Seismo-Tectonic Model of Highly Naturally Risked Territories of Uzbekistan

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Abstract

Based on a comprehensive analysis of the results of geological-geophysical and seismological studies, neotectionic and seismotectionic models of the central part of Uzbekistan are proposed. These Annotation models are used to predict the probable kinematic type of movements in the focal zones of possible earthquakes.

Introduction

The basis of the methodology of detailed seismic zoning inquire about and production in high-risk zones of Uzbekistan which created in 77-80 (1). Appropriate alterations and clarifications have been made from time to time in association with the advancement of prospecting and investigate work, the collection of exact geological, geophysical and seismological information for specific regions. For example, in Uzbekistan, on the case of Tashkent region, seismic risk assessment technology based on modern DEM maps has been created. Currently, seismotectonic analysis plays a key part in the DEM (2) research complex, which culminates within the development of a seismotectonic model of the research object, which is the geological and geophysical premise required to identify and characterize potential sources. In previous studies on detailed seismic zoning of high-risk areas in western and southern Uzbekistan, the model of seismic vibration sources was based on faults, spatial position and morphology, most of which were conditionally identified. This was especially true in the Central and Western regions of Uzbekistan. Nowadays, due to the collection of new data on geology, fracture tectonics, recent and modern movements, seismicity, etc., it is possible to make a comprehensive analysis of these materials and make the necessary corrections to previously existing versions of seismotectonic models.

The purpose of this study is to create neotectonic and seismotectonic models of high-risk areas of Uzbekistan.

During the seismotectonic analysis of the research area, we studied the deep structure of geophysical fields, the results obtained from modern tectonics, geodynamics, seismicity, etc., and their world practice on seismic zoning (DEM). neotectonics) plays a key role in the process of seismotectonic analysis of seismically hazardous areas. The latest tectonic (3) movements (neotectonics), which created a modern geomorphological view of the high-risk part of Uzbekistan, are very complex. To describe the manifestation features of the latest tectonics, a model of the same name was developed (Fig. 1), which shows the main structural elements (linear and isometric rises, depressions in the crust, active cracks) and the amplitudes of their movements. . This model was created in 1991 on the basis of the latest tectonic map of the Republic of Uzbekistan, compiled by A.Yu. Plotnitsky, Yu.M. Sodikov and R.N. Ibragimov. Changes and explanations related to this map were made later.

According to this model, the newest structure of the high-risk part of Uzbekistan is genetically linked to the epiplatform orogen of the Southern Tien Shan, and in its western-northwestern part to the

Turan plate (4) fell. The neotectonic structures developed here extend from east to west and reflect a chain of isometric rock formations. In the same direction, a decrease in the amplitudes of recent tectonic movements, the thickness and size of the Neogene-Quaternary deposits, the intensity of dissection of the relief by erosion and its absolute heights are observed. and the neotectonic structures of the Nurata-Zirabulak zone. The Southern Tien Shan zone is the largest and most complex neotectonic structure in the region. In the section, the neotectonic structures of the Southern Tien Shan are characterized by narrow, highly dislocated and large-amplitude active cracks, linear blocks. In the Quaternary period, the intensity of tectonic movements increases sharply. An increase in the intensity of vertical movements occurs during the early Pleistocene. The seismic (5) risk of the Southern Samarkand zone is determined by the mobility of the blocks, their development is limited and controlled by internal cracks, which are characterized by an increase in the amplitudes of neotectonic movements. For example, the edge fault system bordering the zone to the north is characterized by parallel faults that control the gradual subsidence of the northern wing of the Turkestan Rise to the body of the Fergana Depression, where -tectonic movements reach 11000–12000 m, as well as analysis (6) South Tyan -Synchronizes the neotectonic movements in the Shan and Nurata-Zirabulak zones. The analyzed area mainly includes the newest structures of the high-risk zone Nurata-Zirabuloqnitabi (Figure 1). The Kattakurgan Depression, the Samarkand Depression and the Panjikent Depression correspond to the whole Samarkand zone, mainly bordered by faults, which simultaneously separate the region from the largest depressions.

