Mantle xenoliths from Befang (Oku Massif) in the Cameroon Volcanic Line

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Cameroon Volcanic Line (CVL) is a ca. 1600 km long Cenozoic volcanic chain which crosses the boundary between ocean and continent in West Africa. Its origin, as well as the nature and age of the underlying continental lithospheric mantle (CLM), is still a matter of debate. Some of the CVL lavas contain peridotite xenoliths that can provide data elucidating the role of the CLM in the sustained magma generation along the line. In this abstract we describe xenolith suite from the Befang pyroclastic cone (< 1Ma) in the Oku Massif in the continental part of CVL, consisting of 14 spinel lherzolites, one spinel harzburgite and one websterite. The xenoliths are between 3 and 21 cm in diameter and have porphyroclastic to serial or equigranular texture, with porphyroclasts of olivine or orthopyroxene up to 9 mm in diameter. Some are weakly foliated. Olivine is Fo 88.6-90.4, contains 0.36 to 0.42 wt.% NiO and 180-750 ppm of Ca. Orthopyroxene (Mg# 0.89-0.91) contains 0.14 – 0.19 atoms of Al pfu, and clinopyroxene (Mg# 0.90-0.92) contains 0.24 – 0.31 atoms of Al pfu. The Cr# of lherzolite spinel is 0.09-0.15, in the harzburgitic one it is 0.18-0.19. Pyroxenes in all studied peridotites record a temperature range of 910 – 1010°C (Brey and Köhler 1990). Clinopyroxenes' REE patterns are flat at HREE-MREE and make a spectrum from slightly LREE-depleted to slightly LREE-enriched (La₆/Lu₆ from 0.08 to 2.65). The trace-element patterns are flat except well-defined negative Nb-Ta and positive Th-U anomalies. Orthopyroxenes' REE patterns are variably depleted from HREE to LREE (La₆/Lu₆ from 0.001 to 0.037). The REE pattern of clinopyroxene occurring in websterite exhibits enrichment from HREE towards LREE with hump in Sm/Nd, typical of silicate melt crystallization. The REE pattern of clinopyroxene The Befang lherzolites represent CLM metasomatised by melts produced by various, but generally low degrees of melting of DMM-like (Depleted MORB Mantle) source. Conversely, the harzburgite was formed by low degrees (few percent) of melting of DMM.

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References: