Geophysical Research Abstracts
Vol. 12, EGU2010-7810, 2010
EGU General Assembly 2010

Lateral variation in lithospheric mantle beneath NE Bohemian Massif

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The samples of peridotites forming the subcontinental lithospheric mantle beneath SW Poland have been brought to the surface by alkaline Cenozoic volcanoes of the Central European Volcanic Province. The area of SW Poland belongs to the Variscan Bohemian Massif. The Cenozoic rifting event formed the Ohře (Eger) Rift with voluminous volcanic sequences in the NW part of the Massif. Miocene lavas with abundant mantle xenoliths occur in SW Poland at the NE prolongation of the Ohře Rift (e.g. Księginki nephelinite). The single ca. 4 – 4.5 My xenolith-bearing eruptions occur to the SE of the Rift (Kozákov and Lutynia basanites), which allows the comparison of lithospheric mantle located outside the rifted area to that located close to the rift, and to asses possible changes in the mantle during the time span of ca 20 My.

The mantle peridotites from the Księginki nephelinite are affected by silicate-melt induced cryptic metasomatism resulting in enrichment of clinopyroxene in light REEs. All of them show similar equilibration temperatures in the range of 1000 – 1100 ºC. The pyroxenites of similar TE characteristics, some with well preserved cumulative textures, are common in the Księginki nephelinites. The composite xenoliths show that pyroxenites form the veins in peridotites. These data suggest that at least part of the lithospheric mantle beneath northern termination of Ohře Rift was affected by silicate melt metasomatism and thermally rejuvenated, and its lithology was modified by addition of pyroxenitic veins. The modification was contemporaneous with volcanism.

The peridotite xenoliths occurring in the 4 Ma Kozákov basanites (Czech Republic, ca 25 km SE from Ohře Rift margin) yield temperatures of equilibration from 680 to 1065 ºC (Christensen et al. 2001). The 4.5 My basanites from Lutynia (SW Poland, ca 170 km ESE from the Ohře Rift) contain peridotites which equlibrated at 960 to 1000 ºC. The clinopyroxenes occurring in these peridotites preserved three different kinds of REE patterns, all LREEs enriched and contain common post-garnet spinel-clinopyroxene symplectites (Matusiak-Małek et al., submitted). These data suggest that the lithospheric mantle occurring outside the Ohře Rift was also metasomatically modified. However, the record of older events is still preserved and the thermal rejuvenation does not occur in all places.

The interpretation of lithospheric mantle structure and lithology based on xenoliths brought to the surface by alkaline lavas is subjected to uncertainties arising from accidental sampling, always representing only the parts of mantle penetrated by the lavas. However, the data presented above suggest that the lithospheric mantle occurring in the area of Ohře Rift was strongly thermally rejuvenated and lithologically modified during Cenozoic, whereas outside the Rift the scale of rejuvenation and modification was smaller.

REFERENCES

Christensen, N. I., Medaris Jr., L. G., Wang, H. F. & Jelínek, E. (2001). Depth variation of seismic anisotropy and petrology in central European lithosphere: A tectonothermal synthesis from spinel lherzolite. Journal of Geophysical Research 106, B1, 645-664.
Matusiak-Małek, M., Puziewicz, J., Ntaflos, T., Grégoire, M., Downes, H. (submitted). Metasomatic effects in the lithospheric mantle beneath the NE Bohemian Massif: a case study of Lutynia (SW Poland) peridotite xenolith. Lithos.