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Research Article

POSSIBILITIES OF DIGITAL SPACE IMAGES IN THE INTERPRETATION OF TECTONIC ELEMENTS

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ABTRACT
In article it is given the results of researches by different methods of digital satellite acquisition widely now in use in Uzbekistan for detection of the covered tectonic structures. New data is obtained on stretch, width and a nonconventional trajectory of the Gissarsky deep fault which is stretching on the opened and closed Chakylkalyan-Karatyube zones and Zirabulak-Ziyaetdinskymountains.

Keywords: *Deep Fault, Suture, Digital Space Image, Interpretation, Intrusion, Deflection, Unconventional Trajectory*

INTRODUCTİON
The Gissar deep fault, referred to by various researchers as the North Gissar, Gissar-Bukhara, etc., is one of the large, complexly constructed and long-term developing zones of discontinuous faults, proven by geophysical studies. It was first identified during geological survey work in the 40-50s of the last century Tarasenko (1970). The fault zone is considered in its exposed part at a distance of about 200 km, its depth reaches 50 km, and possibly more, then it extends to the northwest for more than 1000 km, with a width of 25-45 km.
Throughout the fault zone, in some areas of the tectonic suture, under the cover of Mesozoic-Cenozoic deposits, manifestations of magmatism are noted in the form of a band of effusives of basic composition and chains of intrusions of acidic composition. To the west of Sultan-Uvais, in this complex system, a branching of the tectonic suture in two directions is observed. One of them acquires a meridional strike and follows the Urals through the Aral Sea; the other stretches northwest to Mangyshlak and continues through the Caspian Sea to the Donbass.
The history of the occurrence and development of this fault from a mobilist position was explained by T.N. Dalimov and V.I. Troitsky, who believed that in the late Paleozoic South Tien Shan entered a collision stage of development. The stress stresses of converging microcontinents - Kyrgyz-Kazakh in the north and Afghan-Tajik in the south - predetermined the emergence of a complex cover-folded structure of the Southern Tien Shan. Its northern border is marked by a suture stretching from the foothills of the Northern Nuratau, through the southern and eastern outskirts of the Fergana depression to the Eastern Tien Shan along the northern slope of the Atbashi Range. To the north of the suture, the Kuramino-Beltau volcano-plutonic belt was formed. To the south of the suture, the Gissar-Bukhara-Kharezm volcano-plutonic arc was formed. The southern boundary of the Tien Shan fold-cover belt is not so confidently distinguished. Probably, it should be carried out to the north of the Gissar volcanic belt (Dalimov and Troitsky 2005).
The purpose of the study: The study of the materials of previous researchers on the interpretation of the geological and structural features of this segment of the earth's crust showed that the trajectory of the Gissar deep fault in the Bukhara-Gissar direction is interpreted differently. Therefore, it is especially important to obtain an effective tool that would reliably identify and determine its strike (его простирание). The article

presents some arguments reflecting the author's ideas on changing and clarifying the position of the Gissar fault based on the results of satellite images and geological data.
For this purpose, several variants of Landsat digital space images were processed and analyzed, according to which the information content of the spectral-reflective characteristics and the system of integral decoding features were carefully assessed.

MATERIALS AND METHODS

In predictive metallogenic studies of endogenous mineralization, the most important ore-controlling value is played by deep faults, which predetermine a favorable environment for the migration and localization of productive, highly heated physico-chemical geological systems that arise in various zones of the earth's crust. These faults are characterized by the duration of their development, the length along the strike (hundreds, thousands of km), the depth of laying (tens, hundreds of km) (Babaev, 1995).
This article discusses some of the results of studies of the Gissar deep fault, extending in the Chakylkalyan-Karatyube-Zirabulak-Ziyaetdin mountain range based on remote sensing materials and geological data.

