volcanic rocks. The tectonic low-order elements distinguished in it are specific volcano-tectonic, block, and block-fold structures. The subjects of our study are the aquifer layers (reservoir systems) situated in these structures investigated from the point of view of the possibilities, if other favorable conditions for storage of natural gas and carbon dioxide (CO_2) exist. Special studies carried out by the authors in the limits of the perspective structures are concentrated mostly on the: lithological-physical segmentation of the Tertiary section; defining of permeable and hard-permeable formations and their studying (structure, lithology, reservoir and sealing parameters, spatial behavior); defining of natural reservoirs and studying their spatial relationships; prognosis of possible types of local structures and natural traps. Because of the restricted volume and the absence of specialized information for a number of important geological preconditions and parameters, prognostic assessments are made with the use of indirect data, based on the contemporary ideas about the geological evolution of the examined region. Such are the structural-tectonic, the seismotectonic and the hydrogeological (hydrochemical, hydrodynamic) and the thermo-baric conditions. The prognoses concerning the perspectives for storage of natural gas and CO_2 are related to the sunken areas within the Dzhebel and Krumovgrad depressions.

Loss of ^{40}Ar(rad) from leucite-bearing basanite at low temperature: implications on K/Ar dating

Balogh K.[1], Németh K.[2], Itaya T.[3] Molnár F.[4], Stewart R.[2], Thanh N.X.[5], Hyodo H.[3] and Daróczi L.[6]

[1] *Inst. Nuclear Res., Hungarian Acad. Sci., Debrecen, Hungary, balogh@atomki.hu*

[2] *Massey University, CS-INR, Volcanic Risk Solutions, Palmerston North, New Zealand, k.nemeth@massey.ac.nz*

[3] *Res. Inst. Nat. Sci., Okayama Univ. Sci., Okayama, Japan*

[4] *Dept. Mineralogy, Eötvös L. Univ., Budapest, Hungary*

[5] *Dept of Geology, Hanoi Univ. of Mining and Geology, Hanoi, Vietnam*

[6] *Dept. Solid State Phys., Univ. Debrecen, Debrecen, Hungary*

The Bakony-Balaton Highland Volcanic Field (BBHVF) is located in the central part of Transdanubia, Pannonian Basin, with over 50 alkali basaltic volcanoes. The volcanism was related to the post-extensional tectonic processes in the middle part of the Pannonian Basin. The basanite plug of Hegyestű erupted in the first phase of volcanic activity. It overlies Triassic limestone and dolomite forming a double hill. Since there is no clear evidence of explosive eruption history, Hegyestű is likely either a remnant of a dominantly lava emitting volcanic vent, or remnant of a lava derived from some sources nearby.

Ar/Ar [1] and K/Ar [2] ages were published on the alkali basalt rocks of the BBHVF. Conflicting K/Ar (5.97 ± 0.41 Ma, isochron) and Ar/Ar (7.78 ± 0.07 Ma, isochoron, 7.94 ± 0.03 Ma, plateau) ages were measured on the leucite-bearing basanite of Hegyestű. As it has been shown, this effect is caused by the special Ar retention feature of leucite in this basanite.

In a new study 18 K/Ar ages were measured on subsamples of HT-4 and on its fractions produced by magnetic and heavy liquid separation.18 K/Ar ages measured in the usual way were 25 – 45 % younger, but after HF or HCl treatment of the rock, or after reducing the baking temperature of the argon extraction line from 250 °C to 150 °C, they became similar to the Ar/Ar ages.

HCl treatment dissolved olivine, nepheline, leucite, magnetite and from 1-1 sample analcime or calcite. K dissolution studies on 6 samples from different locations of Hegyestű have shown that K content is mostly ~2 %, but it may decrease to ~0.3 %. HCl treatment dissolved 19 – 32 % of the rocks, 28.0-63.5 % of the K content, reduced the K concentration of the residue to 1.1 – 0.3 %, and for the dissolved part of samples with ~2 % K, the calculated K concentration was 4.02 – 6.42 %. These data and EMP analyis suggest leucite is the responsible mineral for the low temperature loss of ^{40}Ar(rad) during baking the extraction line, though a minor role of nepheline can not be excluded.

