New model of two-stage seafloor spreading in the Eurasian basin (Arctic Ocean); insights from the analysis of the sedimentary basin architecture

Pavel Rekant and Oleg Petrov
A.P. Karpinsky Russian Geological Research Institute VSEGEI, Geological mapping, Saint-Petersburg, Russian Federation (rekant@mail.ru)

Base on thorough interpretation of Russian seismic reflection data the sedimentary architecture of Amundsen and Nansen basins was studied. Accordingly, we infer four development stages of the Eurasian Basin (EB) sedimentary system, caused by tectonic evolution of the region.

**Continental break-up stage I** (~120-56 MA) leads to formation of 120-130 km wide synrift basins both in the Eastern Amundsen and in the Western Nansen basins. Both basins were floored by extremely extended continental crust. Therefore, the hypothesized continent-ocean boundary (COB) should be placed at the seaward edges of synrift portions of Amundsen and Nansen basins, roughly along the magnetic anomaly #20.

**Spreading stage II** (56-34 MA) was characterized by seafloor spreading in the EB as low as 8 mm/year, which was accompanied by expansion of the Amundsen and Nansen sedimentary basins up to their current sizes. The successive expansion of the sedimentary basins which is characteristic of the seafloor spreading basin, was revealed from the architecture of only this sequence, neither underlying nor overlapping. We propose the formation of a Gakkel Ridge rift valley and its infilling with thick sediments sequence during this stage.

**Synoceanic stage III** (34–~3 MA) was resulted in the accumulation of the undisturbed Oligocene-Quaternary sediment sequence all over the entire EB. If the non-tectonized architecture of this sequence indicates a calm tectonic regime for the most of the Oligocene-Miocene, the existence of the sediment veneer all over the entire EB proves that sedimentation basin and consequently the oceanic crust domain of modern size were already formed by the beginning of Oligocene.

**Re-spreading stage IV** (~3-0 MA) is characterized by the resumption of seafloor spreading in the Gakkel Ridge axial zone by propagation of the oceanic rift from Norwegian-Greenland basin toward the east.

The proposed model of two-stage seafloor spreading in the EB allows us to explain most of the geological issues in this region and is of perfect relation to the known tectonic events along the Arctic periphery.
In particular: (1) thick sediments sequence in the Eastern and Central (e.g. at 94°E by Rekant & Gusev, 2016) Gakkel Ridge rift valley could be explained by the Eocene age of the rift valley, (2) recent spreading resumption could be considered as the cause of the unpredictable high both the hydrothermal activity and volcanism at the Western Gakkel Ridge, (3) the consolidated sand- and siltstones, dredged from the seamount scarp in the middle part of Amundsen Basin (Gaedicke et al., 2019), which thought to be fragments of Mesozoic continental crust, confirm the suggested COB position along magnetic anomaly No.20, (4) the eastward propagation of the ocean rifting along the Gakkel Ridge leads to apparent change of the accentuated high relief morphology of the Western Gakkel Ridge to a smoother ridge morphology of the Eastern Gakkel Ridge as well as to defocusing seismicity at the Eurasia Basin–Laptev Sea transition.