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Stable isotope compositions of the Penninic ophiolites of the Kőszeg-Rechnitz series

A. Demény(1), T.W. Vennemann(2), F. Koller(3)

(1) Institute for Geochemical Research, Hungarian Academy of Sciences, Budapest, Budaörsi út 45., H-1112, Hungary, demeny@geochem.hu (2) Institut de Minéralogie et Géochimie, Université de Lausanne, BFSH-2, CH-1015 Lausanne, Switzerland (3) Department of Geological Sciences, University of Vienna, Althanstr. 14, 1090 Vienna, Austria

Several studies have reported D-enrichment in mantle-derived amphibole megacrysts (Demény et al., 2005) of the Carpathian-Pannonian region relative to normal mantle values. Such unusual H isotope compositions have been interpreted to result from metasomatism by fluids released from subducted oceanic crust. One such possible oceanic crust complex is the Alpine Penninic unit that has been shown to contain D-enriched serpentinites in the Central Alps (Burkhard and O'Neil, 1988). However, the magmatic rocks of the Easternmost Penninic unit,the Kőszeg-Rechnitz series, that is closest to the Carpathian-Pannonian region, have not been studied by means of stable isotope analyses. Serpentinites, gabbros, blueschists, talc deposits and ophicarbonates were analysed in this study in order to determine whether subduction of these Penninic rocks could provide the D-enriched fluids described above.

The oxygen isotope compositions show a large scatter, depending on rock type and locality. Gabbros and serpentinites of Bienenhütte have preserved primary, mantle-like δ^{18}O values (5.9 to 6.3 ‰, all values are in ‰ relative to V-SMOW), whereas the serpentinites of Glashütten and Rumpersdorf and the silicate minerals of the ophicarbonate rocks show strong ^{18}O-enrichment (up to 16.2 ‰). The reason of the ^{18}O-enrichment may be low-temperature serpentinization and interaction with ^{18}O-rich fluids that had been in equilibrium with sedimentary rocks. Contrary to the O isotope compositions, the H isotope compositions seem to be homogeneous in the entire series with δD values of –63 $\pm$ 7 ‰. Only some serpentinite rocks show extremely D-depleted values (down to –106 ‰) that is usually regarded as a result of interaction with meteoric water infiltrating during late stage matemorphism. The meteoric water

infiltration was rather limited as even samples taken directly from slickensides within serpentinite bodies preserved isotopic compositions close to those of the bulk series. the famous talc occurrences of Felsőcsatár, W.Hungary, were also analysed. The δD and δ^{18}O values obtained were quite similar to those obtained for ophicarbonate rocks, suggesting a similar petrologic evolution.

The strong D-enrichment characteristic for oceanic crust that has experienced high-temperature interaction with seawater has not been detected. However, the H isotope compositions obtained for the Kőszeg-Rechnitz series indicate that subduction of the Penninic ocean crust and the associated devolatilization may have metasomatised the mantle resulting in H isotope compositions of water of about –40 ‰, similar to the range determined from mantle derived amphibole megacrysts (Demény et al., 2005).

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References:

Burkhard, D.J.M. and O'Neil, J.R. (1988): Contrasting serpentinization processes in the eastern Central Alps. Contrib. Mineral. Petrol., 99, 498-506.

Demény, A., Vennemann, T.W., Homonnay, Z., Milton, A., Embey-Isztin, A., Nagy, G. (2005): Origin of amphibole megacrysts in the Plio-Pleistocene basalts of the Carpathian-Pannonian Region. Geologica Carpathica, 56, 179-189.