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Research Article

ASSESSMENT OF THE SEISMOTECTONIC POTENTIAL OF THE TERRITORY OF UZBEKISTAN

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ABSTRACT
The article uses a set of geological and geophysical data to classify the Earth's crust. The methodology for classifying the crust is based on cluster analysis, which allows simultaneous and comprehensive analysis of large data sets. Comparative and statistical analyzes of the initial data were conducted, and the problem of classification based on cluster analysis was solved. This study used methods that were completely different from the previous method of estimating the potential of strong earthquakes. The analysis of the correlation of seismic types of earthquakes identified so far with the seismicity of seismic species isolated using them as a reference made it possible to make predictions for similar types of seismicity. A stratified forecast map of potential Mmax deposits in Uzbekistan has been developed.

Keywords: *Forecast, Statistics, Cluster Analysis, Crust, Anomaly, Classification, Frequency Histograms*

INTRODUCTION
The devastating loss of human life as a result of strong earthquakes in nature has manifested itself at different times in different regions, indicating the need for scientists to pay attention and study this area. The first information about earthquakes in Central Asia can be found in the manuscripts of the IX century AD "In 224 (838-839) there was a strong earthquake in Fergana and many houses were destroyed," wrote the historian of that time Abu-Gardizi.

V.V.Belousov (1954): The principle of mapping seismic zoning is based on the assumption that previous strong earthquakes can be repeated anywhere. At the same time, he emphasized that the conditions under which earthquakes occur are related to the structure of the earth's crust and tectonic movements.

It is known that the tectonic activity of a region is determined by a set of geological and geophysical indicators, and their specific combination determines its seismotectonic potential. On this basis, G.I. Reisner (1980) proposed a method of mapping seismotectonic potential. In this case, the studied area is divided into equal-sized cells of a certain size, and each cell is entered data from maps based on observations. The geological-geophysical parameters selected in solving the problem are characterized by their relevance to seismotectonics. The problem was characterized by a certain set of conventional units corresponding to different levels of seismotectonic potential in each cell. The resulting map was then compared with a map of strong earthquake epicenters. [G.I. Reisner et al.,1990] [1].

The division of the Earth's crust into species opens up a wide range of possibilities in the study of endogenous processes, in particular seismic zoning and geodynamics. It will be necessary to establish the connections between the types of crusts and to determine their position in the overall system. In this regard, VV Belousov said, "First of all, of course, it is necessary to raise the issue of differentiating the types of crust by structure. However, if different types of crust are selected, they reflect different types of crustal development, i.e. different endogenous regimes, which allows us to assess not only the modern structure of the crust, but also the laws of its development "(Belousov, Pavlenkova, 1985). in addition, "it would be very important to use the classification of features of the deep structure of the earth's crust to determine the cause-and-effect relationship between processes in the earth's crust.

The method of zoning the crust (G.I. Reisner, M. G. Reisner) is based on the geodynamic concept of a well-structured and well-founded physical model - VV Belousov (1966, 1978, 1986), in contrast to all of the above . According to this concept, the main source of tectonic movements is the differentiation of mantle material, as a result of which its soluble composition enters the earth's crust with a large amount of deep heat, causing physicochemical changes of varying intensity. This, in turn, manifests itself in surface structures and affects the intensity of this or that tectonic activity. [G.I. Reisner et al.,1990] [1].

METHODS AND MATERIALS

A special feature of the study of endogenous regimes is the study of its modern analogues, which led to alpine tectogenesis. The study of modern endogenous regimes is based on the classification of the earth's crust using geological-geophysical data that determine the current state and structure. In this case, the initial geological-geophysical data should be evenly distributed throughout the study area. Most importantly, the selection of the initial data should be consistent with the stated goal [G.I. Reisner et al.,1993] [1].

Taking into account the above, it is expedient to use the following complex of geological and geophysical data in the classification of the earth's crust:

1. Density of heat flow
2. The thickness of the earth's crust
3. The height of the modern relief
4. Isostatic gravity anomalies.
5. Depth of the consolidated foundation.
6. ΔT magnetic anomalies.
7. Density of ground cracks.
8. Amplitude of neotectonic movements.

To some extent, endogenous regimes, especially modern endogenous regimes, are associated with crustal seismicity, magmatism, accumulation of oil and gas deposits, and other similar processes and events [10, 11, 12, 13, 14]. Therefore, the classification of the earth's crust into species should be based on the use of preliminary data describing the modern structure and condition of the earth's crust [Tukhtasinov A. et al.,2021] [3].

A correlation matrix was calculated for each of the 8 parameters: heat flux Q (mW/m2), modern relief height R (km), crustal thickness H (km), isostatic anomalies I (mGal), consolidated foundation depth F (km).), the magnetic field component ΔT (ersted), the density of active ground cracks L (km/km2), the amplitude of neotectonic movements N (km) (Table 1.).