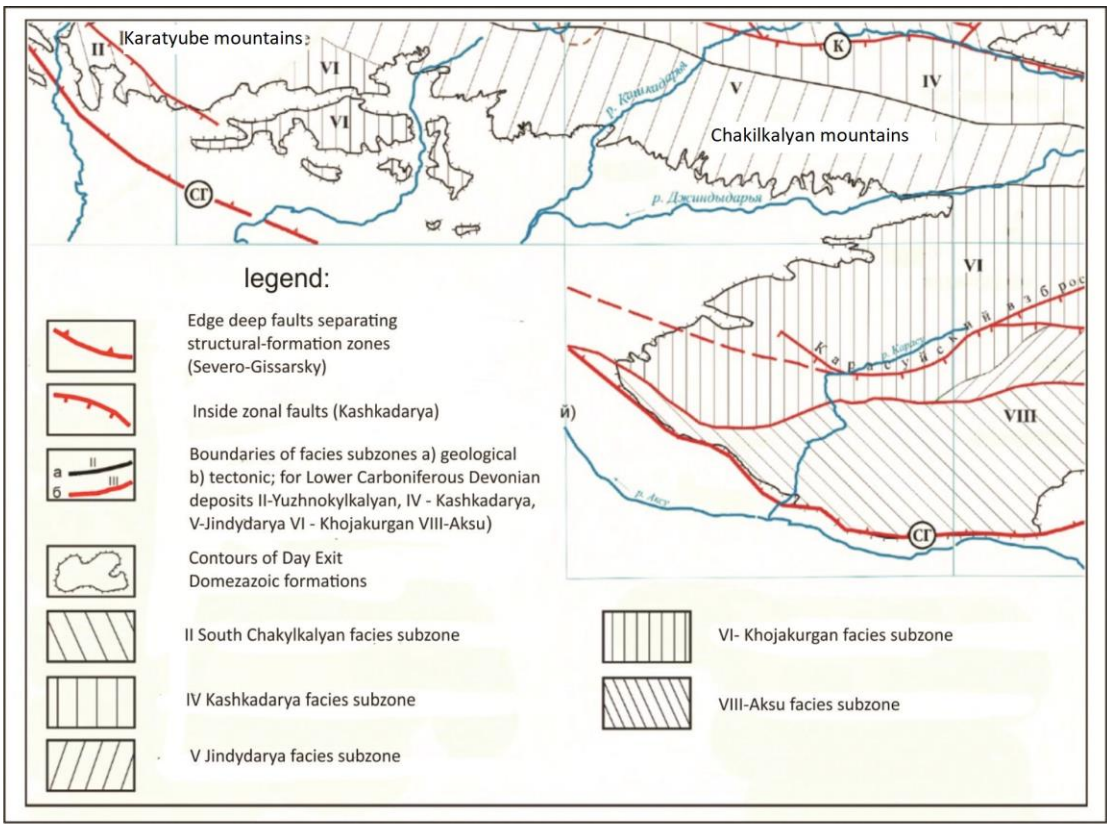

Fig.1. Fragment of the scheme of structural-tectonic and facies zoning of the Karatyube-Chakylkalyan mining district. Authors E.G.Fedorov *et al.*, 2012

RESULTS AND DISCUSSION

Authenticity of geological constructions on the basis of the controlled from distance methods is determined, foremost, geoinformations' of the applied materials of aero- and space surveys. As it applies to the aims of the geological decoding under geoinformations' ability of materials of the controlled from distance surveys to pass the signs of geological objects through an aero- and space image is implied: structural elements of lithospheres, lithologic-and-stratigraphic complexes, displays of exogenous processes and other. Visual interpretation is the most important component of geological research using remote methods. Since the human eye and brain are able to fix and analyze such subtle features in the coloring and drawing of individual anomalies of areas that are not yet available to the available technical means of remote sensing (Gubin, 2003). Especially when it comes to ancient faults, which are difficult to identify on satellite images, since for hundreds of millions of years, due to prolonged repeated endogenous and exogenous processes, they undergo multiple deformations that change their true morphology, texture, structure and even location. Therefore, we used several variants of processed satellite images for different information content. As a result, reliable data were obtained on the direction and extent of the Gissar fault in the band from Chakylkalyan-Karatyube to Zirabulak-Ziyaetdin Mountains.

