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Research Article

ON THE QUESTION OF CREATING REMOTE BASES ON MATERIALS OF REMOTE SENSING OF THE EARTH ON THE EXAMPLE OF THE TERRITORY OF THE MOUNTAINS OF SOUTHERN NURATAU

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ABSTRACT
The article gives information about the remote basis of the cosmogeological map. Modern cosmogeological images from various satellite systems and methods for processing remote sensing data on the Earth`s surface were used to conduct research. The results of geological studies carried out on cosmological geological maps are the remote basis used in the relevant braches, as well as provide an opportunity to obtain additional information and serve as the main sources for subsequent geological research as well as will be planning further geological exploration.

Keywords: *Cosmological Studies, Digital Satellite Imagery, Structurally Deciphering Complexes, Remote Sensing of the EARTH, Ring Structures, Linear Structures, Cosmogeological Map-Remote Basis*

INTRODUCTION
The main geological research is a geological survey of the territory, and the use of space imagery materials in geological mapping is essential and helping to clarify the geological structure of the area, analyzing the distribution of mineral resources. As a result of the scientific and technological revolution, space research already significantly affect the acceleration of the pace of development of geological science and technology and bring a great economic effect (Borisov and Glukh,1982).
Creating a remote basis includes several basic methods: comparison and comparison of objects within one snapshot and their logical interpretation (Nurkhodzhaev *et al.*, 2017).
The remote base is represented in the form of digital images and graphic materials. Materials, as a rule, are presented in the form of spectro zonal images of the earth's surface and are shown in a cartographic projection on which the distant basis is based. The interpretation part of the remote base is the decoding scheme, created by cosmogeological and field materials.
According to the program "Cosmogeological, geochemical and geophysical studies in the territory of the Republic of Uzbekistan for 2009-2020," works were put in place to increase the efficiency of geological exploration with the introduction of Earth remote sensing materials (RSE) into complex geological exploration.

MATERIALS AND METHODS
The remote base (RB) is a modern digital information product created based on materials of remote sensing of the earth (MRS). It is an independent document of regional geological studies, reflecting a new level of organization of data, involving in the process of mapping large territories previously unknown or unused factors arising from non-traditional research methods (Nurkhodzhaev and Togaev 2017). The advantage of the distance base is that it explains the geology of the area from a new position, helps to identify elements that are not distinguished by other methods. The main geological units distinguished on remote sensing materials are linear and annular structures, structurally-deciphering complexes (SDC), which constitute the endogenous framework of the structure of the study area, which is the basis for compiling new generation geological, cosmological and other maps (Borisov and Glukh, 1982, Nurkhodzhaev *et al.*, 2017; Nurkhodzhaev and Togaev 2017).

With the advent of the possibility of obtaining digital photographic images of the Earth, a new era of using space imagery materials (SIM) to create remote bases - cosmological maps has begun.

RESULTS AND DISCUSSION

Creating a remote base - a cosmological map includes several basic methods, such as: comparison and comparison of objects within one image and their logical interpretation (visual and automated). When creating the remote base of the mountain Southern Nuratau, the materials of remote sensing of the earth were used to solve the following tasks:

- the selection of areal and linear geological structures - complexes and their boundaries (structurally interpretable complexes);
- the study of structural-tectonic elements (faults, tectological blocks, zones of collapse, fracturing, ring and folded structures, etc.);
- integration of materials cosmological, geophysical and geochemical data in the environment of GIS projects;
- mineragenic zoning, identification of patterns of placement of minerals and forecasting of potentially promising areas.

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

The decoding of remote sensing materials was carried out in three stages: preliminary, field (validation) and final (Kats *et al.*, 1976; Kashkin and Sukhinin 2001, Nurkhodzhaev and Togaev 2017).

At the preliminary stage, systematization and processing of space imagery materials were carried out. According to the analysis of the factual data, taking into account the geological, geophysical, geochemical and other information, a preliminary interpretation scheme has been created with distinguished areal, linear and concentric landscape elements (Nurhodjaev *et al.,* 2015; Nurkhodzhaev and Togaev 2017). All the identified elements in the preliminary interpretation scheme were refined during the field-verification studies. The final processing of the information received was carried out in the office period. It includes an additional study of multi-scale images on the nodal areas of the area, linking the interpretation results with the data of geological observations, geophysical fields and geochemical anomalies; correction of maps, charts, tables of interpretive signs and criteria for the prediction of mineral resources. The main interpretive signs in determining the areal and linear geological structures and identifying the boundaries of SDC on the composition of rocks are the pattern and structure of the color spectrum (spectral brightness) of the study area (Kashkin and Sukhinin 2001; and Nurkhodzhaev *et al.,* 2017). The structure of the pattern and the spectral brightness of the object in this case depends on the physico-mechanical, chemical properties, mineral composition, texture and structural features of the rocks, as well as the geological structure and geographical conditions of the territory (Fig. 1).

