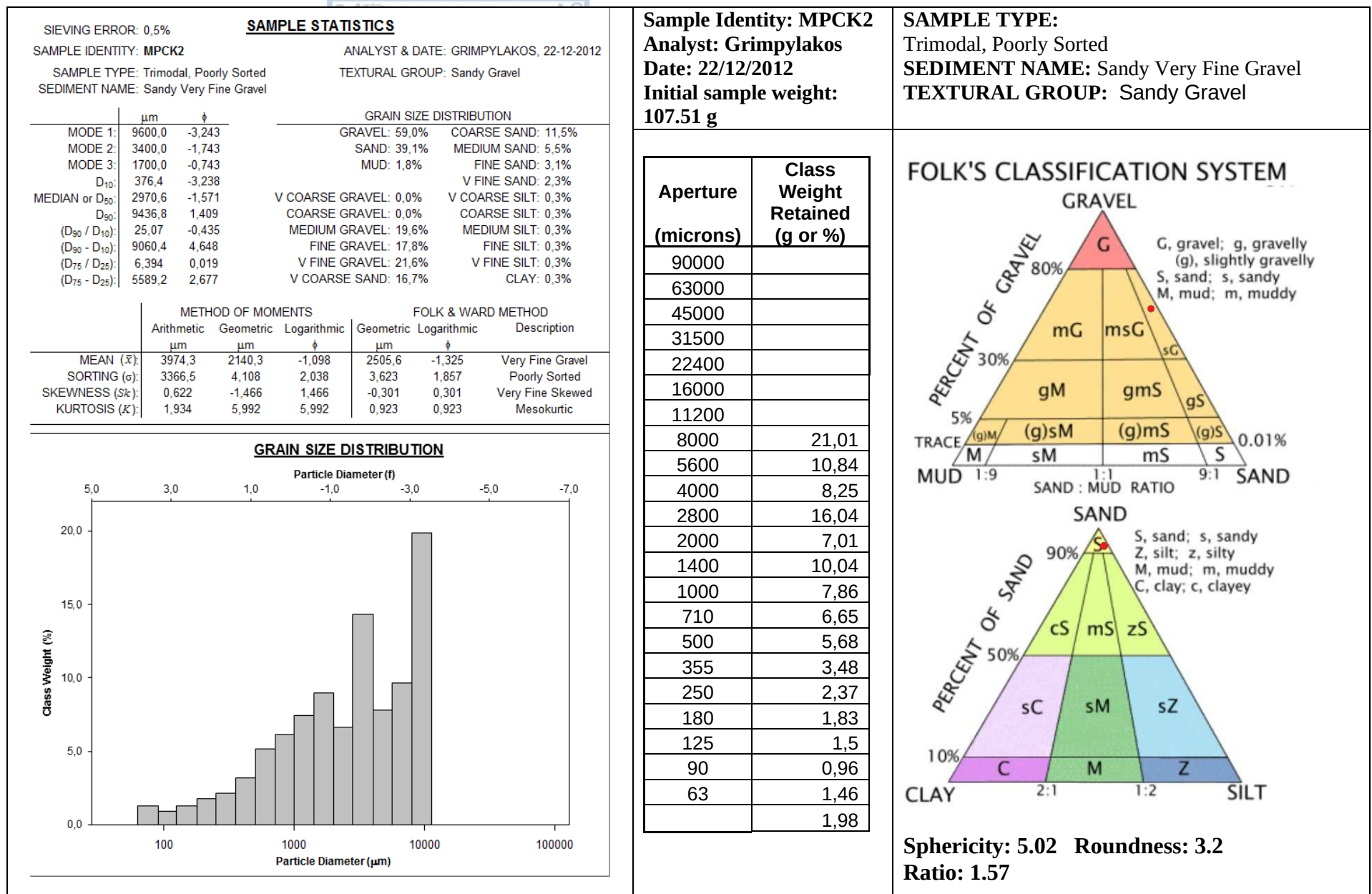


Figure 9SMPCCK2- – Skouries Sedimentological analysis. Center Low Flow 21/09/2010

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

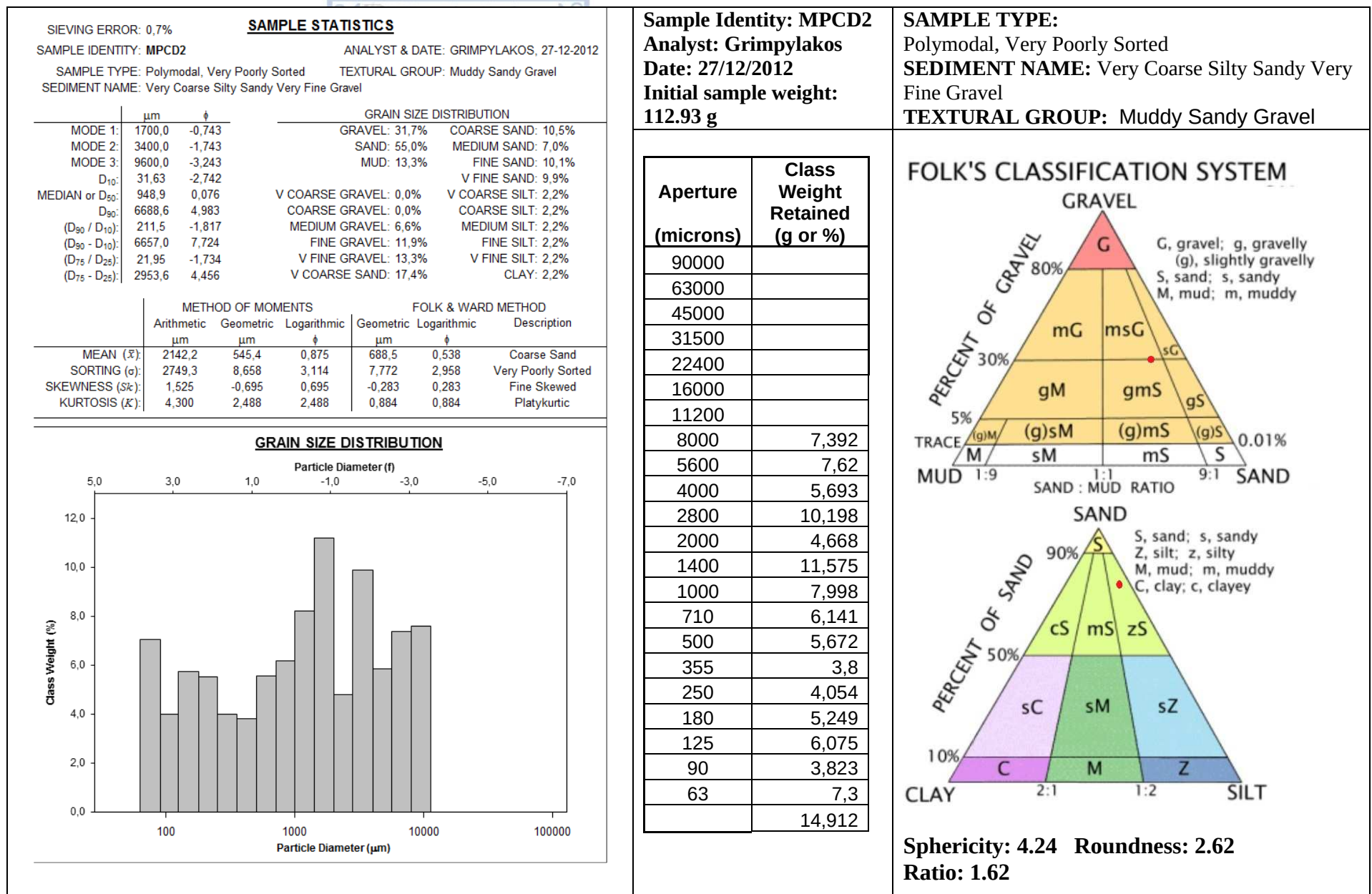
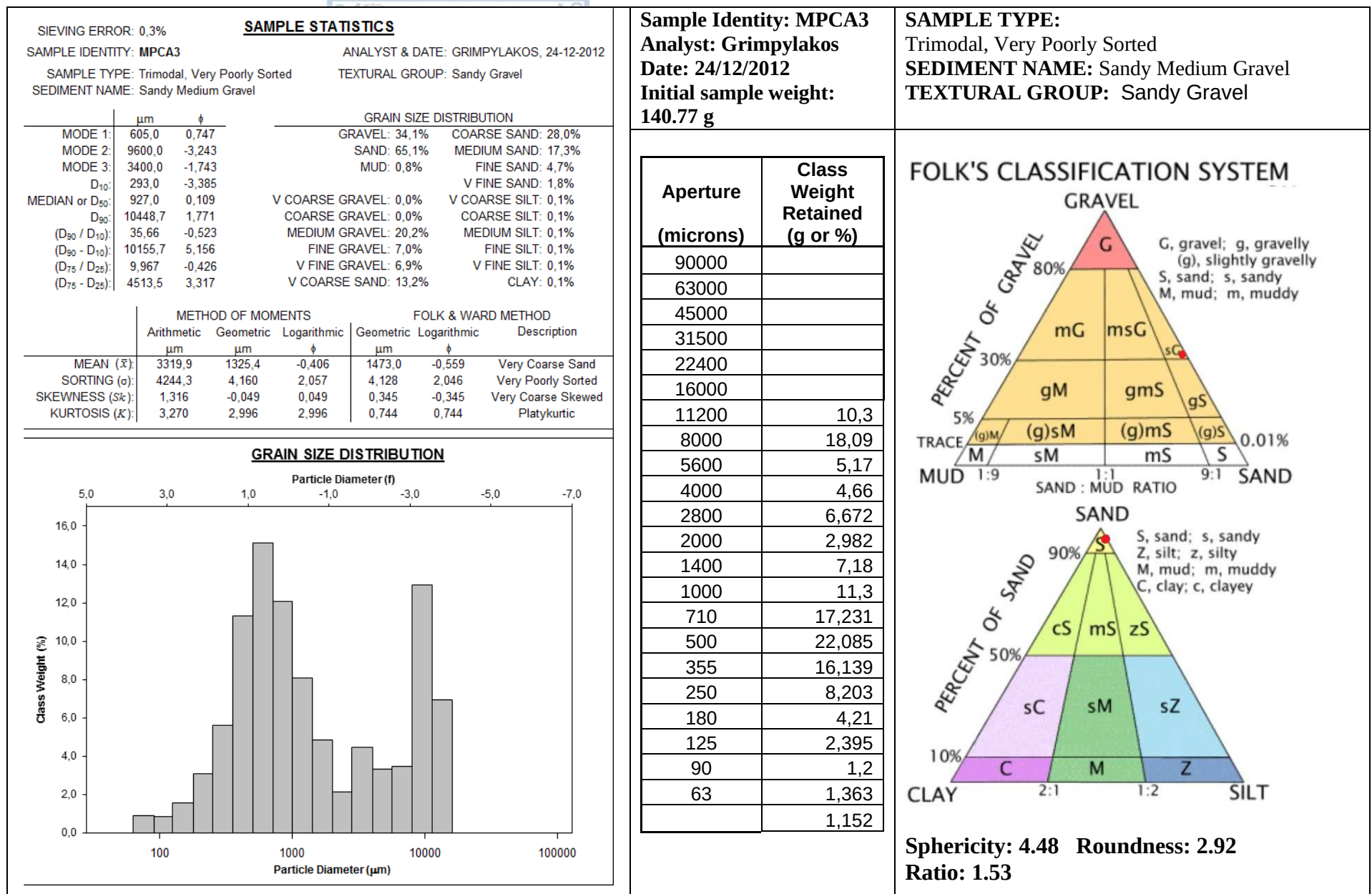


Figure 9SMPCD2- – Skouries Sedimentological analysis. Right Low Flow 21/09/2010.

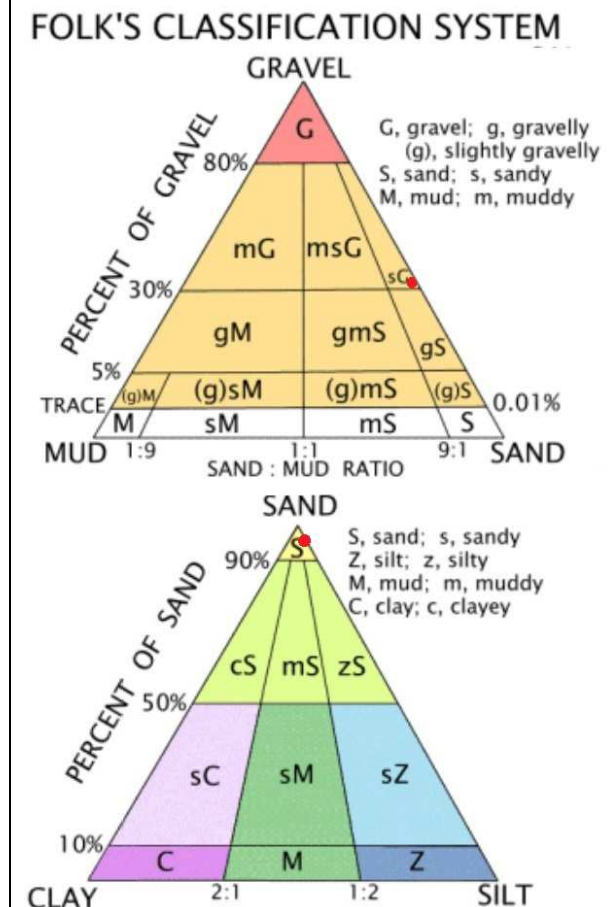
Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.