Conclusion

The Gissar fault on the southern slope of Chakylkalyan is composed of carbonates of the Lower Devonian by the Madmon formation (D_1md) and, passing along them, sinks under Mesozoic-Cenozoic deposits at a distance of more than 20 km. Then the fault continues towards the Karatube Mountains (Fig.1).

On a digital satellite image, exposed carbonate rocks (D_1md) look in a mixture of dark yellow, light green colors (Fig.2.). However, the narrow linear and arc-shaped clusters of light yellow-green anomalies reflected in the satellite image indicate that they extend along closed zones in the sublatitudinal direction where settlements are located Birkunlik, Panji, Kaynarbulak, etc. The confirmation is the opening of the root outcrops of limestone for the purpose of extraction of construction material by private enterprises in the settlement of Birkunlik and on its outskirts.

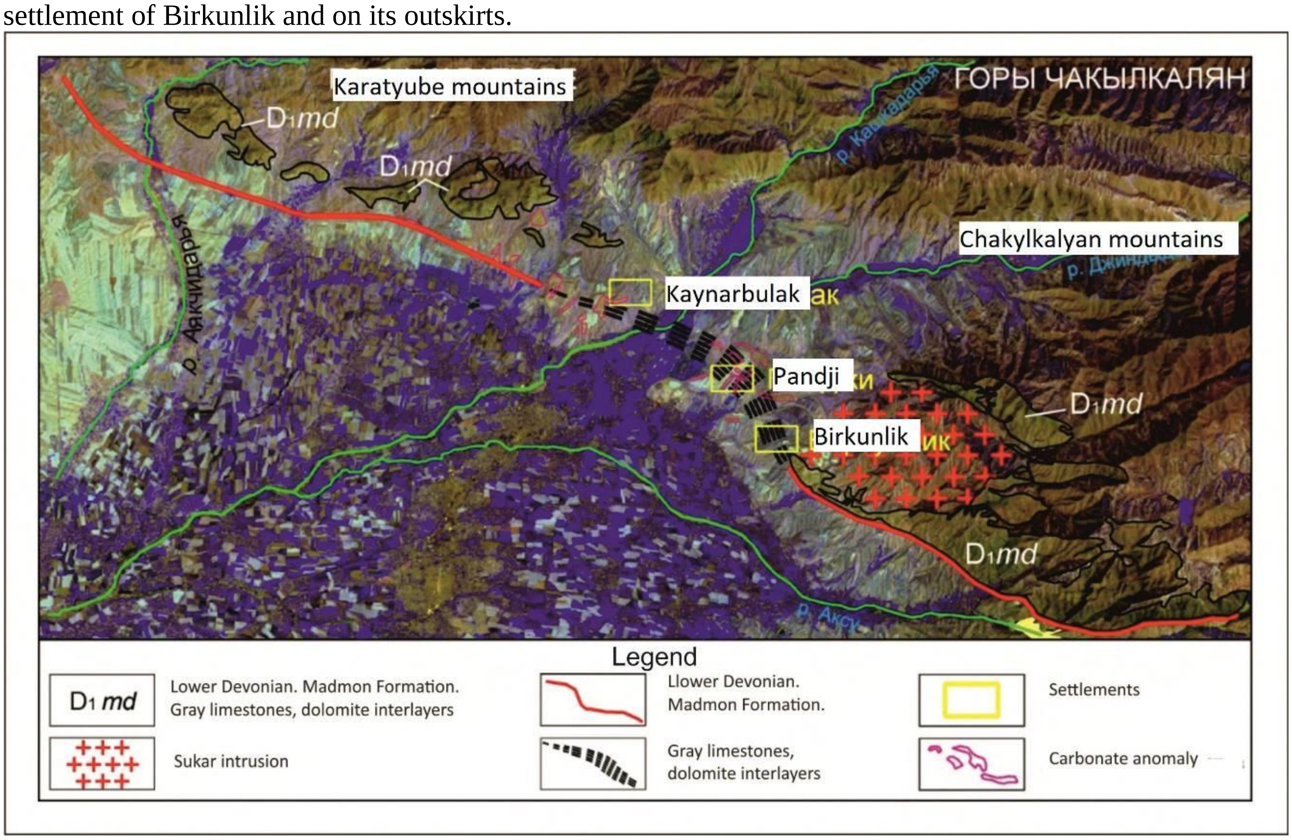

Fig.2. Decoding of the Gissar fault from a digital satellite image