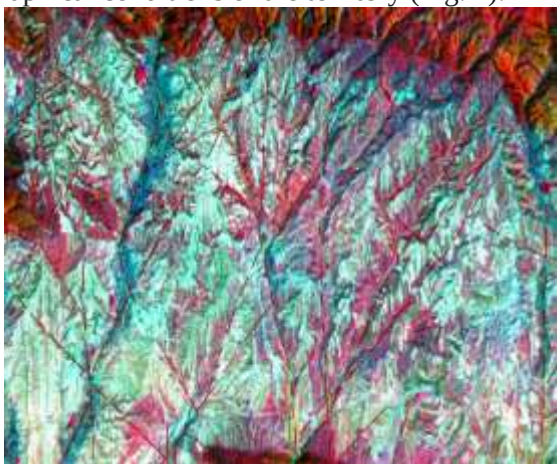


Figure 1: Identified linear structures from the figures and combinations channels

Based on the recognition of various geological structures on the materials of space surveys, preliminary preliminary distance bases are compiled according to the above mentioned characteristics (Fig.2).

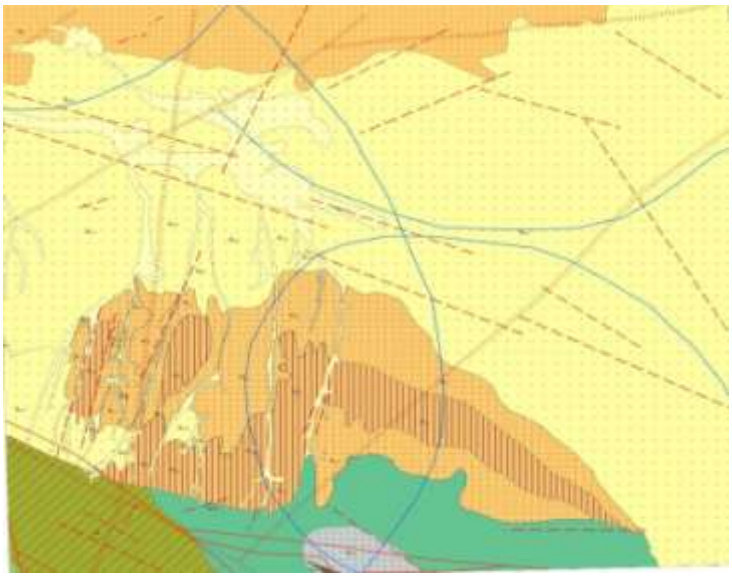


Figure 2: Fragment of a preliminary distance base

When creating a preliminary remote basis when interpreting 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 presence of human settlements, the cultivation of land and others.

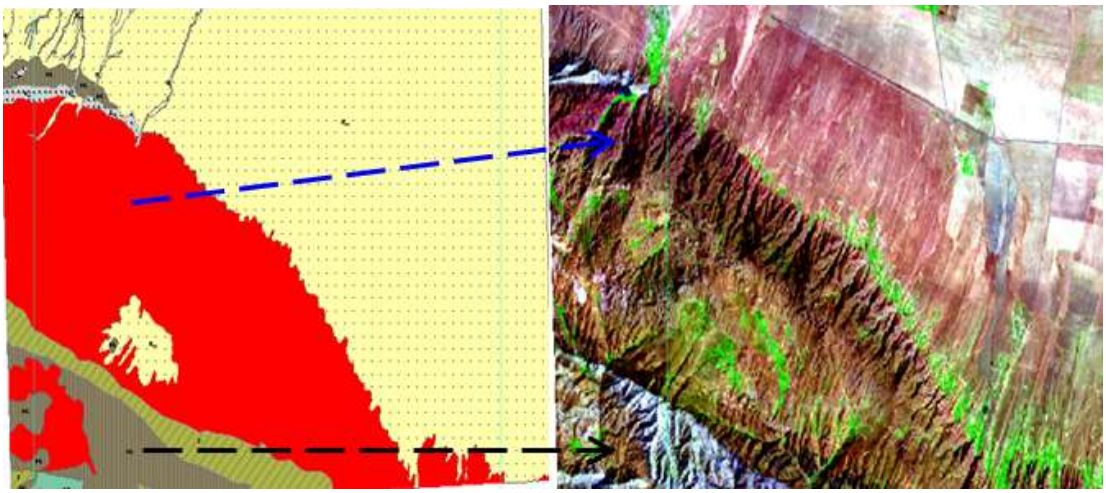
The deciphering of the territory with the mesocoic-cenozoic cover was significantly hampered by the density of the vegetation cover, where there is a technogenic view of the geometric areas. In such cases, indirect signs of deciphering that describe the transition from the tone-geometric and landscape models to models of geological structures come to the fore.