Sample Identity: MPCA3
Analyst: Grimpylakos
Date: 24/12/2012
Initial sample weight: 140.77 g

Aperture (microns)	Class Weight Retained (g or %)
90000	
63000	
45000	
31500	
22400	
16000	
11200	10,3
8000	18,09
5600	5,17
4000	4,66
2800	6,672
2000	2,982
1400	7,18
1000	11,3
710	17,231
500	22,085
355	16,139
250	8,203
180	4,21
125	2,395
90	1,2
63	1,363
	1,152

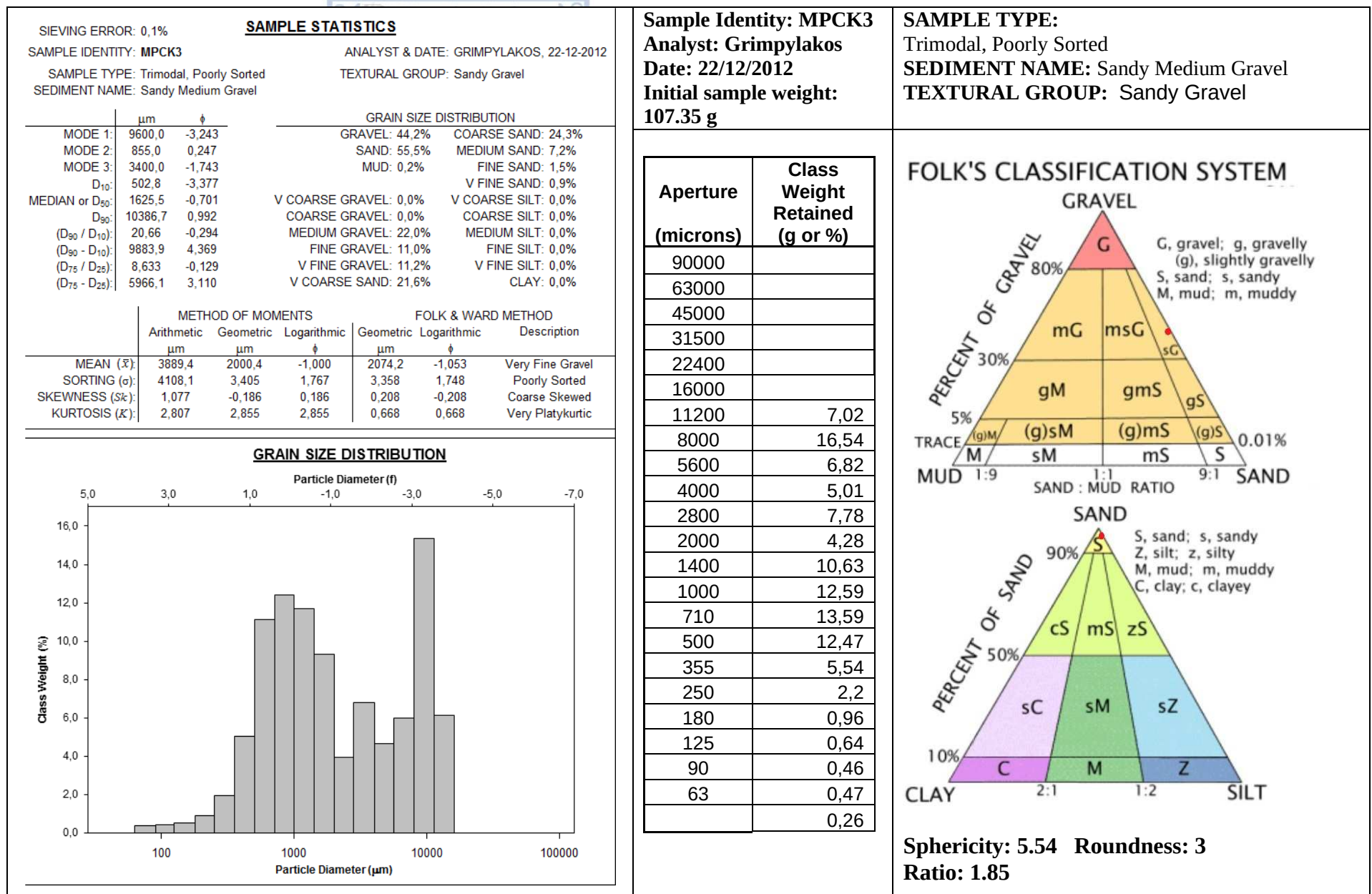
SAMPLE TYPE:
Trimodal, Very Poorly Sorted
SEDIMENT NAME: Sandy Medium Gravel
TEXTURAL GROUP: Sandy Gravel



Sphericity: 4.48 Roundness: 2.92
Ratio: 1.53

Figure 9SMPCA3- – Skouries Sedimentological analysis. Left High Flow 25/03/2011.

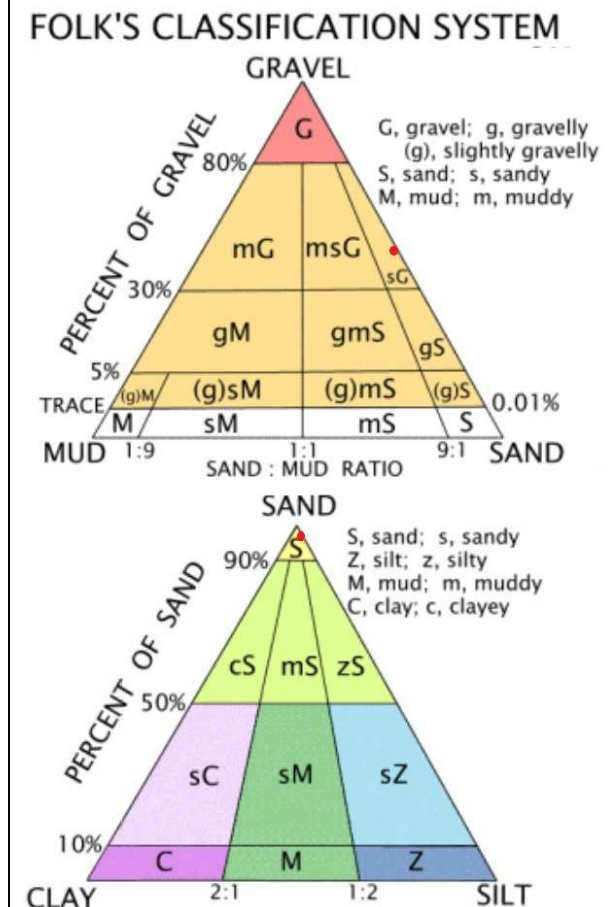
Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.



Sample Identity: MPCK3
Analyst: Grimpylakos
Date: 22/12/2012
Initial sample weight: 107.35 g

Aperture (microns)	Class Weight Retained (g or %)
90000	
63000	
45000	
31500	
22400	
16000	
11200	7,02
8000	16,54
5600	6,82
4000	5,01
2800	7,78
2000	4,28
1400	10,63
1000	12,59
710	13,59
500	12,47
355	5,54
250	2,2
180	0,96
125	0,64
90	0,46
63	0,47
	0,26

SAMPLE TYPE:
Trimodal, Poorly Sorted
SEDIMENT NAME: Sandy Medium Gravel
TEXTURAL GROUP: Sandy Gravel



Sphericity: 5.54 Roundness: 3
Ratio: 1.85

Figure 9SMPC3- – Skouries Sedimentological analysis. Center High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

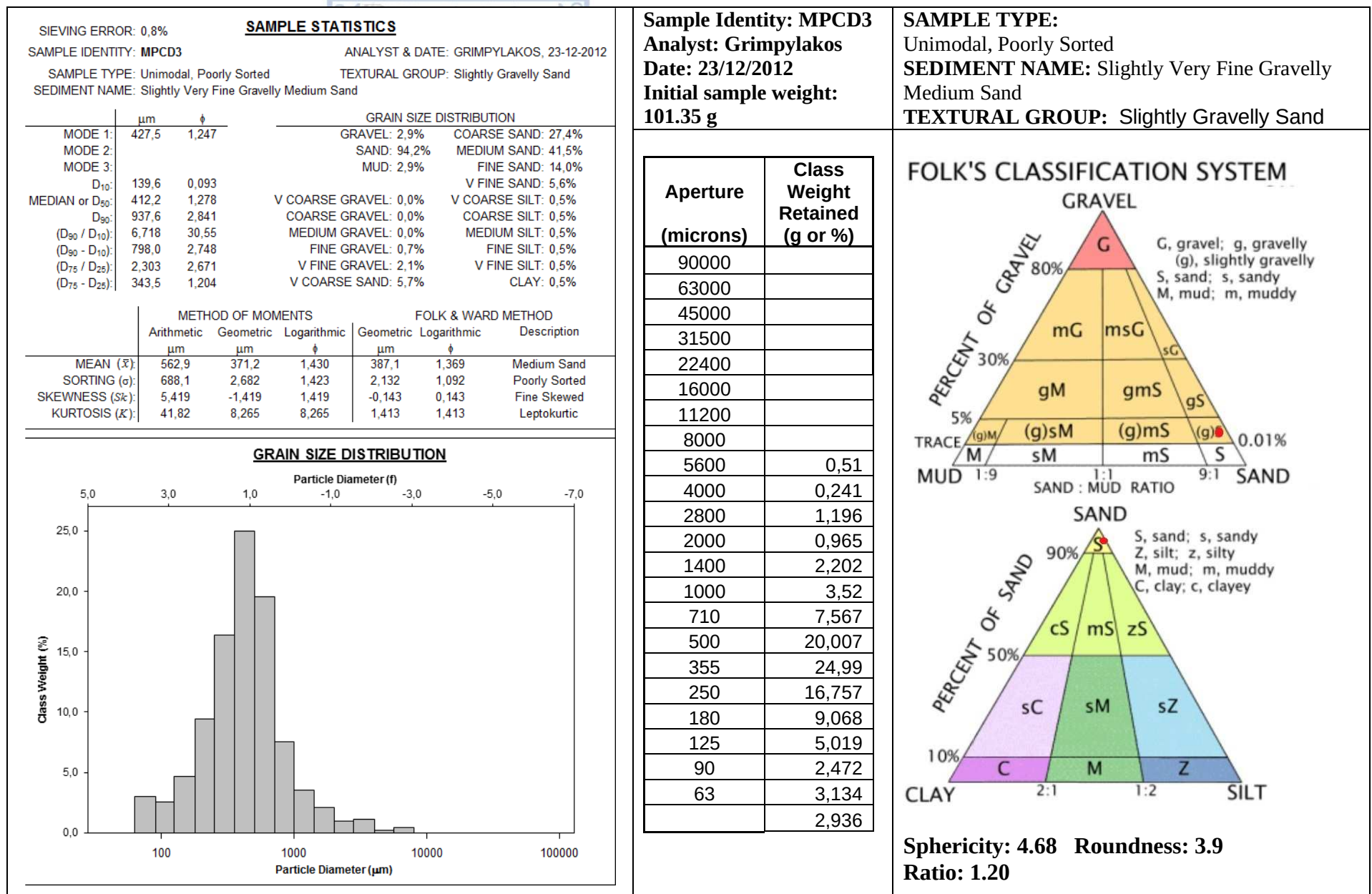
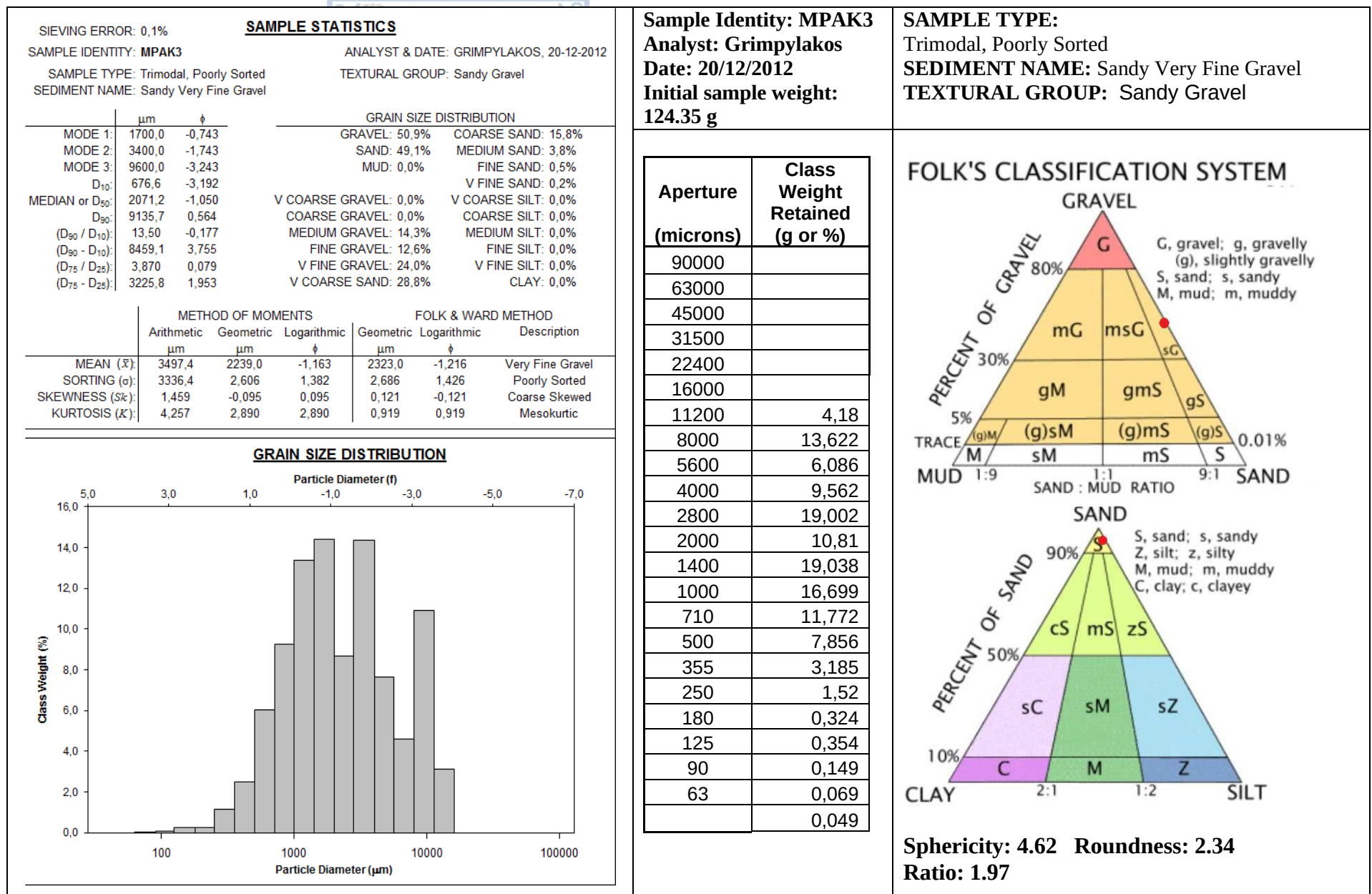


Figure 9SMPCD3- – Skouries Sedimentological analysis. Right High Flow 25/03/2011.

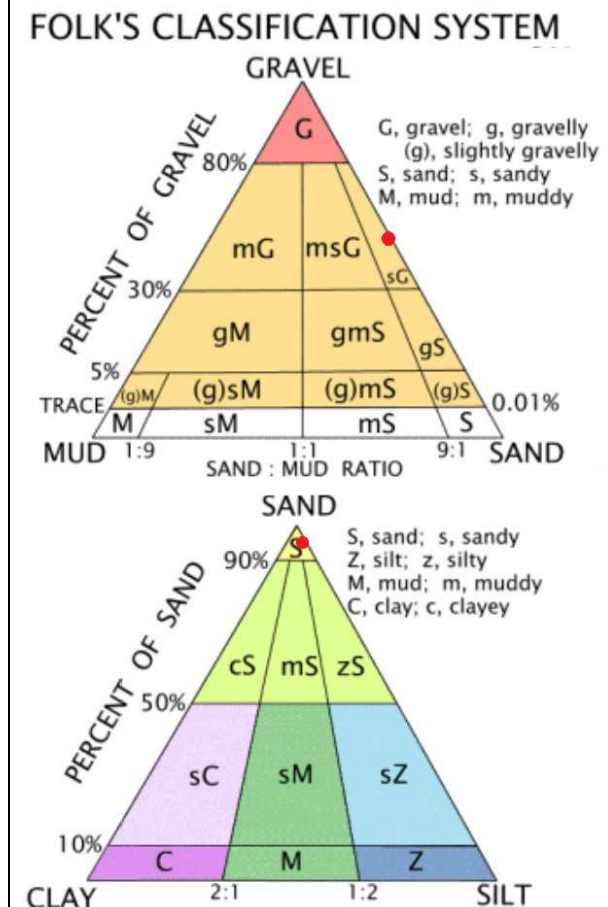
Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.