Ar may release at low temperature from very fine-grained mineral, or when the Ar release mechanism changes. A ^{40}Ar(rad) degassing spectrum has been recorded in the 55 –

295 °C range by stepwise raising the baking temperature and the data were plotted in the Arrhenius diagram. The arrangement of points proves very great change of Ar release properties in the 145 – 295 °C temperature range. This infers that Ar release is caused by a low temperature process, the change of the mineral structure of chemistry. Using the method presented here 7.56 ± 0.17 Ma, regarded as minimum age and similar to the Ar/Ar isochron age (7.78 ± 0.07 Ma) is determined for Hegyestű.

The result presented here point to the importance of checking the suitability of leucite-bearing rocks for K/Ar dating, and simple methods are given for this control.

Parameters of phase transitions in the mantle and its influence on mantle convection

Baranov A., Trubitsyn V. and Trubitsyn A.

Institute of Physics of the Earth, 123995, Moscow, Russia, B. Gruzinskaya 10, baranov@ifz.ru, trub@ifz.ru

Reconstruction of the mantle flows within the mantle is essential for understanding of the Earth evolution. A temperature and pressure increase in the mantle causes phase transitions and related density changes in its material. The transition boundary in the pressure–temperature phase diagram is determined by the curve of phase equilibrium. If the slope is nonzero, a phase transition in hot ascending and cold descending mantle flows occurs at different depths and, therefore, either enhances (gamma>0) or slows down convection (gamma< 0). Endothermic phase transition at a depth of 660 km in the olivine partially slows down mantle flows. The mantle material has a multicomponent composition. Therefore, phase transitions in the mantle are distributed over an interval of pressures and depths. In this interval, the concentration of one phase smoothly decreases and the concentration of the other increases. The widths of phase transition zones in the Earth’s mantle vary from 3 km for the endothermic transition in olivine at a depth of 660 km to 500 km for the exothermic transition in perovskite, and the high-to-low spin change in the atomic state of iron takes place at a depth of about 1500 km. We present results of calculations for 2D and spherical models, demonstrating the convection effect of phase transitions as a function of the transition zone width. Transitions of both types with different slopes of the phase curve and different intensities of mantle convection are examined. The mixing of material under conditions of partially layered convection is examined with the help of markers. We analyze 2D and 3S mantle flow models with strong viscosity variations and phase transition to investigate this joint effect. For 2-D models we employ the generalized Moresi method. The 3S models are calculated with the CITCOM code.

Ore microscopy, EPMA, and X-Ray Diffraction studies on Hamehkasy-1 and KorKora-1 iron deposits western Iran

Barati M.[1] and Lee I.[2]

[1] *Department of Geology, Faculty of science, Bu-Ali Sina University, 65174, Hamedan.Iran, Barati@basu.ac.ir*
[2] *Seoul National University, Korea*

Hamehkasy-1 and Korkora-1 are two iron deposits in Western Iran. Hamehkasy iron deposit is situated in the Sanandaj-Syrjan zone. It consists of two major economic indices and several sub-economic minor indices. Hamehkasy-1 is the largest index and is located to the north of Hamehkasy-2 at distance of 400 m. This ore body is being exploited at present. Korkora-1 iron deposit is located in the Oromieh-Dokhtar volcanic belt. It is one of ten indices in the Shahrak mining district. This ore body is the largest deposit in the area. Magnetite is the main ore in these deposits, but hematite, pyrite and goethite are present, too. For study magnetite in these ore bodies we used ore microscopy, EPMA and XRD methods. X-ray powder-diffraction data were obtained using: magnetite ($Mg_{0.04}Fe_{2.96}O_4$), hematite (Fe_2O_3), quartz (SiO_2) are common minerals, on records from Hamehkasy-1 samples we report magnesioarfvedsonite ($(Na,K)_3(Fe,Mg,Al)_5Si_8O_{22}(F,OH)$) for the first time in this