International Journal of Geology, Earth & Environmental Sciences ISSN: 2277-2081 (Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/jgee.htm
2018 Vol. 8 (1) January-April, pp. 1-4/Nurhodjaev
Research Article

REMOTE METHODS FOR SOLVING THE APPLIED PROBLEMS OF GEOLOGY IN THE LIGHT OF MODERN REQUIREMENTS

***A.K. Nurhodjaev**
State Enterprise "Center for Remote Sensing of the Earth and GIS-Technologies" of the Republic of Uzbekistan
**Author for Correspondence*

ABSTRACT
The characteristic of the remote basis - the cosmogeological map is given. We considered the principles of visual and automated interpretation of remote sensing data. The requirements for the creation of distance bases of different scale are set forth. The main areas of application of space imagery materials in regional studies for solving applied geology problems are proposed.

Keywords: *Space Images, Deciphering, Structurally-Deciphering Complexes, Remote Basis-Cosmogeological Maps*

INTRODUCTION
The development of modern geological prospecting production can not be presented without new technologies and developments that allow obtaining new information serving as a criterion for estimating prospective areas and allowing local forecast of ore content with minimal costs. One of such directions is the use of remote sensing data (RSD) for solving applied and scientific-thematic problems of geology.

MATERIALS AND METHODS
RSD materials carry objective information that allows mapping geomorphological indicators of structural forms formed as a result of the action of endogenous and exogenous processes and the deepest buried structures in combination with geophysical data.
The technique of deciphering geological objects in images is the detection, recognition and interpretation of an object or phenomenon on the basis of certain criteria. At the present stage, the methods of using ERS materials for studying the geological nature of mountain and foothill areas have been developed and successfully introduced into geological exploration.
A great deal of experience in the field of geoscientific research in different mining regions has been accumulated. The survey time, the range of the spectrum and the scale range of the most suitable for solving the problems of applied geology have been experimentally established. With the advent of digital images, the work carried out on the basis of RSD materials was of a completely different nature and is widely used at regional and local levels of geological research. Naturally, along with this, the possibilities of using remote sensing materials have been greatly expanded and the geological decoding technique has been substantially improved.
However, the change in the vector of the direction of prospecting and evaluation works towards areas hidden by soil and vegetation cover, loose sediments (sedimentary cover) requires completely different criteria. Modern software tools are used to analyze remote sensing data with the use of geological, geophysical and geochemical data. This is one of the priority areas of modern geology.
The advantage of the remote basis, the cosmogeological map, is that it explains the geology of the area from a new perspective and helps to identify elements that are not distinguished by other methods. The main geological units allocated to remote sensing materials are linear and ring structures, structurally-diffractive complexes (SDC), which form the framework of the endogenous structure of the investigated territory, which is the basis for the compilation of geological, cosmogeological and other maps of the new generation (Borisov and Glukh, 1982).
With the advent of the possibility of obtaining digital photo images of the Earth, a new era of space survey - cosmogeological maps has been developed.

The creation of a remote base - a geologic map includes several basic methods of comparing and comparing objects within a single image and their logical interpretation (visual and automated). When creating a remote basis of the Republic of Uzbekistan on a scale of 1: 500 000, RSDs were used to solve the following tasks:

- Allocation of area and linear geological structures - complexes and their boundaries (structurally deciphered complexes);
- Study of structural-tectonic elements (faults, tectonic blocks, zones of crushing, fracturing, ring and fold structures, etc.);
- Complexing of cosmogeological, geophysical and geochemical data in the environment of GIS projects;
- Mineragenic zoning, identification of regularities in the location of minerals and forecasting of potentially promising areas (separate blocks).

The solution of these problems was carried out on the basis of space images Landsat 7, Aster (TERRA), Quick Bird and radar satellite imagery SRTM on the basis of ERDAS Imagine and ENVI software.

The deciphering of remote survey materials was carried out in three stages: preliminary, field (verifying) and final. In the preliminary stage, the systematization and processing of space survey materials were carried out. Based on the results of the analysis of factual data, taking into account geological, geophysical, geochemical and other information, a preliminary deciphering scheme was created, with isolated area, linear and concentric elements of the landscape. All identified elements in the preliminary decoding scheme were refined during the field-verification studies. The final processing of the received information was carried out during the office period. It included the additional study of different-scale images on the nodal areas of the area, the linkage of the results of interpretation with geological observations, geophysical fields and geochemical anomalies; Correction of maps, schemes, tables of deciphering signs, criteria for the forecast of minerals.

RESULTS AND DISCUSSION

The main deciphering signs in the determination of area and linear geological structures and the separation of the boundary of the SDC in terms of the composition of rocks are the pattern and structure of the color gamut (spectral brightness) of the studied territory. The structure of the picture and the spectral brightness of the object in this case depends on the physical-mechanical, chemical properties, mineral composition, textural and structural features of the rocks, and also on the geological structure and geographical conditions of the territory (Figure 1).

Figure 1: Identified Area and Linear Structures According to Patterns and Color Anomalies the Central Part of the Nurata Mountains; Western Uzbekistan

Based on the recognition of various geological structures on the materials of space surveys, the preliminary remote bases are drawn in a polish manner according to the above-mentioned signs (Figure 2).