Sample Identity: MPAK3
Analyst: Grimpylakos
Date: 20/12/2012
Initial sample weight: 124.35 g

Aperture (microns)	Class Weight Retained (g or %)
90000	
63000	
45000	
31500	
22400	
16000	
11200	4,18
8000	13,622
5600	6,086
4000	9,562
2800	19,002
2000	10,81
1400	19,038
1000	16,699
710	11,772
500	7,856
355	3,185
250	1,52
180	0,324
125	0,354
90	0,149
63	0,069
	0,049

SAMPLE TYPE:
Trimodal, Poorly Sorted
SEDIMENT NAME: Sandy Very Fine Gravel
TEXTURAL GROUP: Sandy Gravel



Sphericity: 4.62 Roundness: 2.34
Ratio: 1.97

Figure 13SMPAK3- – Megali Panagia MPA Sedimentological analysis. Center High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

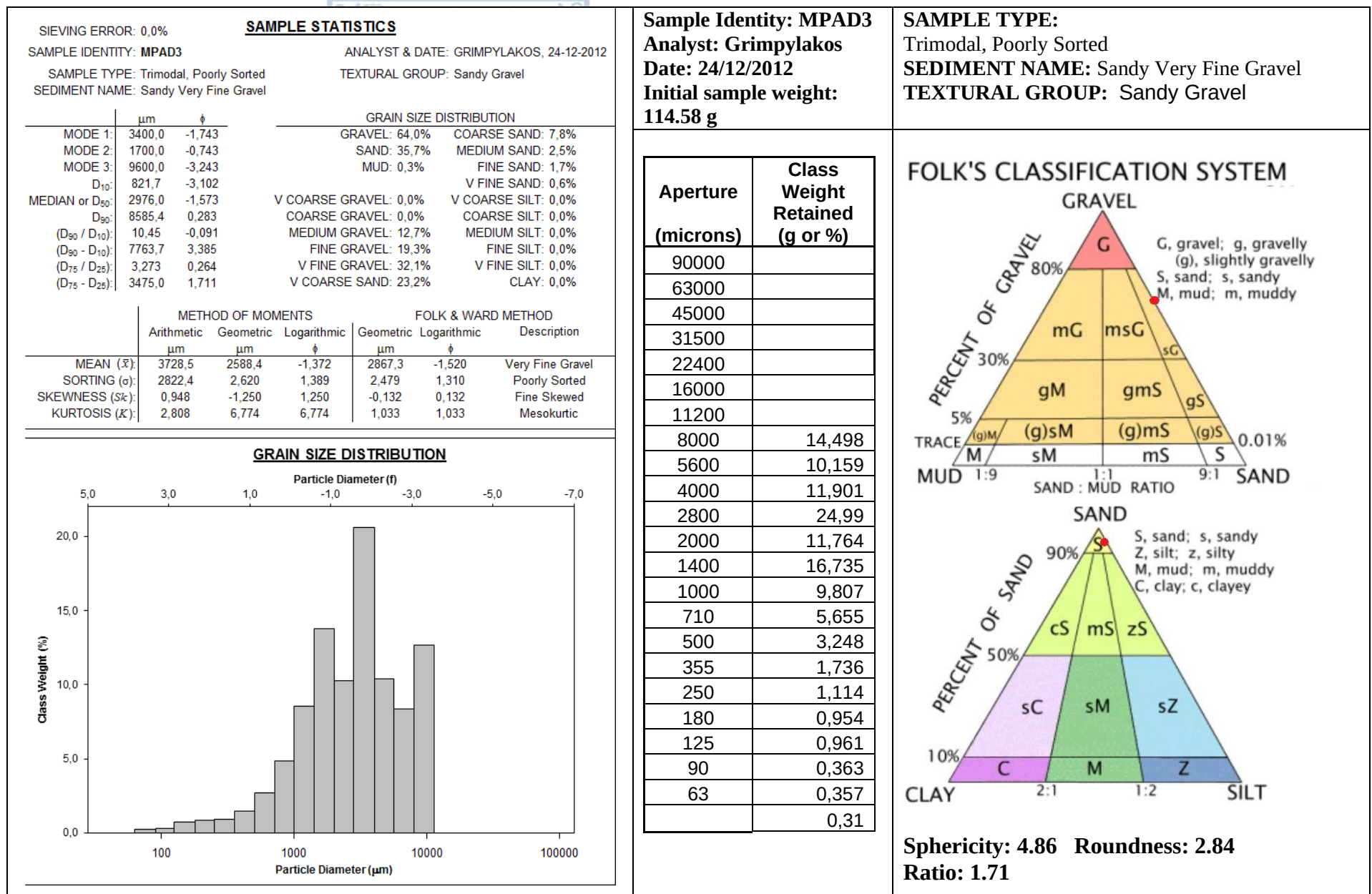


Figure 13SMPAD3- – Megali Panagia MPA Sedimentological analysis. Right High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

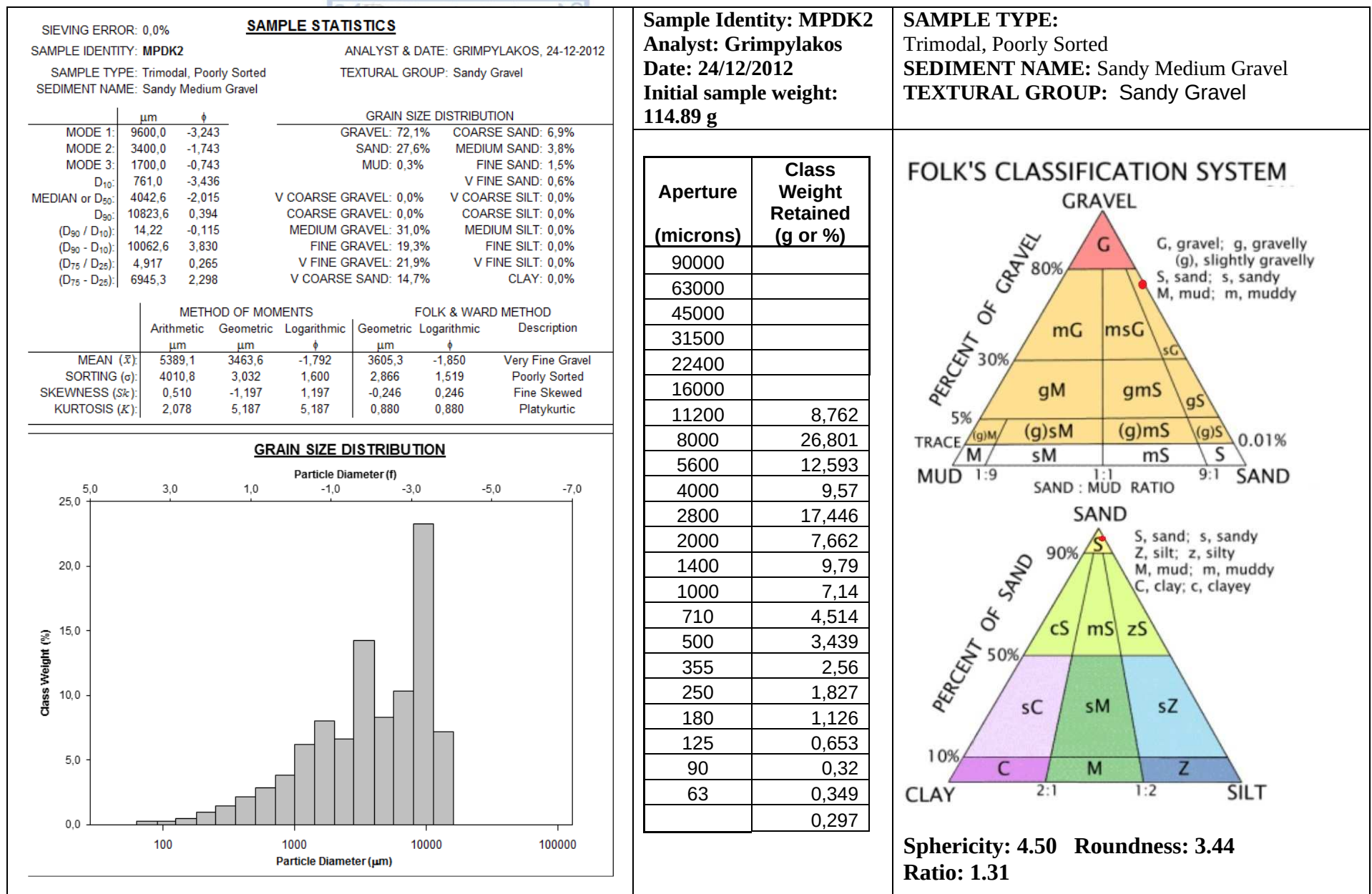
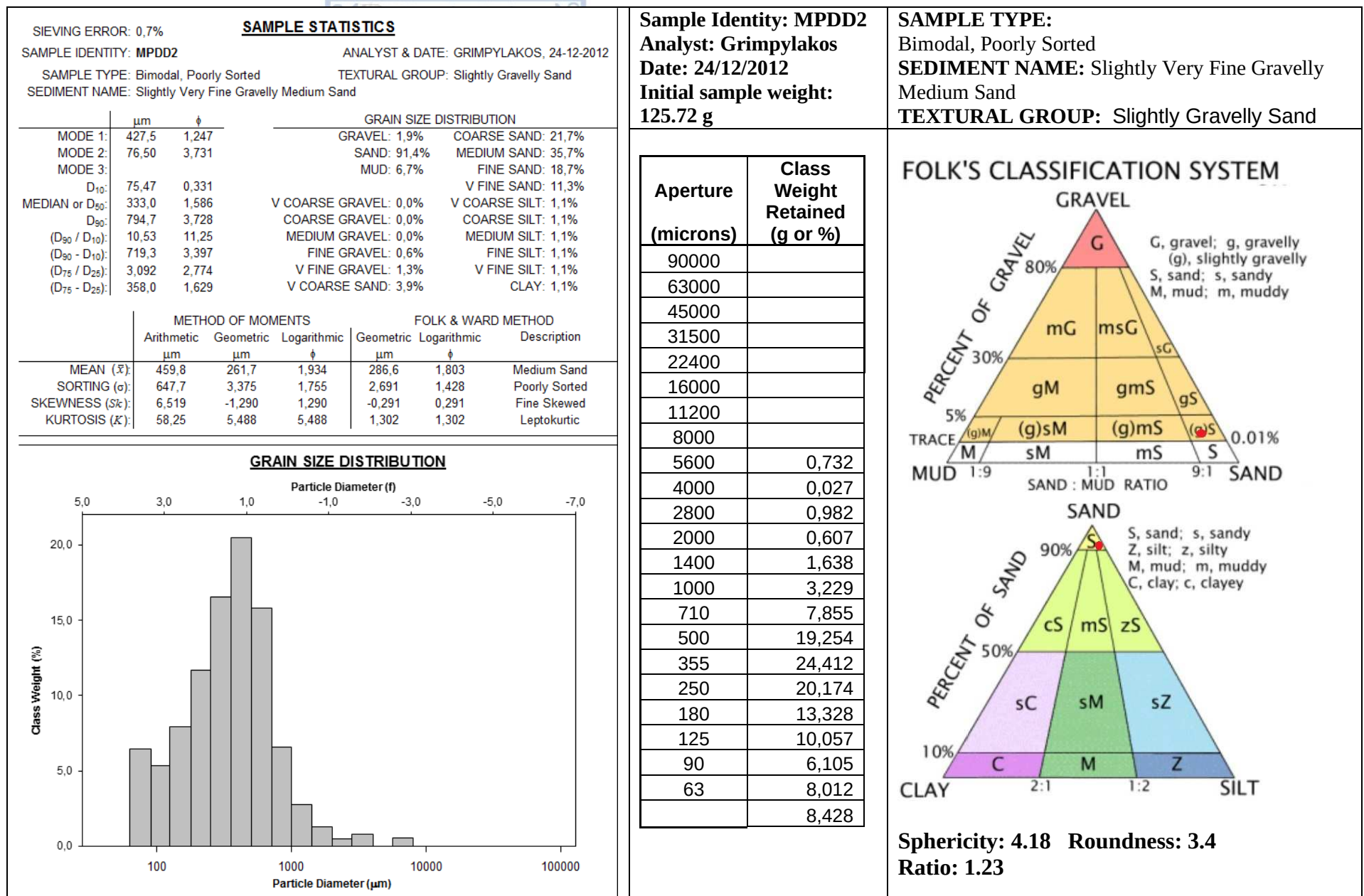


Figure 14SMPDK2- – Skouries MPD Sedimentological analysis. Center Low Flow 21/09/2010.

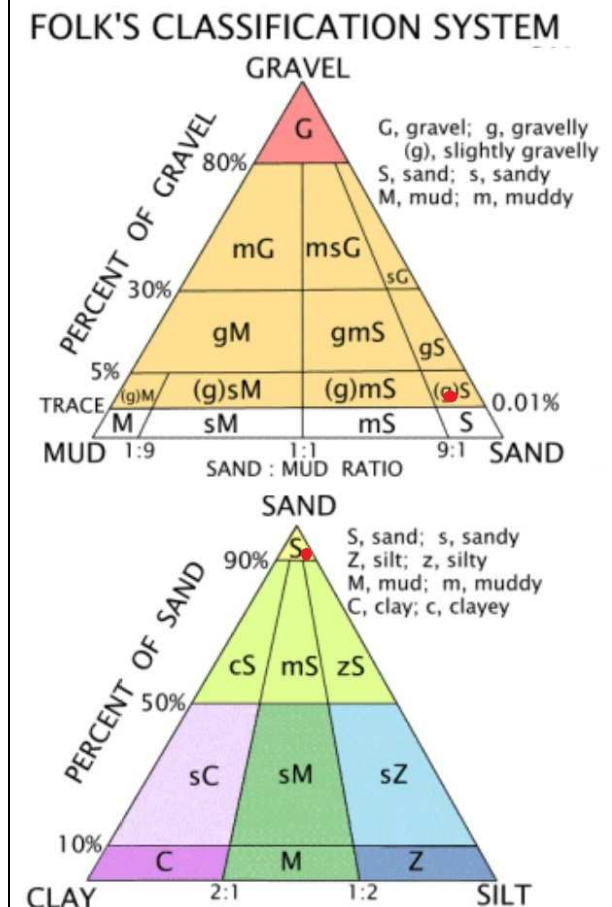
Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.



Sample Identity: MPDD2
Analyst: Grimpylakos
Date: 24/12/2012
Initial sample weight: 125.72 g

Aperture (microns)	Class Weight Retained (g or %)
90000	
63000	
45000	
31500	
22400	
16000	
11200	
8000	
5600	0,732
4000	0,027
2800	0,982
2000	0,607
1400	1,638
1000	3,229
710	7,855
500	19,254
355	24,412
250	20,174
180	13,328
125	10,057
90	6,105
63	8,012
	8,428

SAMPLE TYPE:
Bimodal, Poorly Sorted
SEDIMENT NAME: Slightly Very Fine Gravelly Medium Sand
TEXTURAL GROUP: Slightly Gravelly Sand



Sphericity: 4.18 Roundness: 3.4
Ratio: 1.23

Figure 14SMPDD2- – Skouries MPD Sedimentological analysis. Right Low Flow 21/09/2010.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

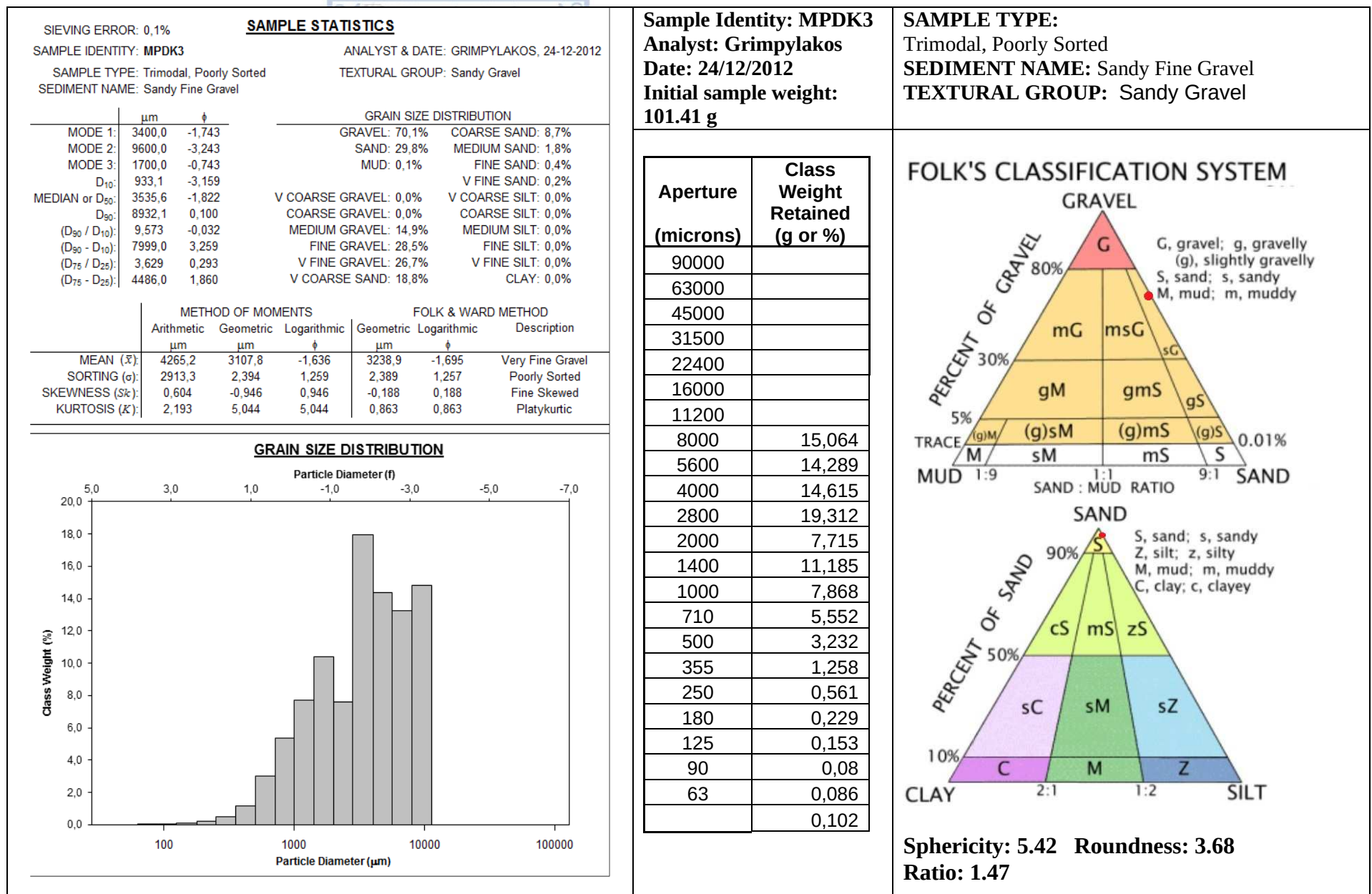


Figure 14SMPDK3- – Skouries MPD Sedimentological analysis. Center High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.

