SUPRA-SUBDUCTION ZONE (?) BASALTS FROM THE DELENI-6042 DEEP WELL (TRANSYLVANIAN DEPRESSION, ROMANIA)

HÖCK, V.[1] & IONESCU, C.[2]
[1] Institute of Geology and Palaeontology, University of Salzburg, Hellbrunnerstr. 34, A-5020 Salzburg, Austria.
E-mail: volker.hoeck@sbg.ac.at
[2] Department of Mineralogy, Babes-Bolyai University, 1, Kogalniceanu Str, RO-3400 Cluj-Napoca, Romania.

The Transylvanian Depression contains a number of gas fields, which were frequently drilled. Only a small number of drill holes penetrated the pre-Badenian formations. One of the deep wells, 6042-Deleni, was set up in the northern part of the major Deleni gas field. Initially it was planned to reach a depth of 6000 m for the well, but finally it stopped at 5062 m in Jurassic (?) basalts. The whole stratigraphic range of the well involves Cenozoic (Sarmatian, Badenian) and Mesozoic (Cretaceous and Upper Jurassic) rocks (*Romgaz Archives, Media*; unpublished data). It is shortly outlined as follows:

Down to the depth of 2997 m the well penetrates Sarmatian sands, sandstones and marls and Badenian rocks, represented mainly by marls, and subordinately by sands. Several tuff levels were crossed for example the "Ghiris Tuff" in 924 m and another tuff level at 1688 m. The presence of salt and tuffs ("Dej Tuff") levels marks the boundary between Cenozoic and Mesozoic rocks (2997 m). The Cretaceous deposits, mainly siliciclastics (marls, sandstones, silts, clays) are believed to include the Late Cretaceous and partly the Early Cretaceous. Beneath the Lower Cretaceous deposits, at a depth of 3660 m, Upper Jurassic carbonate rocks occurred in the well. The oldest rocks overlaying the volcanic sequence belong to the base of Kimmeridgian as exemplified by *Alveosepta jaccardi,* SCHRODT.

Starting with a depth of 4698 till 4742 m, strong underground eruptions of salt water and gases prevented the recovery of the drill cores. For the first two meters of the interval, fragments of dolomites mixed with fragments of basalts were caught in the well-screens, but beneath the depth of 4700 m only basalt fragments appeared. The first massive drill cores of the basaltic rocks are taken from the depth of 4742 and continued till the depth of 5015.5 m. Because of technical problems, the recovery of the drill cores between the depth of 5015.5 and the final depth of 5062 m was very poor, only basaltic fragments remained on the well screens.

The basaltic rocks, crossed by the well between the depth of 4742 and 5015 m, are represented mainly by dark-coloured, blackish-greenish basalts, in general with various degrees of alteration, macroscopically marked by numerous veins, nests and pseudomorphs with calcite ± iron oxides, chlorite and serpentine minerals, microquartz, chalcedony and smectites (see also IONESCU *et al.*, 2003). The volcanic sequence is represented by massive basaltic lava flows; sometimes they are brecciated, mainly in the upper part of the interval. In general, the rocks are poor in phenocrysts such as plagioclase, pyroxene and olivine. The micro-ophitic groundmass, highly altered, contains microlites of plagioclase, small grains of pyroxenes and olivine as well as opaque minerals (Ti-magnetite, hematite, goethite, etc.) and altered glass. The structure is fluidal with the orientation of the feldspar microlites in the direction of the flow. Basalts, brecciated basalts, basalts with olivine, vesicular and amygdaloidal basalts are the main petrographic types. Basaltic andesites occur subordinately.

Nineteen samples of the basaltic sequence between a depth of 4742 and 5015 m were chemically analyzed for major, minor, as well as trace and RE elements. After some correction for the alteration (see also IONESCU *et al.*, 2003) the volcanics classify as basalts, basaltic andesites and andesites with partly a low content of alkalies. Three groups can be distinguished from top to bottom: a low Cr/high Zr group, a high Cr/low Zr group and finally a low Cr/low Zr group. Other elements such as Ni, Y, Sr, Th etc. fit also with this grouping. The generally low contents of Zr, TiO_2, Y as well as a low Ti/V ratio (<20) argue for a formation of these basalts and basaltic andesites in a supra-subduction zone environment. The high Th/Yb ratio as well as the high Ce/Yb ratio combined with a relatively low Ta/Yb ratio suggest a calc-alkaline nature of these volcanics. Comparison with other basaltic and andesitic volcanics in the South Apuseni Mountains shows that the Deleni volcanics are obviously not genetically related with the ophiolitic basalts described by SACCANI *et al.* (2001). On the other hand they might be quite well compared with some basaltic and andesitic volcanics described by NICOLAE (1995) partly from the Capalnas-Techereu Nappe and partly from Rimetea (Bedeleu) Nappe (BALINTONI, 1997).

References

BALINTONI, I. (1997): The geotectonics of the metamorphic terraines from Romania. Ed. Carpatica, Cluj-Napoca, 176 p. (in Romanian)

IONESCU, C., HÖCK, V. & TOPA, D. (2003). Acta Mineralogica-Petrographica, Abstract Series 1, Szeged (this volume).

NICOLAE, I. (1995). Rom. J. Tec. & Reg. Geol., 76: 27-39.

SACCANI, E., NICOLAE, I. & TASSINARI, R. (2001). Ofioliti, 26: 9-22.