Useful and diverse geological information is extracted when decoding space images of faults. Various types 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"; There are several definitions of this concept. However, in all definitions a lot in common. Lineaments are understood as rectilinear or slightly curved natural landscape objects that most often represent linear heterogeneities of the lithosphere, namely: faults of the earth's crust, flexures in the sedimentary cover, zones of dramatic changes in geological structures, separation along a single line of geochemical anomalies and high gradient zones of geophysical fields (Borisov and Glukh, 1982; Barrett and Curtis, 1979, Katz, 1988,; and Kats *et al.*, 1976).

The interpretation signs of faults are diverse, and all of them are controlled by regional structures rather than local ones. The deeper the position of the deformations in the Earth's crust, the more diffuse they reach the surface and can only be noted in the pictures of a high level of generalization (more often they are expressed by zones of regional fracture).

Further, the compiled preliminary distance base is corrected directly in the field by means of certification ground routes.

The field verification of data interpretation of space imagery is an integral part of cosmological studies. It is carried out with the aim of verifying the terrestrial manifestation of photo-anomalous changes on the processed images obtained by different methods of processing satellite imagery and field approbation of direct and indirect signs of structurally-interpretive complexes and structural positions. In addition, mixed grounds are distinguished in this territory (Fig.3-4).



a) Remote base b) a fragment of a space photograph

Figure 3: Dedicated intrusive structurally complexes and associated with the remote basis

