Tectonic Deformation Elements Of The Darband Gorge To The South-West Branch Of Hisor

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ABSTRACT

The article examines the tectonic deformational elements of the Darband gorge belonging to the South-Western branch of Hisar.
The results of the field observation work in the Boisun uplift region of the Machai River valley are given a tariff. Attention is paid to deformation elements and kinematics of blocks of discontinuity zones, cracks. Also, the age of the rocks is determined by disjunctive and plicative deformation elements. The obtained materials testify to various mechanisms of tectonic deformations of the new era.
The methods developed on the basis of the new rank analysis methodology were used for the first time in South-Western Hisar region.
Tensile faults in chalk deposits in the southern part of the Darband gorge region were studied and their elements of different scales (2-3 levels) were separated. Deformation elements were studied in adjacent sections and it was determined that stress differs with deformation states.

Keywords: Tectonics, Baysun uplift, deformation elements, kinematics, slip plane, reverse fault, thrust, fracturing, deformation mechanism

Among geological-structural data, fissures and Earth cracks (commonly referred to as "discontinuities") are widespread and are the main signs of the processes occurring in the geological environment. Their distribution on the ground is related to the stress-deformation state of the geological environment and determines the deformation characteristics. Currently, this information is not enough to study the formation of phenomena in the environment.

Therefore, the study of the mechanisms of formation of them and, of course, folds is included in the task of the special scientific direction of Tectonophysics (M.V. Gzovsky, 1975). We will talk about the characteristics of cracks, discontinuities and folds of the southern slopes of Boisun uplift, which are being studied with the intention of creating a ground for future studies.[10]
The area of surveillance is located in Boysun district of Surkhandarya region. It covers the southern part of the Darband Gorge belonging

to the South-Western branch of Hisar (Fig. 1). The geological erosion of the Machai River contributed to the formation of this gorge.

The purpose of the conducted observation works is to map in detail the geological and structural elements around the Darband Educational Methodological Center and to clarify its diversity and bring it to a certain classification form. The area around the Darband OUM has not been previously studied for the stated purpose, as this area, which is part of the Boisun uplift, based on the geological research known to date, has been limited to only small-scale studies. This article presents some of the results of the initial field observations.

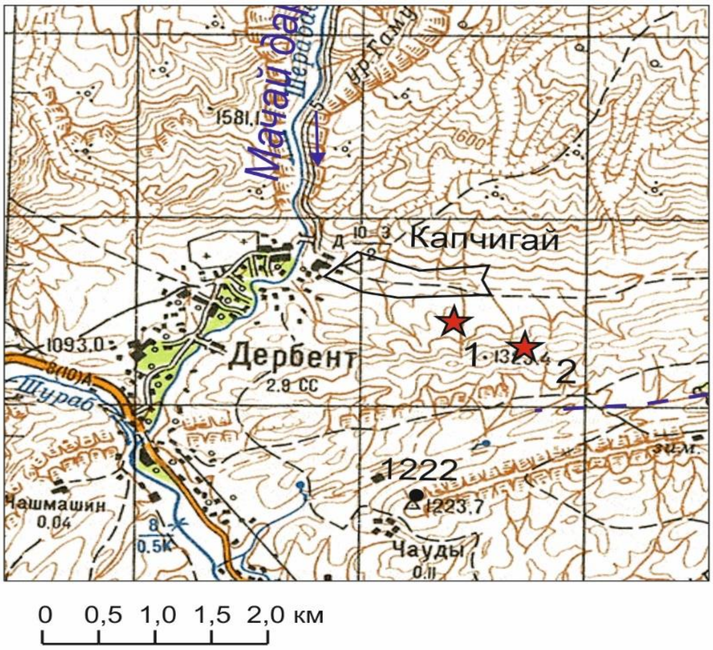


Figure 1. Surveillance area map

Research Methodology

For the first time in South-western Hisar area, methods developed based on the new rank analysis methodology were used, including M.V.Gzovsky's method of restoration of stress fields in the earth's crust, P.N.Nikolayev's method based on statistical measurements of cracks and earth cracks, kinematics of cracks O.I.Gushchenko's method based on signs, R.A.Umurzakov's method of restoring the general movement directions of tectonic blocks in the late Cenozoic were used.

In conducting field observations, methods of field tectonophysical observations were used along with structural geology observation methods. The description of these methods is given in published literature [1]. In Hisar and South-West Hisar regions, similar studies were used to solve regional problems [1,2].

The initial monitoring points (KN) were mainly carried out in the outer southern part of the Darband gorge (1, 2 KN). Stratigraphically, it is located in the 1st and 2nd KN - Cretaceous deposits. We present the detailed tariff of information received at these points only for 1-KN. At the same time, we will dwell on the main tectonic elements found in other KN.