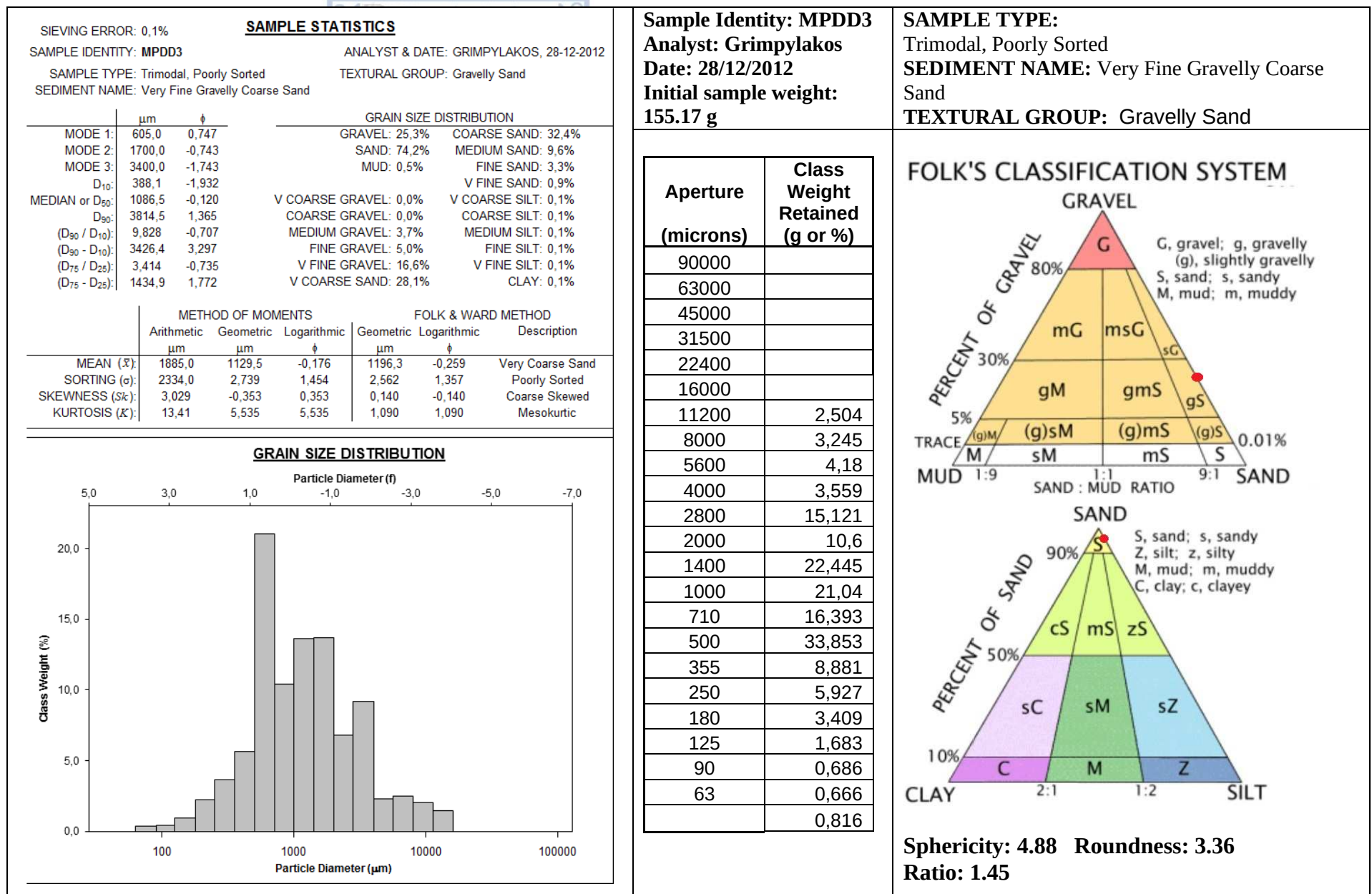


Figure 14SMPDD3- – Skouries MPD Sedimentological analysis. Right High Flow 25/03/2011.

Sphericity and Roundness measurements are multiplied by 10 for analysis and accuracy purposes and refer at 50 measurements of quartz grain sand of 1mm.



APPENDIX III

TABLES WITH MEASUREMENTS AND STATISTICAL ANALYSIS OF HYDROMORPHOLOGICAL PARAMETERS

S/N	Site Name	Sampling Code	Topographic 1:50.000	Aster all	Aster -1	Aster-2	Shreve	Order by Strahler	Catchment Size (km ²)	Perimeter (km)
1	Diavolorema	DIA	6	8	7	6	30189	6	165,65	71,78
2	Arkoudorema	ARK	6	8	7	6	48749	6	274,58	86,45
3	Trikomo	TRIK	7	9	8	7	82463	7	483,79	117,90
4	Eleftherochori	ELEF	8	10	9	8	146750	8	819,95	158,10
5	Mavrolakas	KAL	5	7	6	5	6202	5	36,38	26,17
6	Kipouristra	OL	4	5	4	3	595	4	3,21	8,83
7	Karolakkas	KAR	5	7	6	5	6721	5	37,18	34,37
8	Megali Panagia B	MPB	4	6	5	4	1054	4	6,47	11,71
9	Skouries	MPC	4	6	5	4	461	4	2,39	7,01
10	Kokkinolakas Ierissos	KOK	4	6	5	4	4666	4	24,67	28,94
11	Ekklesiastikoi Muli Ierissos	EKM	5	7	6	5	3396	5	18,86	24,81
12	Asproalakas	ASP	6	8	7	6	16923	6	90,84	43,96
13	Megali Panagia A	MPA	4	6	5	4	872	4	4,39	8,79
14	Skouries	MPD	4	6	5	4	917	4	5,93	12,58

Table 1: For each one of the 14 sampling areas the stream order by Strahler (using 3 different methods), Catchment size and Perimeter. The Hydrographic network of each watershed, estimated using topographic maps 1:50.000 and Aster DEM (28,3x28,3m). Aster -1 is by extracting all level 1 streams, Aster-2 is by extracting all level 1 and 2 streams using ArcMap 10.3 software.

S/N	Site Name	Sampling Code	Catchment Size (km ²)	Perimeter (km)	Mean elevation (m)	Min elevation (m)	Max elevation (m)	Order by Strahler	Order by Shreve	Drainage density	Hypsometry index
1	Diavolorema	DIA	165,65	71,78	1129,77	363	1928	6	30189	3,88	0,49
2	Arkoudorema	ARK	274,58	86,45	1032,08	159	1714	6	48749	3,80	0,56
3	Trikomo	TRIK	483,79	117,90	1219,50	575	2226	7	82463	2,83	0,39
4	Eleftherochori	ELEF	819,95	158,10	1025,65	455	2226	8	146750	3,01	0,32
5	Mavrolakas	KAL	36,38	26,17	341,99	793	13	5	6202	4,47	0,42
6	Kipouristra	OL	3,21	8,83	480,76	225	734	4	595	4,13	0,50
7	Karolakkas	KAR	37,18	34,37	511,91	97	893	5	6721	4,55	0,52
8	Megali Panagia	MPB	6,47	11,71	624,01	368	748	4	1054	5,22	0,67
9	Skouries	MPC	2,39	7,01	635,32	546	731	4	461	6,41	0,48
10	Kokkinolakas Ierissos	KOK	24,67	28,94	256,29	8	821	4	4666	3,41	0,31
11	Ekklesiastikoi Muli Ierissos	EKM	18,86	24,81	397,86	80	869	5	3396	4,36	0,40
12	Asprolakas	ASP	90,84	43,96	381,37	2	892	6	16923	4,30	0,43
13	Megali Panagia	MPA	4,39	8,79	646,58	545	740	4	872	4,73	0,52
14	Skouries	MPD	5,93	12,58	664,10	483	885	4	917	5,02	0,45

Table 2: For each one of the 14 sampling areas the Catchment size, Perimeter, Mean elevation, Min elevation, Max elevation, Order by Shreve, Drainage density and Hypsometry index. All parameters were estimated using ArcMap 10.3 software on Aster DEM (28,3x28,3m) and excel 2010.

S/N	Sampling Code	Catchment Size	L maximum length (km)	H med (m)	Z (m)	Tc	Pi 1	Qm 1 Giandotti	Pi 10	Qm 10 Giandotti	Pi 50	Qm 50 Giandotti	Pi 100	Qm 100 Giandotti
1	DIA	165,65	27	884,67	522	2626,07	0,1332	3,3784	0,14	3,60	0,59	14,86	0,67	16,89
2	ARK	274,58	33,94	677,33	518	3329,72	0,1155	4,3871	0,12	4,68	0,51	19,29	0,58	21,94
3	TRIK	483,79	33,68	1125,33	550	4083,99	0,1022	8,4901	0,11	9,06	0,45	37,34	0,51	42,45
4	ELEF	819,95	55,63	1045,33	590	6031,79	0,0809	11,0529	0,09	11,79	0,36	48,61	0,40	55,26
5	KAL	36,38	9,89	273,00	260	763,39	0,2795	0,8872	0,30	0,95	1,23	3,90	1,40	4,44
6	OL	3,21	4,13	394,67	170	217,62	0,5936	0,1821	0,63	0,19	2,61	0,80	2,97	0,91
7	KAR	37,18	12,97	362,33	265	890,95	0,2548	0,9241	0,27	0,99	1,12	4,06	1,27	4,62
8	MPB	6,47	4,90	495,33	126	246,30	0,5511	0,3601	0,59	0,38	2,42	1,58	2,76	1,80
9	MPC	2,39	2,93	607,67	62	103,95	0,9247	0,2380	0,99	0,25	4,07	1,05	4,62	1,19
10	KOK	24,67	12,21	279,00	271	787,08	0,2745	0,6382	0,29	0,68	1,21	2,81	1,37	3,19
11	EKM	18,86	9,87	343,00	263	652,14	0,3072	0,5555	0,33	0,59	1,35	2,44	1,54	2,78
12	ASP	90,84	18,57	298,67	297	1420,90	0,1926	1,6809	0,21	1,79	0,85	7,39	0,96	8,40
13	MPA	4,39	2,79	610,00	65	126,62	0,8215	0,3694	0,88	0,39	3,61	1,62	4,11	1,85
14	MPD	5,93	4,88	617,00	134	246,79	0,5504	0,3422	0,59	0,37	2,42	1,51	2,75	1,71

Table 3: For each one of the 14 sampling areas the Catchment size, L maximum length, H med, Z, Tc, Pi1 and Qm 1 (m^3/s), Pi10 Qm10(m^3/s), Pi50 Qm50(m^3/s), Pi100 Qm100(m^3/s) by Giandotti. All parameters were estimated using ArcMap 10.3 software on Aster DEM (28,3x28,3m) and excel 2010.

S/N	Site Name	Sampling Code	Catchment Size	Precipitation	Geology	Max elevation	Order by Strahler	Order by Shreve	Waterpower (hm ³)	Flood Giandotti
1	Diavolorema	DIA	165,65	687	Siliceous	1928	6	30189	53,39	16,89
2	Arkoudorema	ARK	274,58	666	Siliceous	1714	6	48749	82,70	21,94
3	Trikomo	TRIK	483,79	819	Siliceous	2226	7	82463	216,63	42,45
4	Eleftherochori	ELEF	819,95	794	Siliceous	2226	8	146750	317,80	55,63
5	Mavrolakas	KAL	36,38	643	Siliceous	13	5	6202	6,92	4,44
6	Kipouristra	OL	3,21	645	Siliceous	734	4	595	0,68	0,91
7	Karolakkas	KAR	37,18	642	Siliceous	893	5	6721	7,96	4,62
8	Megali Panagia	MPB	6,47	641	Siliceous	748	4	1054	1,36	1,80
9	Skouries	MPC	2,39	655	Siliceous	731	4	461	0,57	1,19
10	Kokkinolakas Ierissos	KOK	24,67	631	Siliceous	821	4	4666	4,93	3,19
11	Ekklesiastikoi Muli Ierissos	EKM	18,86	637	Siliceous	869	5	3396	3,93	2,78
12	Asproalakas	ASP	90,84	635	Siliceous	892	6	16923	18,73	8,40
13	Megali Panagia	MPA	4,39	638	Siliceous	740	4	872	0,98	1,85
14	Skouries	MPD	5,93	652	Siliceous	885	4	917	1,38	1,71

Table 4: For each one of the 14 sampling areas the Catchment size, Mean annual precipitation, Geology, Max Elevation, Order by Strahler, Order by Shreve, Mean Annual Waterpower and Flood by Giandotti. All parameters were estimated using ArcMap 10.3 software on Aster DEM (28,3x28,3m) and excel 2010

