

ELECTRONIC ARCAtlas "MAN AND THE EARTH"

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Abstract

Electronic complex geographical ArcAtlas "Man and the Earth" is compiled by Russian and American specialists. It provides the general public including scientists, specialists, high school teachers, students, and secondary school pupils with complex scientific information about the nature, resources, and economy of the Earth's continents. ArcView-2 will provide users with excellent and flexible tools active use of the ArcAtlas.

The complex atlas mapping plays an important role for information and geographical support of fundamental and applied sciences, economy education, and culture. Products of the atlas type gain in significance nowadays. It is a result of developing intellectual and technical opportunities to make an integral human and mechanical complex with a large body of geographical and cartographic information (usually included in atlases) and automatic information and geoinformation technologies.

A product of such kind called ArcAtlas "Man and the Earth" has been compiled by scientists and specialists of Russia (Institute of Geography of Russian Academy of Sciences, M.V. Lomonosov Moscow State University, joint venture Data+) and the United States (Environmental

System Research Institute, Inc.). It is intended for the general public including secondary school pupils, students, teachers, scientists and specialists of the Earth's sciences, as well as others to provide them with powerful educative and applied instrument. The atlas is to be brought out late this year. It pertains to the forth generation of the computer atlases if regarding from the first computer maps based on alphabet and digital printing devices. The atlas is specially designed as electronic (for CD-ROM) for the standard and high-developed software and system ARC/INFO (ArcView-2) and is based on digital elements of the software (digital map ArcWorld).

The ArcAtlas consists of 7 big sections that classify information by 6 thematic subsections for each continent of the Earth. Each continent (excluding Antarctica) has a set of more than 30 themes and subjects (see Table 1).

The content of geographical information by themes and subjects is similar to standard maps of a 1:10,000,000 scale for Europe, 1:20,000,000 scale for North and South Americas, Africa, and Antarctica, 1:25,000,000 scale for Asia and Australia (with Oceania). Some themes are presented by several layers (44 layers in total for each continent excluding Antarctica). For example, Geology consists of 2 layers (Geological Structure and Faults); Transport does 4 layers (Roads and Railroads, International Airports, Pipelines, Density of Transport Network), etc. Moreover, the tables of thematic attributes (contents) contain additional information that can be used for spatial units, other subject and/or thematic layers. It provides more flexible use of information, additional opportunities to combine and compare it. Comparability and adjustment of all the thematic information along with the technical property to correct maps to common scales and projections let us gain integral (combined) scenes for two or more continents including the Earth, as a whole.

Table 1

Subsection	Theme / Subject
Society	Political System, Population (Density), Urban Settlements
Social Infrastructure	Power Generation, Transport, Industry, Agriculture
Resources	Soil, Potential Threats of Soil Pollution and Degradation, Vegetation, Wildlife, Anthropogenic Landscapes, Land Use, Protected Natural Areas and National Parks, Reservoirs, Mineral Resources
Lithosphere	Geology, Seismicity, Volcanoes, Impact Craters, Quaternary Deposits, Geomorphological Structure (Morphostructure, Morphosculpture), Mountain Peaks
Atmosphere	Solar Radiation, Air Temperature
Hydrosphere	Hydrographic Network, Precipitation, Snow Cover, Permafrost, Runoff, Groundwater Discharge

Almost all the layers are supplemented by descriptions, ground photographs, and space images. The descriptions contain general information on a layer (introduction), method of compiling, attributes, principal references, as well as short characteristics of patterns of distribution both worldwide and continental.

Ground photographs and space images are selected both to illustrate specific features of each continent and typical features of geographical objects. The photographs are supplemented by names and comments. The space images are supplemented by short annotations that are results of special component and complex interpretation. All this information is structured and arranged by themes and subjects of maps

to provide simultaneous view of cartographic images and texts. All the texts are arranged in hypertext. The software ArcView-2 (a new product of ESRI) is a flexible instrument for active use of the Atlas materials.

The Russian staff of the Atlas compilers consists of more than 120 scientists and specialists including more than 20 authors of the maps, thematic interpretations of space images from more than 10 research institutes.

Although ArcAtlas "Man and the Earth" is considered, as mentioned above, an information and reference product of the new generation, its content, structure, and methods of designing and compiling keep the features of traditional atlases. The experience of the work shows that it is necessary to develop new approaches to design and compile electronic atlases.

It is significant to emphasise that increasing degree of freedom to use atlas data demands more scientific, technological, and, to some extent, labour contribution to design atlases and maps, acquire and process data.

It requires, at least:

-- to provide maps of an atlas with more detailed initial data compared with the needs for the maps on chosen basic scales;

-- to extend logical compiling and technical work with original maps (to inspect unclosed contours, logical errors of code compositions, etc.);

-- to extend multi-aspect and multistep scientific editing of thematic classification of natural and social objects used in map legends (to compare and combine maps or information layers of interrelated and different contents, scales, projections including

one on another, one with another, in details, in aggregation, simultaneously, etc.).

These methods manifest a new way to solve the problems of:

-- adjustment of atlas maps by repeated and interrelated elements, legend units, natural boundaries and particular areas, as well as horizontal arrangement of materials;

-- development of some or numerous configurations of map elements and a map, as a whole;

-- preferable application of mapping methods to provide higher level of geometric accuracy and geographical compliance of objects to be mapped (for example, application of the method to plot objects by situation, which is characteristic of small-scale mapping, to reduce much, etc.);

-- more accurate and labour-intensive operations to show up geographical names of objects;

-- providing permanent and close interrelations between map authors, editors, digitizing and computer specialists;

-- careful design of job procedure (by steps) excepting doubling digitizing and other operations.

These thoughts do not embrace all the revealed features of generating complex thematic electronic atlases. They have to be elaborated and systematized further.