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The stable oxygen isotope composition of Siberian eclogite xenoliths: paleosubdiction significance

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The authors studied a collection of Grt clinopyroxenite and eclogite xenoliths from the Mir, Udachnaya and Obnajennaya kimberlite pipes of Siberian craton (57 samples). Garnets from pyroxenites are also characterized by a relatively high Mg# content (75–83) and low TiO_2 contents (up to 0.2 wt %). It belongs to the "lherzolite" paragenesis by content CaO (3.68 - 5.35 wt.%) and Cr_2O_3 (0.07-3.7 wt.%). Eclogites are characterized by high-calcium (3.78 - 9.46 wt.%) and high-iron (7.77 - 17.20 wt.%) composition of garnet getting into the "wehrlite" paragenesis area. Also garnets from the lithospheric mantle under the Mir kimberlite pipe are characterized by a low-Ti garnet composition (up to 0.7 wt.%) and differs from the lithospheric mantle under other diamondiferous fields (for example, Udachnaya kimberlite pipe). The Mir mantle xenoliths are characterized by the pyroxenites widespread development (up to 50%), the low-Ti composition and deformed lherzolites absence. These features indicate the minimal silicate metasomatic alteration in the lithospheric mantle under the Mirny field (in contrast to the center of the Siberian craton). The isotopic oxygen composition in garnet and clinopyroxene was also determined. The $\delta^{18}O$ value varies in Cpx from 5.7-5.8‰ in clinopyroxenites and 6.1-6.1‰ in eclogites. On the whole, minerals from pyroxenites demonstrate $\delta^{18}O$ values exceeding mantle values, which suggests a wide development of melting processes in the lithospheric mantle in the south of the Siberian craton Craton and the formation of megacrystalline pyroxene cumulates. In some cases, metamorphic recrystallization leads to oxygen isotope equilibrium between garnet and clinopyroxene. For minerals from eclogites higher values of $\delta^{18}O$ are noted, which may indicate the origin of eclogites from subducted oceanic crust, the presence of a subduction component in the process of formation of the lithospheric mantle.

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