CRUSTAL STRUCTURE OF THE SOUTHERN PART OF THE BALTIC SEA USING GEOPHYSICAL METHODS

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The study of the crustal structure of the World Ocean is very important in the many aspects. First of all, it is necessary to understand the structure of the Earth, its history, the processes of the nature which form it. When there was a need for the extraction of hydrocarbons and minerals, it was understood that studying of the crustal structure of the World Ocean is also necessary. Because, the World Ocean it is 2/3 of our planet. In the second half of the 20th century there is new problem, the global warming. Scientists realized that in order to solve this problem, is necessary knowledge in the paleoclimate, which can be obtained by studying of the sediments, crustal structure and the processes of their formation. The main source of information about the geological structure of the World Ocean floor are the results of geophysical studies. In this paper we studied the gravity data which were obtained in July 2016, in the scientific expedition AL481, on the scientific vessel RV ALKOR, the northern coast of the Rügen island, in the Baltic Sea.

The main goal of this study is to understand the crustal structure of the southern part of the Baltic Sea using geophysical methods. For a more detailed study, was decided to concentrate only on one geophysical method, gravity method. We tried to combine the previously obtained data with the gravity data obtained in the expedition AL481, interpret, and to understand whether any changes and to try, find the reason.

For the necessary result, was took gravity data, processed it, using the GRAVNAV and SEEDAT programs and obtained Free-air and Bouguer anomalies. Then, use the Oasis Montag program, Free-air and Bouguer anomalies data, were constructed of anomalies map. Further, these anomalies were interpreted using the Euler method. We calculated of the depth of bodies which creating these gravity anomalies. For comparison, we took the gravity data, obtained in previous studies of the region, the Moho depth, the depth of the crystal basement, the depth of the intracrustal boundary, the density of sediments, the density of the upper crust, and the density of the lower crust. And also the data of geological and tectonic structure of this region and bathymetric data. Then we compare and analyze this data.

The obtained results of the gravity data from the expedition AL481 showed that, they coincide with the data obtained in previous studies of this region. But gravity data from expedition AL481 also showed new gravitational anomalies, both, negative and positive. Interpretation of these anomalies, using the Euler method, revealed the depth of the bodies which creating these gravity anomalies. Average depth of occurrence of bodies 2 - 3 km. In the west of the study area, was revealed a local values of bodies at a depth of 5 to 9 km. Comparison of the obtained results with the geological and tectonic structure of the study area allowed us the following conclusions. Considering that the study area is located in the Teicseer-Tornquist

zone impact, where the West European young platform separates from the Baltic-Transdniestrian zone of pericratonic troughs in the west of the East European platform and consists of a series of deep faults, as well as in the Caledonian folding zone. The first thing that we can suppose is that in the study area there is a accumulation of fault zone and transition zone. The second is that after analyzing the southern part of the Baltic Sea, it was revealed that this is a zone of salt diapirism. The salt diapirism has the special rheological properties of the salt thickness (relatively low density, but high, especially at high pressures, plasticity). What can explain to us the negative values of gravity anomalies in the study area. In totality, transition zone , faults and salt diapirism, can lead to the formation of stratigraphic traps for hydrocarbons.

With the help of the obtained gravity results, in this study, we confirmed the heterogeneity of the gravity anomalies in the study area, the coincidence with previous studies and found a logical explanation based on geological and tectonic data of the study area. And also discovered new local gravity anomalies.