

Early Paleozoic Drift Kinematics of the New Siberian Islands Terrane: Two Possibilities From Paleomagnetic Data

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ABSTRACT

The New Siberian Islands (NSI) archipelago is located in the East Siberian Sea in the junction region of various structural elements: the Verkhoyansk-Kolyma folded area, the Taimyr-Severnaya Zemlya folded area and the submerged Lomonosov and Mendeleev ridges in the Arctic Ocean. It is also one of the few sites available for direct geological study on the Eastern Arctic shelf. Based on research results from fieldwork in 2011 and 2013 we could prove that the geological basement of the De Long and Anjou island groups is Precambrian and the overlying Paleozoic sections formed within the same terrane. The boundaries of the NSI terrane are actively debated and are probably continued from the Lyakhovsky Islands in the south-west to the southern parts of the submerged Mendeleev Ridge. Some models for the Paleozoic tectonics and structural affinity of the NSI terrane infer that the Paleozoic sedimentary section formed on the passive continental margin of Siberia, while others link its origin with marginal basins of Baltica and Laurentia, or regard the NSI terrane as an element of the Chukotka-Alaska microplate. Our paleomagnetic studies of the sedimentary, volcanogenic-sedimentary and igneous rocks of the Anjou (Kotelny and Belkovsky) and De Long (Bennett, Jeannette and Henrietta) island groups let us calculate an apparent polar wander path for the early Paleozoic. From this path, we conclude that the NSI terrane could not have been part of the continental plates listed above, but instead had active tectonic boundaries with them. Paleomagnetic data indicate that the terrane underwent a gradual, slow drift in the tropical and subtropical regions of the Earth – 40° latitude at most. The main ambiguity of the tectonic interpretation of our new data is due to not knowing the true polarity. Consequently, it is uncertain what geographic hemisphere the NSI terrane was in during the recording of the paleomagnetic signal. Therefore, we present two possible tectonic scenarios of its Paleozoic history, and discuss them on plotted corresponding global reconstructions describing the paleogeography and probable mutual drift kinematics of the Eastern arctic terranes.