

MODERN APPROACH TO DEVELOPMENT OF GRAPHIC AND ART SCHOOLS ON MAP DESIGN IN MOSCOW STATE UNIVERSITY OF GEODESY AND CARTOGRAPHY (MIIGAIK)

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Abstract.

Cartographic design is an up-to-date direction of the MIIGAIK cartographic school of map design. In present conditions of map creation with the use of computer technologies the role of fundamental theory and scientific methods of artistic composition of both traditional and digital cartographic products is further increasing.

The paper considers the principles and methods of cartographic design, and gives recommendations on their application to the increase of the aesthetic level of maps and atlases.

The background of graphic and art school of map design at the Moscow State University of Geodesy and Cartography (MIIGAIK) goes as far back as 1823 when the main subjects of the educational plan in the Konstantinov Land Surveying Institute, a geodetic school, were «Drawing» and later «Calligraphy», «Art of drawing of maps and plans». Introduction of these subjects to the educational plans was connected with carrying out land measurements in Russia and their use in plans and maps. The job was done manually including picturesque design of maps and plans.

Since 1936 much attention had been paid to development of subjects of graphics and design for training cartographers-engineers at the Cartographic faculty which resulted in setting up the Department of Drawing and Map Designing in 1940. One of the leaders of the graphic school of the University may be considered P. P. Levitsky (1859-1930) remarkably talented in graphics. For 50 years P. P. Levitsky headed teaching of graphic arts. The synopsis of lectures «Topographic Drawing» was written by him and in 1909 «Short practice in drawing plans, making inscriptions on them and coloring them » was issued.

Evolution of thematic cartography called for more profound training for specialists on map designing. Among the first teachers who contributed significantly to the theory and practice of map design was Adrianov V. N. In 1934 he supervised the design of the Large Soviet Atlas of the World (abbreviated in Russian as "BSAM") for which he worked out and designed a special font called "BSAM italics".

Art training is integral in obtaining education by the students of the Cartographic faculty. Therefore solid traditions and the high level surveying graphic school have been continued by teaching the subject of «Map design». This subject has received its further scientific development. Skvortsov P. A. and Koldaev P. K. may be rightfully considered as founders of art school of map design. Koldaev P. K. studied the problems of light and shade, color depiction of relief, map hachures. He contributed notably to their theory and practice.

Years 1935 to 1970 may be called the period of formation of native school of artistic design of maps. Skvortsov P. A., a talented artist, cartographer and scientist, is rightfully considered its father. He carried out fundamental investigations into color plasticity and color depiction of relief. He worked out a classification of hypsometric scales, which included a group of pictorial scales. A unique landscape-relief map made by Skvortsov's students under his supervision and showing the

European part of Russia decorates the University reading hall now. Under his leadership and with his direct participation numerous pictorial maps were designed. The uniqueness of design methodology of pictorial landscape maps is an organic merging of strict principles of designing cartographic products and those of landscape painting.

Skvortsov's artistic school of map designing is being extended by his numerous students and followers. His scientific and methodological ideas in the field of pictorial map designing are implemented in the courses «Color design of relief», «Artistic map design».

Now that the majority of cartographic products are being created with the use of computer technologies the role of art design is more increasing. An important problem in this process is development of fundamental theory and scientific methods of map design, introduction of traditional design principles into the field of digital maps and atlases.

Thus the role of cartographic design modeling for effective transfer of the information in the electronic presentation is increasing in view of the following characteristics of digital maps:

- visualization on computer displays;
- the use of color models;
- limitation of map visualization sizes;
- capability of simultaneous presentation of vectorial and raster map, space and aerial images;
- two or three-dimensional animation of the spatial data for demonstration of processes dynamics;
- including of multimedia elements into cartographical images.

Designing maps and atlases various in purpose and content the cartographic project is created by means of hachure, background and art decoration.

Hachuring and background decoration determines the composition of a map sheet, while art design increases an aesthetic level of cartographic products. The choice of a composite solution is a creative process requiring good taste in art and the ability of a cartographer - designer to estimate maps and atlases aesthetically.

On projecting a design it is important to keep in mind that a sheet of a map or an atlas has a certain format on which a harmonic and expressive composition, which takes into account contents diversity, color combinations, proportionality and size of signs and fonts selection, is developing. Besides it is necessary to be guided by fundamental scientific principles of cartographic design:

- classification of map symbols and fonts;
- conformity of design and ways of transfer of the information to the purpose of a map;
- accuracy of mapping information;
- ergonomics, compactness, unification, constructibility, aesthetic, reliability, progressiveness.

The problems of maps and atlases design should be decided with the use of composite - spatial means. A basic element of composition is the layout determining relation between elements of design. The relation between elements providing harmony of composition are characterized by certain properties:

- Replication of the whole in its compounds as the basic feature, which provides composition integrity. It is provided by the shape, size and color;
- Coordination, meaning the order of all elements or element groups ensuring certain sequence of composition perception;

- Proportionality as a method of deriving a common unit for commensurable signs of elements or their groups in composition for true perception of map parts and a whole;
- Balance of every part and the whole about symmetry axes.
- Unity and integrity of composition as the generalizing principle.

The quality of a map is characterized by many properties, one of which is the expressiveness of color composition provided by means of a design. In meeting the requirements of a design - beauty, convenience, usefulness of a cartographic product - color plays an important role being one of representational means of a map. The problems of colors selection, their harmonic combination should be decided in view of particular tasks. The color may improve or worsen aesthetic and functional qualities of cartographic products.

With development of engineering and introduction of new technologies in manufacturing maps and atlases the potential of computer design extends. Within the program of development of educational cartographic manuals for educational institutions MIIGAiK carries out work on creation of series of educational maps, and their electronic variations. Wall educational maps of Russia of 1:5 000 000 scale, intended for use in the course of physical and social economic geography of Russia for 8-9 forms of secondary school may be regarded as the first result of this work.

Scientific principals of MIIGAiK art and graphic schools had been used in developing the design of the maps. Harmony and integrity of the maps had been gained because of the use of combinations of nuance and contrast color combinations, art frames, symmetrical composition on a sheet of the map, and single mathematical basis.

The design of a complex map of Russia developed by a group of authors is of particular interest. The map represents a new type of cartographic school manuals. The integrated approach to the contents was provided by a combination of geographical elements (hydrography, relief, boundaries, roads) with thematic elements of the map - natural zones, boundaries of buoyant ice, directions of cold and warm marine flows, main deposits of natural recourses of Russia. The mathematical basis of the map gives correct impression of the territory. Landscape design combined with color shading was used for map creation. Every stage of map creation involved computer technology.

To sum it up it should be noted, that the scientific basis of the MIIGAiK graphic and art schools of map design have found their evolution and continuation in a new direction of art-designer activity - cartographic design. The growing need for various kinds of cartographic products requires a qualitative change in art designing process of cartographic production, a move to a higher stage of creative activity of cartographers, application of modern technologies, materials and new kinds of cartographic image.

References

- Nyrtsova T. P. (1990), Design in laying out maps and atlases. *Izvestiya vuzov*, № 6, pp. 127 – 135
- Nyrtsova T. P. The composite - spatial means of design and their use in maps and atlases decoration. *Geodesy and cartography*, November 1999, pp. 33 – 37
- Nyrtsova T. P. Cartographic education at the Moscow State University of Geodesy and Cartography. *Geodesy and cartography*, May 1999, pp. 15 – 17