When dealing with the problem of classifying the Earth's crust, when faced with large arrays of different data, a complex combination of initial data, the best way to solve it is to analyze it comprehensively and simultaneously. Such an analysis can be performed by cluster analysis. [Duran, Odell, 1977] [8]. The merging criteria in this analysis can serve as a measure of proximity to the entire character set in multidimensional space. As a measure of proximity we can take Euclid or Descartes distance, Pearson's logarithmic or racial criteria, or other measurements. The solution to the cluster analysis problem is to separate objects of the same level with higher-level objects, characterized by a primary data set, each of which can only be described by a set of specific values of the same source data [Reisner G.I.] [5].

In this study, cluster analysis was performed using the k-mean McQueen method. The principle of classification serves to randomly, initially divide many objects into a certain number of clusters (classes, groups, populations), then redistribute other objects to the nearest clusters, recalculate new "centers of gravity" of clusters, and continue the described procedure until certain optimal divisions occur. The peculiarity of the method is that as a result of calculations, the separated clusters do not overlap, each separated object is guaranteed to belong to only one cluster.

Modern endogenous regimes are associated with processes such as seismicity, magmatism, rudogeneration, oil and gas accumulation in the earth's crust. Therefore, data on the modern structure and condition of the

earth's crust are used to compare the processes of strong earthquakes. In this case, the first step of cluster analysis, ie the step with a very small "convergence norm" is selected. [Tukhtasinov A. et al.,2021] [3,4].
Based on the parameters that determine the current structure and condition of the Earth's crust, the seismotectonic potential of the Earth's crust can be predicted when the types of crust separated are "trained" with the epicenters of strong earthquakes. The study used the cluster classification method and the regions with strong earthquake epicenters as a reference.
Processing of primary geological and geophysical materials was carried out using cluster analysis by the K-medium method. STATISTICA v 6.0 was used in this study. 339 cells across the region were allocated according to the proximity criterion to 200 clusters (classes). Based on this information, 200 different formalized (digital) maps of the territory of Uzbekistan were created using the computer program "program KA".[Tukhtasinov A. et al.,2021] [4].
The results of the cluster analysis and the data on the epicenters of the opened strong earthquakes were considered together, and in the 1st stage a catalog of earthquakes by clusters was compiled. At the national level, the epicenter of earthquakes in different clusters is located in 53 cells. These clusters are the benchmark in solving the forecasting problem associated with identifying areas where the probability of strong earthquakes exists. [Tukhtasinov et al.,2021] [4].

RESULTS AND DISCUSSIONS

In this catalog, using the nomenclature sheet, cluster type data, the data of reference cells with earthquakes are distributed to 339 cells allocated on the territory of Uzbekistan. Using the Image Recognition method, the data of the reference cells belonging to one cluster are distributed to the unexplored cell in the same cluster. As a result, a digital forecast map showing the potential for Mmax, classified by earthquake series, was created.

Table 2: Catalog of strong earthquakes in Uzbekistan (magnitude 5 and above)

№	Year	Long	Lat	Magnitude	Depth (km)	Name of earthquake	Type of cluster
1.	838	40-40	71-30	5,30	10,00	Fergana	194
2.	942	40-00	64-30	6,70	15,00	Bukhara	3
3.	1208	42-20	60-00	6.1	8,00	Kunya-Urgench	185
4.	1494,1927	41-00	71-30	5,10/6.0		Namangan, Namangan	192
5.	1620	41-00	71-00	5,80	7,00	Asinsk	189
6.	1822	39-40	64-30	6,40	20,00	Bukhara	137
7.	1868	41-20	69-00	6,40	20,00	Tashkent	160
8.	1868	41-20	69-60	6,50	18,00	Tashkent	127
9.	1883	40-40	72-30	5,50	20,00	Osh	155
10.	1886	41-40	69-00	6,00	14,00	Tashkent	188
11.	1888	40-00	69-80	6,30	10,00	Kostakozskoe	
12.	189,1920	41-40	70-30	7,20/5,60	25,00/10,00	Sandalash, North Angren	141
13.	1892	41-00	66-30	6,10	25,00	Kyzylkum	1
14.	1897	40-00	68-00	6,60	25,00	Uratube-1, Uratube-2	152
15.	1902,1947	41-00	72-00	6,40/5,90	10,00/9,00	Andidzan/ Naiman	189
16.	1903	41-00	72-30	6,10	14,00	Aimys	189
17.	1907	38-40	67-30	7,50	30,00	Karatag-1	162

