shifted in time and space, respectively, to evaluate the variability of correlations in both cases. In the case of 3D shifting domain, a specific algorithm, called "statistical tidal tomography", is described. The results reveal important issues: a). There is a specific temporal footprint of the p-values around the larger earthquakes; b) A Fast Fourier Transform on the n-order polynomial least squares fit (LSF) of the p values variations emphasizes a long-term period about 17 – 18 years; c) Following the 3-D distribution of p<5% values in different sliding time windows we observe a certain pattern confirmed by the CN algorithm for the earthquake prediction and the future strong Vrancea events monitoring; d) the statistical tidal tomography of M2 component has similar patterns with the analysis of seismicity patterns introduced by others for the Vrancea seismic region.

## Combined petrological, geochemical, and statistical analysis of Eocene-Oligocene sandstones of the Thrace Basin, Greece and Bulgaria

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The Rhodopeian Orogen developed since Late Cretaceous-Lower Eocene during accretionary processes following the closure of the Vardar ocean basin. We concentrate on Paleogene clastic sediments of the Rhodope area, developed synchronous to the post – Cretaceous collisional collapse and the subsequent Tertiary extensional phase. Throughout a multidisciplinary approach, including sedimentary petrology, sandstone geochemistry and compositional data analysis, we argue to reconstruct the unroofing history of the Rhodopian orogen and the abrupt onset of the volcanic activity between Late Eocene and Oligocene across the eastern and southern Rhodopian region. A total of 127 sandstone samples have been analysed. Sandstone detrital modes include three distinctive petrofacies, a quartzolithic, quartzofeldspathic and volcaniclastic. The major contributions are from the metamorphic basement units, represented mostly by low-medium grade lithic fragments for the quartzolithic petrofacies and high grade metamorphic rock fragments for the quartzofeldspathic petrofacies. Volcaniclastic sandstones recorded different composition betweeen eastern Rhodopes and southern Rhodopes samples. Detrital mode evolution testifies contributions from three key source areas corresponding with the two main crystalline tectonic units of the Rhodope Massif, Variegated Complex and Gneiss-Migmatite Complex and from the Circum-Rhodope Belt. The volcaniclastic petrofacies is interbedded with quartzofeldspathic petrofacies reflecting superposition of active volcanic activity. Geochemical analyses for major and trace elements provide useful provenance informations. The Zr/Sc vs. Th/Sc and Cr vs. Cr/Ni plots suggest that sediment recycling is negligible. The use of geochemical diagrams for tectonic setting discrimination confirmed, in most of the cases, the inferred tectonic setting, corresponding mainly to an active continental margin and subordinately to a continental island arc. The idea of a multidisciplinary approach has been represented by the successful attempt to use together the information provided by petrographic and geochemical analyses. Compositional data from Eocene-to-Oligocene sandstones of the Thrace Basin were used to unravel the interplay between tectonics and sedimentation by means of multivariate statistical methods adapted to the particular nature of the available data (concentrations and percentages). The biplot was particularly useful in order to extract details in terms of source area evolution. The indications obtained call for a progressive enrichment from mafic to felsic elements, corresponding to increasing rates of supply from deeper levels of the crust. In conclusion, petrostratigraphic (detrital modes)

evolution and geochemical signatures of the Eocene-to-Oligocene sandstone suites of the western portions of the Thrace basin in Greece and Bulgaria is closely related to various geodynamic stages of the Rhodopian region, from collisional to post-collisional orogenic collapse and the superimposed volcanism related to extensional collapse. The type of sedimentary provenance of these Rhodopian Paleogene sandstones, provide an example of the changing nature of orogenic belts through time, and may contribute to the general understanding of similar geodynamic settings.

## Underwater geoarchaeological survey in front of the Danubian Island "Pacuiul Lui Soare" (Romania) using Remote Sensing Techniques – Preliminary results

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On the Danubian island "Pacuiul lui Soare", between 355 and 357 km, there are the ruins of a Byzantine fortress from the X-XIII centuries, most of which has already been eroded by the Danube river. A seismoacoustic survey which was carried out along the Danube in front of the island, showed the presence of the fortress ruins under the river waters. Further geo-archaeological survey is required in the studied area, aiming to a better understanding of the island evolution and of the fortress history as well.

## Geochemical survey – an optimal solution in environmental assessment on local and regional scale

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The quality of environment is extremely important for the human society development as well as for the entire biosphere equilibrium. In order to decipher the real status of an extended (regional) area and to rapport the print image of the local areas - subjects of development projects, a geochemical investigation have been performed in the Bucharest-Ilfov Region (Romania). The environmental factors (soil, underground and surface water and plants) evaluation on local or regional scale finds in geochemical survey (sampling, analyzing, mapping and reporting to national/international qualitative standards) an adequate solution. Taking into account the necessity of evaluating and monitoring the intensive populated areas, the exigency of such operation on height qualitative standards and at low costs increases. Admitting the European criteria to evaluate the water, soil and plants quality preservation as reasonable and averaging between national standards of EU community, the first observation regards the lowest possible price of sampling (proportional with sampling density, and increasing in case of difficult field access) and the highest accuracy/detection limits of final qualitative database acquisition. The necessary analytical diversity for a complex environmental investigation exceeds the classical routine of geological-geochemical one (usually limited to metalogenetic objectives) and includes various sophisticated categories (organic). For example the pesticides (a widespread category of biocides) investigation is an example of mostly refined and expensive analytical imperative. A systematic sampling must be performed at densities that ensure the representativeness on small surfaces (at least 4 soil samples/km$^2$, 1-2 underground water samples/km$^2$, 1 surface water sample/km$^2$, 2 samples of the same species of plant/km$^2$) followed by physical-chemical analyses for specific categories (*soil*: As, Cd, Cr, Cu, Pb, Ni, Zn, Hg, mononuclear aromatic hydrocarbons and poli-aromatic hydrocarbons BTEX, PAH, insecticide organic-