KN 1 is located about 2 km southeast of the entrance to the Darband Gorge (Figure 1). The deposits here are fine-grained, intercalary clayey sandstones belonging to the Apt Suite of the Cretaceous. Large pieces, thick layer, layer thickness up to 60^{o} - 90^{o} cm. The lying azimuth of the layers is 160^{o}, the lying angle is 75^{o}, and in some places the lying azimuth is 340^{o}, the lying angle is changed to 80^{o}. These layers make up the mountain range extending along 80^{o} (260^{o}) azimuth.

The mountain range is connected to a 1.5-2 km wide stream valley and is separated from the north side by a large uplift made of Jurassic limestones. The mountain range on which the point is located is composed of chalk formations, and the highest point is composed of gray limestone. From point 1, the surrounding landscape is well observed and provides an opportunity for structural geomorphological photography. First of all, there is a large uplift made of Jurassic layers in front of the bar (Fig. 2). In the block on the right bank of the Machai river, the western "wing" of the Darband gorge, the features of stratification are well observed (Fig. 2).

Figure 2. View of the entrance to the Darband Gorge from the 1st KN

A large fault runs through the southern part of this rise. It runs from west to east - through the northern part of Darband village, through Kapchagay village and towards Yolgizbulok village. The kinematic form of the earth fault is uplift and thrust, the angle of lying of the surface is about 60°.

Research results and their discussion

In the 1st KN, sandstones are divided into pieces by large cracks - their lying azimuths and angles: 120° ∟40°, 110° ∟60°, 90° ∟60° -70 °. The surfaces of these cracks are oriented close to each other, and the layers on this surface form an uplift. The amplitude of the rise is about 1-2 meters. Crushing of rocks on the measured surface is observed.

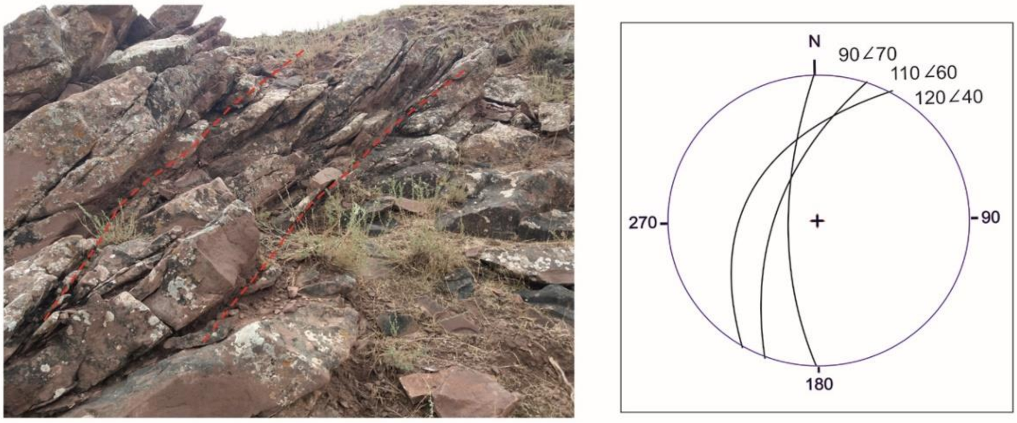
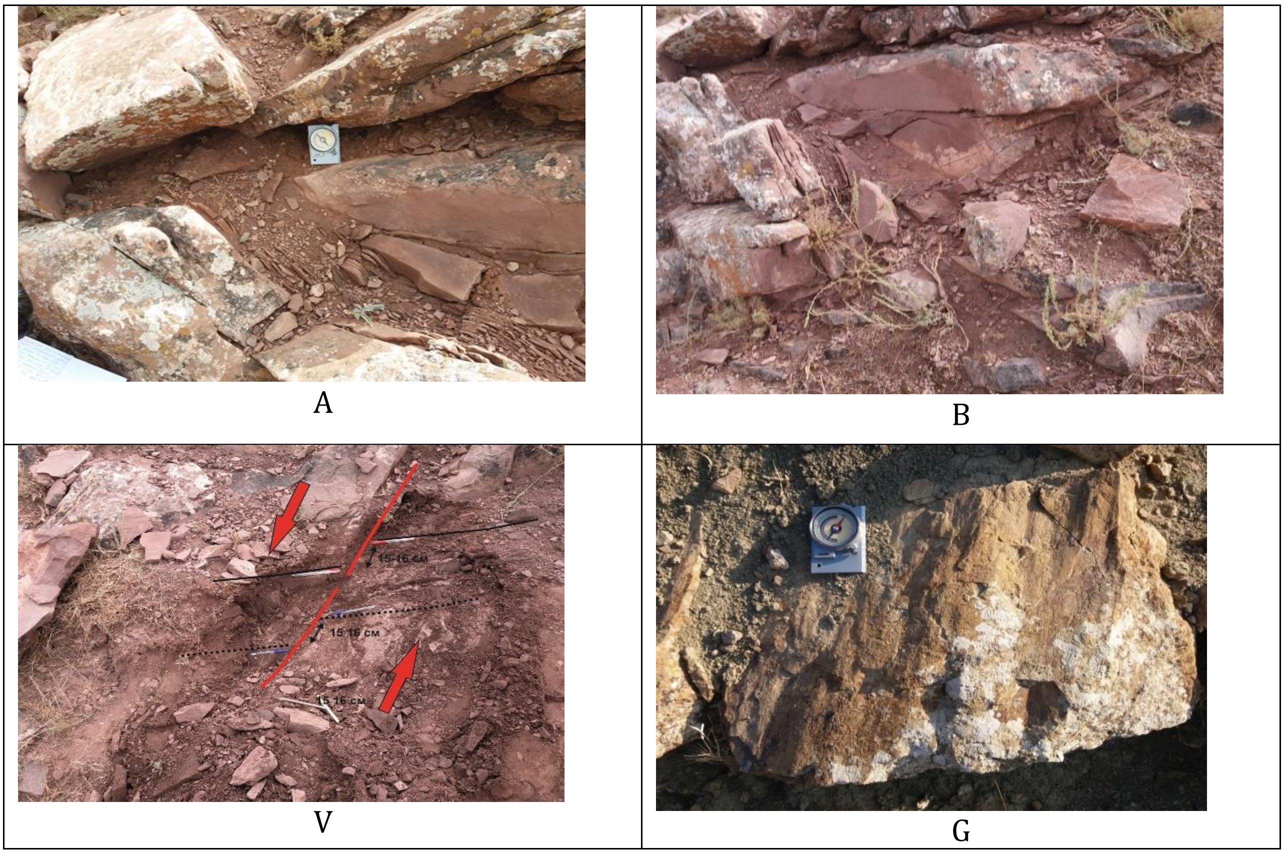