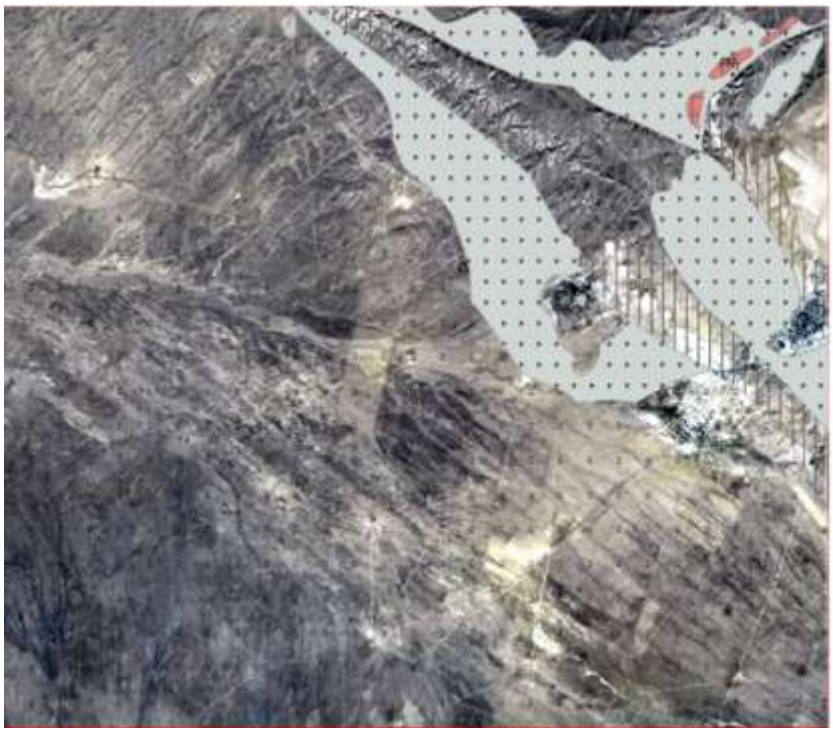


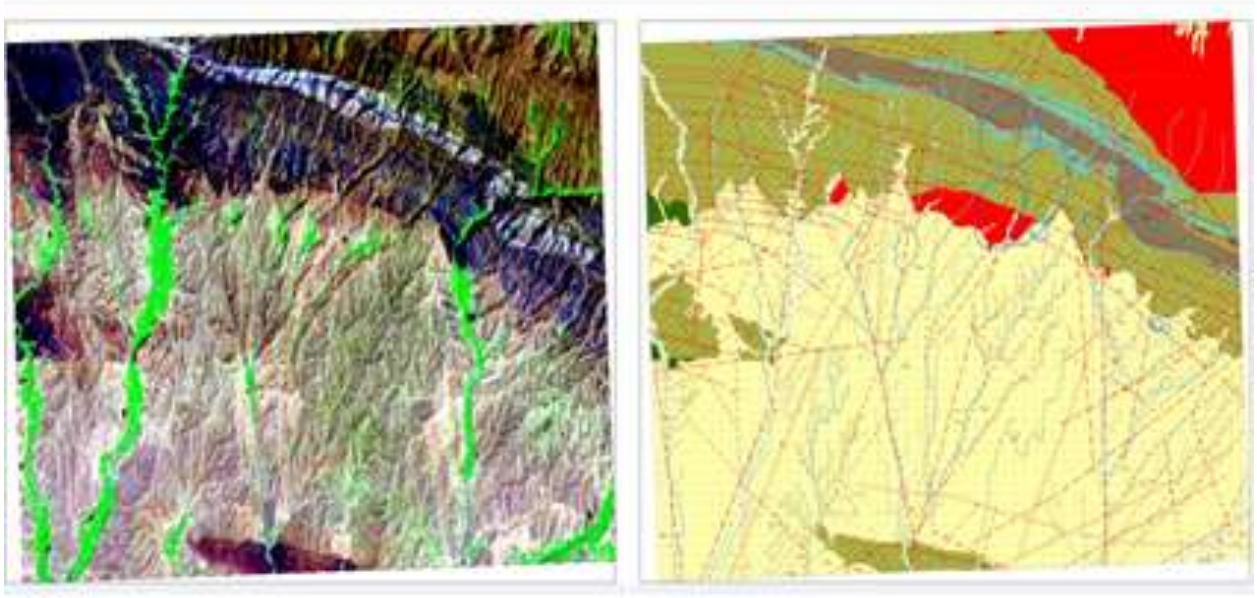
Figure 4: Mikstite complexes revealed on the territory of the South Nuratau mountains in satellite images

Carrying out field verification work includes several stages: checking the compliance of objects with the interpretation of reality; joint analysis of maps of factual material and interpretation schemes in order to select the possible directions of validation routes to specific objects of a point, linear or areal nature (clarification of the contours of ring structures, faults); clarification of pre-compiled digital cosmogeological foundations of objects of interpretation and their elements.

The final stage of creating a remote basis is the post-field interpretation of remote sensing materials, during which the results of visual and automated interpretation, field verification work materials,

integration with geophysical and geochemical data of the studied area are used. As a result of the analysis of all the available materials, the final version of the remote basis will be created.

The remote basis is a constructive, project-based document that will be used in planning and conducting geological exploration, as it allows generalizations, perspective and retrospective analysis of geological and geophysical materials, the study of patterns of placement of minerals and thereby contributes to the rational placement of prospecting works within recommended forecast areas. The created new document has a specific character and special requirements for it (Fig.5).



(A) (B)

Figure 5: Space image (A) and the results of creating a remote base (B) the territory of the South Nuratau mountains

The original MDC used in creating the remote basis must meet the requirements for detail, visibility, and must also be presented in several informative spectral channels. The shooting season should provide the most expressive image of natural indicators of mapped objects. Clouds and technical defects that significantly impair the quality of the source materials should not occupy more than 20% of the area of the distance base, which is permissible only if it is impossible to obtain MDC without the indicated defects. Images must be taken in the visible and infrared zones of the electromagnetic spectrum and provide such coverage to reflect the position of the mapped area in the overall structure of the region. Visibility should be provided by the MDC, which have a wider shooting range. The components of the interpretational part of the remote basis are the interpretation schemes and the interpretation schemes for the interpretation results.

