

**Research Article**

## **NEW DATA ABOUT GEODYNAMIC CONDITIONS OF FORMATIONS OF GOLD OREDEPOSITS IN WESTERN UZBEKISTAN**

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### **ABSTRACT**

Results of tectonophysical and geodynamical researches of gold ore deposits in Central Kyzyl Kum are expounded. Due to tectonic activity the structures of deposits are subdivided on active and passive ones. Geodynamics of active faults is expressed through faulting - strike-slip and thrust kinematics. Local occurrence of these processes can be observed in passive faults. Described factors controlled tectonic activity of faults. These factors influenced on deformation change. It is revealed that gold deposits were formed in the areas with certain tectonic intensity and size of the deformation, caused by a regional geodynamic condition.

**Keywords:** *Geodynamics, Tectonophysics, Gold Ore Deposits, Geological and Structural Conditions, Experimental Works, Tectonically Pre-stressed Perspective Areas*

### **INTRODUCTION**

Use of traditional methods of researches in the exploration of new mineral deposits does not give notable effect. Where at there are a number of other reasons. First survey method was developed for the mineral deposits located in near-surface or surface zone. Secondly, the limit of such deposits was depleted long time ago. Thirdly, the exploration technique of deep-laying deposits is not developed. These and other factors affect results of exploration. But, despite this, it is necessary to expand mineral resources base of the Republic of Uzbekistan. We see a solution of this problem in application of experimental tectonics and a field tectonophysics (the structural analysis) at exploration of new mineral deposits, when studying flanks and the deep horizons of developing objects. It will be carried out in a complex with geological and structural, geochemical, geophysical and space methods of researches. It gives the chance to define factors controlled mineralization; to define the mechanism of ore controlling structures formation; to restore geodynamic conditions of the remote past.

### **MATERIALS AND METHODS**

#### ***Prognostic Research***

Based on results of tectonophysics pilot studies of gold deposits of Central Kyzyl Kum we want to show our method of increase of mineral resources base of Uzbekistan.

Experimental tectonophysics of gold fields (Muruntau, Kokpatas, Daugyztau, Turbay, etc.) consisted of research of tectonic stress distribution in structure models of these fields. Such tests were carried out based on Gzovsky's method (1975) and Osokina's compoundings (1964).

Comprehensive study of the library and published works on studying of geology, tectonics and regularities of formation and placement of aore-grade gold in Central Kyzyl Kum was preliminary to experiments.

According to results of our work, it is possible to range ruptural structures on deposit age. It is also possible to make structural and tectonic models of the studied objects.

The developed principle of tectonophysics modeling and interpretation of a geodynamic situation includes:

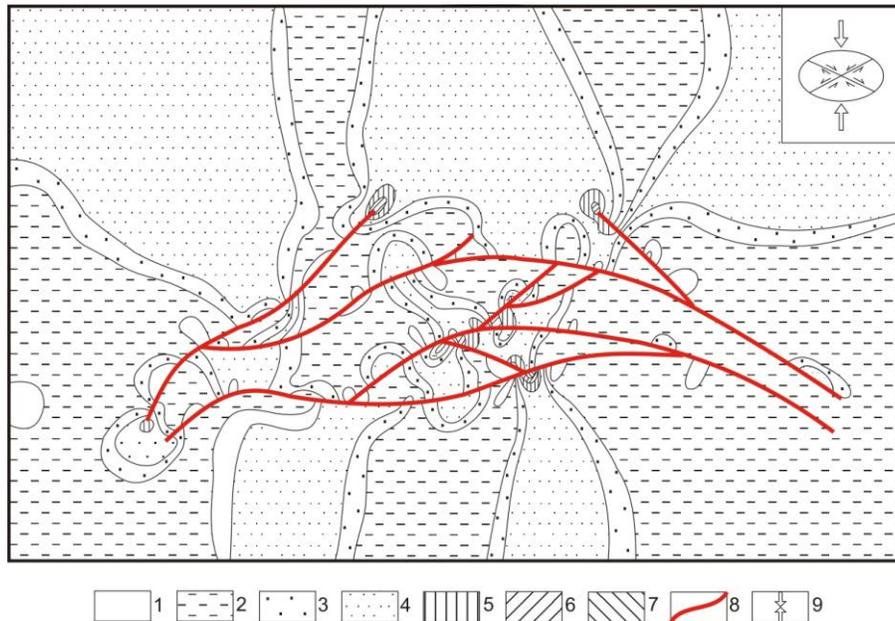
- ranking of tectonic structures according to age of their formation, apart from those structures that were formed after development stage of crust area;
- definition of the direction of tectonic forces of compression.