18.	1907	39-00	68-00	7,30/7,00	24,00/20,00	Karatag -2, Karatag -3	157
19.	1907	40,30	72,30	5,80	10,00	Kyrkkol	186
20.	1908,1941,1984	41-00	71-00	5,40/5,40/5,60	26,00/24,00/14,00	Namangan / Namangan / Pap	189
21.	1912	41-20	71-30	5,20	12,00	Namangan	192
22.	1924,1924	40-40	73-00	5,00/6,50		Kurshabek-1/ Kurshabek -2	
23.	1926	41-00	73-00	5,40	9,00	Dzalalabad	98
24.	1928	42,00	72,30	5,20	20,00	Chatkal	
25.	1928,2016	39-20	67-00	5,30/5,10	15,00/15	Shakhrisabz/Kitab	104
26.	1929	41-40	63-30	5.2		Kyzylkum	
27.	1930,1984	40-20	69-30	5,20/5,00	12,00/15,00	Zamburun, Kayrakkum	
28.	1932	41-40	65-30	6,10	25,00	Tamdybulak	63
29.	1935	40-00	67-30	5,40	20,00	Gallaaral	152
30.	1935,1968	38-20	67-00	6,20/5,00	16,00/15,00	Baysun/Baysun	119
31.	1937	42-20	70-30	6,40	17,00	Pskem	157
32.	1942	41-20	71-30	5,90	18,00	Yartemin	192
33.	1946,1971	42-00	72-00	7,50/5,60	25,00/17,00	Chatkal/ Chatkal	
34.	1955	39-40	68-00	5,20	21,00	Bakhmal	141
35.	1959,1987	42-00	70-00	5,70/5,00	13,00/5,00	Burchmulla/ Oltyntepa	117
36.	1965,1970,2013	41-00	69-00	5,50/5,00/5,20	11,00/20,00/10	Koshtepa/ Pskem/ Tuyabuguz	48
37.	1968	43-00	66-30	5,30	30,00	Kyzylkum -1	
38.	1968	43-20	67-00	5,00	30,00	Kyzylkum -2	
39.	1976	40-40	63-30	7,00	25,00	Gazly-1	197
40.	1976	40-40	63-00	7,30/7,20	20,00/15,00	Gazly -2, Gazly -3	144
41.	1977	40-20	70-30	6,30	15,00	Isfara-Batkent	135
42.	1977	40-20	71-00	5,70	14,00	Khaydarkul	98
43.	1977,2008	41-40	69-30	5,10/5,00	25,00	Tavaksay/ Tashkent	59
44.	1980,1966	41-20	69-00	5,50/5,20	12,00/8,00	Nazarbek/ Tashkent	160
45.	1982,2011	40-20	71-30	5,50/6,30	12,00/15	Chimion/ Kans	123
46.	1988	41-20	72-00	5,50	15,00	Shamaldysay	192
47.	1999	39-00	66-30	5,00	10,00	Kamashi-1, Kamashi-2	17
48.	1999	39-00	66-00	5,10	12,00	Kamashi	64
49.	2007	41-40	71-00	5,10	12	Sumsar	
50.	2008	40-40	72-30	6,00	20	Gulchyn	
51.	2008	41-20	73-00	5,10	9	Djalalabad	
52.	2013	40-00	67-00	6,30	15	Mardzanbulak	89
53.	2017	40-00	67-30	5,10	10	Bakhmal	152

A catalog of earthquakes with a magnitude of 4.0-7.5 on the territory of Uzbekistan to date has been compiled, the data were obtained from sources compiled by the staff of the Institute of Seismology (Table

2). According to the catalog, the earthquakes were mapped to the digital map of the second stage of the classification of the territory of Uzbekistan (Fig.1.).

Clusters with a value of Mmax, taken as a reference, act as a "teacher" for the other numeric cells on the digital map. As a result, a stratified EZO digital map of the territory of Uzbekistan by Mmax was created (Fig. 2).

In the 157th cluster of the Surkhandarya seismogenic zone at the intersection of the Gissar-Kokshaal and Bobotag-Keykitau seismogenic zones in the J-42-41 nomenclature sheet cell Karatag in 1907 were observed 7.0, 7.3 earthquakes, the northern part of this cell cluster type crust, K-42-70 Pskem 1937 magnitude 6.40, K-42-71 nomenclature sheets can be predicted as a reference.