Further to the northwest, the Gissar fault extends between the Karatube intrusive and its Lolabulak satellite, branching in places and then uniting in a submeridian direction for a distance of about 25-30 km (Fig.3.). Here the fault attracts search interest, since it extends along the wide contacts of the Lolabulak and Karatubin intrusives (C_3-P_1), as well as with Ordovician, Lower Silurian and Lower Devonian deposits.

Further, the Gissar fault continues along the Jam trough.
According to the cosmic methods "Index-E V" Zokirov O.T. (2014), it was found that the fault extends under the loose cover in the sublatitudinal direction in the form of a linear, zigzag and fine-mesh strip of black color (Fig.4.). Under the Mesozoic-Cenozoic sediments, where there is less sediment thickness and greater transparency, the Gissar fault it looks in a dark ruby color, and under a more powerful cover, with less transparency, it acquires a dark brown and reddish-brown color.

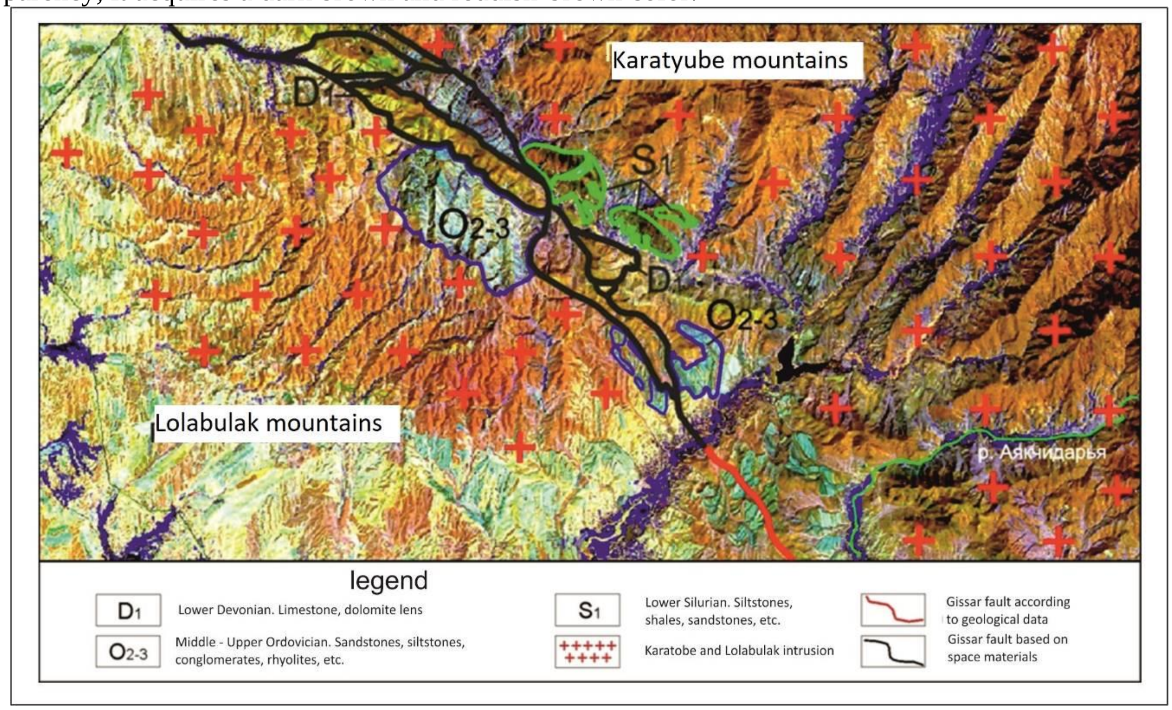

Fig.3. Decoding of the Gissar fault using a digital satellite image.

