

Late Cretaceous-Cenozoic tectonic history of Chukotka according to new paleomagnetic data

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The Verkhoyan-Chukotka (VCSO) and Koryak-Kamchatka fold regions are generally characterized by the tectonic structure of Northeastern Eurasia. Most geologists accept that the formation of the former region was completed by the start of the Late Cretaceous, as a result of successive accretions of the Kolyma-Omolon and Chukotka terranes to Eurasia [1]. These terranes then formed the VCSO region, which is overlain by the Okhotsk-Chukotka volcanic belt (OCVB).

Today, the Northeastern part of Eurasia forms the junction of at least three major lithospheric plates - North American, Eurasian, and Pacific - as well as smaller plates such as the Bering and Okhotsk. The location, magnitude of displacement, and active lifetime of boundaries between the aforementioned plates in the geological past have been described very vaguely. For example, [2], [3] provide limited information on the kinematic behavior of plates in the past. The paleomagnetic technique can provide constraints on the kinematics of plates during geological time. However, the few existing studies [4], indicate the presence of significant post-Late Cretaceous motions of the entire Verkhoyan-Chukotka fold region in a southern direction over considerable distances (up to 1,000 kilometers). Despite the existence of several plates that have articulated in this region, these large-scale movements clearly contradict existing geological models that describe the development of Northeast Asia. The resolution of this discrepancy forms the main goal of this study.

Such data were collected for two objects located in the northern parts of the Okhotsk-Chukotka Volcanic Belt. The age of the first object, the Kupol, was determined to be 88 to 84 million years old. The youngest object, Valunistoe located in the Eastern Chukotka sector of the OCVB, and has an age range of 76 to 68 million years. Kupol now refers to the North American Plate, while Valunistoe is approximately located at the border between the North American and Bering Plates. When comparing the new paleomagnetic poles according to Kupol to the reference ones, there are no statistically significant differences, indicating the absence of significant tectonic movements of Kupol compared to the main parts of North America and Eurasia. This is true at least since 86 million years ago. The paleomagnetic data from Valunistoe differ significantly from both North America and Eurasia, supporting the model of existing of the Bering Plate and its relative kinematics with respect to Eurasia that was previously proposed in [3].

The study was supported by the Russian Academy of Sciences grant No. 23-17-000112.

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