Geophysical Research Abstracts, Vol. 7, 08481, 2005
SRef-ID: 1607-7962/gra/EGU05-A-08481
© European Geosciences Union 2005

Slow spreading environment or ocean-continent transition? The Ozren peridotite massif, -Dinaride ophiolite belt

Z. Jovanovic (1,2), E. Hellebrand (1), J. Snow (1), V. Hoeck (2), A. Popevic (3)

(1) Max Planck Institute for Chemistry, Mainz, Germany (2) University Salzburg, Salzburg, Austria (3) Geoinstitut, Belgrade, Serbia and Montenegro (zoranj@mpch-mainz.mpg.de)

The Dinaride ophiolite belt represents the northern extension of the Greek Pindos and Albanian Mesozoic ophiolites. It is characterized by large ultramafic bodies which that lack an oceanic crust component, and is associated with metamorphic rocks that tectonically overlay Jurassic mélange. The fact that the accompanying metamorphic rocks are HP-HT granulites and not typical metamorphic soles led Lugovic et al (1991) to question the true ophiolitic nature of this ophiolite. The occurrence of pyroxenites and garnet pyroxenites as a layers within the peridotites in some massifs (Popevic et al, 1993) is also unusual for suboceanic mantle. Similar kind of mafic layers within the peridotites are very well known from Alpine peridotites however, it is believed that they represent subcontinental mantle exhumed on passive margins during amagmatic rifting.

We present here new EMPA and SIMS data on peridotites from Ozren massif (SW Serbia). These are fertile lherzolites with 10-20 % cpx which sometimes contain cpx or opx rich websterite layers/lenses concordant to the foliation. The Cr# in spinel (Cr/(Cr+Al)) is low, ranging from 10-19. Spinel in the clinopyroxene-rich websterite is extremely Cr-poor (Cr# 5). While low Cr numbers are generally considered to be indicators of low-degree partial melting of fertile mantle, the websterites are probably derived from a Cr-poor melt.

The sodium content of cpx is very high (Na_2O: 0.65-1.35; in websterites 0.95-1.59). This suggests again the fertile nature of the mantle samples, which that experienced only low degrees of melting. Their chemistry is comparable to the least depleted abyssal peridotites from slow and ultraslow ridges but also to some orogenic peridotites. On the other hand, websterites, with extremely aluminous spinels, are never found neither in abyssal nor ophiolitic peridotites but are described in Alpine peridotites (Ronda, External Ligurians, Lherz etc) and in passive margin peridotites e.g. at Zabargad island in Red Sea e and Iberia Abyssal plain peridotites. These mafic layers are generally interpreted as high –pressure cumulates and considered to represent mineral segregates in magma conduits. More recently mafic layers of Ronda were interpreted as having formed by pervasive melt-rock reaction during heating of subcontinental lithosphere by upwelling asthenosphere (Garrido &Bodnier, 1999).

However although the presence of such mafic layers have never been conclusively established in suboceanic environment, there is ongoing debate about their eventual presence (Hirschmann and Stolper, 1996)

Another problem which is well constrained in subcontinental mantle and poorly in oceanic lithosphere is the sodium metasomatism which that decouples LREE elements from sodium in cpx, and is present in the Ozren samples. Namely, their clinopyroxenes have high concentrations of Na_2O and at the same time they are extremely depleted in LREE. It is not possible to explain these observations by a one single partial melting event. There are two possible explanations: (1) Low degrees of near-fractional melting led to LREE depletion. After accretion to the subcontinental lithosphere, Na metasomatism may have led to the decoupling of Na from the LREE or (2) sodium metasomatisam is possible at in the oceanic environment although it is not yet well understood.

At present it appears that the Ozren massif (and consequently much of the Dinaride ophiolite belt) bears more mineralogic and geochemical resemblance to continental margin mantle than to oceanic mantle.

Garrido, C.J. & Bodinier, J.L. (1999). Diversity of mafic rocks in the Ronda Peridotite; evidence for pervasive melt-rock reaction during heating subcontinental lithosphere by upwelling asthenosphere. *Journal of Petrology* **40**, 729-754

Hirschmann, M. M. & Stolper, E. M. (1996). A possible role for garnet pyroxenite in the origin of the "garnet signature" in MORB. *Contribution to Mineralogy and Petrology* **124**, 185-208

Lugovic, B., Altherr, R., Raczek, I., Hofmann, A.W. & Majer, V. (1991). Geochemistry of peridotites and mafic igneous rocks from the central Dinaric ophiolite belt, Yugoslavia. *Contributions to Mineralogy and Petrology* **106**, 201-216.

Popevic, A.A, Korikovsky, S.P., Karamata, S. (1993). Garnet Clinopyroxenite from Bistrica, southern Zlatibor, Serbia. *Bull. Geol. Soc. Greece* **XXVIII/2**, 93-103