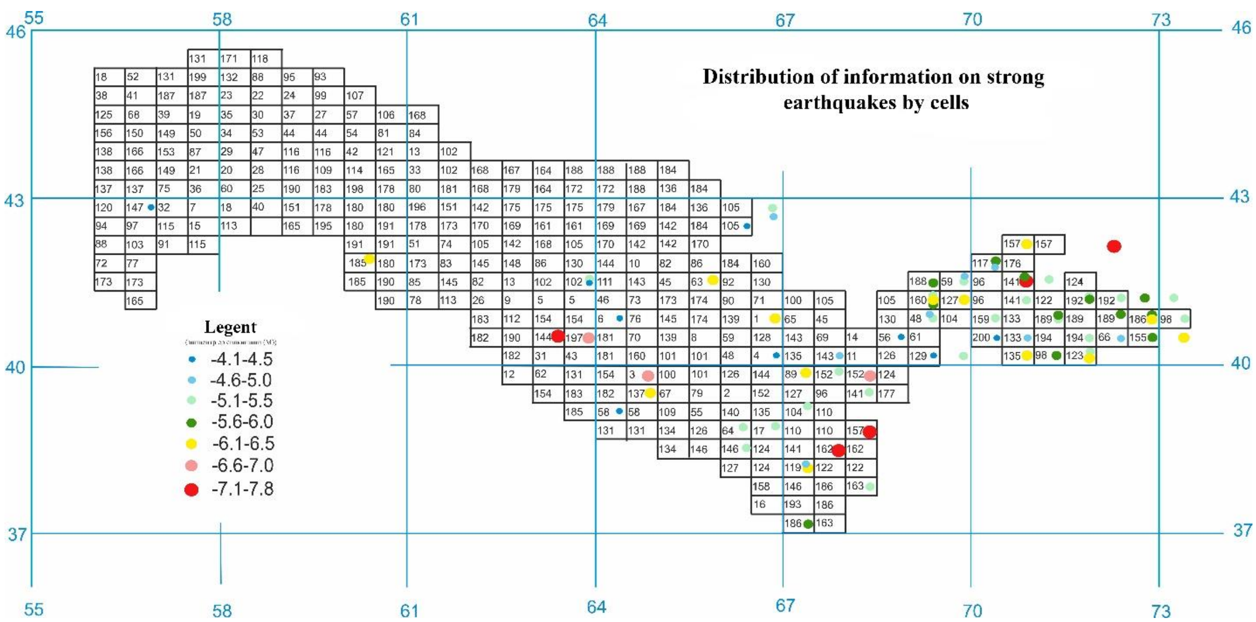

Fig. 1. Distribution of data on strong earthquakes by cells

In the 141st cluster type crust, the cell K-42-94 nomenclature sheet located in the Sandalash seismogenic zone. magnitude, J-42-17 nomenclature sheet 5.5 magnitude earthquake cells were predicted to be selected as a 7.20 magnitude region.

152-cluster type crust J-42-5 nomenclature sheet Uratepa in the seismogenic zone of Northern Nurata as a reference cell for a 6.6, 6.7 magnitude earthquake in 1897 A 5.1 magnitude earthquake occurred in the year, and the J-41-14 nomenclature sheets allow a 6.7 magnitude earthquake to be predicted.

186-cluster type crust K-43-110 nomenclature sheet in Taldysuy seymogenic zone Aim 1903 6.1 magnitude earthquake as a standard J-42-76, J-42-88, J-42-99 sheet nomenclature in the central part of Surkhandarya basin allows 6.5 magnitude earthquakes to be predicted in the earth’s crust.

In the 127th cluster type crust in the Tashkent Nurekota seismogenic zone K-42-104 nomenclature sheet Tashkent 1868 6.5 magnitude earthquake as a reference cell J-42-15, J-42-61 nomenclature sheet cells 6.5 magnitude earthquake forecast gave.

In the 160-cluster type crust in the Pskem Tashkent seismogenic zone K-42-103 nomenclature sheet Tashkent 1868 6.4, Tashkent 1966 5.3 magnitude earthquakes as a reference K-41-142 in the central part of the Southern Tien Shan and Bukhara seismogenic zone, Bukantau allowed forecasting for K-42-74 nomenclature sheets north of the seismogenic zone.

The Bukhara seismogenic zone of the 137th cluster type J-41-22 made it possible to forecast the K-40-29, K-40-30 nomenclature sheets in the central part of Karakalpakstan as a reference cell for the 6.4 magnitude earthquake of 1822 in Bukhara.

Research Article

The 185-cluster type crust Sultanuvays, Bukantau is located in the K-41-73 nomenclature sheet cell Kunya-Urgench at the junction of seismogenic zones west of all southern Uzbekistan. 41-85, the J-41-32 nomenclature in the central part of the Chorjuy ridge allows forecasting for sheet cells.

