deposits along active and collided continental margins. A number of key factors related to magmatic/volcanic activity contribute to the effectiveness of those environments in concentrating metals present at low contents in large volumes of magma and/or country rocks within smaller volumes of high-concentration ore bodies. Such factors invariably include the presence of persistent and focalized heat-sources fueling the "hydrothermal engine" by hydrous fluid circulation in the shallow crust leading to metal extraction, transport and concentration through time. Here we focus on the role of the time factor in controlling both heat-source persistency and metal availability in the Neogene volcanic areas of the Carpathian-Pannonian Region (CPR). Based on K-Ar geochronology (> 1400 data), patterns of time-space evolution of Neogene volcanism and ore mineralization in CPR have been identified in both the back-arc part of the orogenic system and the fold-and-thrust arc, as follows.

1. In the back-arc intra-Carpathian region petrochemistry of volcanism has evolved in the order: felsic calc-alkaline, intermediate-acidic and then alkaline. The total duration of volcanic activity is about 20 Ma (from 21 to < 1 Ma), however, ore fertile stages are clearly related to the intermediate-acidic volcanism which has more restricted time span starting at around 17-14 Ma and lasting to about 5-7 Ma in different areas. The most striking observation is that the major stage of ore deposition occurred in a relatively narrow time interval between 11 and 14 Ma. Localization of major ore deposits are controlled by regional fault systems interacting with evolved volcanic structures. These ore deposits mostly represent differentially eroded parts of deep-seated intrusion-related low-sulfidation type epithermal systems in their exposures. The exception is the Apuseni Mts. where an additional younger ore stage with Cu (-Au) porphyry ores occurred at 9 Ma in relation to emplacement of shallow andesitic intrusions.

2. In the Carpathian arc portion of CPR two evolution patterns can be distinguished:

2a. a slowly migrating (from west to east) persistent ca. 700 km long intermediate/felsic calc-alkaline magmatic arc from Eastern Moravia to Bârgău Mts., in the 15-7 Ma time range. Ore deposition occurred in the southeastern part of the arc, again in a relatively narrow time interval between 8 and 11 Ma. Localization of these ore deposits are mostly controlled by shallow andesitic intrusions.

2b. a transient, fast-migrating (from north-west to south-east) volcanism along the ca. 160 km long Călimani-Gurghiu-Harghita (CGH) range in the East Carpathians (11- < 0.05 Ma) without important ore mineralization.

In general, duration of magmatic activity in individual areas is particularly significant if taking into account a "magmatic focusing factor" (i.e. duration of magmatism weighted by occurrence area of its products): longer-lasting magmatism in a smaller area both in the groups of 1 and 2a results in higher ore productivity as compared to shorter-lasting and/or larger occurrence area magmatism in the 2b group. On the other hand, regional scale fault systems related to the back-arc tectonism as long-living controlling factors (group 1), as well as occurrences of shallow intrusions as short-living local factors appear to be also important in defining ore mineralization (group 2). Post-mineralization uplift/subsidence related to the Carpathian collision and basin inversions defines erosion levels in different areas and thus ore types (from shallow epithermal to porphyry levels) observed in exposures.

Fissure caves and other gravitationally-induced discontinuities detected by 2D electrical resistivity tomography - case studies from flysch Carpathians (CZ, PL, SK)

Tábořík P., Pánek T. and Hradecký J.

Department of Physical Geography and Geoecology, Faculty of Science, University of Ostrava, Chittussiho 10, 710 00, Ostrava, Czech Republic, petr.taborik@post.cz, tomas.panek@osu.cz, jan.hradecky@osu.cz

Fissure caves as one of the types of the subsurface dislocations can represent initial forms of the gravitational disintegration of rock massif ranging from shallow to deep-seated (>40 m) gravitational slope deformations. Occurrence of pseudokarst forms, such as crevice-type caves, trenches, escarpments, tension cracks or sinkhole-type depressions is frequent in the massifs of the Outer Western Carpathians which are formed by anisotropic flysch rock. Detailed research of these landforms can significantly contribute to understanding to the processes transforming a relief of the medium-high mountains in the Carpathian flysch belt. Method of electrical resistivity tomography (ERT) based on various resistivity values of particular subsurface structures offers a non-invasive way to display the situation beneath the surface. Each of the commonly used electrode arrays (Wenner Alpha, Wenner-Schlumberger and Dipole-Dipole) is suitable for different type of subsurface structures. Verification of the known fissure cave systems is one of the advantages of this method. However, final 2D resistivity model often reveals new information on the subsurface structures, namely undiscovered cave chambers or spreading crevices. Using the ERT-evidence of the known cave system in the similar lithological situation, we are able to detect supposed non-revealed cave parts or individual new cave. Research focused on application of ERT on the fissure-induced structures on several sites located to the area of Czech, Slovak and Polish Carpathians during the years 2009-2010 brings a new knowledge in their detection. Method of the Wenner-Schlumberger array offers similar results as the Wenner Alpha electrode array. Both of the methods are suitable mainly for the (sub) horizontal subsurface structures and as such seemed to be less suitable for detection of rather vertical fissure-structures. According to our experience, Dipole-Dipole electrode array appears to be the best method for fissure cave detection (likely due to high total resolution). The results of Dipole-Dipole array are also the best in accuracy of location of particular cave segments in final 2D resistivity model. Nevertheless, too high sensitivity to high near-surface resistivity may sometimes be the limiting factor of the use of the Dipole-Dipole array. Understanding the genesis of gravitationally-induced discontinuities may considerably help to fully recognize their role in context of massif disintegration and overall landscape evolution. Presented study deals with detection and verification of known fissure caves and their possible prolongation with use of different electrode array, resolution and depth range. Set of the ERT results confirms an assumption that deep-seated disintegration is closely connected with development and extension of the fissure and fault systems. These forms of the massif disintegration also represent initial phase of the slope processes such as rock-slides, catastrophic rock avalanches or forms of terrain subsidence (sagging, toppling). Experimental 2D resistivity modelling has been also applied to the dealt issue. Geophysical technique of the ground penetrating radar (GPR) has been used on the one of the sites in order to confirm and specify the ERT results.

Acknowledgements: This study was funded by a project of Czech Science Foundation no. P209/10/0309: "The effect of historical climatic and hydrometeorological extremes on slope and fluvial processes in the Western Beskydy Mts. and their forefield".

Preliminary data on the crystal-chemical characteristics of beryl from Cer Mt. (Serbia)

Tančić P.[1], Poznanović M.[1] and Dimitrijević R.[2]

[1]*Geological Institute of Serbia, Rovinjska 12, 11000 Belgrade, Serbia, pavletan@infosky.net*
[2]*Faculty of Mining and Geology, Department of Crystallography, Đušina 7, 11000 Belgrade, Serbia, dradovan@rgf.bg.ac.rs*

A beryl crystal from Cer Mt. (Serbia) studied in this paper was characterized by means of XRPD and wet-chemical analyses. It has following unit cell dimensions: a = 9.2166(8) Å, c = 9.192(1) Å, V = 676.2(1) Å^3 and ratio c/a = 0.9973. According to the calculated c/a ratio and structural formula of $(Be_{2.86}Li_{0.11})_{2.97}(Al_{1.96}Fe^{2+}{}_{0.05})_{2.01}Si_{5.96}O_{18}(Na_{0.09}Ca_{0.03}Mg_{0.03}K_{0.01})_{0.16} \times 0.14H_2O$ composition, this sample belongs to the "normal beryl group". The obtained characteristics prove that the host pegmatite is of Li-bearing type.