		Correlations																		Categoricals
		Size	RiverLength	Perimeter	MeanElev	MinElev	MaxElev	DrainageDensity	Shalov	Shrova	Hypsometric	Pmm	P_Emm	Qm1	Qm10	Qm50	Qm100	SumRunoff	Categories	
Size	Pearson Correlation	1	.995	.999	.997	.919	.894	-.879	.904	1.000	-.420	.902	.899	.836	.836	.836	.836	.851	.911	
	Sig. (2-tailed)		.000	.000	.006	.266	.000	.008	.000	.000	.135	.000	.000	.000	.000	.000	.000	.000	.000	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	0	.000	.024	.024	-.031	.025	-.019	-.001	.000	.051	-.016	.000	.060	.060	.060	.060	.073	.016 ^e	
	Std. Error	0	.005	.011	.106	.262	.059	.128	.047	.000	.287	.174	.166	.077	.077	.077	.077	.071	.040 ^e	
	95% Confidence Interval Lower Upper	1	.993	.991	.988	.715	.695	-.377	.971	1.000	.339	.990	.984	.999	1.000	1.000	1.000	.999	.994 ^e	
RiverLength	Pearson Correlation	.995	1	.980	.709	.274	.890	-.601	.923	.996	-.390	.070	.890	.836	.836	.836	.836	.835	.919	
	Sig. (2-tailed)	.000		.000	.004	.343	.000	.007	.000	.000	.168	.800	.000	.000	.000	.000	.000	.000	.000	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	.005	0	.003	.019	-.020	.022	-.015	.001	.000	.049	-.012	-.001	.070	.070	.071	.071	.075	.016 ^e	
	Std. Error	.005	0	.010	.162	.260	.053	.133	.037	.003	.296	.170	.152	.077	.077	.077	.077	.076	.034 ^e	
	95% Confidence Interval Lower Upper	.993	1	.983	.520	-.304	.820	-.509	.829	.999	-.707	.520	.734	.771	.772	.771	.771	.770	.860 ^e	
Perimeter	Pearson Correlation	.999	.980	1	.736	.203	.846	-.766	.955	.968	-.407	.875	.914	.901	.901	.901	.901	.904	.948	
	Sig. (2-tailed)	.000	.000		.003	.486	.000	.002	.000	.000	.149	.000	.000	.000	.000	.000	.000	.000	.000	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	.004	.003	0	-.013	-.032	.003	-.006	-.008	.006	.032	-.032	-.024	.037	.037	.037	.037	.043	-.005 ^e	
	Std. Error	.011	.010	0	.183	.289	.035	.110	.037	.010	.262	.189	.170	.042	.042	.042	.042	.045	.043 ^e	
	95% Confidence Interval Lower Upper	.990	.993	1	.350	-.522	.880	-.860	.847	.953	-.778	.402	.625	.858	.858	.858	.858	.853	.815 ^e	
MeanElev	Pearson Correlation	.687	.709	.736	1	.640	.886	-.396	.650	.691	.086	.775	.900	.820	.820	.820	.820	.797	.764	
	Sig. (2-tailed)	.006	.004	.003		.014	.000	.161	.012	.008	.770	.001	.000	.000	.000	.000	.000	.001	.001	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	.024	.019	-.013	0	.002	-.018	.016	-.020	.027	.011	.025	.009	-.018	-.018	-.018	-.018	-.004	-.020 ^e	
	Std. Error	.165	.162	.193	0	.161	.139	.270	.200	.165	.296	.087	.032	.166	.166	.166	.166	.161	.172 ^e	
	95% Confidence Interval Lower Upper	.519	.528	.550	1	.283	.668	-.778	.167	.520	-.448	.637	.838	.512	.513	.513	.513	.611	.343 ^e	
MinElev	Pearson Correlation	.319	.274	.203	.640	1	.344	.159	.082	.312	.154	.526	.521	.316	.316	.317	.316	.387	.287	
	Sig. (2-tailed)	.265	.343	.486	.014		.220	.680	.780	.378	.600	.053	.056	.271	.271	.270	.270	.172	.319	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	-.031	-.028	-.032	.002	0	-.019	-.011	-.021	-.030	-.005	.002	.005	-.047	-.047	-.047	-.047	-.051	-.028 ^e	
	Std. Error	.262	.260	.259	.161	0	.242	.326	.302	.261	.249	.159	.177	.263	.263	.263	.263	.273	.278 ^e	
	95% Confidence Interval Lower Upper	.358	.384	.522	.383	1	.218	-.558	-.626	-.361	-.355	.216	.153	.373	.373	.372	.373	.296	.361 ^e	
MaxElev	Pearson Correlation	.884	.898	.946	.886	.344	1	-.709	.886	.880	-.284	.879	.968	.935	.935	.935	.935	.905	.926	
	Sig. (2-tailed)	.000	.000	.000	.000	.228		.005	.000	.000	.325	.000	.000	.000	.000	.000	.000	.000	.000	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	.025	.022	.003	-.018	-.019	0	.007	-.011	.028	.021	-.006	-.013	.012	.012	.012	.012	.024	-.013 ^e	
	Std. Error	.059	.053	.035	.139	.242	0	.147	.084	.059	.273	.140	.129	.040	.040	.040	.040	.052	.087 ^e	
	95% Confidence Interval Lower Upper	.790	.820	.880	.668	.218	1	-.529	.832	.789	-.703	.742	.905	.896	.895	.896	.896	.823	.682 ^e	
**. Correlation is significant at the 0.01 level (2-tailed).																				
*. Correlation is significant at the 0.05 level (2-tailed).																				
c. Cannot be computed because at least one of the variables is constant.																				
d. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples																				
e. Based on 500 samples.																				

Table 5: The correlation of parameters: size_Riverlength_Perimeter_MeanElev_MinElev_MaxElev with the rest hydromorphological parameters is shown.

		Correlations																		
		Size	RiverLength	Perimeter	MeanElev	MinElev	MaxElev	DrainageDensity	Strahler	Shreve	HypsometricalIntegral	Pmm	P_Emm	Qm1	Qm10	Qm50	Qm100	SurfRunoff	CatchmentArea	
DrainageDensity	Pearson Correlation	-.579**	-.681**	-.755**	-.396**	.159	-.709**	1	-.697**	-.675**	.526**	-.615**	-.624**	-.719**	-.719**	-.719**	-.719**	-.701**	-.700**	
	Sig. (2-tailed)	.008	.007	.002	.161	.588	.005		.006	.008	.053	.019	.017	.004	.004	.004	.004	.025	.005	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	-.019	-.015	-.006	.016	-.011	.007	0	.012	-.022	.008	.041	.029	.000	.000	.000	.000	-.050	.010 ^e	
	Std. Error	.129	.133	.110	.270	.326	.147	0	.174	.127	.106	.279	.259	.137	.137	.137	.137	.140	.162 ^e	
	95% Confidence Interval Lower Upper	-.307	-.309	-.350	-.778	-.558	-.929	1	-.843	-.903	.101	-.923	-.924	-.942	-.942	-.942	-.942	-.933	-.938 ^e	
Strahler	Pearson Correlation	.904**	.923**	.955**	.650**	.082	.886**	-.697**	1	.904**	-.396**	.802**	.836**	.857**	.857**	.857**	.857**	.823**	.840**	
	Sig. (2-tailed)	.000	.000	.000	.012	.786	.000	.006		.000	.161	.001	.000	.000	.000	.000	.000	.020	.000	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	-.001	.001	.008	-.020	.021	.011	.012	0	.001	.029	-.037	-.032	.026	.026	.026	.026	.030	.005 ^e	
	Std. Error	.047	.037	.037	.200	.262	.084	.174	0	.044	.201	.185	.101	.047	.047	.047	.047	.062	.042 ^e	
	95% Confidence Interval Lower Upper	.790	.829	.847	-.187	-.626	.632	-.843	1	.801	-.802	.175	.363	.788	.788	.788	.788	.712	.807 ^e	
Shreve	Pearson Correlation	1.000**	.996**	.988**	.941**	.912**	.890**	-.675**	.904**	1	-.421**	.893**	.892**	.825**	.825**	.825**	.825**	.836**	.867**	
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.008	.000		.134	.000	.000	.000	.000	.000	.000	.050	.000	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	.000	.000	.006	.027	-.030	.028	-.022	.001	0	.051	-.612	.003	.075	.075	.075	.075	.078	.019 ^e	
	Std. Error	.000	.003	.010	.186	.261	.059	.127	.044	0	.287	.175	.166	.082	.082	.082	.082	.076	.039 ^e	
	95% Confidence Interval Lower Upper	.999	.989	.953	.520	-.361	.789	-.903	.901	1	-.797	.521	.763	.774	.774	.774	.774	.785	.839 ^e	
HypsometricalIntegral	Pearson Correlation	-.420**	-.390**	-.407**	.088	.154	-.284**	.526**	-.298**	-.421**	1	-.206**	-.203**	-.203**	-.203**	-.203**	-.203**	-.218**	-.252**	
	Sig. (2-tailed)	.135	.168	.149	.770	.600	.325	.053	.061	.134		.172	.327	.327	.326	.327	.327	.272	.217	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	.051	.049	.032	.011	-.005	.021	.008	.039	.051	0	.053	.043	.014	.014	.015	.015	.020	.036 ^e	
	Std. Error	.287	.295	.262	.230	.249	.273	.186	.281	.287	0	.307	.298	.256	.256	.256	.256	.209	.260 ^e	
	95% Confidence Interval Lower Upper	-.787	-.767	-.770	-.448	-.355	-.763	-.901	-.802	-.787	1	-.774	-.768	-.680	-.680	-.680	-.680	-.750	-.756 ^e	
Pmm	Pearson Correlation	.902**	.876**	.875**	.775**	.526**	.879**	-.615**	.802**	.893**	-.306**	1	.859**	.904**	.904**	.904**	.904**	.845**	.885**	
	Sig. (2-tailed)	.000	.000	.000	.001	.053	.000	.019	.001	.000	.172		.000	.000	.000	.000	.000	.020	.000	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	-.016	-.012	-.032	.025	.002	-.006	.041	-.037	-.012	.053	0	-.001	-.037	-.037	-.037	-.037	-.035	-.039 ^e	
	Std. Error	.174	.170	.189	.087	.159	.140	.279	.195	.175	.307	0	.032	.175	.174	.175	.175	.159	.180 ^e	
	95% Confidence Interval Lower Upper	.530	.520	.502	.637	.216	.742	-.823	.175	.521	-.774	1	.898	.525	.526	.525	.525	.602	.604 ^e	
P_Emm	Pearson Correlation	.899**	.890**	.914**	.900**	.521**	.908**	-.624**	.836**	.892**	-.283**	.859**	1	.937**	.937**	.937**	.937**	.842**	.817**	
	Sig. (2-tailed)	.000	.000	.000	.000	.056	.000	.017	.000	.000	.327	.000		.000	.000	.000	.000	.020	.000	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	.000	-.001	-.024	.009	-.005	-.013	.029	-.032	.003	.043	-.001	0	-.019	-.019	-.019	-.019	-.013	-.030 ^e	
	Std. Error	.156	.152	.170	.032	.177	.129	.259	.181	.156	.298	.032	0	.152	.152	.152	.152	.153	.157 ^e	
	95% Confidence Interval Lower Upper	.757	.734	.625	.838	.153	.906	-.924	.363	.753	-.706	.898	1	.780	.780	.780	.780	.834	.820 ^e	

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

e. Cannot be computed because at least one of the variables is constant.

d. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples.

e. Based on 998 samples.

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

c. Cannot be computed because at least one of the variables is constant.

d. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples.

e. Based on 998 samples.

Table 6: The correlation of parameters: DrainageDensity_Strahler_Shreve_HypsometricalIntegral_Pmm_P_Emm_ with the rest hydromorphological parameters is shown.

		Correlations																	
		Sw	RiverLength	Perimeter	MeanElev	MinElev	MaxElev	DrainageCan aly	Strahler	Shreve	Hypsometa dical	Pann	P.Emv	Qm1	Qm10	Qm50	Qm100	SurfRunof6cl	Categories Class
Qm1	Pearson Correlation	.836	.836	.901	.820	.316	.935	-.719	.857	.825	-.283	.904	.937	1	1.000	1.000	1.000	.968	.933
	Sig. (2-tailed)	.000	.000	.000	.000	.271	.000	.004	.000	.000	.327	.000	.000		.000	.000	.000	.000	.000
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	Bootstrap ^d Bias	.069	.070	.037	.018	-.047	.012	.000	.026	.075	.015	-.037	-.019	0	.000	.000	.000	.020	.006 ^e
	Std. Error	.077	.077	.042	.166	.283	.040	.137	.047	.082	.266	.175	.152	0	.000	.000	.000	.007	.036 ^e
	95% Confidence Interval Lower	.789	.771	.858	.513	-.373	.896	-.942	.788	.774	-.689	.525	.780	1	1.000	1.000	1.000	.971	.951 ⁺
	Upper	.899	.998	.994	.928	.760	.991	-.362	.972	1.000	.339	.981	.983	1	1.000	1.000	1.000	.998	.993 ⁺
		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Qm10	Pearson Correlation	.836	.836	.901	.820	.316	.935	-.719	.857	.825	-.283	.904	.937	1.000	1	1.000	1.000	.968	.933
	Sig. (2-tailed)	.000	.000	.000	.000	.271	.000	.004	.000	.000	.326	.000	.000	.000		.000	.000	.000	.000
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	Bootstrap ^d Bias	.069	.070	.037	.018	-.047	.012	.000	.026	.075	.015	-.037	-.019	.000	0	.000	.000	.020	.006 ^e
	Std. Error	.077	.077	.042	.166	.283	.040	.137	.047	.082	.266	.174	.152	.000	0	.000	.000	.007	.037 ^e
	95% Confidence Interval Lower	.789	.771	.858	.513	-.373	.896	-.942	.788	.774	-.689	.526	.780	1.000	1	1.000	1.000	.971	.951 ⁺
	Upper	1.000	.998	.994	.928	.760	.991	-.362	.972	1.000	.339	.981	.983	1.000	1	1.000	1.000	.998	.993 ⁺
		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Qm50	Pearson Correlation	.836	.836	.901	.820	.316	.935	-.719	.857	.825	-.283	.904	.937	1.000	1.000	1	1.000	.968	.933
	Sig. (2-tailed)	.000	.000	.000	.000	.270	.000	.004	.000	.000	.327	.000	.000	.000	.000		.000	.000	.000
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	Bootstrap ^d Bias	.069	.070	.037	.018	-.047	.012	.000	.026	.075	.015	-.037	-.019	.000	.000	0	.000	.020	.006 ^e
	Std. Error	.077	.077	.042	.166	.283	.040	.137	.047	.082	.266	.175	.152	.000	.000	0	.000	.007	.036 ^e
	95% Confidence Interval Lower	.789	.771	.858	.513	-.373	.896	-.942	.788	.774	-.689	.525	.780	1.000	1.000	1	1.000	.971	.951 ⁺
	Upper	1.000	.998	.994	.928	.760	.991	-.362	.972	1.000	.339	.981	.983	1.000	1.000	1	1.000	.998	.993 ⁺
		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Qm100	Pearson Correlation	.836	.836	.901	.820	.316	.935	-.719	.857	.825	-.283	.904	.937	1.000	1.000	1.000	1	.968	.933
	Sig. (2-tailed)	.000	.000	.000	.000	.270	.000	.004	.000	.000	.327	.000	.000	.000	.000	.000	.000	.000	.000
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	Bootstrap ^d Bias	.069	.070	.037	.018	-.047	.012	.000	.026	.075	.015	-.037	-.019	.000	.000	.000	0	.020	.006 ^e
	Std. Error	.077	.077	.042	.166	.283	.040	.137	.047	.082	.266	.175	.152	.000	.000	.000	0	.007	.036 ^e
	95% Confidence Interval Lower	.789	.771	.858	.513	-.373	.896	-.942	.788	.774	-.689	.525	.780	1.000	1.000	1.000	1	.971	.951 ⁺
	Upper	1.000	.998	.994	.928	.760	.991	-.362	.972	1.000	.339	.981	.983	1.000	1.000	1.000	1	.998	.993 ⁺
		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SurfRunof6cl	Pearson Correlation	.851	.836	.884	.797	.387	.906	-.701	.823	.838	-.316	.945	.942	.988	.988	.988	.988	1	.916
	Sig. (2-tailed)	.000	.000	.000	.001	.172	.000	.005	.000	.000	.072	.000	.000	.000	.000	.000	.000	.000	.000
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	Bootstrap ^d Bias	.073	.075	.043	-.084	-.051	.034	-.006	.030	.078	.020	-.035	-.013	.000	.000	.000	.000	0	.010 ^e
	Std. Error	.071	.075	.045	.161	.273	.052	.140	.062	.076	.259	.169	.153	.007	.007	.007	.007	0	.050 ^e
	95% Confidence Interval Lower	.802	.778	.853	.611	-.296	.823	-.833	.712	.785	-.700	.802	.834	.971	.971	.971	.971	1	.804 ⁺
	Upper	.999	1.000	.994	.927	.790	.997	-.351	.969	1.000	.368	.994	.989	.998	.998	.998	.998	1	.996 ⁺
		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Categories6class	Pearson Correlation	.911	.919	.943	.794	.287	.926	-.700	.840	.908	-.362	.885	.917	.933	.933	.933	.933	.916	1
	Sig. (2-tailed)	.000	.000	.000	.001	.319	.000	.005	.000	.000	.017	.000	.000	.000	.000	.000	.000	.000	.000
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	Bootstrap ^d Bias	.016 ^e	.016 ^e	-.005 ^e	-.020 ^e	-.028 ^e	-.013 ^e	.010 ^e	-.005 ^e	.019 ^e	.026 ^e	-.039 ^e	-.030 ^e	.006 ^e	.006 ^e	.006 ^e	.006 ^e	.010 ^e	0 ^e
	Std. Error	.040 ^e	.034 ^e	.043 ^e	.172 ^e	.276 ^e	.087 ^e	.162 ^e	.042 ^e	.039 ^e	.265 ^e	.180 ^e	.157 ^e	.036 ^e	.037 ^e	.036 ^e	.036 ^e	.050 ^e	0 ^e
	95% Confidence Interval Lower	.831 ^e	.860 ^e	.819 ^e	.343 ^e	-.391 ^e	.893 ^e	-.838 ^e	.807 ^e	.839 ^e	-.756 ^e	.804 ^e	.820 ^e	.851 ^e	.851 ^e	.851 ^e	.851 ^e	.804 ^e	1 ^e
	Upper	.994 ^e	.963 ^e	.987 ^e	.925 ^e	.738 ^e	.965 ^e	-.363 ^e	.877 ^e	.933 ^e	.302 ^e	.990 ^e	.995 ^e	.993 ^e	.993 ^e	.993 ^e	.993 ^e	.966 ^e	1 ^e
		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

