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Mantle terrains of the Siberian craton and their interaction with plume melts: reconstructions with the thermobarometry and geochemistry of mantle xenocrysts.

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Variations of the structure and composition of mantle terranes in the terminology of the Siberian craton were studied using database (>60000) EPMA of kimberlite xenocrysts from the pipes of Yakutian kimberlite province (YKP) by a team of investigators from IGM, IGH, IEC and IGBM SB RAS and ALROSA company. The monomineral thermobarometry (Ashchepkov et al., 2010, 2014, 2017) Geochemistry of minerals obtained LA ICP MS was used to determine the protolith, melting degree, Type of the metasomatism . The mantle stratification commonly was formed by 6-7 paleosubduction slabs, separated by pyroxenite, eclogite, and metasomatic horizons and dunite lenses beneath kemberltes . We built mantle sections across the kimberlite field and transects of craton. Within the established tectonic terrains strengthening to thousands km (Gladkochub et al, 2006), the collage of microplates was determined at the mantle level. Under the shields of Anabar and Aldan lower SCLM consist of 3 -4 dunites dunites with Gar-Px-Ilm– Phl nests. Terranes framing protocratons like suture Khapchanskyare are saturated in eclogites and pyroxenites, sometimes dominated probably represent the ascending bodies of igneous eclogites intruding mantle lithosphere (ML). The ubiquitous pyroxenite layer at the level of 3.5-4.5 GPa originated in the early Archaean when melted eclogites stoped stoped subdction. Beneath the Early Archaean granite-greenstone terranes - Tunguskaya, Markhinskaya, Birektinskaya, Shary-Zhalgaiskaya (age to∼3.8-3.0 GA) (Gladkochub et al., 2018) the SCLM is less depleted and often metasomatized having flat structures in some subterrains. Daldyn and Magan granulite-orthogneisic terranes have a layered and folded ML seen in N-S sections from Udachnaya to Krasnopresnenskaya less pronounced in latitudinal direction. From Daldyn to Alakit field increases the degree of Phl metasomatism and Cpx alkalinity. The most productive Aykhal and Yubleynaya pipes confined to the dunite core. Within the Magan terrane, the thin-layered SCLM have depleted base horizon. Granite-greenstone Markha terrane contains pelitic eclogites. Central and Northern craton parts show slight inclination of paleoslabs to West.
The formation of SCLM in Hadean accompanied by submelting (Perchuk et al., 2018, Gerya, 2014.) had no deep roots. Ultrafine craton nuclei like Anabar shield was framed by steeper slab. During 3.8-3.0 GA craton keel growth in superplume periods (Condie, 2004) when melted eclogites and peridotites acquiring buoyancy of the sinking plate melted. For peridotites, the melting lines calculated from the experimental data (Herzberg, 2004) mainly lie near 5-6 GPA (Ionov et al., 2010; 2015).
In classical works all geotherms are conductive (Boyd, 1973), but this is quite rare. The garnet pyroxene geotherms for (Ashchepkov et al., 2017) calculated with most reliable methods (Nimis, Taylor, 2000; McGregor , 1974; Brey Kohler, Nickel Green, 1985; Ashchepkov et al., 2010; 2017) give are sub-adiabatic and are formed during the melt percolation superplume vent often in presence of volatiles (Wyllie, Ryabchikov, 2000) and therefore, after superplumes trends P-Fe# of garnet are smoothed and change the tilts. RBRF grants 16-05860;16-05-00788.