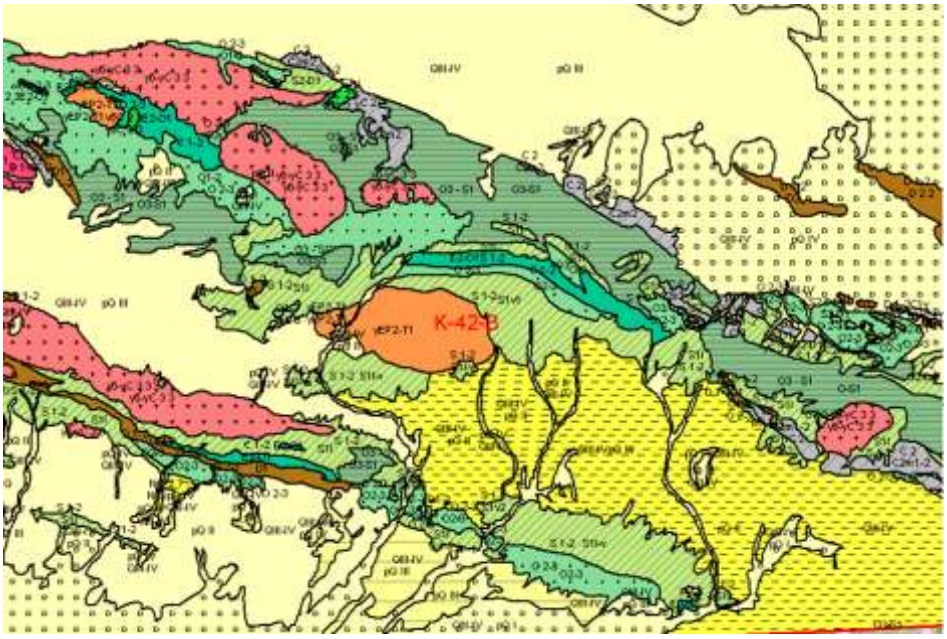

Figure 2: Preliminary Distance Basis the Central Part of the Nurata Mountains; Western Uzbekistan

When creating a preliminary remote basis for interpreting the materials of the Earth's surface, many natural and man-made factors were taken into account, such as the transparency of the atmosphere, the type of relief, the density of vegetation, the availability of settlements, land cultivation, and so on. The deciphering of the territory with the meso-cainazoic cover was considerably hampered by the density of the vegetation cover, where there was technogenic appearance of geometric areas. In such cases, indirect indications of interpretation emerged on the first flank, describing the transition from tonal-geometric and landscape models to models of geological structures.

Useful and diverse geological information extracted when deciphering space images of disruptive disturbances.

Various elements of disjunctive tectonics appear on the materials of remote sensing of the earth's surface in the form of lineaments. Despite the age-old history of using this concept in the study of the deep structure of the Earth, there is still no single concept of "lineament". Nevertheless, in all definitions there is much in common.

Under the lineaments are understood rectilinear or slightly curved natural objects of the landscape, most often reflecting linear heterogeneities of the lithosphere, namely faults in the earth's crust, flexures in the sedimentary cover, zones of sharp changes in geological structures, separation of geochemical anomalies on one line and high gradient zones of geophysical fields. The final stage of creating the remote basis is post-field dehiviriation of RSD materials, which will use the results of visual and automated interpretation, field verification materials, integration with geophysical and geochemical data of the studied area. As a result of the analysis of all available materials, the final version of the remote framework was created.

The remote basis is a constructive, project-oriented document that can be used for planning and performing works, allows generalizations, long-term and retrospective analysis of geological and geophysical materials, study of regularities in the location of mineral resources and facilitates the rational placement of prospecting within the recommended forecast sites.

REFERENCES

Borisov OM and Glukh AK (1982). *Ring Structures and Lineaments of Central Asia*, (Fan, Tashkent, Uzbekistan) edition "Science": Book 123.

Jian GL and Mason PJ (2009). *Essential Image Processing and GIS for Remote Sensing*, (London, Chichester, Wiley-Blackwell) 434.

Katz YG, Tevelev AV and Poletaev AI (1988). *Bases of Cosmic Geology*, (Russia, Moscow: Nedra) 235. ISBN 5-247-00319-5.

Nurhodjaev AK (2017). Current state and prospects for the development of remote sensing of the Earth in the geological exploration of the Republic of Uzbekistan. *Journal of Geology and Mineral Resources of Uzbekistan* **1** 78-83. ISSN 2010-5495.

Nurhodjaev AK, Asadov AR, Ryskidinov ZT and Ubaydullaeva SA (2015). Cosmo-structural features of the Toldytau mountains and some results of cosmogeological studies. *Journal of Geology and Mineral Resources of Uzbekistan* **4** 9-12 ISSN 2010-5495.

Snitka NP and Khamroev IO (2016). The connection of geodynamics with the metallogeny of the Southern Tien Shan and the actual tasks of conducting geological exploration work. Geodynamics, magmatism and mineralization of the Western Tien Shan. *Materials of the Scientific Conference Dedicated to the 80th Anniversary of Academician T.N. Dalimov* 105-109. Book-1. ISBN 978-9943-364-80-6.