

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**

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The Lutzkan magmatic complex (LMM) belongs to the Kraishite 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  $537 \pm 1.6$  Ma (U-Pb zircon dating) with mantle-dominated island-arc geochemical characteristics (Ta-Nb negative anomaly;  $\epsilon_{\text{Hf-zircon}}$  values between +8.9 and +12.4). The rocks are calc-alkaline, metaluminous, and A/CNK varies between 0.7 – 0.9. They show low fractionation of the REE with  $\text{La}_N/\text{Lu}_N$  of 4 and a weak Eu anomaly of 0.8. The gabbro-diorites have very low  $\text{K}_2\text{O}$ , 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  $334.1 \pm 1.2$  Ma by late magmatic titanites and at  $332.57 \pm 0.60$  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;  $\epsilon_{\text{Hf-zircon}}$  values between +3 and -10. The granitoids of both plutons are mainly high-K calc-alkaline, meta- to peraluminous, with A/CNK between 0.74 - 1.2, fairly enriched in  $\text{K}_2\text{O}$ , Rb, Ba, Cs, Sr, Th, and with important U content up to 21.4 ppm. Granitoids display fractionated trend of REE,  $\text{La}_N/\text{Lu}_N$  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  $588.3 \pm 1.6$  Ma by U-Pb zircon method and reveal positive (age corrected)  $\epsilon_{\text{Hf-zircon}}$  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

Bulgaria, “Zlata”. It was mined from the beginning of the 20th century by English companies and in 1939-1974 by Bulgarian companies. The EurOmax Company has been exploring a license in the region of the Lutzkan magmatic complex since 2004. EurOmax classifies these deposits as Intrusion Related Gold (IRG) deposits with gold mineralisation related to the CO<sub>2</sub>-rich gold bearing fluids produced by the cooling of the intrusion at depth ([www.euromaxresources.com/projects](http://www.euromaxresources.com/projects)). Although the deposit is not directly dated based on the type and the characteristics of the Au-Ag±W mineralisation we suggest a link with the differentiated Carboniferous granitic intrusion of LMM.

## **Climatological assessment of atmospheric instability indices for southeastern Europe**

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Atmospheric instability indices are routinely used in operational forecasting for identifying the possibility of convective storm activity. This study focuses on the long-term temporal assessment of Showalter Index, SWEAT Index, K- Index and CAPE at three coastal (Athens, Istanbul and Brindisi) and at one inland station (Sofia) of southeastern Europe. The indices are calculated from daily archived radiosonde observations for a 36-year period, from 1973 to 2008. In order to identify meaningful temporal trends, a two-phase methodology is applied. The first step contains the assessment of the monthly, seasonal and yearly averages. The yearly trends of Showalter and SWEAT indices indicate an increase of atmospheric instability mean values for Athens, Brindisi and Sofia after mid 1990s. The second step, which is the primary focus of this study, is the assessment of index extremes. After the selection of index threshold levels, index extremes are studied in terms of threshold exceedences. The analysis reveals long term trends for some combinations of indices and stations.

## **Fe-Mn Nodular Concretions Associated with Middle Jurassic Oceanic Melange (Argolis, Greece)**

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Fe-Mn nodular concretions from Angelokastron and Lykotroupi areas, Northern Argolis Greece, are friable and compact types. They are associated with Middle Jurassic radiolarian red chert and red siliceous shale matrix slivers, originated and detached from a Middle Jurassic oceanic mélange. Friable Mn concretions consist of poly- or mononucleate nodules lacking primary botryoidal microstructures and possessing a unique composition. They form by the replacement of chalcedonic jasper by cryptomelane and todorokite; these concretionary crystalline manganese-structures are dissected by a birnessite phase oxidized to ntsutite and then crosscut by veinlets of hollandite and manganese carbonated fluoroapatite during late-stage hydrothermal alteration. The resultant composition consists mostly of manganese with a very low content of iron and transition metals. The mineralogical and chemical compositions differ from those of recent or fossil manganese nodules and are related to a hydrothermal field. Compact Fe-Mn concretions consist of jasper and chert dissected by veinlets of hydrothermal todorokite. Sulphides with magnetite characterize these concretions, even when altered and silicified. Some enclose scattered fragments of magnesiochromite with Ni-rich todorokite as veinlets and as concretionary crystalline structures. Some others, such as silicified basaltic fragments, contain remnants of copper mineralization such as sulfides, oxides, and hydroxide copper minerals, generated by an older hydrothermal event with subsequent oxidation. Furthermore, a few compact concretions, which were chemically treated, revealed that they contain equal amounts of iron and manganese similar to the