Hypocentre determination was improved with the use of the VELEST algorithm. Cross sections perpendicular to the fault zones were plotted in order to approximate their depth. It is also known that innovative advanced tools lately applied in geosciences, provide a versatile approach in studying active fault systems. For this reason, high quality topographic maps along with any available tectonic data regarding active faulting were also used in order to investigate the properties of the faults population that dominates in the study area. Fault outcrops with a wide range of sizes are depicted as tectonic lineaments and GIS methodology is used for their analysis. Accurate digital elevation models (DEMs) of the area were constructed, while, cross sections and topographic profiles were produced mainly where seismicity is clustered. Similarities extracted from both methods, give combined interpretation about the fault possible segmentation or linkage either at the surface or at depth. The combined results from such an investigation provide important contribution to fault interaction, fault segmentation, seismotectonic zoning and seismic hazard assessment.

Neogene andesite intrusions along the Carpathian calc-alkaline volcanic arc

Gméling K.[1], Pécskay Z.[2], Lexa J.[3], Konečny V.[4] and Birkenmajer K.[5]

[1]*Department of Nuclear Research, HAS Institute of Isotopes, 1121Budapest, Hungary, gmeling@iki.kfki.hu*
[2]*Institute of Nuclear Research of the Hungarian Academy of Sciences, Debrecen, Hungary*
[3]*Geological Institute, Slovak Academy of Sciences, Bratislava, Slovak Republic*
[4]*Geological Institute, Slovak Academy of Sciences, Bratislava, Slovak Republic*
[5]*Institute of Geological Sciences, Polish Academy of Sciences, Krakow, Poland*

Numerous magmatic intrusions follow the Inner-Carpathian calc-alkaline volcanic arc with decreasing age towards the East-Southeast. At the West Carpathians intrusions located: in south-eastern Moravia (internal Biele Karpaty nappe of the Magura flysch unit); and in the Pieniny Mts. between the Magura flysch unit and the Pieniny Klippen Belt. At the internal East Carpathians a big volume subvolcanic body (Ţibleş-Toroiaga-Rodna-Bârgău) found between the Gutâi and the Călimani volcanic massifs.

The Moravian high-K pyroxene-amphibole basalt and andesite intrusions extend southeast of the Morava River. They are sills, dykes and irregular bodies. Emplacement of intrusions was post-tectonic, and the intrusive rocks have been generally affected by post-magmatic alteration. Towards the east at the Slovakian/Polish border, products of intrusive activity form approximately a 20 km long belt of the Pieniny Andesite Line. It post-dates the Early Miocene folding and strike-slip movements. The magma made its way along tensional fissures that opened above a steeply bent downgoing North European Plate. Emplacement of intrusions took place in two phases: 1st phase intrusions are mostly dykes, parallel with the strike slip fault at the northern part of the Pieniny Klippen Belt; the 2nd phase intrusions are restricted to the westernmost part of the Pieniny Andesite Line and follow transversal faults that cut the 1st phase andesites. The Toroiaga intrusive area situated north of the Rodna Mts., consist of a complex subvolcanic intrusions with pierce metamorphic rocks and its southern part, Paleogene to Miocene sedimentary deposits, suggesting a multiphase intrusive activity. Hydrothermal activity and mineralisation processes are related to the 2nd and 3rd phase intrusions.

