

THE RELATIONSHIP OF TENSION AND DEFORMATION WITH THE MODERN GEODYNAMICS OF THE DEHKANABAD TROUGH (SOUTHWESTERN TIEN SHAN)

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ABSTRACT

The article deals with the issue of studying the geodynamic situation of the Dehkanabad trough, confined to the transition zone of the inter-platform oil and gas-bearing territory and the orogenic region of the Southwest Tien Shan. It is shown that under the influence of external tectonic forces, the current geodynamics of the deflection is determined, expressed by the activity of north-eastern faults, the formation of small folded dislocations and the concentration of tension in the zones of curvature, intersectionality and conjugation of faults.

Keywords: *Geodynamics, Deflection, Structure, Plate, Deformation*

INTRODUCTION

Earthquake forecasting, seismic zoning in order to reduce their damage are a priority direction in the study of seismically active territories. This also applies to Uzbekistan, located in the Central Asian seismic zone. The stable development of states located in seismogenic zones, their economic and infrastructural level of progress depends on the degree of zoning solution and the reliability of forecasting. In particular, conducting complex geological and geophysical studies makes it possible to reliably decipher the current tectonic and dynamic situation and the structure of a section of the Earth's crust, which makes it possible to assess its seismic risk and identify the most seismically active faults.

The planned research is aimed at solving the problems of seismotectonics through the prism of modern geodynamics of the territory of the Southwestern Tien Shan, in particular the Dehkanabad trough. The restoration of the modern geodynamics of this structure was carried out through a comprehensive synthesis of data on geology, tectonics, oil and gas content, geophysically, cosmogeology and seismogeology. In our opinion, an integrated approach will allow us to successfully solve this urgent problem and most reliably restore the modern geodynamics of the Dehkanabad trough.

MATERIALS AND METHODS

The aim of the study was to study the modern geodynamics of the Dehkanabad trough with the determination of external and internal factors that contributed to the formation of this situation against the background of variability of tension and deformation. The factor should be understood as the tectonic forces affecting the territory under study, specifying their direction and the reasons for their origin. Internal factors include the tectonic elements (masonry and faults) of the deflection, as well as the stress-strain state of the deflection.

To achieve this goal, we have studied geological, geological-geophysical, tectonic, seismogeological materials and modern geodynamic models of the Southwestern Tien Shan and Central Asia; materials of remote sensing of the earth in order to identify ring and linear space structures.

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The obtained data of a complex analysis of these materials, as well as the results of experimental work on modeling tectonic stresses in the structures of the Dehkanabad trough, were the basis for the reconstruction of its modern geodynamics.

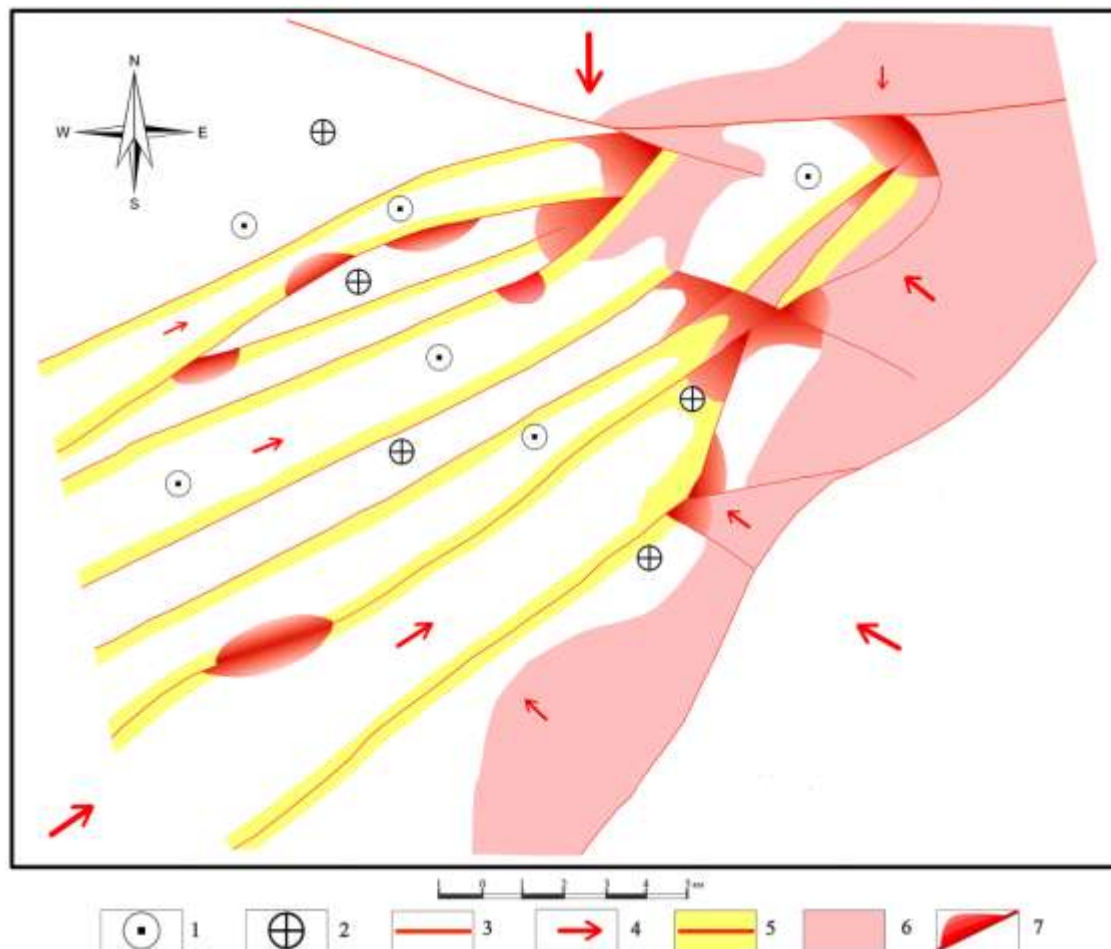


Figure 1: Model of modern geodynamics of the Dehkanabad trough.

