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

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The Pindos and Vourinos ophiolites 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. Mantle units mainly consist of highly depleted spinel harzburgite, but some plagioclase harzburgites are also present in the Pindos ophiolite.

Li, Be and B contents of minerals and whole rocks were measured in order to test the hypothesis of a supra-subduction origin, put forward by [1-2]. Li contents of olivine (0.68-1.6 ppm) and orthopyroxene (0.2-1.5 ppm) seem to be consistent with values for "normal" mantle minerals [3-4]. The Li contents of clinopyroxene (0.2-4.7 ppm) are within the upper range of values published for unmetasomatised mantle clinopyroxene [4-5]. 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 [5]. The Li contents of serpentine are highly variable (<0.01 - 11 ppm). Be abundances are below detection limit in all minerals. B is low in all primary minerals (<0.01 – 0.4 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 and Vourinos mantle rocks [6-7]. 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 and Vourinos mantle rocks can be used to constrain the potential input of light elements into subduction zones.

References

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