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- drawing up the structural and tectonic framework of area corresponding to a certain stage of its development;
- experimental works on modeling of structures of a site where it is possible to allocate the structures which are becoming more active both in horizontal, and in vertical planes;
- according to results of processing of experimental works to allocate zones of deformation change, a zone of local compression or stretching against regional forces of compression; sites of concentration or neutralization of tectonic tension; active and passive faults; shift of separate blocks, their local areas in the horizontal plane; covered and uncovered areas. Based on these data we can make the scheme or the map of a geodynamic condition of ore area, field and deposit for a certain stage of their development.

Basis for restoration of a geodynamic condition are, first, results of geological and structural researches of conditions of formation and placement of an endogenous mineralization and results of experimental works on structural modeling of stress fields in ore bodies and deposits. Carrying out of experimental works on structural modeling let us understand geodynamics of ore objects over the whole territory: horizontal and vertical shifts on elements, imitating faults; shift of separate blocks; formation of uncovered cavities in faults. Processing of results of experiment shows how fields of tectonic stress on all area of model, along zones of faults, in separately taken tectonic blocks are distributed. This way we define areas of further deformation change (a zone of local compression and stretching), zones of concentration or neutralization of stress, etc.

According to results of experimental works on modeling of tectonic stress fields in structures of gold deposits of Central Kyzyl Kum we can differ active faulting from passive faulting. The example can be model of fault structures in Muruntau ore field of the northwest, sublatitudinal and submeridional directions belong to active faulting. Activity is expressed through the diagonal-slip fault movements. Northeast faults are passive structures (Figure 1). Total absence of horizontal movements is observed in them but if they occurred (in zones of their crossings with other faults), then, in limited space only. Northeast faults which are in most cases echoes of deep cross structures to which in due time Akhmedzhanov *et al.*, (1967) paid attention, belong to passive faults.



**Figure 1: The Map of Tectonic Stress Fields Distribution in Model of Structures of the Muruntau Ore Field**

**Intensity of the Maximum Tangential Stress (as Increase  $\tau_{max}$  1 <2<3 <4 <5 <6 <7); 1. Lack of Tangential Stress; 2, 3. Fields of Weak Stress; 4, 5. Fields of Moderate Stress; 6, 7. Fields of Strong Stress; 8. Faultings; 9. Directions of the Active Squeezing Efforts**

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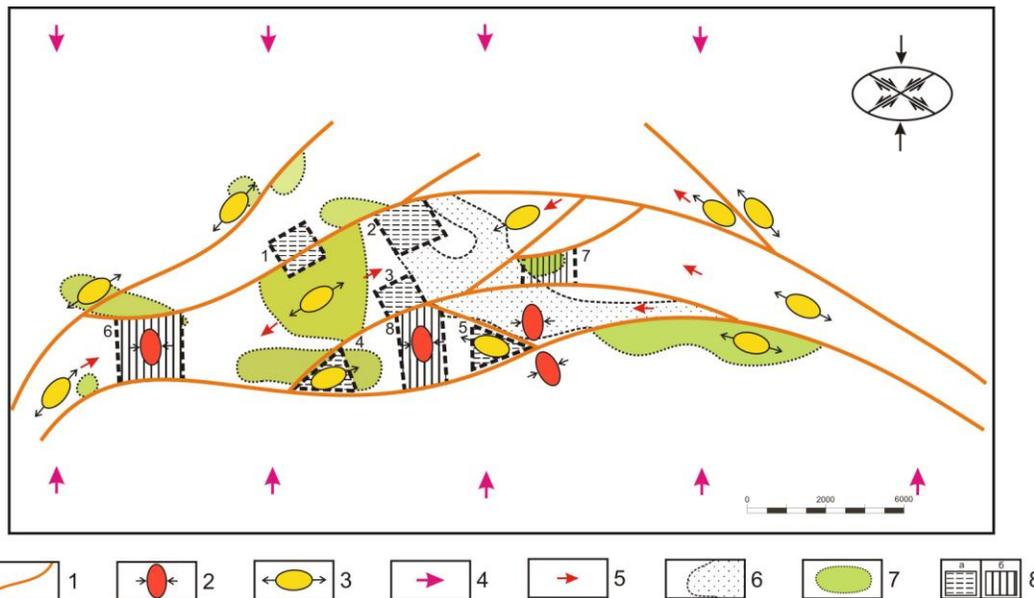
Models of reference fields of Central Kyzyl Kum were exposed to tectonic efforts of compression in the northeast direction that corresponds to the direction of the horizontal efforts forming the Southern Tian - Shan folded system.

