AVIATION AND SPACE EQUIPMENT IN OUR REPUBLIC DEVELOPMENT BASICS

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Abstract*. This article discusses the importance of ground-controlled satellites in the development of air and space satellites and space exploration, thousands of such satellites have been launched to date, and many ground-controlled satellites in different countries are still around the earth. the movement of satellites along with the exploration of space with their help, the weather on earth, the regular study of various processes on earth, the transmission of television and radio programs, as well as mobile telephone communications on earth are also information from satellites. it is reported that it is being carried out to completion.*

Keywords*: aerial photography, space photography, GPS, GLONASS, geodesy, space geodesy, cartography, cadastre, digital photogrammetry, monitoring of agriculture and water management, modern space equipment.*

One of the most important applications of aerospace photography is aerial photography, that is, from airplanes, helicopters, drones, earth satellites, etc. Aerial photography is a body of work for obtaining aerial negatives and aerial photographs or digital images of the Earth for later use in plans and maps.

Aerial photography – including development of technical specifications for aerial photography, design and execution;

Field laboratory work (photography) - traditional aerial photography, including photo processing of exposed aerial films, shooting and preparing prints from them and other basic products;

Organization of field photogrammetric work - registration of aerial photography materials in field work and assessment of the quality of work performed, observation and photography.

As part of the traditional work, courses in aerial photography, aerial photography and special flying classes are organized. Aerial photographs - photographs of the earth, covering without interruption a certain part of the earth, surface, are used for further transformation and maps and plans are drawn up from them. Adjacent aerial photographs will need to be compared with the calculated value to support further work.

Dimensional and photometric aerial photography work is mainly necessary for aerial photography of photographic materials and optical systems, depending on the fulfillment of the technical conditions of aerial photography and the choice of parameters used. At the same time, the accuracy and quality of aerial photographs are determined, the quality of maps and plans

compiled from them, the time of photogrammetric processing and laboratory work are organized. There is a need to work together to obtain high-quality, comprehensive aerial imagery and use it effectively. Flight research work and, above all, their parameters are coordinated with the organization of all topographic and geodetic production.

It is known that traditional aerial photography, digital aerial photography is carried out using two technologies, depending on the type of digital cameras:

When organizing flight photography, digital cameras are used and two GPS+INS systems are integrated.

GPS - Global Positioning System

INS – visualization system available. This visualization system is also often used in space exploration.

A modern computer in the cockpit and modern computer software make it possible to combine the processing of GPS receiver data and INS data - a visualization system, and the combined image is converted into full-fledged images. It is difficult to predict changes in the height of an aerial camera platform. Therefore, the advanced and second technology approach is to install a matrix sensor.

Based on a matrix sensor - (meters to determine the position of the image at each time in space), when all elements of the matrix are exposed simultaneously, it is more similar to the traditional analogue method of aerial photography. In this method, the geometry within a pixel is known and more fixed than in linear technology, where the speed of the media varies depending on the size of the pixel.

The current problem with matrix technology is that it is difficult to produce large matrices. Therefore, they are combined: they make 4 large cells and several small ones. For example, four lenses produce four separate images, which become the central projection and are automatically scaled, and such images are processed using existing analytical programs. Digital aerial photographs also have external directional elements recorded in flight (linear - Xs, Ys, Zs - coordinates of the center of the photograph; angular - α, ω, χ - camera direction relative to the coordinate axes).

According to the laws of central projection, it creates an image of the earth, aerial negative (aerial photographs) values include a number of distortions determined by the angle, tilt of the optical axis of the aerial camera and the vibration of the earth is not constant. The process of eliminating these distortions is called photogrammetric processing, namely photographic or digital transformation.

The use of aerial photographs without their original photographs is limited by the effects of distortion, which serve as the basis for transferring the completed work to cartographic (topographic) software, including GIS. The readings of special instruments and equipment recorded during aerial photography ensure the stability of the flight camera or their subsequent identification for further use in photometric work and transformations. The spatial location of aerial photographs in absolute or relative coordinate systems is shown on plans and maps. Such devices include gyroscopes (devices for determining meridians), GIS - global positioning systems and determination of flight altitude, heights between photocenters, as well as aviation systems and others.

The availability of the obtained data mainly affects the processing of aerial photography materials in laboratory conditions, the efficiency and accuracy of photogrammetric constructions

and work to support them. Aerial photography is carried out by specialized units of the topographic-geodetic or land management service on a specially equipped flight.

Specialists of the Republican Center for Aerogeodesy of the Department of Stereotopography and Digital Cartography are working on creating topographic maps of the Tashkent region object in 2024 on a scale of 1:10,000. The territory of the Tashkent region object is 7,400 sq.m. km, consists of 304 sheets. Digital topographic maps at a scale of 1:10000 are created in the Photomod program based on a photogrammetric system.