** Correlation is significant at the 0.01 level (2-tailed).

+ Correlation is significant at the 0.05 level (2-tailed).

e. Cannot be computed because at least one of the variables is constant.

d. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples.

e. Based on 998 samples.

Table 7: The correlation of parameters: Qm1, Qm10, Qm50, Qm100, SurfRunof6cl (otherwise Qmean), Categories 6 Class with the rest hydromorphological parameters is shown.

		Size	RiverLength	Perimeter	MeanElev	MinElev	MaxElev	DrainageDensity	Strahler	Shreve	HypsometricIntegral	Pmm	P_Emm	Qm10	SurfRunoff6cl	Categori6classes	Length	Relief_Ratio	
Length	Pearson Correlation	,948**	,971**	,987**	,894*	,113	,919**	-,741**	,949**	,950	-,390	,793	,857**	,841**	,809	,919**	1	-,744**	
	Sig. (2-tailed)	,000	,000	,000	,006	,699	,000	,002	,000	,000	,168	,001	,000	,000	,000	,000		,002	
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	,000	-,001	,001	-,008	-,034	,005	-,019	-,007	,001	,027	-,021	-,015	,052	,059	,003 ^e	0	-,012	
	Std. Error	,027	,016	,009	,168	,280	,038	,097	,040	,024	,265	,178	,149	,068	,081	,036 ^e	0	,118	
	95% Confidence Interval	Lower	,886	,934	,971	,287	-,566	,843	-,924	,845	,897	-,770	,371	,566	,774	,752	,834 ^e	1	-,940
		Upper	,987	,991	,999	,857	,532	,984	-,538	,985	,987	,271	,951	,954	,990	,991	,981 ^e	1	-,484
Relief_Ratio	Pearson Correlation	-,686**	-,711**	-,733**	-,525	-,182	-,652*	,320	-,739**	-,689**	,288	-,556*	-,623*	-,630*	-,588*	-,714**	-,744**	1	
	Sig. (2-tailed)	,007	,004	,003	,054	,533	,012	,265	,003	,006	,319	,039	,017	,016	,027	,004	,002		
	N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
	Bootstrap ^d Bias	-,020	-,020	-,012	-,010	,006	-,007	,045	-,008	-,021	-,017	-,005	-,009	-,042	-,049	-,026 ^e	-,012	0	
	Std. Error	,125	,120	,116	,153	,208	,134	,252	,121	,123	,236	,185	,147	,102	,120	,121 ^e	,118	0	
	95% Confidence Interval	Lower	-,923	-,934	-,931	-,788	-,550	-,874	-,146	-,935	-,925	-,256	-,853	-,873	-,880	-,884	-,933 ^e	-,940	1
		Upper	-,466	-,494	-,489	-,172	,297	-,361	,838	-,471	-,472	,677	-,108	-,274	-,473	-,411	-,480 ^e	-,484	1
**. Correlation is significant at the 0.01 level (2-tailed).																			
*. Correlation is significant at the 0.05 level (2-tailed).																			
c. Cannot be computed because at least one of the variables is constant.																			
d. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples																			
e. Based on 997 samples																			

Table 8: The correlation of parameters: Longest Length and Relief Ratio with the rest hydromorphological parameters is shown.



APPENDIX IV

STATISTICS FOR CHAPTER 4

Correlations

		Size	RiverLength
Size	Pearson Correlation	1	,995 ^{**}
	Sig. (2-tailed)		,000
	N	14	14
	Bootstrap ^d	Bias	,000
		Std. Error	,005
		95% Confidence Interval Lower	,983
		Upper	,999
RiverLength	Pearson Correlation	,995 ^{**}	1
	Sig. (2-tailed)	,000	
	N	14	14
	Bootstrap ^d	Bias	,000
		Std. Error	,005
		95% Confidence Interval Lower	,983
		Upper	,999
Perimeter	Pearson Correlation	,969 ^{**}	,980 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d	Bias	,004
		Std. Error	,011
		95% Confidence Interval Lower	,950
		Upper	,991
MeanElev	Pearson Correlation	,697 ^{**}	,709 ^{**}
	Sig. (2-tailed)	,006	,004
	N	14	14
	Bootstrap ^d	Bias	,024
		Std. Error	,166
		95% Confidence Interval Lower	,518
		Upper	,888
MinElev	Pearson Correlation	,319	,274
	Sig. (2-tailed)	,266	,343
	N	14	14
	Bootstrap ^d	Bias	-,031
		Std. Error	,262
		95% Confidence Interval Lower	-,356
		Upper	,715
MaxElev	Pearson Correlation	,884 ^{**}	,898 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d	Bias	,025
		Std. Error	,059
		95% Confidence Interval Lower	,790
		Upper	,995

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Correlations

		Perimeter	MeanElev
Size	Pearson Correlation	,969**	,697**
	Sig. (2-tailed)	,000	,006
	N	14	14
	Bootstrap ^d Bias	,004	,024
	Std. Error	,011	,166
	95% Confidence Interval Lower	,950	,518
	Upper	,991	,888
RiverLength	Pearson Correlation	,980**	,709**
	Sig. (2-tailed)	,000	,004
	N	14	14
	Bootstrap ^d Bias	,003	,019
	Std. Error	,010	,162
	95% Confidence Interval Lower	,963	,528
	Upper	,994	,896
Perimeter	Pearson Correlation	1	,736**
	Sig. (2-tailed)		,003
	N	14	14
	Bootstrap ^d Bias	0	-,013
	Std. Error	0	,183
	95% Confidence Interval Lower	1	,350
	Upper	1	,880
MeanElev	Pearson Correlation	,736**	1
	Sig. (2-tailed)	,003	
	N	14	14
	Bootstrap ^d Bias	-,013	0
	Std. Error	,183	0
	95% Confidence Interval Lower	,350	1
	Upper	,880	1
MinElev	Pearson Correlation	,203	,640
	Sig. (2-tailed)	,486	,014
	N	14	14
	Bootstrap ^d Bias	-,032	,002
	Std. Error	,289	,161
	95% Confidence Interval Lower	-,522	,283
	Upper	,683	,894
MaxElev	Pearson Correlation	,946**	,886**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,003	-,018
	Std. Error	,035	,139
	95% Confidence Interval Lower	,880	,668
	Upper	,989	,955

Correlations

		MinElev	MaxElev
Size	Pearson Correlation	,319	,884**
	Sig. (2-tailed)	,266	,000
	N	14	14
	Bootstrap ^d	Bias	-,031
		Std. Error	,262
		95% Confidence Interval	Lower
		Upper	,790
RiverLength	Pearson Correlation	,274	,898**
	Sig. (2-tailed)	,343	,000
	N	14	14
	Bootstrap ^d	Bias	-,028
		Std. Error	,260
		95% Confidence Interval	Lower
		Upper	,820
Perimeter	Pearson Correlation	,203	,946**
	Sig. (2-tailed)	,486	,000
	N	14	14
	Bootstrap ^d	Bias	-,032
		Std. Error	,289
		95% Confidence Interval	Lower
		Upper	,880
MeanElev	Pearson Correlation	,640*	,886**
	Sig. (2-tailed)	,014	,000
	N	14	14
	Bootstrap ^d	Bias	,002
		Std. Error	,161
		95% Confidence Interval	Lower
		Upper	,668
MinElev	Pearson Correlation	1	,344
	Sig. (2-tailed)		,228
	N	14	14
	Bootstrap ^d	Bias	0
		Std. Error	,242
		95% Confidence Interval	Lower
		Upper	-,218
MaxElev	Pearson Correlation	,344	1
	Sig. (2-tailed)	,228	
	N	14	14
	Bootstrap ^d	Bias	-,019
		Std. Error	,242
		95% Confidence Interval	Lower
		Upper	1

Correlations

		DrainageDensity	Strahler
Size	Pearson Correlation	-,679**	,904**
	Sig. (2-tailed)	,008	,000
	N	14	14
	Bootstrap ^d Bias	-,019	-,001
	Std. Error	,129	,047
	95% Confidence Interval Lower	-,907	,790
	Upper	-,377	,971
RiverLength	Pearson Correlation	-,681**	,923**
	Sig. (2-tailed)	,007	,000
	N	14	14
	Bootstrap ^d Bias	-,015	,001
	Std. Error	,133	,037
	95% Confidence Interval Lower	-,909	,829
	Upper	-,362	,975
Perimeter	Pearson Correlation	-,756**	,955**
	Sig. (2-tailed)	,002	,000
	N	14	14
	Bootstrap ^d Bias	-,006	-,008
	Std. Error	,110	,037
	95% Confidence Interval Lower	-,950	,847
	Upper	-,485	,992
MeanElev	Pearson Correlation	-,396	,650*
	Sig. (2-tailed)	,161	,012
	N	14	14
	Bootstrap ^d Bias	,016	-,020
	Std. Error	,270	,200
	95% Confidence Interval Lower	-,778	,167
	Upper	,242	,856
MinElev	Pearson Correlation	,159	,082
	Sig. (2-tailed)	,588	,780
	N	14	14
	Bootstrap ^d Bias	-,011	-,021
	Std. Error	,326	,302
	95% Confidence Interval Lower	-,558	-,626
	Upper	,733	,600
MaxElev	Pearson Correlation	-,709**	,886**
	Sig. (2-tailed)	,005	,000
	N	14	14
	Bootstrap ^d Bias	,007	-,011
	Std. Error	,147	,084
	95% Confidence Interval Lower	-,929	,632
	Upper	-,342	,971

Correlations

		Shreve	Hypsometric Integral
Size	Pearson Correlation	1,000 ^{**}	-,420
	Sig. (2-tailed)	,000	,135
	N	14	14
	Bootstrap ^d	Bias	,000
		Std. Error	,287
		95% Confidence Interval Lower	-,797
		Upper	,339
RiverLength	Pearson Correlation	,996 ^{**}	-,390
	Sig. (2-tailed)	,000	,168
	N	14	14
	Bootstrap ^d	Bias	,000
		Std. Error	,003
		95% Confidence Interval Lower	-,787
		Upper	,375
Perimeter	Pearson Correlation	,968 ^{**}	-,407
	Sig. (2-tailed)	,000	,149
	N	14	14
	Bootstrap ^d	Bias	,006
		Std. Error	,010
		95% Confidence Interval Lower	-,778
		Upper	,260
MeanElev	Pearson Correlation	,691 ^{**}	,086
	Sig. (2-tailed)	,006	,770
	N	14	14
	Bootstrap ^d	Bias	,027
		Std. Error	,166
		95% Confidence Interval Lower	-,448
		Upper	,685
MinElev	Pearson Correlation	,312	,154
	Sig. (2-tailed)	,278	,600
	N	14	14
	Bootstrap ^d	Bias	-,030
		Std. Error	,261
		95% Confidence Interval Lower	-,355
		Upper	,593
MaxElev	Pearson Correlation	,880 ^{**}	-,284
	Sig. (2-tailed)	,000	,325
	N	14	14
	Bootstrap ^d	Bias	,028
		Std. Error	,059
		95% Confidence Interval Lower	-,703
		Upper	,392

Correlations

		Pmm	P_Emm
Size	Pearson Correlation	,902**	,899**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,016	,000
	Std. Error	,174	,156
	95% Confidence Interval Lower	,530	,757
	Upper	,990	,984
RiverLength	Pearson Correlation	,870**	,890**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,012	-,001
	Std. Error	,170	,152
	95% Confidence Interval Lower	,520	,734
	Upper	,986	,983
Perimeter	Pearson Correlation	,875**	,914**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,032	-,024
	Std. Error	,189	,170
	95% Confidence Interval Lower	,402	,625
	Upper	,965	,968
MeanElev	Pearson Correlation	,775**	,900**
	Sig. (2-tailed)	,001	,000
	N	14	14
	Bootstrap ^d Bias	,025	,009
	Std. Error	,087	,032
	95% Confidence Interval Lower	,637	,838
	Upper	,954	,965
MinElev	Pearson Correlation	,526	,521
	Sig. (2-tailed)	,053	,056
	N	14	14
	Bootstrap ^d Bias	,002	-,005
	Std. Error	,159	,177
	95% Confidence Interval Lower	,216	,153
	Upper	,857	,873
MaxElev	Pearson Correlation	,879**	,968**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,006	-,013
	Std. Error	,140	,129
	95% Confidence Interval Lower	,742	,905
	Upper	,989	,990

Correlations

		Qm1	Qm10
Size	Pearson Correlation	,836**	,836**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,069	,069
	Std. Error	,077	,077
	95% Confidence Interval Lower	,789	,789
	Upper	,999	1,000
RiverLength	Pearson Correlation	,836**	,836**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,070	,070
	Std. Error	,077	,077
	95% Confidence Interval Lower	,771	,772
	Upper	,998	,998
Perimeter	Pearson Correlation	,901**	,901**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,037	,037
	Std. Error	,042	,042
	95% Confidence Interval Lower	,858	,858
	Upper	,994	,994
MeanElev	Pearson Correlation	,820**	,820**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,018	-,018
	Std. Error	,166	,166
	95% Confidence Interval Lower	,512	,513
	Upper	,928	,928
MinElev	Pearson Correlation	,316	,316
	Sig. (2-tailed)	,271	,271
	N	14	14
	Bootstrap ^d Bias	-,047	-,047
	Std. Error	,283	,284
	95% Confidence Interval Lower	-,373	-,373
	Upper	,760	,760
MaxElev	Pearson Correlation	,935**	,935**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,012	,012
	Std. Error	,040	,040
	95% Confidence Interval Lower	,896	,895
	Upper	,991	,991

