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The oceanic mantle as an important repository for light elements (Li, Be and B)

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Despite the key importance of altered oceanic mantle as a repository and carrier of light elements to depth, its inventory is largely unexplored. We just started a systematic study on the abundance, partitioning and mobility of Li, Be, B and the B isotope fractionation in rock-forming minerals from hydrothermally altered oceanic mantle under different pressure-temperature conditions. Within this context, the Pindos and Vourinos ophiolites were chosen as a case of obducted non-metamorphic oceanic lithosphere that has been hydrothermally metamorphosed to different degrees. Different serpentinites from ODP leg 209 are being analysed to characterize the Li, Be and B budget of mantle rocks at a mid-ocean ridge.

Preliminary results obtained on samples from Pindos and Vourinos by SIMS (Secondary Ion Mass Spectrometry) show Li contents of olivine (0.68-1.65 ppm) and orthopyroxene (0.63-1.3 ppm) that seem to be consistent with values for "normal" mantle minerals (Eggins et al., 1998; Woodland et al., 2004). The Li contents of clinopyroxene (1.5-4.8 ppm) are within the upper range of values published for unmetasomatised mantle clinopyroxene (only xenolith data available; Seitz & Woodland, 2000; Woodland et al., 2004). The high diffusivity of Li is illustrated in this study by non-systematic zonation patterns of Li and by Li increasing or decreasing rimwards in pyroxenes. The Li characteristics of spinel harzburgite from Pindos and Vourinos differ from published data for non-metasomatised mantle by higher values for clinopyroxene than for olivine. This reverse Li partitioning could be explained by a reaction with a mafic silicate melt or by an interaction with a high-temperature fluid.

Be abundances were below detection limit in Pindos spinel harzburgite and near the

detection limit in minerals of Vourinos samples. B concentrations are low in both massifs for orthopyroxene, clinopyroxene and olivine, from below the detection limit to 0.6 ppm. Further analyses on Pindos, Vourinos and ODP samples are on their way to elucidate the behaviour of Li, Be and B in the oceanic mantle.

Eggins S.M., Rudnick R.L., McDonough W.F., 1998: Earth and Planetary Science Letters, 154, 53-71

Seitz H.-M. & Woodland A.B., 2000: Chemical Geology, 166, 47-64

Woodland A.B., Seitz H.-M., Yaxley G.M., 2004: Lithos, 75, 55-66