GLAUCONITE AND CELADONITE IN THE ALTERED BASALTIC ROCKS FROM THE DELENI-6042 DEEP WELL (TRANSYLVANIAN DEPRESSION, ROMANIA)

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The Deleni-6042 deep well was drilled in the northern part of a major gas-bearing structure, in the Transylvanian Depression (Romania). After penetrating Cenozoic, Upper Cretaceous and Upper Jurassic sediments, the drill crossed, between 4700 and the final depth of 5062 m, a thick pile of basalts, basaltic andesites and andesites, most likely of Jurassic age. The previous mineralogical, petrographical and geochemical studies (HOECK & IONESCU, 2003; IONESCU & HOECK, 2004) showed the calcalkaline-SSZ features of these volcanics. Geochemically, three groups of rocks were distinguished: A) the lowermost group, with low Cr, Ni and Zr as well as low alkalies; B) the middle group, with very high Cr and Ni and low Zr and alkalies and C) the uppermost group, with low Cr and Ni and high Zr and alkalies.

Some of the rocks are rich in alteration products, e.g. the sample Del-10 collected from the basaltic andesites in a depth of 4850 m. Geochemically it belongs to the uppermost level of the volcanic sequence (C). Macroscopically, the sample consists of black-greenish massive basaltic rock containing greenish veins and nests. Microscopically, basaltic andesite shows a porphyritic, sometimes glomeroporphyritic texture, with zoned plagioclase and rare augite phenocrysts in an intersertal groundmass. A wide range of secondary minerals formed at low-TP conditions were noticed by IONESCU *et al*. (2003) and IONESCU & HOECK (2004), among which are glauconite, smectite (Fe-saponite), Fe-clinochlore, calcite, Fe oxides, and chalcedony. Based on microscopical observations and microprobe analyses, two generations of glauconite forming aggregates of platelets or fibres, were noticed. Glauconite I has a yellowish-green colour (1N) and low birefringence (+N) while glauconite II has an intense bluish-green colour (1N), and higher birefringence (+N). Glauconite I occurs mainly as aggregates of platelets with rosette texture, filling in vesicles, irregular voids or veins while glauconite II occurs mainly as fibres filling in vesicles, forming thin rims around augite phenocrysts, or replacing partly or totally, augite. Glauconite II substitutes also the former volcanic glass in the groundmass. Chemically, glauconite I has lower Mg and Si and higher Fe content while glauconite II has higher Mg and Si and lower Fe content. The following succession was observed: glauconite I, followed by Fe-saponite, then glauconite II and finally a Fe-clinochlore appeared.

In this study we present more details on these glauconite I and II. From microprobe analyses, the crystal chemical formulas based on a mica-like structure with a total charge balance of 11 oxygen atoms were calculated. For celadonite, Fe^{2+} to Fe^{3+} ratio was calculated based on ideal dioctahedral site occupancy of 2. In some cases, in particular for glauconite, the total amount of Fe was assigned to Fe^{3+}, by these procedures. According to the IMA criteria (RIEDER *et al.,* 1998), our minerals classify as ***glauconite*** (the previous glauconite I, yellowish-green) and ***celadonite***, respectively (the previous glauconite II, bluish-green), with the calculated formulas listed below:

$(K_{0.8}Na_{0.01}Ca_{0.04})(Fe^{3+}_{1.31}Al_{0.28}Mg_{0.4})(Si_{3.58}Al_{0.42})_4O_{10}(OH)_2$ for glauconite,

$K_{0.94}(Fe^{3+}_{0.72}Al_{0.42}Mg_{0.6}Fe^{2+}_{0.24})(Si_{3.9}Al_{0.1})_4O_{10}(OH)_2$ for celadonite.

This study confirms the presence of glauconite (first reported as glauconite I by IONESCU *et al*., 2003 and IONESCU & HOECK, 2004) and provides the first record of celadonite (glauconite II in IONESCU *et al*., 2003 and IONESCU & HOECK, 2004) in the upper level of the volcanic sequence in the Deleni-6042 deep well (Transylvanian Depression, Romania). The occurrence of these minerals proves the alteration processes of basaltic andesite in a marine environment.

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