Geophysical Research Abstracts
Vol. 14, EGU2012-7006, 2012
EGU General Assembly 2012

Modern Geodynamic Model of the Arctic Ocean

O. Petrov (1), N. Sobolev (1), A. Morozov (2), G. Grikurov (3), S. Shokalsky (1), S. Kashubin (1), and E. Petrov (1)

(1) A.P. Karpinsky Russian Geological Research Institute (VSEGEI), Saint-Petersburg, Russian Federation , (2) Federal Agency on Mineral Resources (ROSNEDRA), Moscow, Russian Federation, (3) VNIIOkeangeologia, Saint-Petersburg, Russian Federation

In 2011 at VSEGEI (Russia) within the international project “Atlas of Geological Maps of the Circumpolar Arctic”, a draft of the structural tectonic map of the Arctic at 1: 5,000,000 scale was prepared. This map is accompanied by a model of deep lithospheric structure of the Russian Arctic, which reflects thickness, types and specific features of crustal structure, and by geodynamic reconstructions.
Analysis of the geological and geophysical data enables distinguishing a set of features in the Arctic evolution:
- Differences in geological structure and geodynamic evolution of the Western and Eastern Arctic have been spotted no less than since the Early Paleozoic, which was reflected in the formation of caledonides in the West of the Arctic, and ellesmerides in the East.
- In the Middle Paleozoic-Mesozoic (Late Devonian-Early Cretaceous), the eastern parts of the Arctic were affected by geodynamic processes taking place in the Paleo-Pacific. The formation of the Canadian basin was a result of the Late Jurassic-Early Cretaceous riftogenesis. A set of features of this basin - such as constrained spreading, considerable depth and topography of the floor, sedimentation specifics - allows us to consider it as a marginal basin of the Paleo-Pacific that moved into an island-arc evolution stage in the Late Jurassic. Collision orogenic activities that widely manifested themselves in the Northern-Eastern part of Asia on the verge of the Early-Late Cretaceous are related to intraplate riftogenic processes in the Central Arctic that were followed by basic magmatism manifestations in Svalbard, Franz Josef Land and New Siberian Islands. Cretaceous stage of the intraplate riftogenesis determined to a great extent the modern-day structure of the Eastern Arctic.
- The opening of the Northern Atlantic was accompanied by tectonic compression in the Eastern parts of the Arctic. The formation of the Eurasian basin was preceded by Late Cretaceous-Paleogene period of amplitude differentiated vertical tectonic movements. At that time, the Barents-Kara plate suffered lifting whose amplitude reached as many as 2000-3000 meters. Within the Amerasian basin prevailed descending movement that determined the generation of the cover of Late Cretaceous-Cenozoic formations.
- Analysis of seismic data shows that the mid-oceanic Gakkel Ridge takes over older - presumably Early Cretaceous - riftogenic structure. Young oceanic Eurasian spreading basin changes into the riftogenic Laptev Sea basin. The Eastern and Western Eurasian basin passive margins are different. Within the Barents and Kara marginal seas, sedimentary paleobasins are reconstructed with a thick (up to 20 km) Paleozoic and Mesozoic (Triassic-Early Cretaceous) sedimentary cover and a heterogeneous basement. Amerasian basin was formed in the Late Jurassic-Early Cretaceous similar to the marginal basin of Paleo-Pacific. In the Late Cretaceous, it transformed into a residual basin, and beginning from the Neogene it evolved into an intraplate basin of the passive margin of the newly formed Eurasian Oceanic basin.