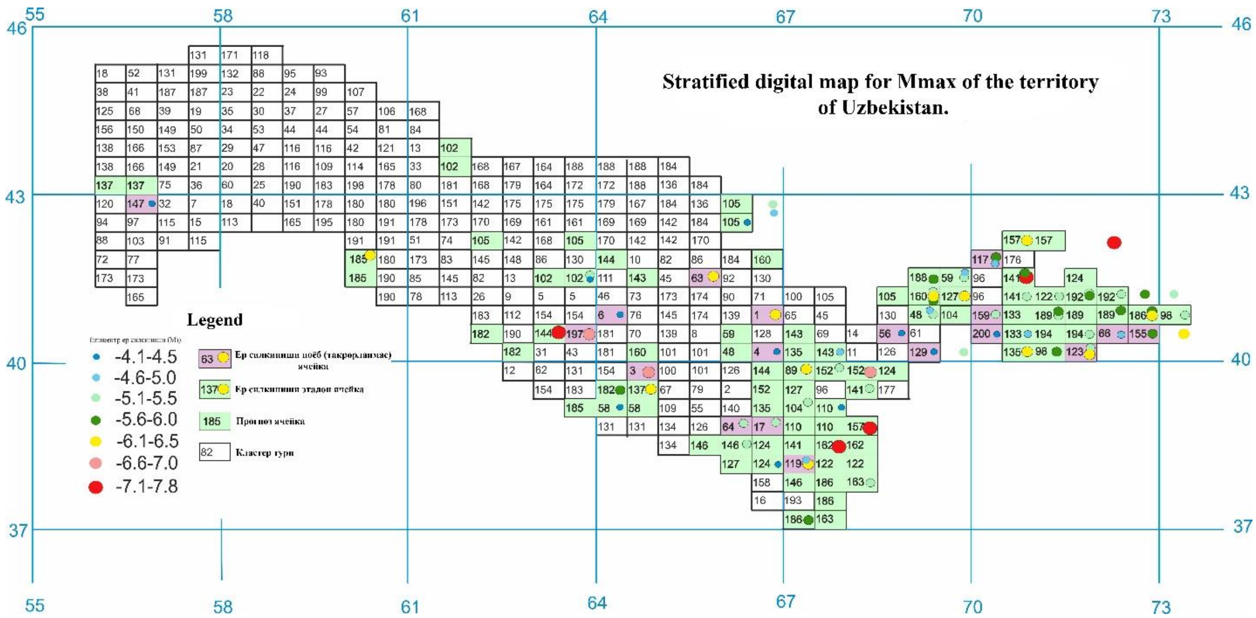

Fig. 2. M_{max} stratified EZO digital map of the territory of Uzbekistan

The 192-cluster-type crust of the North Fergana seismogenic zone K-42-108 nomenclature sheet Shamaldysay as a reference cell for the 1988 5.5 magnitude earthquake made it possible to predict the K-43-97 nomenclature sheet to the east as a 5.5 magnitude region.

Two cells of the 189-cluster type K-42-119 on the nomenclature sheet Namangan 1908 5.4 magnitude, Namangan 1941 5.4 magnitude, Pop 1984 5.6 magnitude, K-43-109 nomenclature sheet Andijan 1902 6.0 magnitude, Naiman 1947 5.9 magnitude, The 5.8 magnitude earthquakes of the axis 1620 allow the prediction of the K-42-120 nomenclature sheet as a 6.0 magnitude region as a reference.

In the 124-cluster type crust J-42-50 nomenclature sheet Kamashi 5.0 magnitude earthquake in 1999 allows to predict this type J-42-62 nomenclature sheet cell as a reference.

A total of 1, 3, 4, 63, 66, 123, 147, 155, 159, 147 cluster species of the seismicity of the territory of Uzbekistan on the stratified map by M_{max} were found to be compatible with rare (non-recurrent) crustal rocks. however, this type of crust is no longer found in the studied areas (Fig. 3).

General "training" As mentioned above, based on the assessment of seismotectonic potential, the earthquakes that occurred in the territory of the Republic of Uzbekistan are taken as benchmarks and "training" of the types of earth's crust is combined into the same cluster. As can be seen from the obtained results (self-study), seismological information is lacking in the large part of the studied area, that is, there is no information about instrumental or historical earthquakes that occurred in a large part of our area. If we increase the search area, we will get more information about benchmark earthquakes. In this case, we can identify exactly similar cells in the area obtained for cluster analysis, give them the Mmax value, and solve the prediction problem. This was done by GI Reisner and D.D. Khusanbaev in the form called general "teaching". Table 3 and Figures 4-5 show the results of the cluster analysis, which included the regions of Eurasia and Uzbekistan.

