Density heterogeneity of the lithospheric mantle beneath the Siberian craton: do geophysical and xenolith data agree?

YULIA CHEREPANOVA[1] AND IRINA M ARTEMIEVA[1]

[1]Oester Voldgade 10, DK-1350, Copenhagen, Denmark
yc@ign.ku.dk

We examine the density structure of the Siberian craton, where mantle-derived xenoliths show strong lateral heterogeneity and vertical stratification of the lithosphere mantle (LM). The density calculation is based on buoyancy approach. The crustal correction is based on the recent regional crustal model SibCrust (Cherepanova *et al*, 2013). The thermal contribution is based on the analysis of regional heat flow data (updated thermal model of Artemieva and Mooney, 2001). Given that regional xenolith data indicate high Mg# below Moho and essentially fertile composition below a 150 km depth, we consider two models of density distribution (1): thickness of thermal and chemical boundary layers (TBL and CBL) is the same, i.e. density anomaly is distributed through the entire LM (Moho to LAB). (2): CBL extends from Moho to 150 km depth, and fix LM density between 150 km depth and the LAB at 3. 36 g/cc. We compare both results with regional xenolith data. Our results indicate the presence of a very fertile mantle beneath parts of the craton affected by different tectono-magmatic events, while most of the craton interior has a depleted LM. However, the most depleted Archean LM is observed underneath the Anabar and Aldan shields, in regions which have not been sampled by kimberlites. Our results support earlier conclusions based on seismic tomography study (Artemieva, 2009) that kimberlites are non-representative of pristine cratonic LM. Based on the gravity and buoyancy modelling, we argue that Archean LM sampled by kimberlites has been metasomatically modified and the most depleted cratonic LM in Siberia is restricted to shield regions.