In modeling under such conditions, active cataclasis is in northeast, sublatitudinal and submeridional position, at the same time passive cataclasis is in northwest position. The reason for that is strike of fault in space coincides with the direction of regional tectonic compression forces. In this regard elements of the models imitating northwest faults and deep cross structures are not exposed to the horizontal (shift) movements whereas share movements are noted in northwest and in sublatitudinal elements that often lead to formation of uncovered areas in zones of their conjunction and in intersection nod with other ruptural structures.

Morphology offaults influences the formation of geodynamic situation which occurred in activity of faults, change of rock deformation, redistribution of tectonic tension, (Dulabova and Turapov, 2008; Turapov *et al.*, 2007). If a break is rectilinear, on all its extent it is possible to observe geodynamic activity or on the contrary - lack of any activity. The rough surface of faults, their bend, wavy or broken morphology directly influence the vertically horizontal movements on faults. Such morphology of structures does not allow them to show tectonic activity intensively on all extent of faults. Activity can locally be shown, on a certain area of a fault, thus, it is formed slightly opened or partially covered side of a gap (Figure 2).

Therefore, in a zone of their influence there is a deformation change, it increases or decreases. This geological phenomena is reflected in the containing environment which under their influence collapses, new structures and zones of rock fracture are formed. All these consequences of the geological phenomena can become one of the main reasons of occurrences in these new structures and zones of rock destruction, processes of endogenous ore formation.

To confirm data received experimentally it is necessary to point to the following: the majority of gold deposits of Central Kyzyl Kum were controlled by faults in the northwest, sublatitudinal, submeridional directions, and sites of fault conjunction and fault crossings.



**Figure 2: Scheme of Geodynamic Conditions of the Muruntau Ore Area with Forecast Elements**  
**1. Faults; 2. Zone of Local Compressing; 3. Zone of Local Stretching; 4. Direction of Active Force of Compression; 5. Direction of Shifting of Blocks; 6. Areas of Formation of Auriferous Metasomatite (According to M. T. Hon, Yu.I. Paramonov); 7. Complex Geochemical Anomalies (According to M. T. Hon, Yu. I. Paramonov); Forecast Elements; 8. Allocated Perspective Areas: a –According to the 1st Version of the Forecast; - According to the 2nd Version of the Forecast**

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### **RESULTS AND DISCUSSION**

1. Geodynamic mode of tectonic blocks directly depends on a spatial position of structures and degree of their activity. These structures are the borders of the blocks.
2. The mechanism of faults formation depends on three main factors: 1) consistence, structural and textural features of the geological environment in which there was deposit of faults; 2) tectonic and magmatic processes; 3) earlier formed geological non uniformities (faults). Their further development also depends on these factors, but new factors that playing important role in their dynamics as well are added to them. Position of a fault in relation to the direction of active regional efforts of compression refers to such factors. Fault position defines degree of its tectonic activity.
3. Available data on gold ore deposits and results of the experimental works that are carried out for the purpose of interpretation of a geodynamic situation of ore formation period gives the grounds to recommend the developed technique of interpretation of geodynamic condition. We can use this technique widely at prospecting and prognostic works. We also can use it as specialized prospecting type of work within the perspective areas, when studying flanks of the known and developing deposits for the purpose of detection of new industrial ore block.

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