

# THE USE OF AEROSPACE PHOTOGRAPHIES AND REMOTE SENSING DATA IN CARTOGRAPHY

M.H. Gojamanov

Baku State University, Faculty of Geography, Dept. of Geodesy and Cartography  
23, Z.Khalilov Str., Baku, Azerbaijan, AZ-1148

**KEY WORDS:** Photography, Satellite, Image, Resolution, Ikonos, Orthophototransformation, Update map, QuickBird

## ABSTRACT:

This article dedicated to the features of the use of space imagery and remote sensing data for the various tasks of cartography. Maps produced by satellite imagery are more modern and accurate outlines of mapped objects that best represent the phenomena are interrelated and that in the absence of such images in general could not be mapped. There was considered two new directions of space cartography. The first simulates the cosmic view of the Earth on the maps, which led to the creation of so-called "orbital" maps. Combination of traditional cartographic map image with aerospace is the essence of the second direction. Remote Sensing, carried out in a wide range of scales, to update maps of small and medium-size directly from the photographs, not seeking renewal of large-scale maps. The Technical characteristics of modern space images are suitable for mapping scale of 1:5000 and smaller. Cosmic digital images opens up new possibilities: reduction of the cost of repeated surveys, the increase in area coverage areas, reducing the distortions associated with the relief. Therefore, surveying from space can become the main method of updating topographic maps.

## 1. INTRODUCTION

Cosmonautics and remote sensing images have made in mapping the Earth is truly revolutionary transformation. The main sources of information in remote satellite surveys are satellite imagery - images of objects obtained as a result of registration with the great distance of their own or reflected radiation.

For mapping use are important the properties of these satellite images, as their huge territorial scope and completeness of mapping territory. To this have to add simultaneity fulfill mapping, a sharp reduction of time collecting information and ensuring a high consistency of created on its base the series of thematic maps.

The development of radio electronics led to a flight of aerospace systems for imaging areas, different from traditional photography, such as television, scanner, radar and thermal surveys.

The introduction of aerospace methods of creating maps and the development of automated compilation sheet systems - two major problems of modern theoretical and practical cartography generated by scientific and technological revolution.

## 2. MAIN BODY OF TEXT

Development of space surveys gave new impetus to the remote methods of mapping. They expanded their capabilities - the global reach of information, including the previously inaccessible area of the Earth and the surface of other planets, regular speed and repeatability of receipt and processing of information, imaging on the satellite pictures of phenomena that otherwise could not fix.

Maps produced by satellite imagery, are more modern and accurate outlines of mapped objects that best represent the phenomena are interrelated and that in the absence of such images in general could not be mapped (eg, deep faults on geological maps).

Using space images allows for control and revision of maps in part: a) the correctness of the boundaries outlines of areals and geographical distribution of mapping objects and phenomena; b) overlay compilation of cartographic representation and the relative position of objects; c) the reliability of the content of individual units and maps in general.

In connection with the aerospace mapping there were developed two new directions. The first simulates the cosmic view of the Earth on the maps, which led to the creation of so-called "orbital" maps. Combination of traditional cartographic map image with aerospace - the essence of the second direction. It led to the creation photomaps. Photomap - this printing impression of photomaps, at which the photo image of the area obtained by mounting transformed aerospace photography (Gruenberg, Lapkina, 1991). These photographs, thanks to the generalization of the optical image passing nature of the Earth in "natural" form and saving the nuances and details, highlight the most significant.

In the U.S. there photomap this state, assembled from 569 images obtained by satellite "Landsat". It is reproduced on the scale of 1: 250000 to 1: 5 000 000 for the different seasons in different spectral regions. Similar photomaps compiled for the territory of other countries (Canada, France, Britain, Japan, etc.).

