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Abdulkhay A. Zhamaletdinov
Yury L. Rebetsky *Editors*

The Study of Continental Lithosphere Electrical Conductivity, Temperature and Rheology

 Springer

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Editors

Abdulkhay A. Zhamaletdinov
St. Petersburg Branch of IZMIRAN
St. Petersburg, Russia

Yury L. Rebetsky
Schmidt Institute of Physics of the Earth
of the Russian Academy of Sciences
Moscow, Russia

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Devoted to memory of Prof. Aida Kovtun

Review

To Proceedings of the 2nd All-Russian (with international participation) scientific-practical seminar “The Study of Continental Lithosphere Electrical Conductivity, Temperature and Rheology”. Eds. Dr. of Sc. A. A. Zhamaletdinov and Dr. of Sc. Yu. L. Rebetsky.

The presented collection is divided thematically into two sections devoted to theoretical studies and the results of experimental observations. The total number of articles is 13. Despite the fact that studies of the earth’s crust of the Kola region for all its thickness using deep electromagnetic studies were actively conducted in previous years (1974–1990), the issues of studying the structure and nature of geophysical boundaries still remain relevant for the continental crust.

The proceedings also present works relating to the study of the earth’s crust in other regions of Russia: the Voronezh Massif, the Yamalo-Nenets Autonomous District. Distant (foreign) regions such as the Indian Craton, the Himalayas, Eastern Tibet and subduction zones in the Pacific Ocean are not deprived of attention.

Of particular interest is the work devoted to the study of the deep distribution of electrical conductivity depending on the existing thermodynamic regimes at depth, as well as calculations of temperature and rheological parameters using geoelectromagnetic and petrophysical data. A number of articles are devoted to theoretical works, computer simulations and examples of experimental observations. In addition, the Geological Institute KSC RAS has developed a set of programs for processing and interpreting the results of research in the field of electromagnetic sounding using controlled sources and sounding with natural fields. The developed algorithms were first tested in practice. Some projects related to future researches are presented also.

Presented for review the proceedings of the 2nd scientific-practical seminar “The Study of Continental Lithosphere Electrical Conductivity, Temperature and Rheology” edited by A. A. Zhamaletdinov and Yu. L. Rebetsky causes scientific interest. New researches are presents, new developments, both theoretical and methodical. The results obtained allow us to revise some existing ideas about the nature and nature of the thermodynamic characteristics of the lower horizons of the earth’s crust.

Dr. of Sc. Valentina T. Filatova

Annotation

The main content of the articles' collection is devoted to the possibilities study for compilation of new models of the continental lithosphere structure by integrating the methods of geothermodynamics and deep geoelectrics. Considerable attention is paid to the study of nature of the deep geophysical boundaries using powerful controlled sources of the electromagnetic field. Of particular interest are researches related to the study of the transition boundary between the brittle and quasiplastic states of the matter of the earth's crust and the position of the creep area of the earth's crust. Geothermal and rheological studies in combination with the deep electromagnetic soundings are considered as a promising direction, which allows performing tectonophysical reconstruction of natural stresses in the lithosphere. The experimental studies' results and tectonophysical modeling are considered on examples of the Fennoscandinavian shield, the Indian Craton, the Himalayas, Eastern Tibet and the Eurasian continent as a whole. The collection is of interest to professional scientists involved in the study of Solid Earth Physics.

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About the Editors

Abdulkhay A. Zhamaletdinov is DSc, Geological and Mineralogical Sciences (1991), professor of Murmansk Arctic State University, academician of the Russian Academy of Natural Sciences (2010). He was the principal investigator of more than 25 national and international research projects focusing on the study of the nature and structure of continental lithosphere electrical conductivity in complex with geodynamic, geothermal and rheological reconstructions with the use of super-deep drilling data. Most studies are conducted using powerful, controlled source electromagnetic soundings. Results of his research are reflected in 210 scientific articles, eight monographs and three patents.

Yury L. Rebetsky is DSc, Physical and Mathematical Sciences (PhD in Technical Sciences). He is a leading specialist of Russia in the study of natural stresses in the earth's crust and the author of the original method of tectonophysical inversion (reconstruction) of natural stresses from data on faults and cracks, as well as seismological data on the mechanisms of earthquake foci. They performed the reconstruction of the modern stress on seismically active regions of Eurasia. He is the head of the section "Tectonophysics" at the Department of Earth Sciences RAS. He is the one of the leading experts in the field of geomechanical and tectonophysical modeling of tectonic objects of the earth's crust. The results of his research are reflected in 82 scientific articles in leading Russian and foreign scientific journals, as well as four monographs.