5.6.P02

Geochemical heterogeneity of the upper mantle: Os isotope evidence from the Oman ophiolite

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We have determined the Os isotopic composition of mantle peridotites from different tectonic levels along the paleo-ridge of the 90 Ma-old Oman ophiolite in order to study the nature and scale of upper mantle heterogeneities. The study reveals a large spread in Os isotopic compositions indicating an along ridge and a bottom to top isotope heterogeneity. Mantle rocks related to regions with high magmatic activity, the mantle-crust transition zone or the transition zone itself, tend to have more radiogenic Os isotopic compositions ($^{187}Os/^{188}Os_{t=O}$ = 0.12820 to 0.15596) than harzburgites from deeper mantle sections, which have Os isotope ratios typical for the depleted upper mantle ($^{187}Os/^{188}Os_{t=O}$ = 0.11523 to 0.12516). The most unradiogenic Os isotope signature implies a depletion age of about 2 Gyr. Among the deep mantle samples Os concentrations, ranging from 3.8 to 6 ng/g, are correlated with parameters indicating the degree of partial melting: negatively with TiO_2 and Yb of clinopyroxene, and positively with (Cr/(Cr+Al)) of Cr-spinel. The latter parameter is negatively correlated with the Os isotope ratios. The radiogenic samples have lower Os concentrations (0.55 to 2.42 ng/g) than the deep mantle peridotites. In a $^{187}Os/^{188}Os_{t=0}$ vs 1/Os diagram the radiogenic samples define a mixing line having the depleted mantle and a radiogenic pyroxenitic dyke ($^{187}Os/^{188}Os_{t=O}$ = 0.20943) as end members. Furthermore, the Os isotope ratios of these samples are positively correlated with trace element contents in clinopyroxene, such as Ti and SEE.

It is suggested that the geochemical and Os isotope variability of the deep mantle samples mainly reflect old partial melting events. In contrast, the radiogenic Os isotpoic compositions ($^{187}Os/^{188}Os_{t=0}$ > 0.128) in and close to the transition zone suggest that the depleted mantle interacted with melt/pyroxenite containing radiogenic Os.

5.6.P03

Coupled Sr-Nd and Os systematics of the Othris Ophiolite, Greece

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The history of the western Tethys is complex; cannibalism of three generations of marginal basins took place and resulted in the Alpides orogenic system. Such a great complexity in a small region tests the limits of most plate-scale reconstruction methods. In this complex region, studies of ophiolites are particularly useful to validate proposed plate reconstruction models. The current work focuses on the Dinaric-Hellenic ophiolite belt in the Aegean/Anatolian region of the Europe-Africa convergence zone.

The Othris Ophiolite of central Greece shows conflicting evidence for a mid-ocean ridge and supra-subduction zone tectonic setting. The Fournos Kaïtsa sub-massif consists of layers of harzburgite, plagioclase harzburgite and plagioclase lherzolite with accurately known stratigraphic, structural, and petrographic control. Refractory, Cr-rich spinel compositions and light rare earth element depleted clinopyroxenes in the harzburgites are consistent with ~15% dry partial melting. The plagioclase peridotites have higher Ti and REE contents in the pyroxenes but similar refractory spinel compositions to the harzburgites, indicating that they may be products of impregnation of harzburgites with a fractionating melt. These observations suggest that the moderately depleted mantle section of the Fournos Kaïtsa block most probably originated at a slow-spreading mid-ocean ridge.

We aim to determine the temporal evolution of the geodynamic setting(s) of the Othris Ophiolite to aid tectonic reconstructions of the closure of the Tethys Ocean. The ages of melting affecting the Othris Ophiolite are currently poorly constrained. The first marginal basins along the Eurasian margin opened in the Permo-Triassic and back-arc basins continued to form during the Jurassic and Cretaceous. The emplacement-related metamorphism in Othris is inferred to be Middle Jurassic. The high metamorphic grade of the sole, up to garnet amphibolite facies, indicates that during emplacement the overriding peridotites were still young and hot. Coupled Sr-Nd and Os isotope systematics of the plagioclase lherzolites, harzburgites, and dunites will be used to evaluate the age(s) of melting and melt infiltration events and provide information on the source rocks.