unsupervised classification methods of the digital image data are seen to be overlap with the geological map of the area after surface controlling.

Karstification and their size in the limestone which are widespread in the basin and which are mostly forming the reservoir rock were interpreted by means of their chemical analysis results. The permeability of alluvial sediments was determined by means of sieve analysis. The variations in the water level of the lake were interpreted statistically. The chemical analysis results of surface and spring water were evaluated in different diagrams and the possibly of these water as being drinkable and usable were searched.

Deformation history of the Outer West Carpathian Flysch Units and Pieniny Klippen Belt (NW Slovakia, SE Czech Republic)

Beidinger A.[1], Decker K.[1], Zamolyi A.[1,2], Lee E.Y.[1], Hoprich M.[1] and Strauss P.[3]

[1]*Department of Geodynamics and Sedimentology, University of Vienna, Austria, andreas.beidinger@univie.ac.at*
[3]*Dept. of Geophysics and Space Sciences, Eötvös University, Budapest, Hungary,*
[2]*OMV Exploration & Production GmbH, Vienna*

The project Karpatian Tectonics Slovakia addresses the development of a coherent tectonic model for the Early Miocene in the Vienna Basin and adjacent areas. Studies include 2D/3D seismic interpretation in the Vienna Basin and structural fieldwork in the Outer West Carpathians. Structural data comprises 105 outcrops from the NW-rim of the Pieniny Klippen Belt (PKB) and Outer West Carpathian Flysch units in Northwest Slovakia and Eastern Czech Republic.

Structural data from the Outer West Carpathian Flysch Units (Biele Karpaty-, Magura-, Silesian Unit) depict (N)NW-directed shortening (D_{F1}), which is related to the large scale architecture of the ENE-striking fold-and-thrust-belt. Thrust ages, obtained from the ages of youngest overthrust sediments indicate Eocene to Early Miocene in-sequence thrusting towards the European foreland. Foreland propagating thrusting is also regarded to be responsible for the progressive steepening of thrust units towards the internal parts of the fold-and-thrust-belt, which causes overturning of the innermost flysch units and the PKB.

Crosscutting relationships observed in outcrops give evidence that (N)NW-directed shortening is followed by ENE-striking strike-slip faulting (D_{F2}), reactivating former thrusts of D_{F1}. Strike-slip faults occur at the front of and within the Bystrica and Biele Karpaty Unit close to the PKB. Structures of D_{F1} and D_{F2} are further cut or overprinted by (N)NE-striking sinistral strike-slip faults and fold-thrust structures related to (N)NE-directed shortening (D_{F3}). Structural data and geological maps indicate that (N)NE-striking strike-slip faults and NNE-directed out-of-sequence thrusts coincide with bends at the front of the Magura and Bystrica Unit.

Structures from the NW margin of the adjacent PKB prove a complex polyphase deformation history. Multiple folding events, tilted and refolded ramp-flat structures and overturning of strata complicate deciphering individual deformation events and their relative chronology. However, NNW-directed shortening, which postdates large scale overturning of strata, was identified in the region around the Middle Váh Valley. There, the NNW-directed shortening is followed by NNE directed shortening. Deformation styles are comparable with D_{F1} and D_{F3} in the flysch units. NNW-directed shortening is interpreted as out of sequence thrusting during deformation D_{F1}. In addition, ENE-striking sinistral strike-slip faults are recorded within the PKB, close to the border to the Biele Karpaty and Bystrica Unit.

The outcrop-derived deformation history is compared to tectonics in the Vienna Basin area, where seismic data provide excellent constraints for deformation ages. In the Vienna Basin, out-of-sequence thrusting coeval with NE-striking sinistral strike-slip faulting occurs in the flysch units and Northern Calcareous Alps during the Early Miocene contemporaneously with in-sequence thrusting in the external Waschberg Unit. Early Miocene NE-striking sinistral strike-slip faults are cut by (N)NE-striking Middle to Late Miocene sinistral strike-slip faults. NE- and (N)NE-striking strike-slip faults mapped in the Vienna Basin are related to the eastward lateral extrusion of the Eastern Alps towards the Pannonian region, whereas (N)NE-striking faults are linked to the pull-apart stage of the

Vienna Basin during Middle to Late Miocene times. D_{F2} and D_{F3}, identified in the Outer West Carpathians are therefore interpreted as to be linked to Miocene extrusion kinematics. ENE-striking strike-slip faulting (D_{F2}) may represent Early Miocene kinematics. NNE-directed out-of-sequence thrusting and (N)NE striking strike-slip faults (D_{F3}) are interpreted to be linked to the pull-apart stage of the Vienna Basin. Considering several blocks moving towards (N)NE at different velocities during Miocene lateral extrusion, structures of D_{F3} may depict a transfer of such (N)NE-directed movements to thrusts into the Outer West Carpathians.

Groundwater vulnerability assessment to contamination (Erzeni Basin, Albania)

Beqiraj A.[1] and Cenameri M.[2]

[1]*Department of Earth Sciences, Faculty of Geology and Mining, Polytechnic University of Tirana, Rruga Elbasani, Tirana, Albania, ae_beqiraj@yahoo.com*
[2]*Department of Geoinformatics, Applied Geology and Environment, Faculty of Geology and Mining, Polytechnic University of Tirana, Rruga Elbasani, Tirana, Albania, m_cenameri@yahoo.com*

Groundwater quality has been recently deteriorating in different alluvial aquifers of Albania due to industrialization expansion, waste disposal, and agriculture activity. A preliminary assessment of vulnerability to groundwater contamination in Erzeni watershed area was undertaken because of enormous mining activities of river bed alluviums, the presence of the largest urban solid waste disposal site of Tirana and intensive agricultural and industrial activities at the plane part of the river course. The major geological and hydrogeological factors that affect and control groundwater contamination were incorporated into the DRASTIC model. Moreover, a Geographical Information System (Arc Gis 9.2 INFO) was used to create a groundwater vulnerability map of Erzeni river basin. Aquifer vulnerability assessment aims at predicting areas, which are more likely than others to become contaminated as a result of human activities at the land surface. As a result of the vulnerability assessment, 20% of the Erzeni basin was classified as being very highly vulnerable, 5% highly vulnerable, 15% vulnerable at moderate to low levels and, finally, around 60% of the basin has very low vulnerability.

Crust to upper mantle geophysical imprints of the West Black Sea opening

Besutiu L.

Solid Earth Dynamics Department, Institute of Geodynamics of the Romanian Academy, 19-21, Jean-Louis Calderon St., 020032 Bucharest, besutiu@geodin.ro

Some inherited geophysical evidence in the lithosphere of the SE Carpathians, created by the geodynamic processes related to the W Black Sea opening are subject of the paper.

During the time, various models have been proposed for the Black Sea genesis. They are dominated by the idea of the basin opening within the back-arc extensional environment created behind Pontides by the northward subduction of the Neo-Tethys ocean floor.

Overall, the presence of the oceanic crust in the central part of W and E Black Sea basins is well revealed in the pattern of the geomagnetic anomaly.

But, the hypothesis of the Black Sea opening during a unique geodynamic event is less supported by the residual geomagnetic and gravity anomalies pattern, showing completely different strikes for western and eastern Black Sea. Besides, gravity high, typical for the presence of the oceanic crust correlates with a geomagnetic high (normal magnetization) within W Black Sea, while E Black Sea, the gravity high correlates with a geomagnetic low, advocating for a reverse magnetization of the crust. These aspects advocate for a distinct opening of the W and E Black Sea basins during two time-spans with normal and, respectively, reverse geomagnetic field.