Correlations

		Qm50	Qm100
Size	Pearson Correlation	,836**	,836**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,069	,069
	Std. Error	,077	,077
	95% Confidence Interval Lower	,789	,789
	Upper	1,000	1,000
RiverLength	Pearson Correlation	,836**	,836**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,071	,071
	Std. Error	,077	,077
	95% Confidence Interval Lower	,771	,771
	Upper	,998	,998
Perimeter	Pearson Correlation	,901**	,901**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,037	,037
	Std. Error	,042	,042
	95% Confidence Interval Lower	,858	,858
	Upper	,994	,994
MeanElev	Pearson Correlation	,820**	,820**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,018	-,018
	Std. Error	,166	,166
	95% Confidence Interval Lower	,513	,513
	Upper	,928	,928
MinElev	Pearson Correlation	,317	,316
	Sig. (2-tailed)	,270	,270
	N	14	14
	Bootstrap ^d Bias	-,047	-,047
	Std. Error	,283	,283
	95% Confidence Interval Lower	-,372	-,373
	Upper	,760	,760
MaxElev	Pearson Correlation	,935**	,935**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,012	,012
	Std. Error	,040	,040
	95% Confidence Interval Lower	,896	,896
	Upper	,991	,991

Correlations

		SurfRunoff6cl	Categori6clas s
Size	Pearson Correlation	,851 ^{**}	,911 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,073	,016 ^e
	Std. Error	,071	,040 ^e
	95% Confidence Interval Lower	,802	,831 ^e
	Upper	,999	,994 ^e
RiverLength	Pearson Correlation	,836 ^{**}	,919 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,075	,016 ^e
	Std. Error	,076	,034 ^e
	95% Confidence Interval Lower	,778	,860 ^e
	Upper	1,000	,993 ^e
Perimeter	Pearson Correlation	,884 ^{**}	,948 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,043	-,005 ^e
	Std. Error	,045	,043 ^e
	95% Confidence Interval Lower	,853	,819 ^e
	Upper	,994	,987 ^e
MeanElev	Pearson Correlation	,797 ^{**}	,764 ^{**}
	Sig. (2-tailed)	,001	,001
	N	14	14
	Bootstrap ^d Bias	-,004	-,020 ^e
	Std. Error	,161	,172 ^e
	95% Confidence Interval Lower	,611	,343 ^e
	Upper	,927	,925 ^e
MinElev	Pearson Correlation	,387	,287
	Sig. (2-tailed)	,172	,319
	N	14	14
	Bootstrap ^d Bias	-,051	-,028 ^e
	Std. Error	,273	,276 ^e
	95% Confidence Interval Lower	-,296	-,361 ^e
	Upper	,780	,729 ^e
MaxElev	Pearson Correlation	,906 ^{**}	,926 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,024	-,013 ^e
	Std. Error	,052	,087 ^e
	95% Confidence Interval Lower	,823	,683 ^e
	Upper	,997	,995 ^e

Correlations

		Size	RiverLength
DrainageDensity	Pearson Correlation	-,679**	-,681**
	Sig. (2-tailed)	,008	,007
	N	14	14
	Bootstrap ^d Bias	-,019	-,015
	Std. Error	,129	,133
	95% Confidence Interval Lower	-,907	-,909
	Upper	-,377	-,362
Strahler	Pearson Correlation	,904**	,923**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,001	,001
	Std. Error	,047	,037
	95% Confidence Interval Lower	,790	,829
	Upper	,971	,975
Shreve	Pearson Correlation	1,000**	,996**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,000	,000
	Std. Error	,000	,003
	95% Confidence Interval Lower	,999	,988
	Upper	1,000	1,000
HypsometricIntegral	Pearson Correlation	-,420	-,390
	Sig. (2-tailed)	,135	,168
	N	14	14
	Bootstrap ^d Bias	,051	,049
	Std. Error	,287	,296
	95% Confidence Interval Lower	-,797	-,787
	Upper	,339	,375
Pmm	Pearson Correlation	,902**	,870**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,016	-,012
	Std. Error	,174	,170
	95% Confidence Interval Lower	,530	,520
	Upper	,990	,986
P_Emm	Pearson Correlation	,899**	,890**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,000	-,001
	Std. Error	,156	,152
	95% Confidence Interval Lower	,757	,734
	Upper	,984	,983

Correlations

		Perimeter	MeanElev
DrainageDensity	Pearson Correlation	-,756**	-,396
	Sig. (2-tailed)	,002	,161
	N	14	14
	Bootstrap ^d Bias	-,006	,016
	Std. Error	,110	,270
	95% Confidence Interval Lower	-,950	-,778
	Upper	-,485	,242
Strahler	Pearson Correlation	,955**	,650
	Sig. (2-tailed)	,000	,012
	N	14	14
	Bootstrap ^d Bias	-,008	-,020
	Std. Error	,037	,200
	95% Confidence Interval Lower	,847	,167
	Upper	,992	,856
Shreve	Pearson Correlation	,968**	,691**
	Sig. (2-tailed)	,000	,006
	N	14	14
	Bootstrap ^d Bias	,006	,027
	Std. Error	,010	,166
	95% Confidence Interval Lower	,953	,520
	Upper	,990	,891
HypsometricIntegral	Pearson Correlation	-,407	,086
	Sig. (2-tailed)	,149	,770
	N	14	14
	Bootstrap ^d Bias	,032	,011
	Std. Error	,262	,296
	95% Confidence Interval Lower	-,778	-,448
	Upper	,260	,685
Pmm	Pearson Correlation	,875**	,775**
	Sig. (2-tailed)	,000	,001
	N	14	14
	Bootstrap ^d Bias	-,032	,025
	Std. Error	,189	,087
	95% Confidence Interval Lower	,402	,637
	Upper	,965	,954
P_Emm	Pearson Correlation	,914**	,900**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,024	,009
	Std. Error	,170	,032
	95% Confidence Interval Lower	,625	,838
	Upper	,968	,965

Correlations

		MinElev	MaxElev
DrainageDensity	Pearson Correlation	,159	-,709**
	Sig. (2-tailed)	,588	,005
	N	14	14
	Bootstrap ^d Bias	-,011	,007
	Std. Error	,326	,147
	95% Confidence Interval Lower	-,558	-,929
	Upper	,733	-,342
Strahler	Pearson Correlation	,082	,886**
	Sig. (2-tailed)	,780	,000
	N	14	14
	Bootstrap ^d Bias	-,021	-,011
	Std. Error	,302	,084
	95% Confidence Interval Lower	-,626	,632
	Upper	,600	,971
Shreve	Pearson Correlation	,312	,880**
	Sig. (2-tailed)	,278	,000
	N	14	14
	Bootstrap ^d Bias	-,030	,028
	Std. Error	,261	,059
	95% Confidence Interval Lower	-,361	,789
	Upper	,709	,995
HypsometricIntegral	Pearson Correlation	,154	-,284
	Sig. (2-tailed)	,600	,325
	N	14	14
	Bootstrap ^d Bias	-,005	,021
	Std. Error	,249	,273
	95% Confidence Interval Lower	-,355	-,703
	Upper	,593	,392
Pmm	Pearson Correlation	,526	,879**
	Sig. (2-tailed)	,053	,000
	N	14	14
	Bootstrap ^d Bias	,002	-,006
	Std. Error	,159	,140
	95% Confidence Interval Lower	,216	,742
	Upper	,857	,989
P_Emm	Pearson Correlation	,521	,968**
	Sig. (2-tailed)	,056	,000
	N	14	14
	Bootstrap ^d Bias	-,005	-,013
	Std. Error	,177	,129
	95% Confidence Interval Lower	,153	,905
	Upper	,873	,990

Correlations

		DrainageDensity	Strahler
DrainageDensity	Pearson Correlation	1	-,697**
	Sig. (2-tailed)		,006
	N	14	14
	Bootstrap ^d	Bias	,012
		Std. Error	,174
		95% Confidence Interval	Lower Upper
			1 -,250
Strahler	Pearson Correlation	-,697**	1
	Sig. (2-tailed)	,006	
	N	14	14
	Bootstrap ^d	Bias	,012
		Std. Error	,174
		95% Confidence Interval	Lower Upper
			-,943 1
Shreve	Pearson Correlation	-,675**	,904**
	Sig. (2-tailed)	,008	,000
	N	14	14
	Bootstrap ^d	Bias	-,022
		Std. Error	,127
		95% Confidence Interval	Lower Upper
			-,903 ,801
HypsometricIntegral	Pearson Correlation	,526	-,396
	Sig. (2-tailed)	,053	,161
	N	14	14
	Bootstrap ^d	Bias	,008
		Std. Error	,186
		95% Confidence Interval	Lower Upper
			,101 ,844
Pmm	Pearson Correlation	-,615*	,802**
	Sig. (2-tailed)	,019	,001
	N	14	14
	Bootstrap ^d	Bias	,041
		Std. Error	,279
		95% Confidence Interval	Lower Upper
			-,923 ,175
P_Emm	Pearson Correlation	-,624*	,836**
	Sig. (2-tailed)	,017	,000
	N	14	14
	Bootstrap ^d	Bias	,029
		Std. Error	,259
		95% Confidence Interval	Lower Upper
			-,924 ,363

Correlations

		Shreve	HypsometricIntegral
DrainageDensity	Pearson Correlation	-,675**	,526
	Sig. (2-tailed)	,008	,053
	N	14	14
	Bootstrap ^d Bias	-,022	,008
	Std. Error	,127	,186
	95% Confidence Interval Lower	-,903	,101
	Upper	-,383	,844
Strahler	Pearson Correlation	,904**	-,396
	Sig. (2-tailed)	,000	,161
	N	14	14
	Bootstrap ^d Bias	,001	,029
	Std. Error	,044	,281
	95% Confidence Interval Lower	,801	-,802
	Upper	,969	,289
Shreve	Pearson Correlation	1	-,421
	Sig. (2-tailed)		,134
	N	14	14
	Bootstrap ^d Bias	0	,051
	Std. Error	0	,287
	95% Confidence Interval Lower	1	-,797
	Upper	1	,343
HypsometricIntegral	Pearson Correlation	-,421	1
	Sig. (2-tailed)	,134	
	N	14	14
	Bootstrap ^d Bias	,051	0
	Std. Error	,287	0
	95% Confidence Interval Lower	-,797	1
	Upper	,343	1
Pmm	Pearson Correlation	,893**	-,386
	Sig. (2-tailed)	,000	,172
	N	14	14
	Bootstrap ^d Bias	-,012	,053
	Std. Error	,175	,307
	95% Confidence Interval Lower	,521	-,774
	Upper	,989	,515
P_Emm	Pearson Correlation	,892**	-,283
	Sig. (2-tailed)	,000	,327
	N	14	14
	Bootstrap ^d Bias	,003	,043
	Std. Error	,156	,298
	95% Confidence Interval Lower	,753	-,706
	Upper	,983	,482

Correlations

		Pmm	P_Emm
DrainageDensity	Pearson Correlation	-,615*	-,624*
	Sig. (2-tailed)	,019	,017
	N	14	14
	Bootstrap ^d Bias	,041	,029
	Std. Error	,279	,259
	95% Confidence Interval Lower	-,923	-,924
	Upper	,220	,029
Strahler	Pearson Correlation	,802**	,836**
	Sig. (2-tailed)	,001	,000
	N	14	14
	Bootstrap ^d Bias	-,037	-,032
	Std. Error	,195	,181
	95% Confidence Interval Lower	,175	,363
	Upper	,940	,954
Shreve	Pearson Correlation	,893**	,892**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,012	,003
	Std. Error	,175	,156
	95% Confidence Interval Lower	,521	,753
	Upper	,989	,983
HypsometricIntegral	Pearson Correlation	-,386	-,283
	Sig. (2-tailed)	,172	,327
	N	14	14
	Bootstrap ^d Bias	,053	,043
	Std. Error	,307	,298
	95% Confidence Interval Lower	-,774	-,706
	Upper	,515	,482
Pmm	Pearson Correlation	1	,959**
	Sig. (2-tailed)		,000
	N	14	14
	Bootstrap ^d Bias	0	-,001
	Std. Error	0	,032
	95% Confidence Interval Lower	1	,898
	Upper	1	,999
P_Emm	Pearson Correlation	,959**	1
	Sig. (2-tailed)	,000	
	N	14	14
	Bootstrap ^d Bias	-,001	0
	Std. Error	,032	0
	95% Confidence Interval Lower	,898	1
	Upper	,999	1

Correlations

		Qm1	Qm10
DrainageDensity	Pearson Correlation	-,719**	-,719**
	Sig. (2-tailed)	,004	,004
	N	14	14
	Bootstrap ^d Bias	,000	,000
	Std. Error	,137	,137
	95% Confidence Interval Lower	-,942	-,942
	Upper	-,363	-,362
Strahler	Pearson Correlation	,857**	,857**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,026	,026
	Std. Error	,047	,047
	95% Confidence Interval Lower	,788	,788
	Upper	,972	,972
Shreve	Pearson Correlation	,825**	,825**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,075	,075
	Std. Error	,082	,082
	95% Confidence Interval Lower	,774	,774
	Upper	1,000	1,000
HypsometricIntegral	Pearson Correlation	-,283	-,283
	Sig. (2-tailed)	,327	,326
	N	14	14
	Bootstrap ^d Bias	,014	,014
	Std. Error	,256	,256
	95% Confidence Interval Lower	-,689	-,690
	Upper	,339	,339
Pmm	Pearson Correlation	,904**	,904**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,037	-,037
	Std. Error	,175	,174
	95% Confidence Interval Lower	,525	,526
	Upper	,981	,981
P_Emm	Pearson Correlation	,937**	,937**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,019	-,019
	Std. Error	,152	,152
	95% Confidence Interval Lower	,780	,780
	Upper	,983	,983

Correlations

		Qm50	Qm100
DrainageDensity	Pearson Correlation	-,719**	-,719**
	Sig. (2-tailed)	,004	,004
	N	14	14
	Bootstrap ^d Bias	,000	,000
	Std. Error	,137	,137
	95% Confidence Interval Lower	-,942	-,942
	Upper	-,363	-,362
Strahler	Pearson Correlation	,857**	,857**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,026	,026
	Std. Error	,047	,047
	95% Confidence Interval Lower	,788	,788
	Upper	,972	,972
Shreve	Pearson Correlation	,825**	,825**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,075	,075
	Std. Error	,082	,082
	95% Confidence Interval Lower	,774	,774
	Upper	1,000	1,000
HypsometricIntegral	Pearson Correlation	-,283	-,283
	Sig. (2-tailed)	,327	,327
	N	14	14
	Bootstrap ^d Bias	,015	,015
	Std. Error	,256	,256
	95% Confidence Interval Lower	-,689	-,689
	Upper	,339	,339
Pmm	Pearson Correlation	,904**	,904**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,037	-,037
	Std. Error	,175	,175
	95% Confidence Interval Lower	,525	,525
	Upper	,981	,981
P_Emm	Pearson Correlation	,937**	,937**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,019	-,019
	Std. Error	,152	,152
	95% Confidence Interval Lower	,780	,780
	Upper	,983	,983