Figure 3. View of uplift along large cracks in Cretaceous sandstones (1-KN) (projection of the trace of the cracks intersected by the upper sphere of the Wolf grid on a pie chart. Numbers are the azimuth and angle of the cracks)

In some places, 10-15 cm soft friction soil (Russian glinka trenia) and mylonites are observed as a result of compression and thrusting on the surface (Fig. 4 A, B). Lying azimuth 120° angle 40° there are signs of left uplift thrust on the surface (the angle of the residual friction line is 25°). Such sliding surfaces are repeated again at a distance of 90 cm - 1 meter (Fig. 4 A, B).

There is a 30 cm wide mylonites, clay shale zone on the 170^{o} angle 70^{o} surface. After 1-1.5 meters, the zone of clay shales is bounded by another large fracture surface. The lying elements of this surface have an angle of 90^{o} to 70^{o}. In the upper part, this surface connects with the previous 120^{o} angle 40^{o} surface. A similar shift is observed on the 110^{o} angle 40^{o} surface. Such surfaces are repeated between layers. [3]

One such surface is the 110^{o} angle 70^{o} surface in the eastern part of the openings (Fig. 4 A, B, V). On this surface, the clayey shale zone (30-40 cm thick) is observed to shift by 15-16 cm along the 170^{o} angle 70^{o} surface (Fig. 4 V). This clayey shale zone is observed along the entire length of the opening and has a varied appearance along its length. Changes in the lying angle and azimuth are also observed as the surface of the clayey shale zone extends. At first, the lying azimuth is 356^{o} and the angle is 85^{o}, then the lying surface of this zone changes again to 175^{o} and the angle changes by 75^{o}.



A B V G

Figure 4. Signs of movement in large cracks in Cretaceous sandstones (1-KN): A, B – soil layers and mylonites (thickness up to 10-15 cm) formed by friction along the large crack zone; V - signs of displacement along the surface of a large crack 170^{o} angle 70^{o}; G is a sliding surface formed by friction (mirror scologeny). Marks on the surface - drop (top block down on the surface) indicate that movement has occurred.