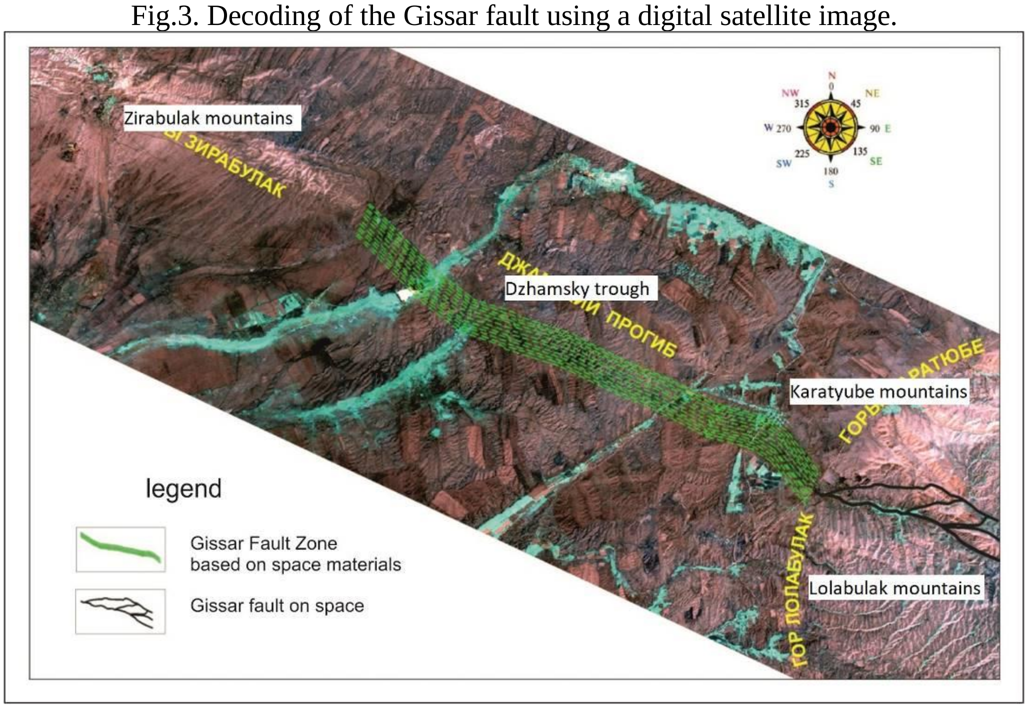

Fig.4. Decoding of the Gissar fault from a digital satellite image

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J.M. Heifetz and others who carried out drilling and geological and geophysical work on deep geological mapping with geological survey assumed the possibility of a deep fault in the Jam trough (Fig.5.).

