

Paper Number: 1231

Tectonic structure and evolution of the Alpha-Mendeleev Fracture Zone

Chernykh, A.^{1,2}, Glebovsky, V.¹, Korneva, M.¹, Astafurova, E.¹, Redko, A.G.¹

¹ All-Russian Scientific Research Institute for geology and mineral resources of the Ocean (VNIIOkeangeologia), St.-Petersburg, Anglisky Ave., 1, Russia

² Saint Petersburg State University, Institute of Earth Science, Saint-Petersburg, Universitetskaya emb., 7-9, Russia

The Alpha Ridge (AR) and the Mendeleev Ridge (AR) are located in the Amerasian part of deep water Arctic Ocean. Geological structure and evolution of this region are poorly studied even now that is explained mainly by limited geological and geophysical information. Bathymetrical data shows obvious angular relationship between two ridges (Figure 1) and therefore some scientists proposed here presence of slip or transfer faults. But due to the absence of reliable geophysical data it has not been possible to validate this hypothesis earlier. Presented results were acquired under Russian State Program for Geological mapping at a scale of 1:1 000 000 and under UNCLOS Program.

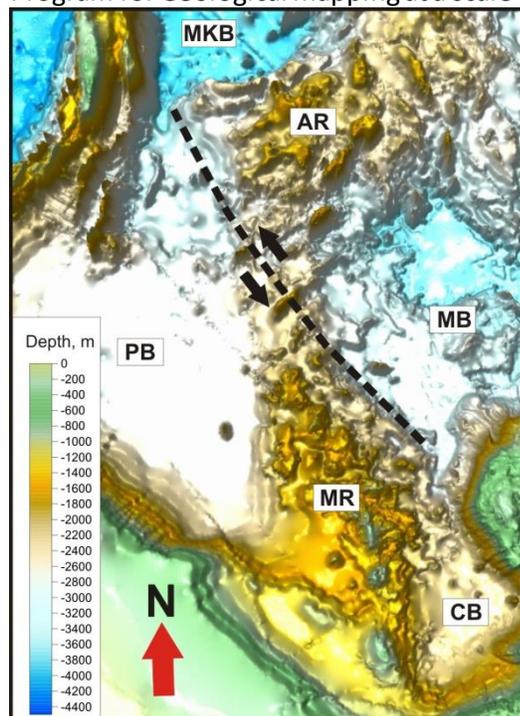


Figure 1: IBCAO 3.0 bathymetry of study area and principal position of AMFZ (dashed line)

The study area (Figure 1) comprises the zone of junction of AR and MR, adjacent Podvodnikov (PB), Makarov (MKB), Mendeleev (MB), Chukchi (CB) basins. It is characterized by very poor magnetic and gravity data coverage. Majority of airborne magnetic surveys were carried out here about 40 years ago and have low spatial resolution and poor navigation. Reliable gravity data is presented by results of space altimetry. Seismic data collected earlier were very sparse. Significant progress in the area exploration took place when multi-channel seismic (MCS) and refraction data were acquired during Russian expeditions «Arctic-2011», «Arctic-2012» and «Arctic-2014».

During present research all available potential fields data were fully reprocessed in order to compile most reliable and detailed grids. Results of interpretation of gravity and magnetic anomaly fields and bathymetry were compared with MCS cross-sections. Some new peculiarities of study area were revealed on the base of mentioned new geophysical information.

Studying prominent horst/graben structure of MR, which has approximately N-S orientation, pull-apart basins were revealed in its northern part. They are combined in chains having NW-SE direction and probably are footprints of oblique-slip faults and markers of past transtensional conditions. Further to the north, in transition zone between the AR and the MR, orientation of horsts and grabens is sharply changed to NE-SW, as mainly the same in the southern end of the AR. Significant offsets between these structures are clearly visible and indicate action of past sinistral strike-slip faults here. Thus summarizing made observations, existence of the Alpha-Mendeleev

fracture (shear) zone (AMFZ) was supposed. It was formed due to sinistral movement of the AR and MR in relation to each other. It is occurred in the Mesozoic, probably in limits of 120-80 Ma, simultaneously with opening of the MB, CB, PB and MKB (Figure 1). Existence of proposed zone is very important for understanding of evolution of the Amerasian Basin. Some more details and speculations concerning discussed theme will be offered in presentation.

