

AND SPACE IMAGES IN THE LARGE LANDSCAPES OF THE WORLD ON MAPS CARTOGRAPHICAL WORK

Vladimir V. Kiselyov, Victor V. Sveshnikov, Valentina I. Ryabchikova, Valentina I. Somova
State Scientific-Research and Production Center "Priroda", Russia
Anatoly G. Isachenko,
St.-Peterburg State University, Russia
Larisa V. Loginova, Roman A. Lotov, Alexandr A. Ljutyi, Elizaveta A. Finko,
Institute of Geography of Russian Academy of Sciences

The problems of representation of landscapes of the world in the new fundamental cartographical work - the atlas named 'Nature and resources of the Earth' - are considered in the report. The landscape, themes are presented by the interconnected and intersupplementary series of maps, the explanatory texts to maps, the space images and the scientific annotations to them. At the first time in the practice of atlas mapping the space images form with maps the general thematic unit connected by united concept, general aims and conceptual apparatus.

1. Atlas named 'Nature and resources of the Earth' : general notion

The atlas named 'Nature and resources of the Earth' prepared to publication by Institute of Geography of the Russian Academy of Sciences in co-operation with other agencies is the compound combined work. The attempt of the detailed generalization of data on the nature and resources of the planet, on the up-to-date state and the prospects of using the natural resources, the support by scientific data of the researches on the global and large-regional ecological problems is realized in this atlas. The atlas includes the world maps of natural conditions and the natural resources of land and oceans, their evaluations and character of usage. The maps of anthropogenic violation on the nature and the change of resources and environment as well as the maps of state of the separate components of landscape are presented. The maps in atlas are grouped by the large thematic sections. All the sections include the interconnected and intersupplementary series of maps, the texts and the space photographic images. At the first time in the practice of atlas mapping the space images form with maps of sections the general thematic units connected by united concept, general aims and conceptual apparatus. The aerial and space data supplement and develop the concept of sections of atlas .

The support of atlas named 'Nature and resources of the Earth' by the space images has been carried out in the result of the combined scientific-research works by Institute of Geography of the Russian Academy of Sciences and State Scientific-Research and Production Center 'Priroda' of Federal Service of Geodesy and Cartography of Russia (Roscartography).

2. Representation of landscapes in atlas

The landscapes of the world in the new fundamental cartographical work are represented by landscape themes of maps of subsection named 'Structure and resources of biosphere' in section named 'Structure and resources of the geographical environment'. These themes in atlas are presented by the interconnected and intersupplementary series of maps, the explanatory texts to maps, the space photographic images and the scientific annotation to them. The landscape

maps in this subsection of atlas are considered as the base documents which to a great content are determining the unity and quality of series of maps of the given subsection. They are a base for comparing the maps of the conjugate themes. The landscape maps show the geographical differentiation of territory on the natural territorial complexes which are grouped into the classification associations.

For example, the highest categories of the landscape classification - zonal groups of landscapes generalized in reference to the sufficiently small scale - are represented on the map named "Zonal groups of landscapes and their bioclimatic potential" (Isachenko A.G.) at the scale of 1:80 000 000. The classification is based on taking into consideration the leading factors of zonal differentiation of land according to the extents of heat and moisture. The said leading factors and indicative features are taken as a basis upon delimiting and mapping the zonal groups of landscapes. The legend of map is made in a form of table in which the types of landscapes are arranged in one row in accordance with the sequence of change of latitude [1]. The map named 'Extents of heat and moisture of the zonal groups of landscapes' (Isachenko A.G.) is compiled at the same scale (1:80 000 000) with legend in a form of table in which for the types of flat landscapes the characteristics of the extents of heat and moisture are given.

The map series named 'Seasonal hydrothermic phases of landscapes (January, April, July, October)' (Isachenko A.G.) is made at the scale 1:150 000 000) with the tables of state of landscapes (seasonal phases) and with the examples of the seasonal spectra for the different types of landscapes of the terrestrial globe.

The map named 'Zonal types of landscapes of the World' (Lukasheva E.V. etc.) at the scale of 1:60 000 000 represents the natural belts, zones and subzones; the zonal types of landscapes characterized by the recovered vegetation cover. The classes and subclasses of the flat and mountain landscapes are showed on the map.

The map named 'Up-to-date landscapes of the World' (Ryabchikov A.M., Kurakova L.I. etc.) at the scale of 1:60 000 000 represent the main categories and groups of up-to-date landscapes, the basic regularities of their distribution within the geographical belts and zones, the degree of their anthropogenic transformation and character of usage. The map gives the characteristic of the up-to-date of land of the terrestrial globe.

3. Space photographic images in representation of landscapes

But the cartographical images can't represent the appearance of landscapes of the world, show in a form - near to real - the structure and morphology of the natural complexes, their development by man and anthropogenic violation. The supplement of maps by the space photographic images allows to a great extent to eliminate this defect. Lately information of the Earth's surface obtained with the aid of the space means in combination with the traditional methods of geographical analysis begins more widely to be used in studying and mapping the natural territorial complexes of different rank (from the small natural areas to the large physical-geographical units). By the space photographic images the boundaries of natural complexes are distinguished, the structure of landscape is determined, the connections and regularities in distributing the natural complexes are established, the individual natural complexes are united into the typological categories of the different taxonomic rank, the

character and degree of influence of the economic activity of man upon the natural complexes are determined, the small- and medium-scaled landscape maps and the maps of physiographical classification. The space photographic images carry the rich and comprehensive information of landscapes of the Earth; they are the objective and high-quality sources of information.

