Pliocene (2.6 Ma) and go up to and into the Early Pleistocene. During the interval of 2.5-0.9 My, the Danube kept branching out gradually towards the east of the Dacian Basin. Concomitant, a number of intensely flooded low plains developed within the actual Romanian Plain as part of the Lower Danube Basin. Subsequently, during the Middle Pleistocene-Holocene, the Danube River cut the actual profile of the Valley. As a result, the higher relief of the Romanian Plain led to repeated down-cuttings of the 7 (8) stepped terraces. In the eastern half of the Lower Danube Valley, against the background of a mainly subsiding behaviour of the Platform, the upfinning sequences of the 7 terraces were progressively overlayed by the Aeolian Formation (up to 55 m thick). On the Black Sea continental shelf, within the Danube roughly 150 km long deep sea fan, there have been identified 8 seismic sequences, the first two with mass flow deposits, and the other six with alluvial channel fills. They have been ascribed, in accordance with their order of deposition, the indices S1 to S8. The S1 sequence may be ascribed to the 800–700 ka interval, and the S2 sequence to the 640–530 ka interval. According to Wong et al. (1997), the approximate intervals of deposition of the last six alluvial sequences are: S3 between 480–400 ka, S4 between 400–320 ka, S5 between 320–190 ka, S6 between 190–75 ka, S7 between 75–25 ka and S8 during the last 25 ka.

Using MODIS atmospheric profile data to monitor regional atmospheric instability in Greece: two case studies

Pexaras Th. and Feidas H.

Department of Meteorology and Climatology, School of Geology, Aristotle University of Thessaloniki, 54124, Thessaloniki, Greece, tpexaras@ad.auth.gr, hfeidas@geo.auth.gr

This study aims at investigating the potential of using atmospheric instability indices, derived by the MODIS/AQUA and TERRA atmospheric profiles, in local weather forecasting. The MODIS Level 2 Atmospheric Profile product consists of several parameters, including temperature and moisture profiles for twenty isobaric level and three atmospheric stability indices: the Total Totals (TT), the Lifted Index (LI), and the K index (K). All of these parameters are produced day and night at 5x5 km pixel resolution at cloud free conditions. The good spatial resolution of the MODIS instrument and of the derived parameters gives a good potential for the identification of pre-convective conditions.

Two cases of thermal induced convection over Greece on 17 and 20/6/2010 were examined. The first date is a typical case of an early afternoon thermal convection development over continental Greece supported by an advancing upper-level trough. The second case is characterized by the evolution of large storms during evening over Thessaloniki and north-eastern Greece associated with very high lightning activity. These storms were the result of a short wave upper-trough passage northern of Greece which triggered convection over the warm ground surface.

First, a comparison between the indices derived by MODIS and temporal matched collocated radiosonde data was performed to assess the quality of the derived parameters. From the above analysis it seems that the three satellite derived instability indices are well correlated with those derived from radiosondes.

Then maps with the spatial distribution of the atmospheric instability based on MODIS satellite data were constructed for the morning satellite passes (9:50 and 8:45 UTC, respectively), a few hours before the convection initiation, and were qualitatively compared to Meteosat Second Generation (MSG) satellite imagery and lightning data to investigate the relation between satellite derived air instability indices and storm occurrence. Among the three instability measures, the Lifted Index and K Index performed best in showing the potential of instability in this region several hours before the initiation of cloud formation.

These results show that MODIS remotely sensed data can be quite helpful in the short term storm prediction. More precisely, it is possible to derive air instability indices of satisfactory quality using MODIS satellite data. This allows us to have this kind of information with unprecedented spatial resolution in areas with no available radiosonde data. In addition, these satellite derived data can be used to visually enhance the areas of high likelihood of strong convection and of cloud growth in Greece at summertime.

From the operational point of view MODIS data are not timely since they are available only twice per day. Morning overpasses in Greece occur sometimes too late. Quite often convection has already started producing cumuliform clouds, which in turn prevent the atmospheric profile retrieval. The Global Instability Index (GII) product derived by the 15min time resolution geostationary MSG imagery could be used in the fast recognition and successful prediction of summer convective cloudiness and precipitation, despite its low spatial resolution (50 km).