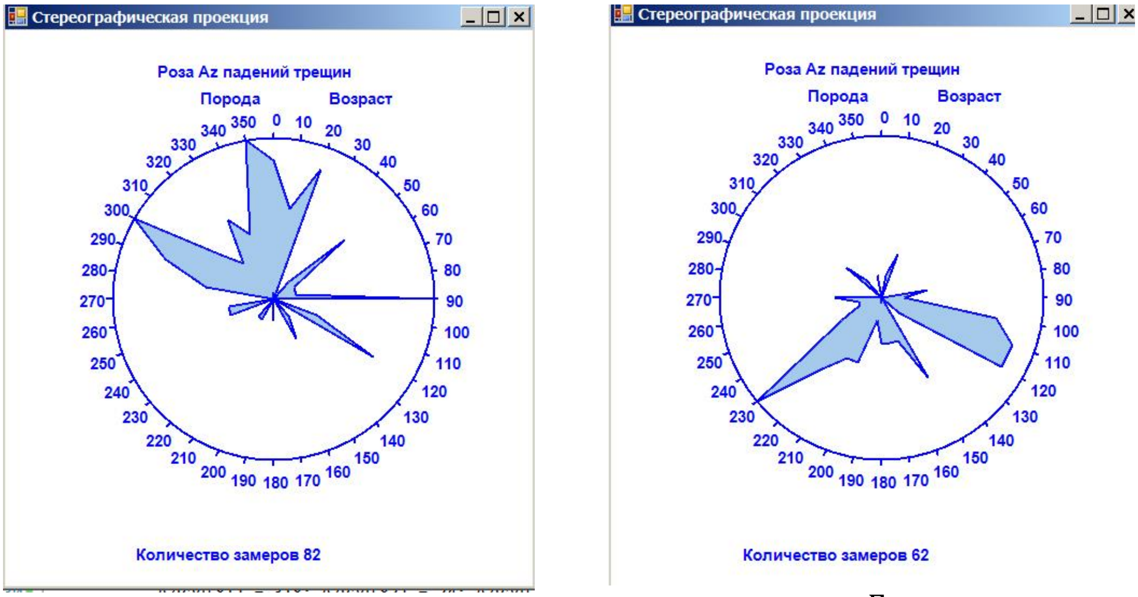
According to the opening, the thickness of this zone also changes: from 50-60 cm, it decreases to 15-20 cm in some places, and the surfaces mentioned in the curved wavy form (170^{o} angle 65^{o}) and 170^{o} angle 70^{o} a shift is observed. Figure 5 shows the flower diagram made on the basis of continuous statistical measurements of the bedding elements of the fracture surfaces of Cretaceous sandstones in 1-KN. The lying azimuths of most of the ridges corresponded to 300^{o}, 350^{o} and 90^{o}. [8]

The direction azimuths of these cracks are 30^{o} (210^{o}), 80^{o} (260^{o}) and 0^{o} (180^{o}), respectively. If we compare the result reflected in the flower diagram with the location of the large cracks given above, it can be seen that the large cracks

(120° angle 60°) are not the systems that make up the main volume, but form a much smaller group in the 120° indicator. In addition to the uplift and thrust deformation observed on their surfaces, two-three types of grouping are observed: 1 corresponds to 300°, 2 corresponds to 350°, and 3 corresponds to 90°. Another small grouping is observed, corresponding to 20° lying azimuth. [6]

2-KN is located at the highest point of the mountain range, which is about 500 meters south of Kapchigay village. The distance from the Darband gorge to the outlet of the Machai river (young layers with the Jurassic) is up to 2.3 km along the 140th azimuth. This mountain range is composed entirely of hard gray limestone along the watershed.

Their azimuth angle of 340° is 60° at our observation point, their orientation has changed dramatically compared to the previous ones, because a large fault has passed between them and changed the orientation of the layers, it seems that the chalk deposits here may be in an overturned state. . The direction of the crack is 75° (255°), the bearing element is 345°, the angle is 70°. To the east of this point the strata are steep. In some places, the lying azimuth angle changes from 340° to 45°. Based on statistical measurements, the main lying azimuths were divided into 2 groups in the flower diagram for 2 points (Fig. 5).



A Б

Figure 5. Flower diagrams based on statistical measurements of fracture systems in chalk deposits: A- 1-KN; B – 2 KN.

The first observation is completely different from the point, it can be said that it is upside down. This observation indicates that the points are located on two opposite sides of a large crack zone and have specific stress and deformation conditions. In the 2nd KN, a large stream passed in the south, and its southern slopes and mountain peaks are composed of white Paleogene strata. At our observation point, the layers are crossed by large cracks: 130° angle 50°, 220° angle 63°, 240° angle 65°, 120° angle 65°, 120° angle 65°, 130° angle 65°, 160° angle 75°, 110° angle 80°, 230° duty 65°.

If the results of the flower diagram are compared with the large cracks - it is observed that the large cracks are mainly in two groups of directions shown in the flower diagram - along the azimuths of 230° and 120°. So, compared to point 1, the state of stress deformation here is characterized by relative uniformity.

Conclusion

Thus, at the end of this statement, the following can be noted:

1. Tensile-thrust faults in the chalk deposits in the southern part of the Darband Gorge region were studied and their elements of different scales (levels 2-3) were separated;
2. Deformation elements were studied in adjacent sections and it was determined that stress differs by deformation conditions;
3. It was found that the application of tectonophysics observation methods in Darband conditions in field conditions provides an opportunity to clarify the types of tectonic elements and the stress-deformation conditions of their formation.

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