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HSE, Os isotopes and LILE as tracers of processes in supra-suduction mantle (Voykar Complex, Polar Ural Ophiolites)

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Consequences of melt transport and conservation of compositional heterogeneities within convecting mantle remain important problem of mantle geochemistry. Here we present detailed study of mineralogy and geochemistry of different ultramafic lithologies coexisting in plastically deformed unites of Voykar ophiolite indicating the long-time (>1.9 Ga) preservation of local-scale (less than1 m) isotope heterogeneities during focused melt percolation events.

The Voykar complex is located in the Northern part of the Uralian ophiolite belt and represents Early Devonian lithosphere formed in a suprasubduction environment (e. g. (1)). It is unique in that the mantle peridotites are very well preserved and virtually free of serpentine, and it provides excellent exposures. The mantle section of Voykar massif preserves a stratigraphic thickness of up to 8 km, composed almost entirely of residual harzburgite and dunite (2). The majority of dunites occur as tabular veins, intersecting each other at the different angles. The contacts with surrounding harzburgite are sharp. For the present study we have chosen an area where dunites form a network within the harzburgite. Numerous pyroxenite veins with variable composition are also widespread in the area.

The distribution of HSE in harzburgite and dunite channels can be explained by melt-peridotite reaction processes. The harzburgites show two types of HSE patterns. One is depleted in Pd, Pt and Re relatively to Os, Ir, Ru with, the second pattern has (Pd/Ir)N>1. The first type of harzburgite has lower ratios of 187Os/188Os compared to the second. Dunites are significantly enriched in 187Os (187Os/188Os up

to 0.1635), hence shifted towards lava compositions. Pyroxenites have the highest 187Os/188Os of up to 29 and show a very strong depletion of Os, Ir, Ru relative to Pt, Pd, Re. They could represent crystallization products of percolating melts.

Osmium isotope data show evidence for at least two significant events in the magmatic history of the Voykar ophiolite mantle section: an ancient (2.1 – 1.9 Ga) melting event formed the depleted spinel harzburgite; a younger melt percolation event (0.6-0.5 Ga) led to the formation of pyroxenite veins, dunite channels and chromitites. The age of melt percolation events based on Os isotopic data coincides with the U-Pb age of zircons found in chromitites [3].

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