Correlations

		SurfRunoff6cl	Categori6clas s
DrainageDensity	Pearson Correlation	-,701 ^{**}	-,700 ^{**}
	Sig. (2-tailed)	,005	,005
	N	14	14
	Bootstrap ^d Bias	-,006	,010 ^e
	Std. Error	,140	,162 ^e
	95% Confidence Interval Lower	-,933	-,938 ^e
	Upper	-,351	-,283 ^e
Strahler	Pearson Correlation	,823 ^{**}	,940 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,030	-,005 ^e
	Std. Error	,062	,042 ^e
	95% Confidence Interval Lower	,712	,807 ^e
	Upper	,969	,987 ^e
Shreve	Pearson Correlation	,839 ^{**}	,908 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,078	,019 ^e
	Std. Error	,076	,039 ^e
	95% Confidence Interval Lower	,785	,839 ^e
	Upper	1,000	,993 ^e
HypsometricIntegral	Pearson Correlation	-,316	-,352
	Sig. (2-tailed)	,272	,217
	N	14	14
	Bootstrap ^d Bias	,020	,026 ^e
	Std. Error	,259	,265 ^e
	95% Confidence Interval Lower	-,700	-,756 ^e
	Upper	,368	,302 ^e
Pmm	Pearson Correlation	,945 ^{**}	,885 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,035	-,039 ^e
	Std. Error	,169	,180 ^e
	95% Confidence Interval Lower	,602	,304 ^e
	Upper	,994	,990 ^e
P_Emm	Pearson Correlation	,942 ^{**}	,917 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,013	-,030 ^e
	Std. Error	,153	,157 ^e
	95% Confidence Interval Lower	,834	,520 ^e
	Upper	,989	,995 ^e

Correlations

		Size	RiverLength
Qm1	Pearson Correlation	,836 ^{**}	,836 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,069	,070
	Std. Error	,077	,077
	95% Confidence Interval Lower	,789	,771
	Upper	,999	,998
Qm10	Pearson Correlation	,836 ^{**}	,836 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,069	,070
	Std. Error	,077	,077
	95% Confidence Interval Lower	,789	,772
	Upper	1,000	,998
Qm50	Pearson Correlation	,836 ^{**}	,836 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,069	,071
	Std. Error	,077	,077
	95% Confidence Interval Lower	,789	,771
	Upper	1,000	,998
Qm100	Pearson Correlation	,836 ^{**}	,836 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,069	,071
	Std. Error	,077	,077
	95% Confidence Interval Lower	,789	,771
	Upper	1,000	,998
SurfRunoff6cl	Pearson Correlation	,851 ^{**}	,836 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,073	,075
	Std. Error	,071	,076
	95% Confidence Interval Lower	,802	,778
	Upper	,999	1,000
Categori6class	Pearson Correlation	,911 ^{**}	,919 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,016 ^e	,016 ^e
	Std. Error	,040 ^e	,034 ^e
	95% Confidence Interval Lower	,831 ^e	,860 ^e
	Upper	,994 ^e	,993 ^e

Correlations

		Perimeter	MeanElev
Qm1	Pearson Correlation	,901**	,820**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,037	-,018
	Std. Error	,042	,166
	95% Confidence Interval Lower	,858	,512
	Upper	,994	,928
Qm10	Pearson Correlation	,901**	,820**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,037	-,018
	Std. Error	,042	,166
	95% Confidence Interval Lower	,858	,513
	Upper	,994	,928
Qm50	Pearson Correlation	,901**	,820**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,037	-,018
	Std. Error	,042	,166
	95% Confidence Interval Lower	,858	,513
	Upper	,994	,928
Qm100	Pearson Correlation	,901**	,820**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,037	-,018
	Std. Error	,042	,166
	95% Confidence Interval Lower	,858	,513
	Upper	,994	,928
SurfRunoff6cl	Pearson Correlation	,884**	,797**
	Sig. (2-tailed)	,000	,001
	N	14	14
	Bootstrap ^d Bias	,043	-,004
	Std. Error	,045	,161
	95% Confidence Interval Lower	,853	,611
	Upper	,994	,927
Categori6class	Pearson Correlation	,948**	,764**
	Sig. (2-tailed)	,000	,001
	N	14	14
	Bootstrap ^d Bias	-,005 ^e	-,020 ^e
	Std. Error	,043 ^e	,172 ^e
	95% Confidence Interval Lower	,819 ^e	,343 ^e
	Upper	,987 ^e	,925 ^e

Correlations

		MinElev	MaxElev
Qm1	Pearson Correlation	,316	,935**
	Sig. (2-tailed)	,271	,000
	N	14	14
	Bootstrap ^d Bias	-,047	,012
	Std. Error	,283	,040
	95% Confidence Interval Lower	-,373	,896
	Upper	,760	,991
Qm10	Pearson Correlation	,316	,935**
	Sig. (2-tailed)	,271	,000
	N	14	14
	Bootstrap ^d Bias	-,047	,012
	Std. Error	,284	,040
	95% Confidence Interval Lower	-,373	,895
	Upper	,760	,991
Qm50	Pearson Correlation	,317	,935**
	Sig. (2-tailed)	,270	,000
	N	14	14
	Bootstrap ^d Bias	-,047	,012
	Std. Error	,283	,040
	95% Confidence Interval Lower	-,372	,896
	Upper	,760	,991
Qm100	Pearson Correlation	,316	,935**
	Sig. (2-tailed)	,270	,000
	N	14	14
	Bootstrap ^d Bias	-,047	,012
	Std. Error	,283	,040
	95% Confidence Interval Lower	-,373	,896
	Upper	,760	,991
SurfRunoff6cl	Pearson Correlation	,387	,906**
	Sig. (2-tailed)	,172	,000
	N	14	14
	Bootstrap ^d Bias	-,051	,024
	Std. Error	,273	,052
	95% Confidence Interval Lower	-,296	,823
	Upper	,780	,997
Categoriδclass	Pearson Correlation	,287	,926**
	Sig. (2-tailed)	,319	,000
	N	14	14
	Bootstrap ^d Bias	-,028 ^e	-,013 ^e
	Std. Error	,276 ^e	,087 ^e
	95% Confidence Interval Lower	-,361 ^e	,683 ^e
	Upper	,729 ^e	,995 ^e

Correlations

		DrainageDensity	Strahler
Qm1	Pearson Correlation	-,719 ^{**}	,857 ^{**}
	Sig. (2-tailed)	,004	,000
	N	14	14
	Bootstrap ^d Bias	,000	,026
	Std. Error	,137	,047
	95% Confidence Interval Lower	-,942	,788
	Upper	-,363	,972
Qm10	Pearson Correlation	-,719 ^{**}	,857 ^{**}
	Sig. (2-tailed)	,004	,000
	N	14	14
	Bootstrap ^d Bias	,000	,026
	Std. Error	,137	,047
	95% Confidence Interval Lower	-,942	,788
	Upper	-,362	,972
Qm50	Pearson Correlation	-,719 ^{**}	,857 ^{**}
	Sig. (2-tailed)	,004	,000
	N	14	14
	Bootstrap ^d Bias	,000	,026
	Std. Error	,137	,047
	95% Confidence Interval Lower	-,942	,788
	Upper	-,363	,972
Qm100	Pearson Correlation	-,719 ^{**}	,857 ^{**}
	Sig. (2-tailed)	,004	,000
	N	14	14
	Bootstrap ^d Bias	,000	,026
	Std. Error	,137	,047
	95% Confidence Interval Lower	-,942	,788
	Upper	-,362	,972
SurfRunoff6cl	Pearson Correlation	-,701 ^{**}	,823 ^{**}
	Sig. (2-tailed)	,005	,000
	N	14	14
	Bootstrap ^d Bias	-,006	,030
	Std. Error	,140	,062
	95% Confidence Interval Lower	-,933	,712
	Upper	-,351	,969
Categori6class	Pearson Correlation	-,700 ^{**}	,940 ^{**}
	Sig. (2-tailed)	,005	,000
	N	14	14
	Bootstrap ^d Bias	,010 ^e	-,005 ^e
	Std. Error	,162 ^e	,042 ^e
	95% Confidence Interval Lower	-,938 ^e	,807 ^e
	Upper	-,283 ^e	,987 ^e

Correlations

		Shreve	Hypsometric Integral
Qm1	Pearson Correlation	,825**	-,283
	Sig. (2-tailed)	,000	,327
	N	14	14
	Bootstrap ^d Bias	,075	,014
	Std. Error	,082	,256
	95% Confidence Interval Lower	,774	-,689
	Upper	1,000	,339
Qm10	Pearson Correlation	,825**	-,283
	Sig. (2-tailed)	,000	,326
	N	14	14
	Bootstrap ^d Bias	,075	,014
	Std. Error	,082	,256
	95% Confidence Interval Lower	,774	-,690
	Upper	1,000	,339
Qm50	Pearson Correlation	,825**	-,283
	Sig. (2-tailed)	,000	,327
	N	14	14
	Bootstrap ^d Bias	,075	,015
	Std. Error	,082	,256
	95% Confidence Interval Lower	,774	-,689
	Upper	1,000	,339
Qm100	Pearson Correlation	,825**	-,283
	Sig. (2-tailed)	,000	,327
	N	14	14
	Bootstrap ^d Bias	,075	,015
	Std. Error	,082	,256
	95% Confidence Interval Lower	,774	-,689
	Upper	1,000	,339
SurfRunoff6cl	Pearson Correlation	,839**	-,316
	Sig. (2-tailed)	,000	,272
	N	14	14
	Bootstrap ^d Bias	,078	,020
	Std. Error	,076	,259
	95% Confidence Interval Lower	,785	-,700
	Upper	1,000	,368
Category6class	Pearson Correlation	,908**	-,352
	Sig. (2-tailed)	,000	,217
	N	14	14
	Bootstrap ^d Bias	,019 ^e	,026 ^e
	Std. Error	,039 ^e	,265 ^e
	95% Confidence Interval Lower	,839 ^e	-,756 ^e
	Upper	,993 ^e	,302 ^e

Correlations

		Pmm	P_Emm
Qm1	Pearson Correlation	,904**	,937**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,037	-,019
	Std. Error	,175	,152
	95% Confidence Interval Lower	,525	,780
	Upper	,981	,983
Qm10	Pearson Correlation	,904**	,937**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,037	-,019
	Std. Error	,174	,152
	95% Confidence Interval Lower	,526	,780
	Upper	,981	,983
Qm50	Pearson Correlation	,904**	,937**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,037	-,019
	Std. Error	,175	,152
	95% Confidence Interval Lower	,525	,780
	Upper	,981	,983
Qm100	Pearson Correlation	,904**	,937**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,037	-,019
	Std. Error	,175	,152
	95% Confidence Interval Lower	,525	,780
	Upper	,981	,983
SurfRunoff6cl	Pearson Correlation	,945**	,942**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,035	-,013
	Std. Error	,169	,153
	95% Confidence Interval Lower	,602	,834
	Upper	,994	,989
Categori6class	Pearson Correlation	,885**	,917**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	-,039 ^e	-,030 ^e
	Std. Error	,180 ^e	,157 ^e
	95% Confidence Interval Lower	,304 ^e	,520 ^e
	Upper	,990 ^e	,995 ^e

Correlations

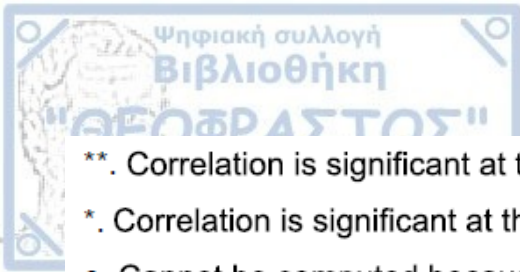
		Qm1	Qm10
Qm1	Pearson Correlation	1	1,000**
	Sig. (2-tailed)		,000
	N	14	14
	Bootstrap ^d	Bias	,000
		Std. Error	,000
		95% Confidence Interval Lower	1
		Upper	1,000
Qm10	Pearson Correlation	1,000**	1
	Sig. (2-tailed)	,000	
	N	14	14
	Bootstrap ^d	Bias	,000
		Std. Error	,000
		95% Confidence Interval Lower	1,000
		Upper	1,000
Qm50	Pearson Correlation	1,000**	1,000**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d	Bias	,000
		Std. Error	,000
		95% Confidence Interval Lower	1,000
		Upper	1,000
Qm100	Pearson Correlation	1,000**	1,000**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d	Bias	,000
		Std. Error	,000
		95% Confidence Interval Lower	1,000
		Upper	1,000
SurfRunoff6cl	Pearson Correlation	,988**	,988**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d	Bias	,000
		Std. Error	,007
		95% Confidence Interval Lower	,971
		Upper	,998
Categori6class	Pearson Correlation	,933**	,933**
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d	Bias	,006 ^e
		Std. Error	,036 ^e
		95% Confidence Interval Lower	,851 ^e
		Upper	,993 ^e

Correlations

		Qm50	Qm100
Qm1	Pearson Correlation	1,000 ^{***}	1,000 ^{***}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,000	,000
	Std. Error	,000	,000
	95% Confidence Interval Lower	1,000	1,000
	Upper	1,000	1,000
Qm10	Pearson Correlation	1,000 ^{***}	1,000 ^{***}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,000	,000
	Std. Error	,000	,000
	95% Confidence Interval Lower	1,000	1,000
	Upper	1,000	1,000
Qm50	Pearson Correlation	1	1,000 ^{***}
	Sig. (2-tailed)		,000
	N	14	14
	Bootstrap ^d Bias	0	,000
	Std. Error	0	,000
	95% Confidence Interval Lower	1	1,000
	Upper	1	1,000
Qm100	Pearson Correlation	1,000 ^{***}	1
	Sig. (2-tailed)	,000	
	N	14	14
	Bootstrap ^d Bias	,000	0
	Std. Error	,000	0
	95% Confidence Interval Lower	1,000	1
	Upper	1,000	1
SurfRunoff6cl	Pearson Correlation	,988 ^{***}	,988 ^{***}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,000	,000
	Std. Error	,007	,007
	95% Confidence Interval Lower	,971	,971
	Upper	,998	,998
Categori6class	Pearson Correlation	,933 ^{***}	,933 ^{***}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,006 ^e	,006 ^e
	Std. Error	,036 ^e	,036 ^e
	95% Confidence Interval Lower	,851 ^e	,851 ^e
	Upper	,993 ^e	,993 ^e

Correlations

		SurfRunoff6cl	Categori6class
Qm1	Pearson Correlation	,988 ^{**}	,933 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,000	,006 ^e
	Std. Error	,007	,036 ^e
	95% Confidence Interval Lower	,971	,851 ^e
	Upper	,998	,993 ^e
Qm10	Pearson Correlation	,988 ^{**}	,933 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,000	,006 ^e
	Std. Error	,007	,037 ^e
	95% Confidence Interval Lower	,971	,851 ^e
	Upper	,998	,993 ^e
Qm50	Pearson Correlation	,988 ^{**}	,933 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,000	,006 ^e
	Std. Error	,007	,036 ^e
	95% Confidence Interval Lower	,971	,851 ^e
	Upper	,998	,993 ^e
Qm100	Pearson Correlation	,988 ^{**}	,933 ^{**}
	Sig. (2-tailed)	,000	,000
	N	14	14
	Bootstrap ^d Bias	,000	,006 ^e
	Std. Error	,007	,036 ^e
	95% Confidence Interval Lower	,971	,851 ^e
	Upper	,998	,993 ^e
SurfRunoff6cl	Pearson Correlation	1	,916 ^{**}
	Sig. (2-tailed)		,000
	N	14	14
	Bootstrap ^d Bias	0	,010 ^e
	Std. Error	0	,050 ^e
	95% Confidence Interval Lower	1	,804 ^e
	Upper	1	,996 ^e
Categori6class	Pearson Correlation	,916 ^{**}	1
	Sig. (2-tailed)	,000	
	N	14	14
	Bootstrap ^d Bias	,010 ^e	0 ^e
	Std. Error	,050 ^e	0 ^e
	95% Confidence Interval Lower	,804 ^e	1 ^e
	Upper	,996 ^e	1 ^e



- ** . Correlation is significant at the 0.01 level (2-tailed).
- * . Correlation is significant at the 0.05 level (2-tailed).
- c. Cannot be computed because at least one of the variables is constant.
- d. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples
- e. Based on 998 samples



Chart of workflow. It's a simple chart that tries to shows the workflow and the most important analysis that took place. But it is also a chart where I want to show my gratitude and acknowledge the help that I receive from specific people, friends, family, researchers and academics.