Research Article

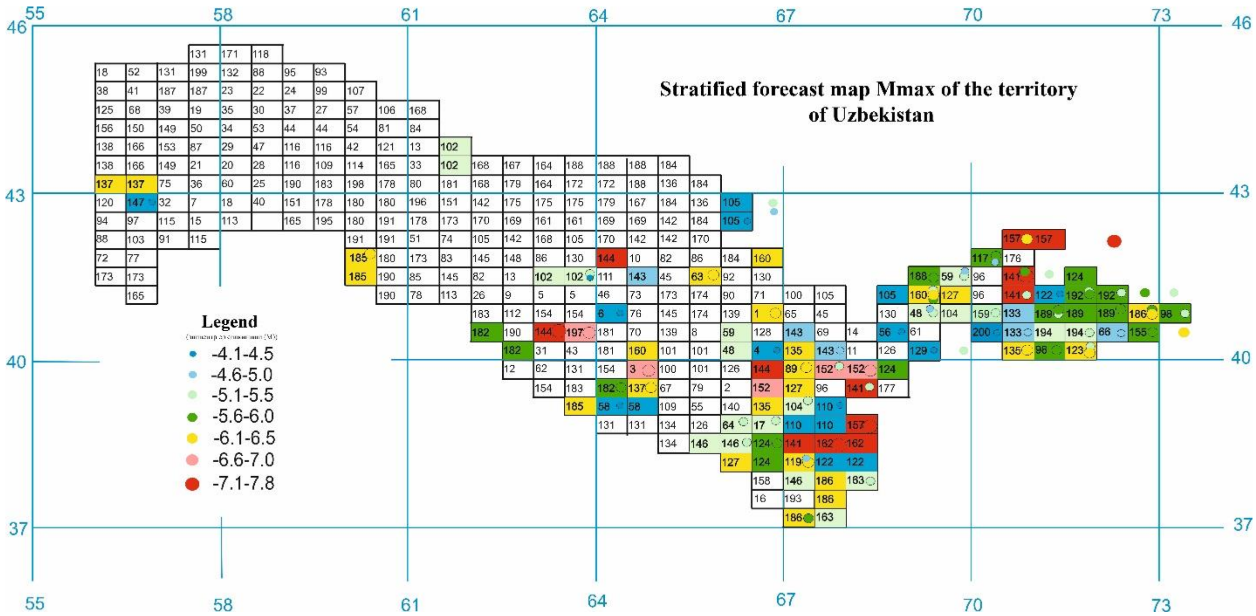

Fig. 3. A stratified forecast map of the territory of Uzbekistan by M_{max}

The results of the cluster analysis of the Eurasian region corresponding to the territory of Uzbekistan and reference earthquakes [Khusanbaev D.D. taken from thesis]
Table 3

№	**Cluster**	**Geological and geophysical indicators**					**Coordinate**		**Mmax**	**Name and date of the earthquake**
		Q	***H***	***R***	***F***	***I***	***N***	***E***		
1.	14	54,7	38,7	0,2	1,4	-10,2	67-00	13-20	6,4	Chiili 03.06.1929
2.	40	72,2	45,3	0,8	2,0	9,5	41-00	44-00	7,1	Spitac 07.12.1988
3.	42	46,6	39,7	0,2	3,5	19,3	42-20	42-00	4,9	Kavkaz 16.07.1887
4.	47	65,3	39,6	0,2	0,7	-2,3	45-20	16-00	5,4	Yutoslaviya 28.01.1910
5.	48	61,1	42,3	0,2	2,4	-14,2	45-20	26-00	6,2	Karpat 09.12.1945
6.	71	55,1	39,6	0,1	4,8	-28,9	45-20	39-00	5,4	Kuban 19.06.1926
7.	75	45,2	39,8	0,1	5,1	1,8	39-20	56-00	5,2	Qizil arbat 12.02.1964
8.	76	75.5	35.1	0.4	0.7	11.4	49-00	21-30	5.4	Karpat 23.12.1778
9.	108	71,6	38,9	0,1	1,3	10,9	45-40	16-00	6,0	Yugoslaviya 08.10.1909

In the cluster analysis carried out on general "training", geological-geophysical indicators of the cells were compared to the cluster analysis performed by the author and clusters with similar geological-geophysical indicators were separated. According to geological and geophysical parameters, the cell where the 6.4

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2024 Vol. 14, pp. 209-218/Akhmadjon and Davron
Research Article

magnitude earthquake occurred in Chiili (Kazakhstan) in 1929 is the same type of crust as the one where the 6.0 magnitude earthquake occurred in Tashkent in 1886, and it was observed that their seismotectonic potential confirms each other.