4. Space data in subsection named 'Structure and resources of biosphere'

The formation of the unit of space data of subsection names 'Structure and resources of biosphere' pursues an aim to acquaint the reader with the different kinds of space photo data representing the zonal types of landscapes of the terrestrial globe; to show the most typical and unique landscapes of the world; to reveal the details of the morphological structure of concrete landscapes; to represent the regularities of landscape structure of the Earth; to show the distribution of soil and vegetation cover; to characterize the most specific features of landscapes displayed on the photographic images; to illustrate and to interpret the contents of single scenes displayed on the small-scaled maps of this subsection of atlas; to recognize the peculiarities of anthropogenic transformation within the landscape zones; to illustrate the signs of ecological situation in the natural complexes.

The unit of space data of subsection named 'Structure and resources of biosphere' takes up in atlas 14 unfolded sheets in sizes of 51.5x51.5 cm; it introduces 75 space photographic images. For realization of space support of this subsection about 300 different space photographic images have been examined and analyzed.

The selection of space images of landscapes of the Earth has been carried out on the zonal-sectoral principle in accordance with maps named 'Zonal landscapes and their bioclimatic potential' (Isachenko A.G.) and 'Up-to-date landscapes (Ryabchikov A.M., Kurakova L.I. etc.) [2-5].

The unit of space data of subsection named 'Structure and resources of biosphere' contains the materials of the different scales and spatial resolution obtained by the Russian space photographic systems. Almost all the unit of space data has been used for effective solving the set task. The basic items of unit of space data are the space photographic images obtained from the automatic space vehicles of the "Cosmos" series as well as the manned space vehicles and the long-duration orbital stations [6,7].

The most informative images for solving the set tasks are the false-colour space photographic images obtained in the result of photographic survey in using the special false-colour film in the band of 570-800 nm. Such images obtained in the conventional colours ensure with the high reliability to distinguish the different objects by the colour contrasts.

The most up-to-date and high-quality data of the false-colour survey carried out by the KFA-1000 photographic camera with the long-focus objective and the great-wide film from the automatic space vehicle of the 'Resource-F1' series intended for solving the tasks of natural studies and cartography have been used widely in the said unit of space data.

The last space vehicles of the 'Resource-F' are equipped by the MK-4 multispectral cameras having four spectral channels. The false-colour space photographic images obtained by this camera have been used most of all in the said unit of space data.

The composite images in the conventional colours obtained in the result of specific transformations of the initial black-and-white negative materials of the multispectral space survey on the optical-mechanical synthesizers have been used also widely in the unit of space data of this subsection. The high expressiveness of colour images is achieved by adding the optical densities of three zones.

The compilers of this unit of space data have tried to show obviously to the reader the natural conditions of our planet are as far as unique and varied. For this here the vertical and oblique space photos; the photos of different scales and details of image that allows to study the natural formations with different areas as well as the photos obtained in the result of photography on the different kinds of film have been used.

5. Conclusion

The presented space photo data obviously illustrate the achievements of science and technique in the field of remote sensing methods of studying our planet. The new methods and the space means of remote sensing of the Earth allow to obtain the regular, operative and comprehensive information on the availability and the spatial arrangement of natural resources, the state of the natural territorial complexes, the dynamics of the natural processes and phenomena. The space photo data improve the reliability of obtaining the information for studying, evaluating and mapping the landscapes of the world and their up-to-date state.

The obvious and high-informative space photographic images presented in the unit of space data of this subsection only to a small extent display the extremely great variety of landscapes of our Earth. The space photo data have given the possibility more objectively to evaluate the up-to-date state of landscapes character and degree of their anthropogenic violation; to determine the ecological state of the natural territorial complexes and nature-protection objects - national parks and reserves; to show the territorial distribution of the unfavourable natural processes and the processes caused by the economic activity of man in either region (for example, forest cutover, savanna formation, desertification). The superimposition of logic of interpretation and descriptions of space photographic images with legends of maps and maps themselves has allowed more completely to reveal the author's idea of the latter ones.

References

- [1] Isachenko A.G., Shlyapnikov A.A., 1989. Nature of the world: Landscapes, 504 pp., Moscow, Mysl.
- [2] Isachenko A.G., Loginova L.I., Lotov R.A., Ljutui A.A., Finko E.A., Kiselyov V.V., Ryabchikova V.I., Svechnikov V.V. 1989. Space images in the new fundamental atlas of the Earth. Resource-ecological mapping on the base of information systems, pp. 144-146, Irkutsk.
- [3] Isachenko A.G., Ljutui A.A., Loginova L.V., Lotov R.A., Finko E.A., Kiselyov V.V., Svechnikov V.V., Ryabchikova V.I., Somova V.I., 1995. Landscapes of the

world on maps and space images in the large cartographical work. Making the cartographical works by the materials of space survey, pp. 16-33, TsNIIGAIK.

[4] Making the cartographical works by the materials of space survey, 1995. Managing editor Sveshnikov V.V. 155 pp., Moscow, TsNIIGAIK.

[5] Ecological mapping with the use of aerospace data. Managing editor Sveshnikov V.V. Summarizing information. 107 pp., Moscow, Central Institute of Geodesy, Air Survey and Cartography (TsNIIGAIK).

[6] Kienko Yu.P., 1991. 'Resource-F' space subsystem. Geodesy and cartography, No. 7 pp., 4-11, Moscow.

[7] Kienko Yu.P., 1994. Introduction into space studies and mapping, 214 pp., Moscow, Cartgeocenter - Geodetical Publishing House (Geodezizdat).