Li, Be and B in Pindos mantle rocks (Greece): evidence against a supra-subduction origin.

Pelletier, L.,Vils, F. & Kalt, A.

Institute of Geology, University of Neuchâtel, CP158, CH-2009 Neuchâtel, Switzerland;
laure.pelletier@unine.ch, flurin.vils@unine.ch, angelika.kalt@unine.ch

The Pindos ophiolite represent non-metamorphic oceanic lithosphere obducted during the Jurassic. The mantle section was hydrothermally altered to different degrees during oceanization, but fresh peridotite is still preserved. The mantle unit mainly consists of highly depleted spinel harzburgite, but some plagioclase harzburgite is also present.

Li, Be and B contents of minerals were measured in order to test the hypothesis of a supra-subduction origin, put forward by Bizimis et al. (2000). Li contents of olivine (0.5-1.1 ppm) and orthopyroxene (0.1-1.5 ppm) seem to be consistent with values for "normal" mantle minerals (Woodland et al., 2004). The Li contents of clinopyroxene (0.2-3.7 ppm) are within the upper range of values published for unmetasomatised mantle clinopyroxene (Seitz & Woodland, 2000; Woodland et al., 2004). The Li characteristics of spinel and plagioclase peridotites differ from previously published data for unmetasomatised mantle by higher concentrations in clinopyroxene than in olivine. This inverse Li partitioning could be explained by a reaction with a mafic silicate melt (Seitz & Woodland, 2000). The Li contents of serpentine are highly variable (<0.01 - 9 ppm). Be abundances are below detection limit in all minerals. B is low in all primary minerals (<0.01 – 0.6 ppm), but concentrated and highly variable in the alteration phases (e.g. serpentine <0.01 - 28 ppm).

The low light element contents in primary minerals argue against a supra-subduction zone origin of the Pindos mantle rocks (Parkinson & Pearce, 1998; Paquin et al., 2004). The latter have Li, Be and B contents of minerals similar to those of oceanic peridotites from ODP Leg 209 (MAR, sites 1272A and 1274A). We therefore conclude that the Pindos mantle rocks were formed in a mid-ocean ridge-type setting, rather than in a supra-subduction zone environment.

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