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Editorial

Editorial: comprehensive research of Antarctica

Antarctica is the least studied continent on the planet. Extreme climate conditions, ice cover, and the lack of permanent infrastructure make it difficult to conduct field and stationary research. Nevertheless, interest in Antarctica as a unique natural laboratory is steadily growing, which is confirmed by a stable increase in the number of scientific publications covering a wide range of topics from geodynamics and glaciology to applied engineering solutions.

Despite the complexity of conducting research work in Antarctica, the number of scientific projects implemented on its territory is growing every year, which indicates a great interest in the sixth continent. This is due to the unique data of glaciers, subglacial reservoirs, and the bedrock of Antarctica, which is a base for solving fundamental problems in geology, glaciology, climate, and many other areas of knowledge. Obtaining new data and improving our knowledge is inextricably linked with the creation of new and improvement of existing technologies and technical means for drilling glaciers and underlying rocks, sampling water and bottom sediments of subglacial reservoirs, as well as remote methods for studying the subglacial environment. A key factor in the successful implementation of scientific projects is their infrastructure and logistical support, which in some cases is of decisive importance when choosing technological solutions, the sequence and timing of expeditionary research. The most important component of the work performed is environmental measures aimed at preserving the unique natural environment of Antarctica.

The thematic volume of the "Journal of Mining Institute" offers articles representing the achievements of domestic and world science in solving fundamental scientific problems and applied tasks aimed at improving the technologies and techniques of conducting scientific research and developing the infrastructure and logistics support of Antarctica. The presented articles reflect the multidisciplinary nature of modern Antarctic research.

The article by *Vanda M. Sergeeva* and *German L. Leitchenkov* analyzes the geodynamic history of the opening of the ocean between Australia and Antarctica, considers in detail the stages of spreading and changes in the drift velocity of lithospheric plates based on reconstructions using the GPlates program.

The article by *Alexey A. Baranov* and *Leopold I. Lobkovsky* studies Cenozoic rifting and the mechanism of formation of the deepest depressions on the Antarctic continent. Geophysical parameters of subglacial structures that determine the dynamics of glaciers and their contribution to global changes in sea level are considered.

Aleksei S. Egorov and co-authors propose a model for the formation of the Lake Vostok depressions, revealing structural analogies with rift zones in the Lake Baikal region. The results of geophysical studies are presented, allowing to assume the widespread development of rift structures in East Antarctica.

In the work of *Alexey A. Baranov* and *Nadezhda V. Andreeva*, seismicity of the South Polar Region of the Earth, including perioceanic and intracontinental zones, is analyzed. A connection between seismicity and rift structures of Antarctica and glacial processes is revealed.

Aleksei V. Bolshunov and co-authors present the results of complex studies of the snow-firn layer in the area of the Vostok station, aimed at clarifying the structure and dynamics of the ice cover, as well as the selection of parameters for deep drilling.

In the article by *Ivan A. Babenko* and colleagues, data on various types of pegmatites of the Larsemann Hills are systematized; their new classification and interpretation are proposed in the context of the Pan-African orogeny and the geodynamic history of East Antarctica.

The article by *Tatyana V. Davydkina* and colleagues examines the specifics of magnetotelluric surveys in Antarctica, highlights methodological approaches that allow minimizing the impact of extreme conditions and obtaining high-quality data.

Marina P. Kashkevich and co-authors demonstrate the use of OKO-3 and Triton M ground penetrating radars for glaciological surveys in the Schirmacher Oasis area. Based on the work performed, the structure of glaciers and subglacial relief is specified.

The article by *Aleksandr E. Simakov* and co-authors presents the results of the first-ever Antarctic research aeromagnetic survey at a scale of 1:25000 using an unmanned aerial vehicle. The high information content of the method and the prospects for its application in aid of geological mapping are emphasized.

Magnetic exploration studies are the subject of the article by *Gleb D. Gorelik* and colleagues, which describes the large-scale pedestrian magnetometric survey of the Broknes Peninsula of the Larsemann Hills. Based on the results of the work, detailed maps of the anomalous magnetic field were constructed, which will be used for geological modeling.

Danil V. Serbin and co-authors study the processes of interaction between drilling fluid and lake water during the opening of Lake Vostok, modeling the physical and chemical conditions and mechanisms of emulsion destruction and hydrate formation.

Aleksei V. Bolshunov and co-authors present the results of experimental ice drilling using environmentally friendly organosilicon fluid PMS-3. The study demonstrates the efficiency of the new technology and improved characteristics of the drilling process.

Sergey P. Polyakov and *Sergey V. Popov* summarize the results of the construction of the Zenit landing site in the area of the Progress station, describing the technological features and logistical significance of this facility for supporting Antarctic research.

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