Age and source heterogeneities in the rocks of Lutzkan and Ruy plutons, Bulgaria: some thoughts about their relation to the Au-mineralization at "Zlata" deposit

Peytcheva I.[1], von Quadt A.[2], Dyulgerov M.[3], Nedialkov R.[3]

[1]*Geological Institute, Department of Geochemistry and Petrology, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria, ipeytcheva@geology.bas.bg*
[2]*Institute of Geochemistry and Petrology, ETH, Clausiusstrasse 25, CH-8092 Zurich, Switzerland, quadt@erdw.ethz.ch*
[3]*Sofia University "St. Kliment Ohridski", Faculty of geology and geography, 1000 Sofia, Bulgaria*

The Lutzkan magmatic complex (LMM) belongs to the Kraishte tectonic zone of Bulgaria. It crops out as large plutons (Lutzkan and Ruy) and few small bodies S and NW from the town of Trun and about 50 km W of the Bulgarian capital Sofia. The rocks of the magmatic complex intrude amphibolite facies metamorphic rocks with presumed Precambrian age and Lower Paleozoic low-metamorphic carbonaceous metasediments, meta-andesite and metabasalts deposited in a deep marine environment. The intrusive rocks of the Lutzkan complex are covered by Permian sediments and overlain and intruded by Paleogene volcanic rocks and dykes. The rock types of Lutzkan pluton are considered to range from gabbros and diorites to leucocratic aplite-granites whereas the granites and granodiorites being the most widespread variety. The Ruy pluton and its vein rocks are mainly granitic in composition. The age of the plutons is considered Ordovician-Silurian or Lower Carboniferous.

Geochemical studies and U-Pb zircon/titanite conventional (ID-TIMS) and LA-ICP-MS dating of the plutons revealed that the gabbro-diorites of the Lutzkan pluton belong to the basement unit. They are Cambrian in age 537 ± 1.6 Ma (U-Pb zircon dating) with mantle-dominated island-arc geochemical characteristics (Ta-Nb negative anomaly; εHf-zircon values between +8.9 and +12.4). The rocks are calc-alkaline, metaluminuous, and A/CNK varies between 0.7 – 0.9. They show low fractionation of the REE with La_N/Lu_N of 4 and a weak Eu anomaly of 0.8. The gabbro-diorites have very low K_2O Rb, Ba, Cs, Sr, Th, U contents and flat HREE distribution, slight enrichment in LILE and LREE. These features are consistent with a subduction-related geodynamic setting.

The granitoids of Lutzkan and Ruy pluton are dated at 334.1 ± 1.2 Ma by late magmatic titanites and at 332.57 ± 0.60 Ma by zircons, applying the "chemical abrasion" technique and the new double spike solutions of the Earth Time project ET2535. They show distinct geochemical characteristics: negligible or absent Ta-Nb anomaly; εHf-zircon values between +3 and -10. The granitoids of both plutons are mainly high-K calc-alkaline, meta- to peraluminuous, with A/CNK between 0.74 - 1.2, fairly enriched in K_2O, Rb, Ba, Cs, Sr, Th, and with important U content up to 21.4 ppm. Granitoids display fractionated trend of REE, La_N/Lu_N varying between 13 and 17, and moderate Eu negative anomaly (0.68-0.69). On spidergrams the granitoids show pronounced LILE enrichment. With the transition toward more compatible elements the trend becomes less fractionated. The geochemical characteristics and zircon inheritance imply melting of lower-middle crustal materials with mixed crust-mantle origin. A possible candidate might be the hosting amphibolite facies metamorphic rocks: the differentiated metagranites with MME there are dated at 588.3 ±1.6 Ma by U-Pb zircon method and reveal positive (age corrected) εHf-zircon values between +0.4 and +10.

Gold has been mined since ancient times in Trun region and has been traditionally related to the Lutzkan and Ruy plutons. The Lutzkan pluton hosts the first gold deposit in