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High-Latitude paleointensities after the end of the Cretaceous Normal Superchron from the Okhotsk–Chukotka Volcanic Belt

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This work presents the results of studies of paleointensity H_{anc} on the Cretaceous igneous rocks from the northern part of the Okhotsk-Chukotka volcanic belt. The goal of the study is to trace the behavior of the Earth's magnetic field during the Cretaceous superchron (the superchron time frame is 121–84 Ma - Geomagnetic Polarity Time Scale, [1]) and after its termination. According to isotope dating, the studied magmatic rocks were formed 72-71 Ma (or 71-67 Ma; [2]). Based on the results of AF and temperature demagnetization, the mean paleomagnetic direction of flows is D=10.2º, I=80.3º. For this time interval after the end of the Cretaceous superchron, there is no data available in the paleointensity database (PINT database, [3]) for high paleolatitudes, and the determinations obtained in this study were aimed to fill this gap.

Ninety-three flows were studied. Fifty lava flows stable to heating (up to 10%) and with an excellent paleomagnetic record were selected for pilot Thellier-Coe experiments (1–4 samples from each of flows) with pTRM checks. Eleven flows were selected for further detailed experiments.

As a result, after 180 Thellier-Coe experiments, only 3 flows were selected. Two flows from one volcanic sequence demonstrate H_{anc}=14.49 μT (mean for 9 samples) and H_{anc}=17.7 μT (mean for 7 samples). One flow from other volcanic sequence demonstrate H_{anc}= 31.19 μT(mean for 8 samples). All determinations meet to criteria PICRIT03 [4] and have at least 5 (out of 8) points according to qualitative reliability criteria [5]. At the Day plot [6] the majority of samples belong to the area usually referred to pseudo-single-domain (PSD) behavior. In accordance with $pTRM_a$ tails[7] for most studied flows MD grains are carriers of remanence to the 300-450ºC interval, and SD and PSD grains are carriers of remanence from 350 ºC to 600 ºC interval. Although Arai-Nagata Diagrams show one slope, for most samples, the high-temperature intervals were selected for interpretation. Selected intervals fully correspond to the primary magnetic component identified during component analysis.

Thus, the obtained determinations of H_{anc} satisfy the reliability criteria and can supplement the existing knowledge about the paleointensity of the geomagnetic field after the end of the Cretaceous superchron with previously unreported data for high latitudes.

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