Interpretation schemes display the information on linear and structurally-interpretive complexes highlighted in images. Interpretation schemes for interpreting results are created at the stage of using the remote base when drawing up a set of maps based on the analysis of the factual part of the base, taking into account the available geological, geophysical and other information.

Interpretation schemes should be compiled for all types of maps, the creation of which uses the information received from the MDC.

On the basis of materials from space surveys of the territory of Southern Nuratau, the geological structure of the territory was clarified, information was obtained on the localization and structure of mineral resources, buried intrusions and structures of linear types were discovered (Fig.6.)

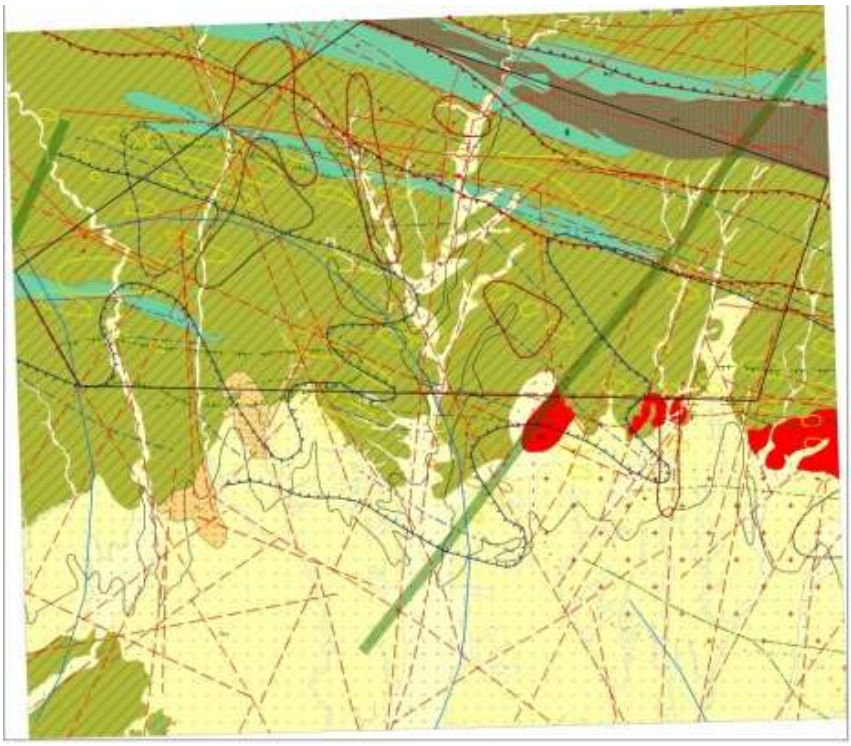


Figure 6: By complexing the results of cosmological and earlier geological and geophysical works, potentially promising areas were identified in the study area

CONCLUSION

The following conclusions from the recent cosmogeological studies in the mountains of South Nurota:

- On a remote basis, deciphering identified structural-deciphering complexes, structural and tectonic disturbances, reflected magmatic factors, cosmological objects of search value. By complexing the results of cosmological and earlier geological and geophysical works, potentially promising areas were identified in the study area.
- The used automated methods for processing satellite imagery solved most of the tasks of an applied nature, such as: mapping structural units, identifying a zone of regional fracturing of the meridional strike, ring structures, tectonic disturbances, as well as recognition and classification of structurally decrypted complexes.
-The most favorable combinations of RGB channels (Red-Red, Green-Green, Blue-Blue) systems for solving geological problems were identified.
- New terms in cosmogeological studies have been substantiated and characterized - structural-interpretation complexes: igneous, volcanogenic-carbonate-terrigenous, terrigenous, carbonate, siliceous-carbonate, etc., as well as mixtitic complexes.

Also, all the results obtained from interpreted space images and field work-faults, structural interpretive complexes and their borders form the basis for the creation of a distance base of the territory of the Mountains Southern Nuratau (Fig.6).

Based on the results of the work performed, remote bases have been created that serve as base maps for conducting regional analysis of endogenous mineralization in the studied area, as well as planning further geological exploration based on the interpretation of satellite imagery using GIS technologies. Estimating the role of the Earth remote sensing materials when creating a remote basis, it should be noted that this method, especially in combination with geophysical, geochemical, and geomorphological methods, is used to solve all the main tasks that geologists face in regional geological work.

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