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Tectonic pattern of the Mendeleev Ridge and adjacent basins: results of joint analysis of potential fields and recent Russian seismic data

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The work was performed under Russian Federation State Geological mapping at a scale of 1:1 000 000 and UNCLOS programs. The study area is located between 76N-84N and 156E-168W and covers the Mendeleev Ridge, adjacent Podvodnikov, Mendeleev, Chukchi Basins and northern part of the East-Siberian Sea shelf. It is characterized by very poor magnetic and gravity data coverage. Majority of airborne magnetic and on-ice gravity surveys were carried out in the region about 40 years ago and have low spatial resolution and poor navigation. Seismic data collected earlier in the study area are presented by sparse lines of historical seismic reflection soundings and by results of deep seismic refraction and reflection observations along several geotransects. Hence, conclusions concerning tectonic structure and spatial relation of the Mendeleev Ridge with adjacent geological structures up to present day remain speculative.

Joint analysis of recent seismic reflection and refraction data collected during Russian expeditions «Arctic-2011» and «Arctic-2012» with mentioned above geophysical information allowed to clarify the contours of geological structures in the study area and reveal some new peculiarities of their tectonic pattern.

Particularly complex tectonic structure of the Mendeleev Ridge, changing from it's southern to the northern part and represented by two main systems of tectonic displacements is discovered. The first fault system comprises horsts/graben-bounding faults oriented preferably in N-S direction. The second system is presented by faults of NW-SE direction disturbing the first one. In the southern part of the Mendeleev Ridge such faults are the strike-slip faults with small horizontal displacements. Starting from the central part of the ridge and further to the north, displacements along strike-slip faults become progressively more pronounced and have sinistral character. In the northern part of the ridge a pull-apart structures are recognized which presumably correspond to the transitional shear zone between the Mendeleev and the Alpha ridges. Mentioned above features indicate that existed earlier as a single structure the Alpha-Mendeleev Ridge was exposed to transtension. As a result it was separated later by the shear zone on two ridges which moved from each other with forming the system of NW-SE left-lateral strike-slip (oblique-slip) faults. Some more details and speculations concerning the tectonic pattern of the Mendeleev Ridge and adjacent structures will be offered in presentation.