In the modern world, space data from Earth remote sensing systems are an essential component of the information support systems of any developed country. The quality of space data, timely prevention and response to emergency situations have become important in decision-making systems. Other services include emergency management, weather assistance, environmental management, electronic mapping and construction planning, transport continuity, defense and more.

After the administrative reform of the Government of the Russian Federation, developed in accordance with Decree of the President of the Russian Federation No. 314 of March 9, 2004, responsibility for the collection and processing of remote sensing data was divided between several leading departments, each of which one is the operator of the recipient's own terrestrial network:

Ministry of Defense
Ministry of Natural Resources
Ministry of Emergency Situations and Consequences Elimination
Federal Space Agency (Roscosmos)
Hydrometeorological service

Satellite images provide fast and detailed information about the entire surface of the Earth, which allows for environmental monitoring, water quality monitoring, assessment of environmental changes, assessment of natural damage, natural disasters, planning and implementation of restoration actions.

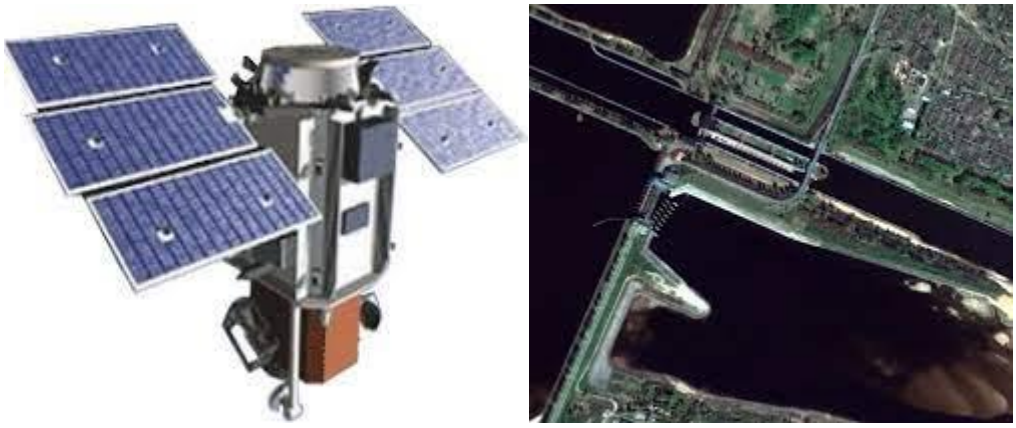
Space data is becoming everything today; it will be easier and cheaper to obtain more diverse and accurate data, receive it, process it in modern programs and update it.

On October 4, 1957, the first Earth satellite was launched into Earth orbit from the Baikonur Cosmodrome (Baikonur), located on the territory of modern Kazakhstan. Almost 65 years have passed since then, and more than 600 types of satellites for various purposes and tasks have been launched around the Earth.

Part of the space around the Earth is studied and developed with the help of Earth satellites. Manned spacecraft are used to conduct various scientific and technical research. The first satellite of the Earth had a mass of 83.6 kg, orbited the Earth for a total of 92 days and completed about 1400 revolutions around the Earth.

The QuickBird satellite is a commercial Earth observation satellite owned by DigitalGlobe. At its launch in 2001, it became the highest spatial resolution commercial Earth remote sensing satellite. The satellite re-entered the Earth's atmosphere on January 27, 2015.

Orbit altitude: 482 km.
Orbital speed: 7.1 km/s.
Price: $60 million (2000).
Launch date: October 18, 2001



Satellite image from the QuickBird satellite

At the present stage of modernization of Uzbekistan, great importance is attached to the development of space activities. For example, on February 12, 2018, Decrees of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev “On measures to develop space research and technology in the Republic of Uzbekistan”, “On the development of space activities in the Republic”. Uzbekistan" Agency "Uzbekcosmos" was created by Resolution No. PF-5806 dated August 30, 2019, No. 781 dated September 17, 2019 in the presence of the Cabinet of Ministers. On November 24, 2022, the decree of the President of the Republic of Uzbekistan Sh. Mirziyoyev “On additional measures for the further development of the space network” was signed. The agency is engaged in increasing the efficiency of government organizations through the use of space technologies, the formation and development of the space industry and infrastructure on the territory of the republic, and the creation of a personnel training system in the field of space research and technology.

Creating conditions for the development of the market for space technologies and services;

Remote sensing of the Earth;

Satellite communications;

Navigation and mathematical services;

Space monitoring system;

The Republic of Uzbekistan includes such a direction as space activities.

The main purpose of the order is to study the experience of advanced foreign countries that have become the locomotive of economic growth, an additional factor in attracting foreign investment, and the introduction of innovative ideas, developments and technologies in the field, space and on roads. creation of an integral management system for the space industry by establishing a unified state policy in the field of related technologies.

In this regard, the issue of creating a state center for receiving, processing and disseminating Earth remote sensing data is being considered, since space images make it possible to obtain reliable information about objects located on the earth. In today's advanced age, it is important to conduct situational analysis for the development of the space industry and the development of optimal management decisions in many areas of life.

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