The effects of external dynamic forces on the deflection according to GS Abdullaev and FG Dolgoplov (compiled by BZ Ziyomov, 2019).

1. Lifting, 2. Lowering, 3. The fault, 4. Mixing blocks, 5. Zones of contrast manifestation of tangential stresses, 6. Polezoi output, 7. Zones of maximum manifestation of tangential stresses associated with areas of curvature, intersections and conjugations of the fault.

RESULTS

The analysis of the available geological materials on the geology, tectonics, geophysics, geodynamics, oil and gas potential and seismotectonics of Central Asia, in particular the southwestern territory of the Southern Tien Shan, allowed us to establish that the studied territory of the Dehkanabad trough is a tectonically active section of the Earth's crust despite the difference in views on tectonics (H. D. Yakubov M. A. Akhmedzhanov, O. M. Borisov 1976 and others Sh. D. Davlyatov, 1971), geodynamics (P. L. Zonenshain, 1972., P. A. Mukhin 1991, etc. H. I. Khamrabaev 1962., G. A. Abdullaev, F. Ya.

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Dolgoplov 2016, etc., B.Z.Ziyomov 2021) and the geological development of the territory of the Southwestern Tien Shan.

According to the data (d. Sh.Davlyatov 1971) two structural floors are distinguished in the structure of the Dehkanabad trough; the lower floor is a strongly dislocated Paleozoic foundation; the upper floor is a Mesozoic-Cenozoic complex of geological formations.

The tectonic activity of the deflection can cause the formation of new structures, update the earlier laid ones, and all this leads to a complication of its structural and tectonic structure.

The presented version of the model (Fig. 1) of the modern geodynamics of the deflection is based on the phenomenon, according to G. S. Abdullaev, F. G. Dolgoplov 2016) when the lithosphere of Central Asia is subjected to the tripartite influence of external tectonic forces.

Dynamic forces migrating from the southeast (having overcome the Surkhandarya megasyncline) act on the discontinuous structures of the eastern part of the Dehkanabad trough perpendicular to their direction, causing the maximum compaction of their zones. In such a tectonic-dynamic environment, structures are very passive in the sphere of tectonic activity along the horizontal plane and vice versa, in vertical ones (upsurges, thrusts), they are active. Migration into the depth of the deflection of external dynamic forces and their energies naturally weaken, since there are natural obstacles in the form of discontinuous and folded structures in the way of their movement. External forces act on tension and deformation, strengthening the latter in the near-fault spaces, especially in the areas of the observed overcoming of each structure is accompanied by a loss of energy of dynamic forces and a weakening of their migration abilities. In this regard, the zones of north-eastern faults in the eastern part of the deflection are tectonically stressed and in their near-fault space there is a change in deformation with the manifestation of zones of local compression deformation (hanging fault block) of the upsurge-thrust movements along the faults cause the displacement of tectonic blocks where these structures are their boundary. The vertical displacements of the blocks form positive and negative relief forms in the areas adjacent to the discontinuous structures. A different dynamic situation was formed in the western part of the Dehkanabad trough, where external dynamic forces act in a north-easterly direction, along the stretch of the main discontinuous structures. In this situation, the dynamics of the north-eastern faults is characterized by the manifestation of their activity along the horizontal plane, while forming the opening and covering of the face, where, respectively, there is a local stretching deformation and a local compression deformation. In the first case, there is a complete neutralization of tangential stresses, and in the second-their high concentrations.

The migration of external dynamic forces in the north-east direction occurs mainly along the zones of north-eastern faults, as well as inter-fault zones. At the same time, tectonic stresses are distributed unevenly, contrastingly in the fault zones and are concentrated in the areas of the interface of the north-eastern structures with the South Tien Shan (Hissar) deep fault.

CONCLUSION

Thus, the model of modern geodynamics of the Dehkanabad trough shows that its main discontinuous structures of the north-eastern strike are in an active phase of tectonic-geodynamic development. Their tectonic activity is expressed in the form of thrust, surge, shift and their combination. At the same time, the geodynamic situation throughout the entire territory of the deflection is expressed ambiguously. Structures located to the east of the deflection axis are characterized by compression. As a result of the influence of these external forces, zones and faults are compressed, compacted, and lose power with an increase in their density and a simultaneous decrease in their permeability. The geodynamics of these structures is expressed through up-thrust processes and the almost absence of horizontal movements. The stress concentration and the increase in deformation are typical for near the fault space.

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The geodynamics of the territory to the west of the axis of the Dehkanabad trough differs from those of the eastern part. All geological, tectonic-geodynamic processes due to the influence of external forces are in the active phase. All geological phenomena depend on the direction and intensity of the external dynamic forces acting on the deflection. The discontinuous structures of the deflection territory are tectonically activated. The dynamics of structures is expressed mainly by horizontal movements, the degree of severity of which depends on the direction of external dynamic forces in relation to the strike of faults, as well as their morphology and structure.

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