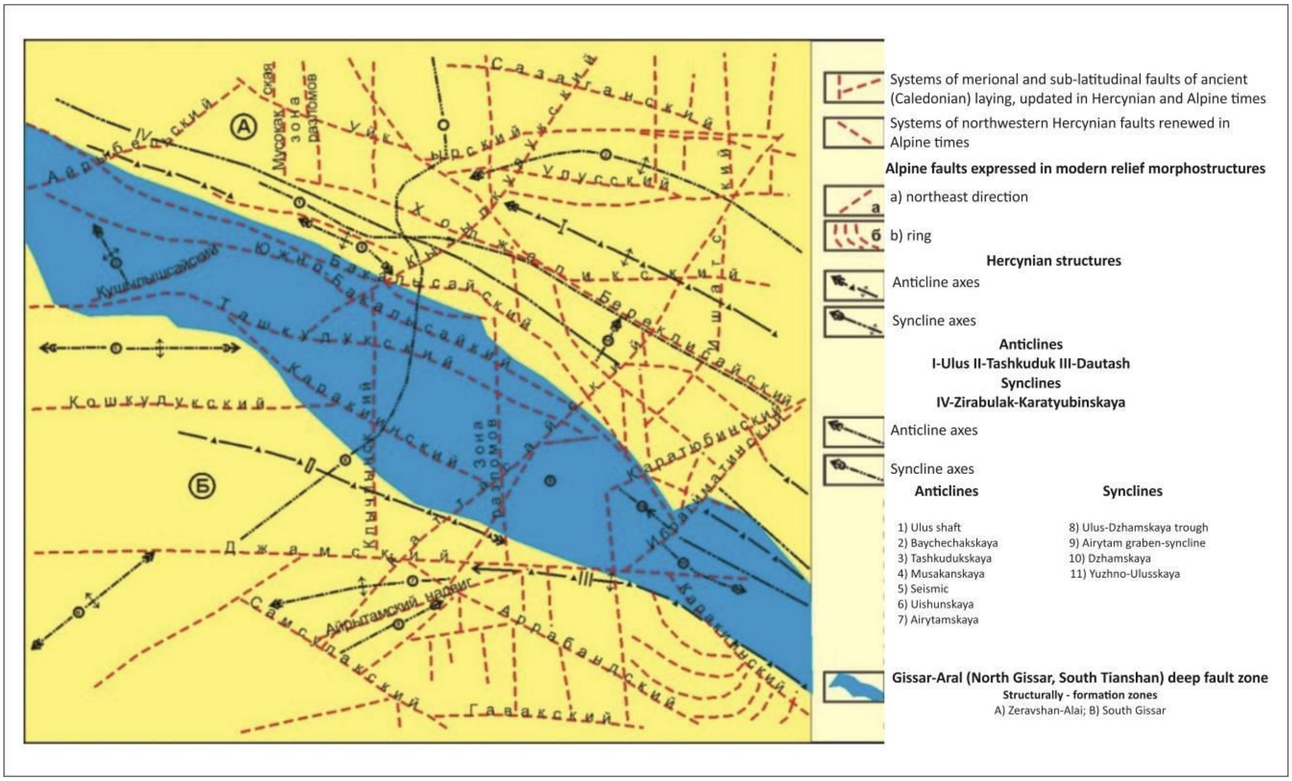

Fig. 5. Structural and tectonic map (based on materials by J. M. Heifets, etc.).

E.G. Fedorov et al., in 2012 in the Jamsky trough under a powerful Meso-Cenozoic cover, revealed Lower Devonian (D_1md) deposits extending in the sub-latitudinal direction, which, we believe, accompany the Gissar fault.

In the Ziaetdin Mountains, the continuation of this fault is a 25-35 km long disturbance zone, identified for the first time by the author, extending from the village of Karnab to the western part of the Ziaetdin Mountains Zokirov O.T. (2011).

The results of geological decoding of satellite images of Western Uzbekistan convince us that the images contain information about tectonic structures that are often not reflected on geological and geophysical maps. They are deciphered due to the subtle features of the landscape. In this regard, interest in the in-depth study of the tectonic structure of the Mesozoic and Cenozoic cover formations is constantly growing. The accumulated geological factual material in combination with the data of decoding satellite images allows us to highlight in detail many unclear issues of deep tectonics of the closed territory of the region Borisov O.M., Nadyrshin R.I. (1988)

Thus, cosmogeological studies together with traditional methods of regional geology increase the objectivity of knowledge about the geological and tectonic structure of the studied region and enable the authors to confidently determine the unconventional trajectory of the Gissar fault along the Chakylkalyan-Karatyube-Zirabulak-Ziyaetdin direction at a distance of 200-210 km, 40-70 m wide and clarify the existing geological-structural-tectonic maps.

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