

Composition of mantle thermochemical plumes did not change from the Mid Paleoproterozoic: Evidence from the LIPs' study

E.V. SHARKOV AND M.M. BOGINA

¹ IGEM RAS, Staromonetny per., 35, Moscow 119017, Russia

Most researchers suggest that origin of large igneous provinces (LIPs) is related to the ascent of mantle plumes. According to modern paradigm (Maruyama, 1994; Dobretsov et al., 2001; French, Romanowicz, 2015, etc.), plumes are generated at the liquid outer core-mantle boundary (CMB) due to percolation of core's fluids in lower mantle. So, mantle plumes consist of two components: lower mantle rocks and core's fluids, which in different proportions are involved in adiabatic melting of plume heads and can reach surface in form of basaltic magmas. Thus, the LIPs' magmas provide insight into composition of liquid core (especially its fluid components) and lower mantle, thus. Because the LIPs existed throughout the Earth's history (Ernst, 2014), they bear a specific record of plumes' matter evolution. According these data, the Early Precambrian (Archean and early Paleoproterozoic) is characteristic by high-Mg magmas derived from depleted mantle, and modern type of LIPs composed of geochemical-enriched basalts and picrites appeared only after ~2.3 Ga and practically did not change till now (Sharkov et al., 2017). Because exactly this type of the mantle plumes is generated at the CMB, from this follows that the Earth's core and lower mantle compositions remain practically unchanged over the past 2.3 billion years; except for slight increase of incompatible components.