

GEOLOGICAL ATLAS OF RUSSIA

Anatoliy A. Smyslov

St.Petersburg Mining Institute, 21 linia, 2,
St.Petersburg, 199026. Russia, telex 121595 Vismut

Alexandr. I. Burde

All-Russian Geological Research Institute (VSEGEI),
Sredny pr. 74, St.Petersburg, 199026, Russia

Nicolai V. Mezelovsky

GEOKART Ltd, B.Gruginsray, 2/4, Moscow, 123242, Russia

Abstract

Geological Atlas of Russia is based on the latest factographic data on geological structure, economic minerals, geophysical and geochemical fields and geoenvironmental study. The Atlas comprises 41 maps supplemented with Explanatory Notes. The maps are subdivided into 4 sections. The publication of the Atlas will be completed in 1996.

Geological surveying and geological maps play an exceptionally important role in studying geological structure and evolutionary history of the Earth, in the origination and development of a number of various branches of geosciences (geophysics, tectonics, metallogeny, etc.). However, as early as , in the 50-ies, extensive metallogenic investigations, continuing study of the Earth's deep structure and some other requirements of geological theory and practice made it apparent that purely geological maps alone were unable to meet new demands. Therefore in 70 - 80-ies, a series of atlases of maps of geological content were prepared; a representative is the Atlas of geological and geophysical maps of the USSR on 1:10 000 000 scale (published in 1982, editor-in-chief A.A Smyslov).

The completion of diversified geological atlases is one of the most efficient ways of synteizing empirical data, preparation and representation of data on the Earth's interior in order to meet the scientific and social requirements in geological knowledge. Such atlases (i.e. atlases proper, map sets, etc) are a long-standing tradition of Russian geological cartography. This tradition is best reflected in the Geological Atlas of Russia on 1:10 000 000 scale. The publication of the Atlas will be completed in 1996. The success in preparing the Atlas should be primarily attributed to enthusiasm and hard work of a large body geologists, geophysicist, experts in the environmental study, specialists in other branches of geosciences from various research of the Federal status, i.e. State Committee of Higher Education (Goskomvuz), State Committee on Geology and Use of Mineral Resources (Roskomnedra) and Russian Academy of Sciences (RAN). Members of Chief Editorial Boards of the Atlas are V.P.Orlov, B.A. Yatskevich, A.F.Morozov, V.M.Terentiev, A.G. Tikhomirov, A.D.Shcheglov (Roskomnedra), N.M. Proskuryakov, A.A. Smyslov, A.N. Tikhonov (Goskomvuz), N.P. Laverov, D.V. Rundquist (RAN), N.V.Mezelovsky (AO "Geokart"). Responsible editor - A.A Smyslov.

Geological Atlas of Russia is based on the latest factographic data on geological structure, economic minerals, geophysical and geochemical fields and geoenvironmental study. It represents a complex of interrelated cartographical models of geological and geoenvironmental medium. The Atlas is intended for geological research, planning of investments into prospecting, exploration and mining of economic minerals and environmental control.

The Atlas comprises 41 maps supplemented with Explanatory Notes. The maps are subdivided into 4 sections:

1. Geological cartographical coverage and conditions for undertaking geological prospecting and mining - 4 maps, editors N.V.Mezelovsky, A.I.Burde.

2. Geological structure and geophysical conditions of Earth's exterior - 17 maps, editors A.A.Smyslov, N.V.Mezelovsky, A.F.Morozov.

3. Economic minerals (fuel, ore minerals and some non-metalliferous minerals - phosphrite, etc.) - 12 maps, editors D.V.Rundquist, V.M.Terentiev.

4. Environmental conditions of geological medium - 8 maps, editors A.A.Smyslov, A.F.Kochetkov, M.G. Kharlamov.

The Atlas pioneers in considering all types of economic minerals, including deposits of gold, platinum, rare metals, etc. on uniform structural basis; this study is accompanied by description of their genetic features, mode of occurrence and economic-geological conditions for their development (see report by A.I.Burde), as well as by the elements of prediction and metallogenic determination. The last (fourth) section of the Atlas consists of maps, many types of which were developed and compiled for the first time and have no analogs in the international cartography. These maps contain data on environmental conditions of geological medium with due regard for natural (seismicity, radon hazards, combined dose of gamma-ray emission, etc.) and technogenic factors (nuclear fuel cycle project, influence of mining and processing enterprises, etc.). One of the maps displays information concerning geological conditions for the development of subsurface space, evaluating the suitability of geological formations and tectonic structure for underground construction (underground nuclear power stations, gas storage, isothermic storage, etc.). For some of these maps, new approaches to mapping geological medium lying at junction of geological sciences and mining were tested.

For compiling the Atlas and individual maps, the following scientific conceptions reflecting from modern tendencies in the evolution of geological theory and practice were used:

a. the necessity of the complex (according to V.I.Vernadsky - geonomic) study of the surface and deeper horizons of lithosphere, for which geological, geophysical and geochemical factographic data as a fundamental scientific basis of a conceptual approach;

b. scientific approach to the analysis of the present state and evolution of geological bodies in the form of maps, reflecting basic parameters of geological material (the substance and its formational, geochemical and petrophysical characteristics, potential geophysical fields, notions of the age and evolution of geological bodies, temperature conditions of the Earth's interior) as a basis for studying geodynamics of lithosphere;

c. conceptual approach realized through a series of tectonic and geodynamic maps, reflecting different interpretations of the evolution and structure of lithosphere, existing of contemporary geological science.

The compilation of the Atlas is based on principles of integrity, inner unity, logical consistency, scientific substantiation, modernity, visibility, simplicity, minimum consumption of time, money and labor, that is on the principles that were worked out in general cartography. The most important features of compilation procedure of the Atlas are: a. combination of maps of natural objects (i.e. geological, geophysical, geomorphological, etc.), condition of geological work and economic evaluation; b. the use of integral indices for compiling maps of evaluating characteristics (condition of geological work, environmental, economic evaluation) and some maps of natural objects; c. different approach to generalization of data

and cartographical materials for maps of different types; d. transformation of data in transition from base maps (geological, geophysical, geochemical, etc.) to the maps of interpretation character based on geological theories and models; e. the use of the GIS technology during of maps (see report by A.I.Burde and S.I.Strelnikov).

In the course of map compilation, some theoretical and practical problems of geological cartography were resolved: general scheme of the Atlas, a system of base maps and maps of interpretation character, a uniform geological basis, the use of theoretical conceptions, generalization of cartographical materials and actual data, a combination of integrated (quality of geologic-cartographical coverage - see report by S.I.Strelnikov a.o., degree of favourability for geological work and mining of economic minerals - see report by A.I.Burde, classification of different areas by environmental assessment, etc.) and individual characteristics of map parts (see report by A.I.Burde), new types of maps, systems of cartographical symbols and means, etc.

The preliminary comprehensive analysis of geological structure on the territory of Russia permits to draw some conclusions as to the structure, present conditions and evolution of the Earth's interior as well as the laws governing the distribution of economic minerals, which will be dealt with in detail in a special monograph "Geological medium and economic minerals of Russia".