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# Mechanisms of formation of mantle section pyroxenites of Voykar Ophiolite, Polar Urals, Russia

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Ural Mountains mark a major mid Paleozoic collision event, which resulted in the closure of an ocean basin separating the Siberian and European plates. Voykar Ophiolite is located in the Northern part of Uralian Ophiolite Belt. Ophiolitic sequence rocks of Polar Urals are usually considered as giant fragments of mantle and MORB-type crust formed in back-arc settings (e.g. Savelieva et al., 1987). Mantle section of Voykar Ophiolite comprises most of the ophiolitic sequence. It is up to 8 km thick and consists mostly of spinel harzburgites with multiple dunitic bodies and pyroxenitic veins representing pathways for different melts/fluids. While it is generally accepted that dunites in mantle sections are formed by melt-rock reaction and mark melt pathways (e.g. Kelemen et al., 1995), formation of pyroxenites is a subject of debate. Often pyroxenites from mantle sections of ophiolites (Varfalvy et al., 1997), as well as pyroxenites from mantle wedge xenoliths (Arai et al., 2006, Bali et al., 2007, Gregoire et al., 2008) are interpreted as interaction products between high-SiO2 melts and mantle peridotites. Such melts are believed to be widespread in SSZ mantle: boninites, high-MgO andesites and adakites. However, some researchers (e.g. Berly et al., 2006, Halama et al., 2009) propose pyroxenite formation in metasomatic reaction with fluid from subducting plate. Moreover, some pyroxenites could be formed by the melt crystallization in hydrous conditions (Muntener et al., 2001).

We present comprehensive study of mineral major and trace element compositions from the mantle section rocks of Voykar Ophiolite in order to determine mechanism of formation of pyroxenites in ophiolitic mantle sections. Compositions of clinopyroxene and olivine from pyroxenites were compared to their compositions in harzburgites and dunites. Furthermore, compositions of clinopyroxene and magmatic amphibole from mantle section pyroxenites were used to calculate equilibrium melts.

Geochemical data (enrichment of clinopyroxenes and amphiboles in LREE and LILE (Rb, Ba, Sr) relative to HFSE (Nb, Zr)) together with structural data suggests that pyroxenites display clear suprasubduction signatures and refer to the last stage of Voykar Ophiolite mantle section formation. All minerals from pyroxenites tend to have lower Mg-numbers and, therefore, high-Si melts\fluids have played major role in their formation. Depletion of clinopyroxenes in HREE and enrichment in Sr and LREE across the harzburgite-pyroxenite contacts suggests that this high-Si melts most probably refer to depleted SSZ melts, such as boninites. One group of magmatic amphibole in pyroxenites refers to such melts. However, another group of magmatic amphiboles probably refers to high-Si fluid depleted in REE and enriched in LILE (Rb, Ba, Sr) and Pb. Therefore, the variety of pyroxenite segregations, veins, and dikes reflects progressive stages of melt/fluid migration through harzburgite and dunite at various P-T conditions. For some pyroxenites (such as zoned websterite dikes) formation by fractional crystallization of hydrous magmas couldn't be excluded.