Major and trace element chemistry of the examined intrusive rocks are indicating subduction-related magmas. Compared to the Pieniny intrusives, the Moravian and the Toroiaga intrusive rocks are relatively enriched in potassium, sodium and other incompatible elements. These latest are lying at the boundary of high-K calc-alkaline- and shoshonitic suites. The LILE enrichment reflects the contribution from the subducted slab, at least the parental magma derived from metasomatised subcontinental lithospheric mantle. Source composition and partial melting was more important then the FC, AFC processes and/or crustal contamination. Partial melting process was triggered by the flux of heat coming from the rising asthenospheric material once the delamination of the subducting European Plate occurred. The B content of the Pieniny andesites is between 2.97 and 29.5 µg/g. The western and the eastern part of the Pieniny Andesite Line can be well separated by the geochemistry. The heat of the 2nd phase intrusions hydrothermally modified the 1st phase intrusions, enriched

the fluid mobile element content of the rocks. Excluding the enriched B data, the B content in the Pieniny area is not higher, then 10.7 µg/g. The examined Moravian and Toroiaga rocks have higher B content (9.9-20.8 and 6.3-21.5 µg/g respectively). This correlates with the higher K_2O content of these rocks, referring to fluid originating from the crust, while the fluid added to the source of the Pieniny rocks are originating more probably from the subducted sediments. The B data of the Moravian rocks overlap with the B content of West Carpathian andesites (11.1-29.8 µg/g), while the B content of the Toroiaga samples overlap with the Călimani and the Gutâi boron data (4.9-30.2 µg/g). The lower values of the Pieniny area is more in the range measured in back arc, intraplate basalts of the Bakony-Balaton Highland volcanic field (1.6-12.9 µg/g). There is a tight connection between the calc-alkaline volcanism and the intrusive magmatic body formation. In absence of biostratigraphic evidence, a comprehensive K-Ar age study of the intrusive whole rocks was carried out, which was driven to the following origin history: from Moravia until the bend of the Carpathians the magmatism was parallel (~13.5-11 Ma). In the subvolcanic zone of the East Carpathians the intrusion took place between 11.3–7.6 Ma.

Acknowledgements: This work was supported by the OTKA (K68153).

Rheological analysis of a sub-marine landslide in the Marmara Sea (Turkey)

Gokceoglu C.[1], Tunusluoglu M.C.[2], Gorum T.[3], Gokasan E.[3], Tur H.[4], Tekkeli A.B.[4], Batuk F.[5] and Alp H.[4]

[1]Hacettepe University, Department of Geological Engineering, Applied Geology Division, 06800 Beytepe, Ankara, Turkey

[2]Canakkale Onsekiz Mart University, Department of Geological Engineering, Applied Geology Division, 17020 Terzioglu Campus, Canakkale, Turkey, ctonoz@gmail.com

[3]Yildiz Technical University, Natural Science Research Center, Besiktas, 34349 Istanbul, Turkey

[4]Istanbul University, Faculty of Engineering, Department of Geophysical Engineering, Avcılar, 34850 Istanbul, Turkey

[5]Yildiz Technical University, Faculty of Civil Engineering, Department of Geodesy and Fotogrametric Engineering, Besiktas, 34349 Istanbul, Turkey.

When seismic and multi-beam bathymetric data from the northern shelf and slope of the Cinarcik Basin are interpreted, some sub-marine landslides are observed clearly. Additionally, seismic data indicate that upper surface of the submarine extension of the Paleozoic aged rocks has NNE-SSW oriented basin and ridge type morphology controlled by the secondary faults of the NAFZ. Basins are fulfilled by Pliocene-Quaternary sediments, which are cut by strike-slip faults on the shelf and slope. Thickness of these deposits increases up to 130 m toward the concave shaped northern slope of the Cinarcik Basin. A relatively recent sub-marine landslide, Tuzla Sub-marine Landslide, cuts the concave slope of the Cinarcik Basin. Detailed morphological investigation indicate that Tuzla Landslide is a deep-seated rotational landslide, which possibly triggered by the NAFZ. Morphological analyses also indicate that thick Plio-Quaternary deposits on the Paleozoic basement were slided during the Tuzla Landslide event. This landslide is considered as a key event for modeling the future landslide potential of the northern shelf and slope of the Cinarcik Basin. For this reason, the main purpose of the present study is to perform some rheological analyses to understand the behaviour of the events. As the main results obtained from the analyses, the runout distances and the velocities were calculated.