



New paleomagnetic evidence for the age and formation mechanisms of the Franz Josef Land large igneous province

Dmitry Metelkin (1,2), Viktor Abashev (2,1), Nikolay Mikhaltsov (2,1), Valery Vernikovskiy (2,1), Evgeny Vinogradov (1,2), Svetlana Monina (2,1), and Anna Chernova (2)

(1) Novosibirsk State University, Russian Federation (metelkindv@ipgg.sbras.ru), (2) Trofimuk Institute of Petroleum Geology and Geophysics SB RAS, Novosibirsk, Russian Federation

According to modern views igneous rocks on the Franz Josef Land (FJL) archipelago either correspond to a short one-stage large igneous province (LIP) magmatic event in the Early Cretaceous, or the magmatism was caused by a long-lived (from the Early Jurassic to and including the Early Cretaceous) hot spot with several brief activity pulses. The large paleomagnetic database we accumulated indicates that the magmatic event was of short duration. The calculated virtual geomagnetic poles are spread around the Late Mesozoic paleomagnetic poles for Eurasia, and the mean pole is displaced from the East European paleomagnetic poles to the Early Cretaceous (145-125 Ma) poles for Siberia. The latter confirms the hypothesis of Mesozoic strike-slip activity within the Eurasian continent during the LIP's formation, and probably is in alignment with the opening of the Amerasian basin of the Arctic Ocean. Geochemical characteristics of the FJL basalts, which are presumably of different ages, are similar and indicate a single intraplate melt source during the LIP's formation. Our new $^{40}\text{Ar}/^{39}\text{Ar}$ data also do not confirm the existence of Jurassic magmatism episodes. To reconstruct the LIP formation mechanisms, estimate the melt travel directions, and determine the location of eruption centers and magmatic bodies morphology, we studied the anisotropy of the magnetic susceptibility (AMS) on the example of one of the larger islands of the FJL archipelago – Hooker Island. The determined features of the primary magnetic texture correspond to a trap formation mechanism and reflect the simultaneous action of multiple small eruption centers. The general area picture of AMS orientation also does not allow to determine a vertical heterogeneity in the section that could indicate significant time gaps in the magmatism evolution and its discrete activation. This is an additional argument supporting the idea of a single stage formation of the FJL large igneous province.

This study was supported by the RFBR (projects 18-35-00273 and 18-05-70035) and by the Ministry of Education and Science of the Russian Federation (projects 5.2324.2017/4.6 and 5.4786.2017/6.7)