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Sulphides from mantle section pyroxenites of Voykar Ophiolite (Polar Urals)

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The Voykar Ophiolite is one of the best exposed and largest ophiolites in the Urals with a strike length of over 200 km. Its mantle section is up to 6 km thick and consists of spinel peridotites, mainly harzburgites, with numerous dunite bodies and pyroxenite veins (clinopyroxenites, websterites and orthopyroxenites as well as complex dunite-pyroxenite veins). Spinel harzburgites sampled far from dunite bodies and pyroxenite veins were interpreted as residues after 14-16% of partial melting, most probably at a mid-ocean ridge setting [1]. Some of dunites and all pyroxenites are believed to be formed in SSZ setting involving boninite-like magmas, which triggered additional 1-3% melting of host harzburgites close to contacts. Formation of different types of pyroxenites is attributed to various degrees of fractional crystallization and reaction of melts and possibly fluids with host harzburgites at changing P and T conditions in forearc region of the mantle wedge [2].

Sulphide globules are present in some dunites as well as pyroxenites. They are mostly found in between other minerals but can also be included in other minerals. Most of them contain Fe-rich, Cu-rich and Ni-rich parts. Cu and Ni-rich parts often contain substantial amounts of Ag, Te and Pb. In some cases, inclusions of tellurides containing Pt and Au were also identified. PGE contents and Pb isotopic composition of the sulphides from dunites and pyroxenites were measured using LA-ICP-MS. Implications of the results for the formation of sulphide globules are discussed. PGE patterns are also compared to those of whole rock analyses to determine the budget of PGEs in the rocks.

In case this part of the forearc mantle is recycled back into convecting mantle those pyroxenite veins would experience preferential melting and sulphides if present in substantial amount could contribute significantly to metal budget of primitive magmas.

[1] Batanova et al., 2011; [2] Belousov et al., 2021