REMOTE SENSING INFORMATION, MODERN PROGRAMS IN GEOLOGICAL EXPLORATION WORKS

A.R. Almordonov
Tashkent State Technical University

Abstract. *Geology - it is emphasized at the state meetings dedicated to the field of geology that the use of modern methods, remote sensing data, and GAT (geographic information system) technologies is the need of the hour for effective, reasonable and cost-effective exploration. Currently, almost every developed country uses remote sensing data at every stage of geological prospecting. The efficient and convenient side of this method is that solid minerals are known to develop mainly in geosynclinal regions. Exploration in geosynclinal regions is always expensive. A lot of geological information can be obtained if remote sensing data is used, i.e. primary processing, visual and automatic decoding. This will serve us as indirect search signs. This article provides information on remote sensing data, software for processing it, and GIS technologies used in geological exploration.*

Key words: *geology-exploration, GAT, Landsat, multispectral images, combination of channels, interpretation, morphological, digital space photo, remote sensing data, landscape.*

INTRODUCTION

These remote sensing data are space-based images of the Earth's surface taken from specially equipped satellites. A remote-sensing photograph of the Earth's surface provides a reduced representation of the actual landscape elements and components of the study area. Landscape structure is determined by the scale and speed of endogenous and exogenous processes. Therefore, it is possible to obtain geological: geomorphological, mineralogical, hydrogeological, geochemical, geophysical, tectonic, neotectonic information by analyzing relief images. The digital representation of spatial data allows to process them using modern computer technologies and programs. As a result, a lot of pictures were taken of various regions containing various geological-structural data, and programs for their processing using modern computer technologies were developed.

Satellite image processing programs are divided into 4 groups:

1. Linear programs based on signal processing.
2. Syntactic programs that allow you to determine the form and primitive extraction.
3. Morphological programs.
4. Statistical programs.

Space photographs are taken using an electronic receiver. An electronic receiver attached to the satellite receives the energy returned from each elemental

surface of the Earth. The smallest elemental area is called a pixel (the size of pixels varies in different satellites). For example, an image from the Landsat satellite is coded in 10 bits and accepts 1024 numerical values. Such space pictures are taken in 11 bands of the electromagnetic spectrum (visible, near-infrared, ultra-infrared and thermal infrared). That's why Landsat (AQSh) satellite images are called 11-channel multispectral images. Photo pixel size (resolution) from 15 meters to 90 meters Fig. 1.

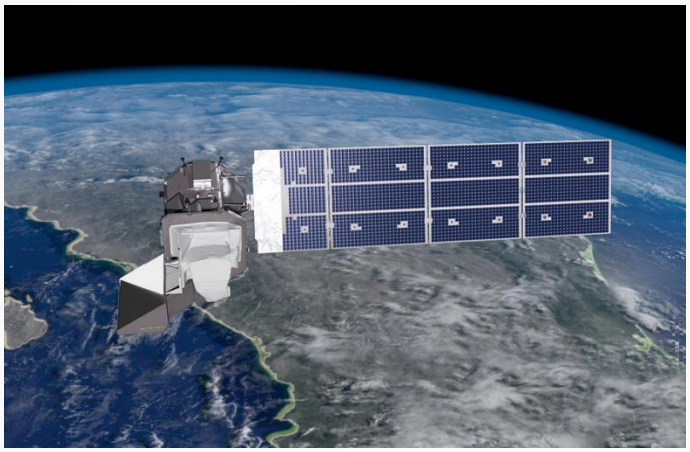

Figure 1. Landsat-9 satellite

Material and Methods. When decoding digital space images, they need initial and thematic processing. Special programs are used for this. These are programs ERDAS IMAGINE, ENVI, GLOMAPPER, GEOMATICA, with the help of which you can geographically connect space images from LANDSAT, ASTER, SENTINEL, WORLDVIEW, QUICKBIRD and many other satellites, view them on the screen, mosaic space images covering a large area, initial and thematic allows you to process and prepare various cartographic images. In addition, these programs include more than 100 methods and algorithms for visual and automatic analysis of digital space images, geological data and their digital maps are created as a result of processing through several methods. These obtained data serve as the basis of GAT technologies in geological research.

The term GAT (geographical information system) appeared as a result of the introduction of information technologies into Earth sciences in geological exploration in developed countries. In this case, the word "geographic" does not mean territoriality and integrity, but the meaning of complexity (complexity) and systematicity in GAT.

GAT is a modern computer technology for mapping and analyzing real world objects, as well as events happening on our planet. This technology allows for map visualization, geographic, spatial and statistical analysis, along with the integration of traditional database operations. These features distinguish GAT from other information systems, and therefore its application provides great opportunities for solving a wide range of tasks, such as analyzing events and phenomena in the world, understanding their possible consequences, making strategic decisions and

forecasting. GAT technologies automate a new, modern, effective, convenient and fast approach to mapping, analyzing and predicting various topics.

Results and Discussion. In geology, the results obtained by processing remote sensing data in computer programs are based on the application of GAT technologies. In addition, geological maps of various contents, results of field work, 3D models of the earth's surface and other data are analyzed in special GAT programs such as GLOBAL MAPPER and ARCGIS. As a result of the analysis, maps with new content, based on remote sensing data: space structures, lineaments, geological structures, rocks, temperature maps of the earth's surface, prediction maps for various minerals, 3D models of the earth's surface, density maps of various geological formations and structures, density of distribution of minerals maps and other types of geological maps are made.

The results of research and the analysis of remote sensing data play an important role in clarifying ideas about the geological structure of a certain area, determining the location and distribution of mineral resources, assessing the geological situation, and predicting promising areas for minerals.

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