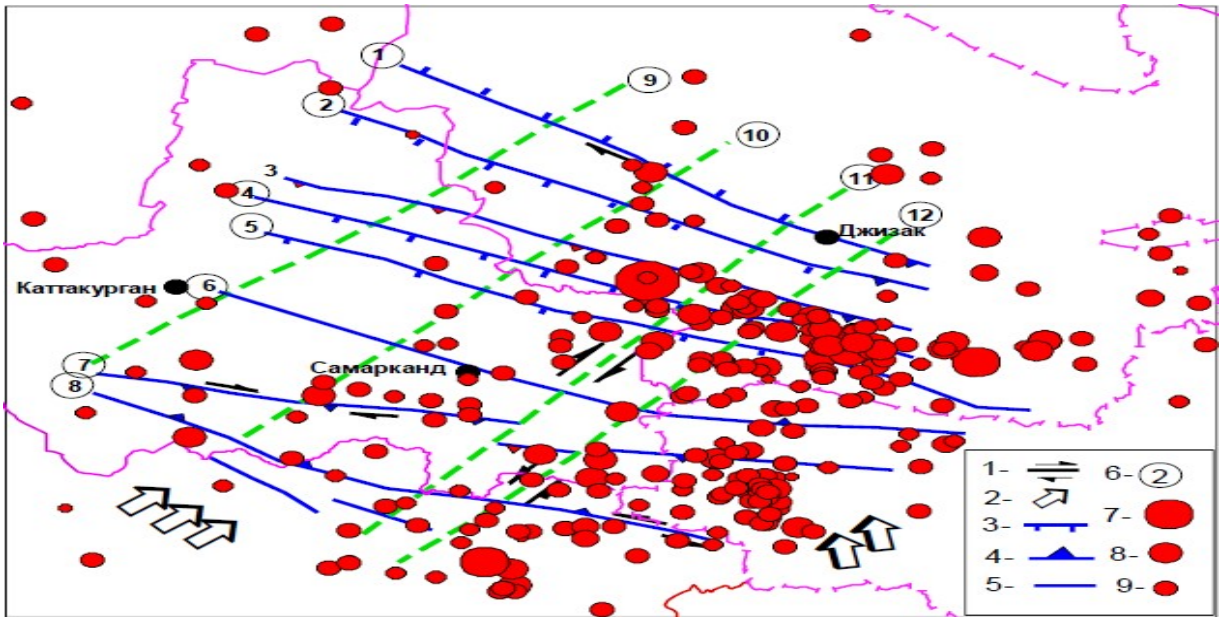

Figure 1. [1] Model of the latest tectonics of high-risk areas of Uzbekistan.

The anticline rise of South Samarkand stretched almost parallel to the rise of North Samarkand. The western end of the ascending hill forms two parallel anticlinal folds, joining the ascent to form a single line, and then joining the axial portion of the ascent from the significant descent. 'lib, facing the rise of Zirabulak. The second is triangular in plan, with rounded corner pieces facing west-northwest and northeast.

It is bordered by faults to the northeast and southwest, and is connected by adjacent rises along them. Morphologically, this is an asymmetric depression with steep southwest wings. The amplitude of the newest turns in a few dozen meters. In terms of amplitude characteristics, the southwest developed more rapidly than the northeast.

AA Yuriyev considered this depression as separate, the western part as Khirabad, the eastern part as

Gallaaral. The entire intermountain between the Southern Nurata and Malguzar Ranges in the north, the western part of Turkestan in the east, the Zarafshan, Gissar Rises (8), and the Zirabulak and Qoratepa Rises in the south, the Zarafshan Range occupied by the depth of The amplitude characteristics of the western and eastern parts of the fault are superior to the middle part. Our neotectonic analysis allowed us to study in detail the structure of this intermountain depression. The depression is divided into extended lines by a system of northwestern faults, which determine the gradual subsidence of the Mesozoic-Cenozoic deposits to the center. The internal structure of these depressions differs significantly from each other. The Kattakurgan depth, south of the Nurata Range, is the most sloping, with the newest sediment amplitude exceeding 2,000 m, followed by the Sanzar Depression in the northeast and the Samarkand Depression in the east. significantly lower than the anterior fissure, and the South-Black-South-Turkestan fracture (9) divides the depressions described above into two parts, which are distinguished by both area size and subsidence depth. To the southeast of the Samarkand Depression is the Panjikent Pipeline, which is connected to the Zarafshan Uplift from the south. The natural boundary of gold in the west is the Qoratepa rise, and in the north-east are the southern ridges of the Turkestan rise. In the north-west it merges with the Samarkand depression. The amplitude of neotectonic sediments in the Panjikent pit exceeds 1,500 m.