Modern surveying space materials in the quality and level of resolution can compete with the aerial photographs as a basis for large-scale topographic maps, and the problem of updating topographic maps are generally very successfully solved with satellite imagery. Remote Sensing, carried out in a wide range of scales, to update maps of small and medium-size directly from the photographs, not seeking renewal of large-scale maps. This gives a great gain in time, in the fullness and present information, as well as the rapid cartographic provision of major socio-economic projects.

The modern world is very variable: growing cities, new settlements, built roads, communication networks, engineering structures, and new areas of mining, cut down forests.

Therefore, there is always the task of creating and updating topographic maps.

At the moment on the world map are practically no white spots - topographic maps covering almost the entire surface of the planet's land, although not all are equally detailed. The territory of the Azerbaijan Republic is fully covered with maps in scale 1:25000, and about two-thirds of the country - in scale 1: 10000. Therefore, development of topographic maps re still required less often - only in case of radical changes.

As the primary material for topographic maps have traditionally been used aerial photographs. With the advent of satellite remote sensing of Earth equipped with optical electronic sensors by high-resolution the satellite imagery could compete with aerial photographs as source material for large-scale mapping. The performance characteristics of modern space images suitable for mapping scale of 1:5000 and smaller (Savinykh, Tsvetkov, 2001); despite the relatively high cost of these photographs, they may be cheaper than aerial photography for mapping small areas. Space survey is also preferable in cases where aerial photography is difficult in organization, for example, for mapping of major cities and in the boundary areas; in addition, it more operational.

Over the past few years received a considerable amount of data space imaging, performed with the spacecraft QuickBird and WorldView - 1 with a resolution of 50-70 centimeter (Elerdova, 2009). In the present time space images from these spacecrafts completely cover the Earth globe. This allows the company DigitalGlobe (USA) to develop and offer various categories of users worldwide, including the CIS (Commonwealth of Independent States) countries, projects of direct access to archived data. One of these services are ImageConnect and ImageBuilde, providing users with direct access to high-precision data from the satellite QuickBird and WorldView-1. The main advantage ImageBuilde is the ability to integrate satellite imagery with vector data user.

Cosmic digital images opens up new possibilities: reduction of the cost of repeated surveys, the increase in area coverage areas, reducing the distortions associated with the relief. In addition, it simplifies the generalization of the image on the small-scale maps: instead of consuming simplify large-scale maps can be immediately used medium-resolution satellite imagery. Therefore, surveying from space can become the main

method of updating topographic maps. When to select images for mapping to have to account the graphical accuracy of maps (0.1 mm). For example, the images should have a spatial resolution better than 10 m for maps of scale 1:100000. Accordingly, the images Ikonos (USA) with a pixel size of 1 m can be many elements of the content maps of scale 1:10000 and smaller ([http:// www / sovzond.ru /](http://www/sovzond.ru/)). However, some elements of topographical maps, such as free-standing trees, the width of the rivers in the map scale, etc., require more detailed imaging.

When you update maps applied only change the contours of the elements, and the mapping to determine the exact position of these elements. Therefore, for the preparation of topographic maps required space images of higher resolution than to update them.

Work on updating topographic plans carried out in several stages: an initial set of data by vectorization the source material, binding and orthophototransformation space image, image decoding and updating of data, field update.

### 3. CONCLUSIONS

Through remote sensing market expansion, new products, especially in the category of products of high industrial expansion, the use of space imagery in the works on cartography and land is becoming more affordable and widespread. Reducing the cost of remote sensing data has led to the fact that for the production of quality outputs a high degree of accuracy is not required enormous time and material costs.

### REFERENCES

Elerdova, M., 2009. Using remote sensing data from space in geoportals and LBS-services. Moscow, *Geoprofi*, 2, pp.20-23.

Gruenberg, G., Lapkina, N., and others, 1991. *Cartography with the basics of Topography*. Education, Moscow, 368 p.

Savinykh, V., Tsvetkov, V., 2001. *GIS analysis of remote sensing data*. Kartgeotsentr-Geodezizdat, Moscow, 228 p.

[http:// www / sovzond.ru /](http://www/sovzond.ru/)

