Geophysical Research Abstracts
Vol. 16, EGU2014-524-2, 2014
EGU General Assembly 2014

TWO LITHOLOGIES IN LITHOSPHERIC MANTLE BENEATH NOTHERN MARGIN OF THE BOHEMIAN MASSIF (E GERMANY AND SW POLAND).

Magdalena Matusiak-Małek (1), Jacek Puziewicz (1), Theodoros Ntaflos (2), Anna Kukuła (1), and Mateusz Ćwiek (1)

(1) University of Wroclaw, Institute of Geological Sciences, Wroclaw, Poland (magdalena.matusiak@ing.uni.wroc.pl), (2) Vienna University, Department of Lithospheric Research, Vienna, Austria

The subcontinental lithospheric mantle (SCLM) occurring beneath Bohemian Massif in Central Europe has been sampled in Cenozoic times by numerous lavas. Recent studies (Puziewicz et al. 2011 and references therein) show that mantle in this region is mostly anhydrous, harzburgitic, and was subjected to various kinds of metasomatic events. Two major mantle lithologies characterized by different major element composition of peridotite- forming minerals occur in the SCLM Lower Silesia and Lusatia (op. cit. and unpublished results, 9 sites). Lithology “A” (minimal temperatures from 900 to 1000ºC or no equilibrium between cpx and opx) contains olivine Fo90.5 -92.0. Part of the population “A” peridotites contain clinopyroxene of mg# 94 – 95, typical for low temperatures of equilibration. The lithology “B” (equilibration temperatures close to 900 ºC) contains olivine Fo87.5-90.0.
Elevated contents of LREE in clinopyroxene from both the lithologies “A” and “B” suggest their equilibration with one of the two metasomatic agents stated in this area: anhydrous silicate alkaline melt or carbonatite-silicate melt. Action of hydrous alkaline melts in the mantle in the region is recorded only locally (e.g. Wilcza Góra). In some sites (e.g. Krzeniów) the trace element patterns show that decreasing mg# of clinopyroxene in the “A” peridotites is due to gradual replacement of primary lower-temperature mineral assemblage by the later higher-temperature one. This suggests that the variation of mineral chemistry is rather due to chromatographic fractionation of metasomatic agents than due to vertical variation in lithospheric mantle temperatures (Christensen et al.,2001). The “B” peridotites originated due to “Fe-metasomatism” of more magnesian peridotites by silicate melts percolating through lithospheric mantle. The peridotites belonging to lithology “A” might have been partly the protolith of the lithology “B”.
The data on Central European lithospheric mantle are equivocal and thus allow various interpretations of history of the same lithologies. We suggest that the lithospheric mantle has a mosaic structure, and consists of the mantle roots of plates assembled during Variscan orogeny intermingled with upwelled asthenospheric mantle and reworked by Cenozoic volcanism.
This study was possible thanks to the project NCN 2011/03/B/ST10/06248 of Polish National Centre for Science.

Christensen, N.I., Medaris, L.G., Wang, H.F. and Jelinek, E., (2001), Journal of Geophysical Research-Solid Earth, 106(B1), 645-664.
Puziewicz, J., Koepke, J., Grégoire, M., Ntaflos, T. and Matusiak-Małek, M., (2011), Journal of Petrology, 53, 2107-2145.