Geophysical Research Abstracts
Vol. 17, EGU2015-10391-1, 2015
EGU General Assembly 2015

Chemical and petrological heterogenity of lithospheric mantle beneath N Patagonia (Argentina) - case study of Cerro Chenque xenoliths.

Dominika Kozdrowska (1), Magdalena Matusiak-Małek (1), Theodoros Ntaflos (2), Jacek Puziewicz (1), and Ernesto Bjerg (3)

(1) University of Wroclaw, Institute of Geological Sciences, Wroclaw, Poland (magdalena.matusiak@ing.uni.wroc.pl), (2) University of Vienna; Department of Lithospheric Research, , Althanstrasse 14, Vienna, Austria, (3) INGEOSUR – CONICET and Dpto. De Geologia Universidad Nacional del Sur, Avenida Colón 80 - Bahía Blanca Argentina

Mantle-xenoliths-bearing, back-arc Pliocene – Quaternary alkali basalts occur in N Patagonia, Argentina (Bjerg et al., 2005, J. of S. Am. Sci.). The Cerro Chenque (Rio Negro province) trachybasaltic lavas carry small (up to 10 cm in diameter) xenoliths of anhydrous, spinel bearing harzburgites, dunites and less abundant clino- , orthopyroxenites, websterites. The xenolith suite comprises also gabbros and norites, which are not discussed in this study.

All the phases forming xenoliths are rich in Mg (Fo=90.5-93.5%; mg#Opx=0.90-0.94; mg#Cpx=0.91-0.95). Composition of spinel is extremely variable (mg#=0.65-0.85; cr#=0.00-0.70). Three types (A, B, C) of REE patterns occur in clinopyroxene and orthopyroxene: (1) type A (harzburgites and orthopyroxenites) is U-shaped in both the pyroxenes, REE contents vary significantly (e.g. La=$\sim$0.5 primitive mantle values (PM), $\sim$5 PM, and $\sim$50PM); (2) type B (dunites and harzburgites) clinopyroxene has flat HREE and is continuously enriched in LREE up to 10x PM, orthopyroxene is U-shaped; (3) type C (harzburgites) clinopyroxene is convex upward, La=5-7PM), orthopyroxene is continuously depleted in LREE. Clinopyroxene of all the types is poor in Ti, while normalized content of other trace elements is strongly variable. Trace element compositions of Cerro Chenque xenolithc clinopyroxene cover whole compositional range of mantle-derived clinopyroxene from Rio Negro province presented by Bjerg et al., 2005 (op.cit.).

In xenoliths where clino- and orthopyroxene are in equilibrium, the calculated temperatures are always around 1000°C (Brey and Köhler,1990, JoP). No spinel-clinopyroxene symplectites suggesting peridotite provenance from garnet stability field were observed.

Strong variations in rock-type and chemical composition of minerals forming Cerro Chenque xenoliths suggest complicated structure of upper mantle beneath N Patagonia. At present stage of study we suggest that Earth's lithospheric mantle in this region:

- suffered from variable but significant degrees of partial melting (variable cr# in spinel from peridotites; low YbN, LaN of clinopyroxene);
- was affected by cryptic or stealth metasomatism; some stages of stealth metasomatism took place in lower temperatures (high mg# in clinopyroxene; Brey and Köhler, 1990, JoP). Variations in trace element composition of clinopyroxene suggests activity of variable metasomatic agents. The exact nature of metasomatic agents is problematic, but they might have been of: silicate (group C) or carbonatitic – silicate (group B, some of the group A xenoliths) origin.

This study was possible thanks to project no. 1121/M/ING/13 to M.M.-M.