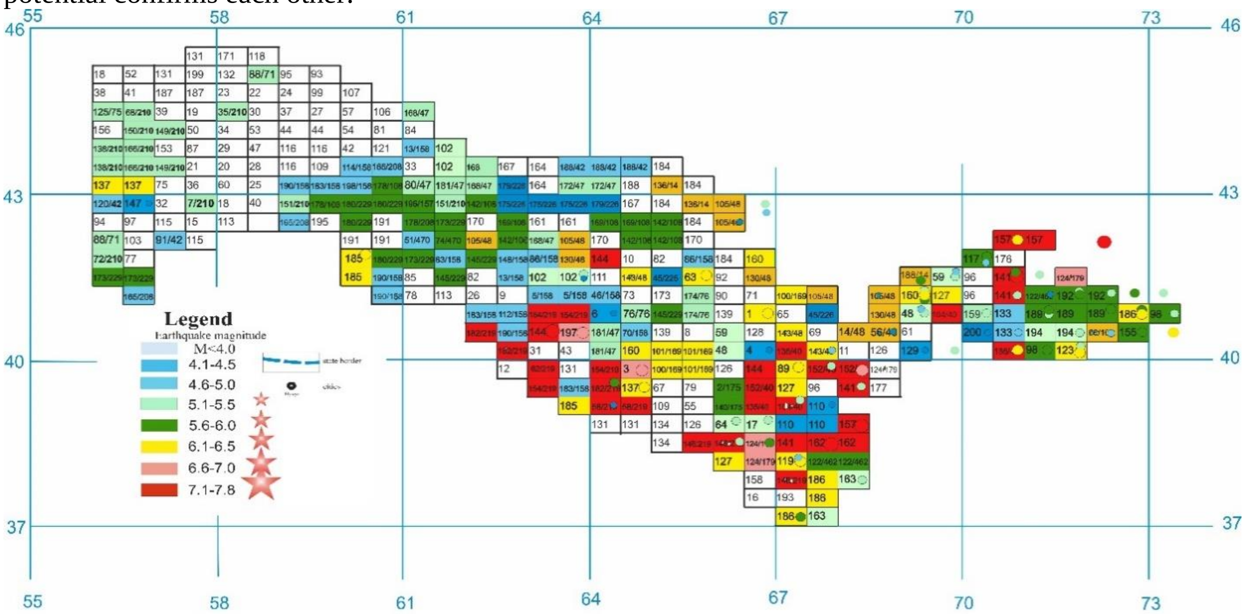

Fig. 4. Digital schematic map of the seismotectonic potential of the territory of Uzbekistan for general "training"

General "training" Spitak earthquake of 7.1 magnitude in 1988, cluster number 40 - Earth's crust in clusters 152, 135, 104, where earthquakes of magnitude 6.6 in 1897, Oratepa in 1897, magnitude 5.4 in 1935, G'allaorol in 1977 occurred in clusters 152, 135, 104 was found to be the same as , and it allowed 7 cells included in this cluster to be predicted as M>7.0 area as a benchmark.

The 7.1-magnitude Kerki earthquake (1175 yr) of the general "training" shell type 219, 1 cell in the Surkhan-Sherabod-Kelif seismogenic zone in cluster 146, 2 cells in the Kyzyl-Darya-Langar-Karail seismogenic zone, Kyzylkum in cluster 154 2 cells in the seismogenic zone of Ody, 1 cell in the seismogenic zone of Bukhara, cluster 62, 182, 58 in the southern part of the seismogenic zone of Bukhara, it was determined that the geological and geophysical parameters of the earth's crust in 5 cells are the same, and M>7.0 is forecast as a reference area for these clusters. made it possible.

The 6.4-magnitude Yugoslavian (1969) earthquake of the general "training" 169 crustal type 100, 101 cluster of 4 cells in the South Tien-Shan and Zarafshan seismogenic zones, 1 cell in the Besapan-Northern-Nurota seismogenic zone geological-geophysical it was found to be the same as the indicators, and it allowed to forecast 6.1<M>6.5 area as a benchmark for these clusters.

The 6.2-magnitude Carpathian (1945) earthquake of the 48th shell type in the general "training" is in clusters 14, 56, 130, 105, 160, the region near Tashkent, the Middle Syr Darya region, 5 cells, Bukantau, North Tomdi seismogenic zones in 2 cells at the intersection It was determined that the earth's crust is the same as the geological-geophysical indicators, which allowed these clusters to be forecast as the 6.1<M>6.5 area as a benchmark.

The 6.0-magnitude Crimean (1927) earthquake of the 210th crustal type in the general "training" geological-geophysical crust of the earth in 9 cells in the area of Ustyurt Karabaur Vali in clusters 72, 138, 166, 150, 68, 149, 7, 35, 151 were found to be the same as the indicators, allowing these clusters to be forecasted as a reference 5.6<M>6.0 region.

The Kuban earthquake of 5.4 magnitude of 1926, which belongs to the general "training" crust type 71, in the 88th cluster, in 1 cell of the island, in 1 cell of South Karakalpakstan, it was determined that the

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2024 Vol. 14, pp. 209-218/Akhmadjon and Davron
Research Article

geological-geophysical indicators of the earth's crust are the same, and it is possible to forecast these clusters as a benchmark. gave

The magnitude 4.9 Caucasus earthquake of 1887, which belongs to the general "training" shell type 42, was found to be the same as the geological-geophysical indicators of the earth's crust in clusters 120, 91, 188, and made it possible to forecast these clusters as a benchmark.

The 5.2-magnitude Kysil Arvot 1964 earthquake, which belongs to the general "training" crust type 75, was found to be the same as the geological-geophysical indicators of the crust of the 125th cluster, which made it possible to forecast these clusters as a benchmark.

The 1950 West Turkmenistan earthquake of magnitude 4.9, which belongs to the general "training" shell type 208, was found to be the same as the geological-geophysical indicators of the earth's crust in cluster 165, which made it possible to forecast these clusters as a benchmark.

The 5.0-magnitude Sharlock 1969 earthquake belonging to the general "training" crustal type 158. The crust in clusters 190, 183, 198, 114, 83, 112, 13, 148, 154, 102, 86, 5, 46, 70, 145 is geological- It was found to be the same as the geophysical indicators, allowing these clusters to be forecasted as benchmarks.

