Geophysical Research Abstracts
Vol. 16, EGU2014-5575-1, 2014
EGU General Assembly 2014

Arctic region: new model of geodynamic history

Anatoly Nikishin (1), Yuriy Kazmin (2), Nikolay Malyshev (3), Andrey Morozov (2), and Eugene Petrov (4)

(1) Moscow State University, Geological Faculty, Moscow, Russian Federation (nikishin@geol.msu.ru), (2) Rosnedra, Moscow, Russia, (3) Rosneft, Moscow, Russia, n_malyshev@rosneft.ru, (4) Geology Without Limits, Moscow, Russia, petrov@rge-geo.com

Basement of the Arctic shelf areas is characterizes with a complex structure. Age of the defined domains is early Pre-Cambrian, Neoproterozoic to Cambrian (Timanian and Baykalian), early-middle Paleozoic (Caledonian) and late Paleozoic (Uralian, Taimyrian and Ellesmerian).

Mesozoic deformations affected Novaya Zemlya, Southern Taimyr and southern parts of the Laptev Sea, the East Siberian Sea, and the Chukchi Sea regions.

There are several Paleozoic rift-postrift basins. The North Kara Basin and the Timan-Pechora Basin was formed during the early Ordovician time as subduction-related back-arc rift systems. The East-Barents Basin has the same origin but the age of its formation is late Devonian. Carboniferous rifting took place in the Norwegian part of the Barents Sea, the Chukchi Sea (Hanna Trough Basin) and the Sverdrup Basin.

There are also rift-postrift basins of the Mesozoic age. Late Permian to Early Triassic rifting took place in the South Kara Basin; it was connected with both collapse of the Uralian Orogen and activity of the Siberian mantle plume.

Aptian to Albian rifting was affected with really big area in the Laptev Sea, the East Siberian Sea and the Chukchi Sea right after the De-Long plume-related magmatic event. Paleogene (mainly Eocene) rifting was also widely spread in these areas.

The Arctic Ocean consists of three main domains: the Canada Basin, Alpha-Mendeleev-Podvodnikov-Makarov domain, and the Eurasia Basin.

The Canada Basin is a typical oceanic one. There are many uncertainties in the definition of spreading age, but in accordance with the prevalent point of view, it should be early Cretaceous, Neocomian.

Alpha-Mendeleev-Podvodnikov-Makarov domain is an enigmatic region. We propose the following scenario for the formation of this domain: Aptian to Cenomanian plume-related large-scale intraplate basalt magmatism was followed by Albian to late Cretaceous rifting. Few axes of rifting were nearly orthogonal to the pre-existing one in the Canada Basin. The Alpha-Mendeleev Ridge is a rifted continental terrane covered by pre-rift basalts.

The Eurasian Basin is a small oceanic one. Defined age of spreading is 56-0 Ma. The basin is characterized by a very slow spreading rate. Eocene to recent sediments covers the system of prominent linear ranges and valleys of former mid-oceanic ridge.

The Lomonosov Ridge is a well known continental terrane dissected by Neogene-Quaternary faults.

New data shows that the area of the Lomonosov and the Alpha-Mendeleev ridges was affected by strong Neogene to recent extension or transtension tectonics with the formation of numerous normal faults and related topographic highs and valleys. Recent bathymetry of these ridges is a result of this Neogene to recent tectonics.

Our report is based on a new set of seismic lines in the Russian part of the Arctic region.