Almost all the malfunctions, in which explosive violations were analyzed, were detected by a complex of previous geological-research works, Geophysical and remote observations. Our task was to distinguish between them those prone to earthquakes. As shown in the neotectonic and seismotectonic analysis, the main characteristics of the fracture neotectonics of the area under study are determined by the ratio of the north-west and North-East directions, the first of which prevails. North-eastern cracks have a relatively latent character and are characterized mainly by geophysical materials komplexia. But some of them were deciphered precisely (10) with the help of aerospace research materials. As can be seen in Figure 1, the closure of positive and negative structures occurs, in most cases, in the fracture zone of the north-eastern direction. The silencing of the neotectonic structures relative to each other and the sharp deposition of the denticles of positive structures in their periclinal parts also occurs in this zone of fractures. Seismotectonic analysis has shown that even if these facts are indirect, they may indicate their importance in building a seismotectonic model of the area to be analyzed.

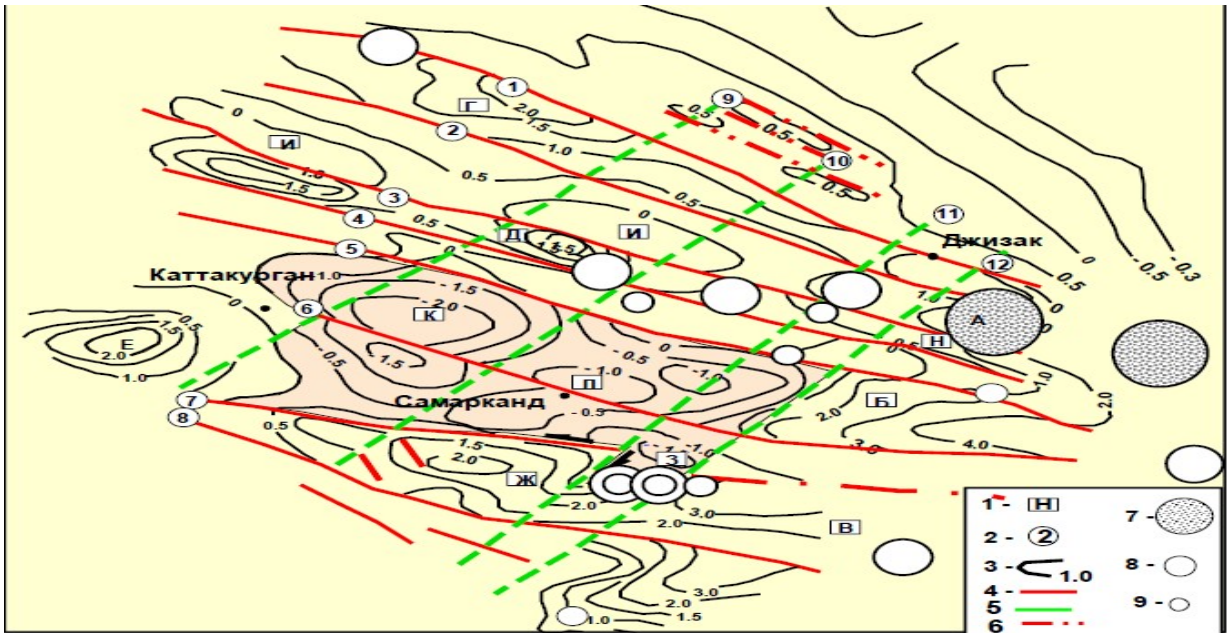

Figure 2 [2] Seismotectonic model of the high-risk part of Uzbekistan.

Cracks in the northwest direction were identified as a result of geological surveys. Their modern activity is confirmed by topographic and aerospace surveys and reliable research on the materials of earthquake epicenters, which are moving towards the zone of morphological violence and cracks. It should be noted that the cracks identified in the Nurata-Zirabulak zone of elevations and depths serve as the boundaries of positively and negatively developing neotectonic structures with a high natural risk.

Obviously, all the mistakes of the north-west include the high level of strike of the area under study, the rise of Turkistan, Zarafshan and Hisar (11). The seismic potential of this region is considered to be a stable and most recent elevation region, confirmed by mountain relief deformation, which occurs as a result of the strongest earthquakes up to strong earthquakes and historical earthquakes. North Nurota helmet siljish crack forms a system of parallel cracks, limiting the rise of the same name from the North-East (Figure 2). The northern Turkistan fault is observed along the coratav branches, and then along the confluence zone of the western part of the Turkistan and Sanzor ditches (12). This crack complicates the northern, flat part of Zarafshan depression.South Koratav-South, Turkestan fault divides the Great Depression and Samarkand depression into two unequal parts: the North and the South, which are less bent. Malfunctions are observed with clearly deciphered geomorphological properties on the basis of materials of aerospace research. The speed of movement in the direction of failure increases in the eastern direction.

