Geophysical Research Abstracts
Vol. 21, EGU2019-10309, 2019
EGU General Assembly 2019

The synoceanic stage of evolution of the East Arctic Basin. New ideas, timing and regional correlation

Pavel Rekant

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

Based on the analysis of the seismic dataset of regional scale, containing >700 seismic lines, new factual information concerning geological evolution of the Arctic Ocean was revealed. The data obtained indicate that modern structure and morphology of the Central Arctic domain has been formed as the result of the Oligocene - Quaternary evolution stage (i.e. synoceanic stage) ~34-0 MA. This stage was triggered by final episodes of the Eurekan orogeny that forms of several complex deformation zones onshore of Canadian Arctic Archipelago, north and NE Greenland, and Svalbard, as well as offshore of the Beaufort Sea. We suggests that prior to this stage, the prototypic terrain of Arctic basin already contained most of the modern morphological structures, however, they were characterized by fairly smooth local topographic relief. If the ridges and plateaus were located within the distal neritic zone, the surrounding depressions occurred in the middle bathyal zone. The blocky differential subsidence of the entire Arctic Basin occurred during the synoceanic stage. The maximal magnitude of subsidence as high as 2000–3000 m was characteristic feature of most of Arctic depressions (Nansen, Amundsen, Podvodnikov, Makarov and Canada), whereas the subsidence of the Arctic Ridges and Highs was characterized by lower magnitude - up to 1000 m.

The onset of synoceanic stage is confirmed by a number of geological evidence throughout the periphery of the Arctic. They are as follows: i – the transition from nearshore neritic into deep-water conditions on the Lomonosov Ridge at 34 MA; ii - the angular unconformities on the Arctic periphery dated approx. 36-34 MA (e.g. in the base of Nerpichinskaya formation on the Novosibirsky archipelago as well in the base of Kugmallit formations on the Beaufort sea), iii - deformations of the Late Cretaceous deposits on the Colville Basin.

In contrast to the numerous Paleozoic and Mesozoic faults, the synoceanic ones are sparse and scattered. The fully undisturbed Cenozoic sedimentary drape is characteristic of East-Siberian shelf. Neither normal faults nor strike-slip faults were revealed in the related sediment sequence offshore.

A number of the synoceanic faults appeared on the western Lomonosov Ridge. Thereby, we suggests that tectonic stresses associated with formation of the Eurasian basin lead to reactivation of the short N-S striking segments of the ancient faults, forming steep West flank of the Lomonosov Ridge. Most of revived faults segments are no longer than 100-150 kilometers.

The sparse synoceanic tectonic movements are recorded in the sedimentary sequence on the Chukchi Plateau and on the Northwind Ridge. The system of N-S trending normal faults indicates the W-E directed extension. The transtensional tectonic settings are recorded in the Chuckchi Plateau – Chuckchi shelf junction zone only.

There are only a few sites (e.g. Trukshina, Rogotskogo, Shamshura, T-3, Pochtareva ets) within the central Amerasian Basin were short faults segments were revived, forming the local seamounts.