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The Pindos and Vourinos ophiolites (Northern Greece): mineral compositions and thermobarometry

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The Pindos and Vourinos ophiolite massifs are located in Northern Greece within the Subpelagonian zone, a part of the former Mesozoic Thetyan ocean. The stratigraphy of the two allochtonous bodies is similar, but in the Pindos massif, ophiolites of two different geodynamic affinities seem to be present: a back-arc setting and a supra-subduction zone setting (SSZ; Saccani & Photiades, 2004). Vourinos ophiolites seem to be only of SSZ affinity (Saccani & Photiades, 2004). The two massifs were formed by obduction and it is believed they are continuous beneath the Meso-Hellenic molasse (Robertson & Shallo, 2000).

Vourinos and Pindos spinel harzburgites show two different generations of olivine, clinopyroxene and orthopyroxene. Clinopyroxene and orthopyroxene clasts are exsolved, illustrating early cooling of the oceanic lithosphere. Blasts of olivine, orthopyroxene and clinopyroxene exhibit no exsolution and smaller grain size. They were crystallized in the course of later deformation, most likely during intra-oceanic obduction of the hot oceanic lithosphere. The zoning patterns of pyroxenes from both massifs record cooling and the rims of the clasts have nearly the same chemical composition as the cores of the blasts.

In Pindos, clinopyroxene clasts show a decrease of Al_2O_3 and an increase of #Mg from core to rim. A similar behaviour is observable in orthopyroxene clasts with rimward decrease of Al_2O_3 and Cr_2O_3. Vourinos ultramafitites show similar chemical characteristics, but zonation in clinopyroxene clasts is less pronounced. The #Mg in clasts of both massifs is higher in clinopyroxene ($\sim$94) than in olivine and orthopyroxene (90-91). This could be related to a cryptic metasomatic event (Bizimis et al., 2000),

perhaps in the course of hydrothermal metamorphism during early cooling. This hypothesis is in line with data on light element concentrations (Li, Be, B) in minerals obtained by Secondary Ion Mass Spectrometry (Pelletier et al., this volume).

The temperatures obtained in both massifs on primary mantle parageneses (clast cores) are higher 1150-1275˚C for Pindos and 1025-1100˚C for Vourinos than those of clast rims and blasts (about 800-900˚C). The latter values correspond to a younger deformation event and may be related to a refertilization by mafic melts as observed in Othris ophiolites (Dijkstra et al., 2001, Barth et al., 2003). This hypothesis is supported by the presence of plagioclase-bearing peridotites in the Pindos massif. The textures of these rocks show that plagioclase, along with clinopyroxene and orthopyroxene, crystallised from an infiltrating melt.

0.1 References

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