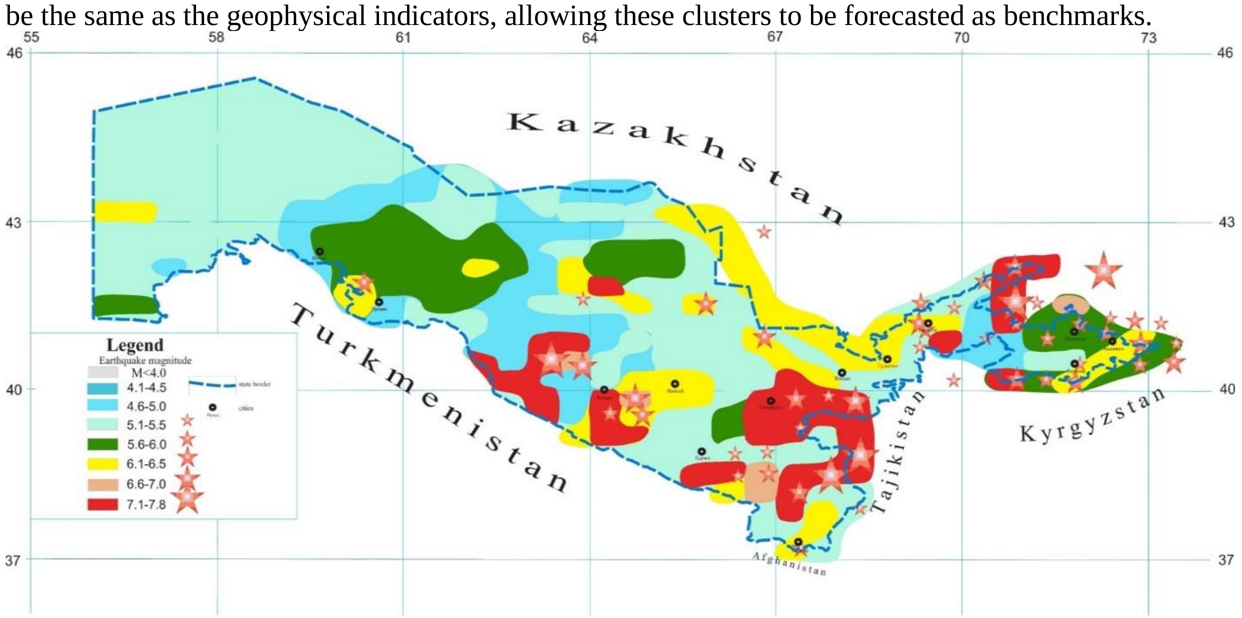

Fig. 5. Schematic map of the seismotectonic potential of the territory of Uzbekistan for general "training" *(Source: Tokhtasinov A.Kh., Khusanbaev D.D., Atabaev D.Kh.)*

As a result of seismotectonic work, a map of the earth's crust was divided into types and classified according to Mmax, according to which forecast, standard and unique (unrepeatable) types of cells were determined. The areas identified as a forecast are those that correspond to and differ from the general seismic zoning map created by the employees of the Institute of Seismology in 2011.

A map of potential earthquake foci of the territory of Uzbekistan, classified by Mmax, was created. It was found that the obtained map is compatible with the general seismic zoning map of the Republic. At the same time, the Mmax values of some seismogenic zones were clarified.

REFERENCES

Anonymous (No date). Laboratory of neotectonics and modern geodynamics Geological Institute of the Russian academy of science. *http://neotec.ginras.ru/neomaps.html (application date 24.10.2021).*

Artemev M.E (1975). Territory of isostasy USSR - M., Nauka, 215p.

Duran K., Odel F. Cluster analysis. M.: *Statistics* 239 p.

Gravimetricheskaya map of the USSR. Scale 1: 500,000, M., 1975.

Reisner G.I., Ioganson L.I., Reisner M.G., Baranov Yu.E (1993). Typization of the earth's crust and modern geological processes M.

Reysner G.I., Baranov Yu.E., Reysner M.G (1990). Types of the earth's crust in oil and gas bearing regions of Europe and southern Central Asia. *Thesis 1990*

Tal-Virskiy B.B (1982). Geophysical fields and tectonics Sredney Asia 271p.

Tukhtasinov A., Khusanbayev D (2022). Evaluating the potential of hydrocarbon generation of the earth's crust within the territory of Uzbekistan. *International Journal of Geology*. **12**. 15-22.

Tukhtasinov A., Khusanbayev D. Atabayev D. Mukhammedrakhimov Ch (2021). Modern endogenous regimes and evolution of the earth's crust of Uzbekistan. *An International Multidisciplinary Research Journal.*

Tukhtasinov A.X., Khusanbaev D.D., Atabaev D.X (1977). Tipiratsiya zemnoy kory po kompleksu geologo-geofizicheskix dannyx v Uzbekistana. *Science and Innovative Development* 5, 2021.

Zuev Yu.N., Polikarpov A.A (2002). Map distribution of heat flow in the territory of Central Asia. Scale 1: 2500 000,.