North-Zirabulak-North-Karatepa-North-Zarafshan fault is observed along the Northern ridges of Zirabulak, Karatepa elevation. The fault is the zone of communication between the Kattakurgan, Samarkand depressions and the western part of the Penjikent pipe and the Zirabulak, Karatepa and Zarafshan elevation.

The South-Zirabolak-South-Karatepa-South-Zarafshan fault is observed along the southern wings of the Zirabulak, Karatepa and Zarafshan elevation. Their role in the formation of the neotectonic structure is obvious. Such signs: the closure of positive and negative structures near the cracks; shrinkage of the pulling structures depending on the zone of cracks sharp fall of the folds on the back separation of structures to places where the amplitude values of the neotectonic movements differ, as already mentioned above, cracks in the north-east direction are forced to be considered an important element of the neotectonic and seismotectonic structure of the study area. Manifestation properties of seismicity. From historical periods to the present day, a series of earthquakes with M≥4.5 and four earthquakes with M≥6.0 have occurred and formed in this part of the republic (Figures 1 and 2). They all took place in the eastern part of the study area. It is noteworthy that most of these earthquakes occurred during historical periods. One of the oldest is an earthquake in 1799 with M = 6.0 [3] near the city of Samarkand. Subsequent strong earthquakes occurred in 1897 with M = 6.6 and 6.7. Although the reliability of the parameters of these earthquakes is not very high, the very occurrence of earthquakes allows us to draw certain conclusions about the seismic risk of the region in the historical period. In addition to the above, in 1935 an earthquake with M = 5.3 [4] occurred 90 km from Samarkand. The last strong earthquake occurred in the Central part of Uzbekistan in 2013 near the village with M = 6.3. Turkestan errors, seismotectonic model According to the neotectonic model, the newest structure of the high-risk part of Uzbekistan is genetically related to the epiplatform orogen of the Southern Tien Shan, which is located in the northwestern part of the country. in the military part fell to the Turan plate. The neotectonic structures developed here extend from east to west and reflect a chain of isometric rock formations. In the same direction, a decrease in the amplitudes of recent tectonic movements (14), the thickness and size of the Neogene-Quaternary deposits, the intensity of dissection of the relief by erosion, and its absolute heights are observed. The main features of the fracture neotectonics of the Nurato-Zirabulak zone are determined by the ratio of the north-west and north-east directions, the predominance of the former.

At the same time, all the faults of the north-western blow are a direct continuation of the marginal and internal cracks of the Southern Tien-Shan zone. Changes occur in the transverse zone of the Southern Tien Shan fault The impact of sublatitudinal marginal and internal faults in the northwestern part of the southern Tien Shan zone, which is characteristic of the Nurata-Zirabulak zone. Neotectonic structures rotate around 40^0-45^0. This creates a zone of tension, the modern activity of which is confirmed by the many epicenters of weak earthquakes located in the zones of dynamic impact of cracks.

Conclusion

Uzbekistan's previous thematic geological, geophysical, geomorphological, Seismological and other studies, including space geodetic materials, allow Central Uzbekistan to offer the following model of seismotectonics:

1. Almost all of the neotectonic structures are arranged in a positive and negative plane, and the long axis has a northwest orientation. It can be assumed that the most likely direction in which the neotectonic structures are formed is the north-eastern direction. Stress stresses for the lower stratified neotectonic structures of southern Tien-Shan have a submeridional orientation.
2. The presence of horizontal silks in the cracks of the north-west and North-East directions, the results of interpretation of the materials of the aerospace research, The conducted seismotectonic analysis indicate the simultaneous effect on the two directions mentioned in Paragraph 1.
3. The morphological appearance of the southern Tien-Shan and Nurata-Zirabulak natural risk-free neotectonic zones, their amplitude characteristics and the manifestation of seismicity indicate a sharp spread in the direction of the north-eastern direction.
4. With such a seismotectonic model, the most likely kinematic type of silences in the source zones of earthquakes can be reverse cracks and reverse cracks.

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