DOI: https://doi.org/10.59849/2219-6641.2023.2.23

MODERN SEISMOGEODYNAMICS OF THE NORTH-WESTERN PART OF AZERBAIJAN

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The article presents an analysis of the seismicity of focal zones in the northwestern part of the Republic of Azerbaijan. Using a geodynamic model of a pair of right-lateral strike-slip faults, an interpretation of the focal mechanisms of the Zagatala, Balakan, Oghuz, Gabala and Sheki earthquakes was given, and a mechanism of the Caucasian fault with a left-sided strike-slip component was established. A connection between the observed seismicity and the tectonic structure of the region was revealed. The nature of movements in the active parts of deep faults has been revealed. An analysis of the orientation of the main stress axes of earthquake focal mechanisms was carried out. Depth profiles of displacements in the sources of strong earthquakes were constructed.

Based on the orientation data of the compression and tension axes, a map of the distribution of the Lode-Nadai coefficient was constructed. As can be seen on the maps, the Zagatala, Balakan and Gabala regions are mainly characterized by tensile stresses. Compressive stresses are observed in the Sheki and Oghuz regions. Thus, in 2003-2023, the displacement values were determined in the foci of earthquakes with magnitude ml≥4 in the Balaken, Zagatala, Sheki, Oguz and Gabala regions. In the Sheki, Oguz, Gabala regions at a depth of 12-19 km, the displacement is 0.26-0.35 m, and in the Zagatala and Balakan regions 0.15-0.27 m at a depth of 3-15 km. The smallest displacement of 0.1-0.12 m was recorded in the Sheki region.

Key words: geodynamics, deep faults, focal mechanisms, Zakatala, Balakan, Okhuz, Gabala and Sheki earthquakes.

AZƏRBAYCANIN ŞİMAL-QƏRB BÖLGƏSİNİN MÜASİR SEYSMOGEODİNAMİKASI

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Məqalədə Azərbaycan Respublikasının şimal-qərb hissəsində seysmogen zonalarının aktivliyi təhlili təqdim olunur. Sağ yana doğru sürüşmə-sürüşmə cütünün geodinamik modelindən istifadə etməklə Zaqatala, Balakən, Oğuz, Qəbələ və Şəki zəlzələlərinin ocaq mexanizmlərinin analizi nəticəsində ümumqafqaz qırılmalar üzrə sol tərəfli hərəkətlər müəyyən olunub. Müşahidə olunan seysmiklik ilə rayonun tektonik strukturu arasında əlaqə və dərin qırılmaların aktiv hissələrində hərəkətlərin xarakteri aşkar edilmişdir. Zəlzələ ocaq mexanizmlərinin əsas gərginlik oxlarının oriyentasiyasının təhlili aparılmışdır. Güclü zəlzələ mənbələrində yerdəyişmələrin dərinlik profilləri qurulmuşdur.

Sıxılma və gərginlik oxlarının istiqamətləndirilməsi nəticəsində Lode-Nadayi əmsalının paylanma xəritəsi qurulmuşdur. Xəritədən göründüyü kimi, Zaqatala, Balakən və Qəbələ rayonları əsasən gərilmə gərginliyi ilə xarakterizə olunur. Şəki və Oğuz rayonlarında sıxılma gərginliyi müşahidə olunur. Belə ki, 2003-2023-cü illərdə Balakən, Zaqatala, Şəki, Oğuz və Qəbələ rayonlarında maqnitudası ml≥4 olan zəlzələlərin ocaqda yerdəyişmə giymətləri müəyyən edilmişdir. Şəki, Oğuz, Qəbələ rayonlarında yerdəyişmənin dəyəri 12-19 km dərinlikdə 0,26-0,35 m, Zaqatala və Balakən rayonlarında isə 3-15 km dərinlikdə 0,15-0,27 m müşahidə olunur. Ən aşağı yerdəyişmə 0,1-0,12 m Şəki ərazisində qeydə alınıb.

Açar sözlər: geodinamika, dərin qırılmalar, ocaq mexanizmləri, Zaqatala, Balakən, Oğuz, Qəbələ və Şəki zəlzələləri.

СОВРЕМЕННАЯ СЕЙСМОГЕОДИНАМИКА СЕВЕРО-ЗАПАДНОЙ ЧАСТИ АЗЕРБАЙДЖАНА

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В статье представлен анализ сейсмичности очаговых зон СЗ части Азербайджанской республики. С использованием геодинамической модели пары правосторонних сдвигов дана

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интерпретация механизмов очага Закатальских, Балаканских, Огузских, Габалинских и Шекинских землетрясений, установлен механизм общекавказского сброса с левосторонней сдвиговой компонентой. Выявлена связь наблюденной сейсмичности с тектоническим строением региона. Выявлен характер подвижек в активных частях глубинных разломов. Проведен анализ ориентации основных осей напряжений механизмов очагов землетрясений. Построены глубинные профили смещений в очагах сильных землетрясений.

По данным ориентаций осей сжатия и растяжения была построена карта распределения коэффициента Лоде-Надаи. Как видно на карте, Загатальский, Балаканский и Габалинский районы в основном характеризуются растягивающими напряжениями. Напряжения сжатия наблюдаются в Шекинском и Огузском районах. Так, в 2003-2023 годах были определены величины смещений в очагах землетрясений с магнитудой ml≥4 в Балакенском, Загатальском, Шекинском, Огузском и Габалинском районах. В Шекинском, Огузском, Габалинском районах на глубине 12-19 км величина смещения составляет 0,26-0,35 м, а в Загатальском и Балаканском районах 0,15-0,27 м на глубине 3-15 км. Наименьшее смещение 0,1-0,12 м зафиксировано в Шекинском районе.

Ключевые слова: геодинамика, глубинные разломы, механизмы очагов, Закатальские, Балаканские, Огузские, Габалинские и Шекинские землетрясения.

Introduction.

The long-term study of earthquakes shows that the vast majority of them occur due to the sudden release of tension accumulated over a long period of time in the tectonically active parts of the earth's crust. The Caucasus, including Azerbaijan, as well as the Caspian Sea, are part of the Alpine-Himalayan rift system, are located in the collisional contact zone of the Eurasian and Arabian tectonic plates, and are characterized by fairly high seismic activity. The Arabian plate is moving northward, breaking away from the African megaplate along the Red Sea and Gulf of Aden rift zones. As a result of the collision of the Arabian plate with the Eurasian megaplate, the lithosphere area between them is divided into the Anatolian, Iranian, Black Sea, southern Caspian microplate and the Caucasian megablock. [3] These microplates, including the southern Caspian microplate, which includes the territory of Azerbaijan, and the Caucasian megablock are characterized by their own directions of movement and are bordered by systems of deep faults with high seismic activity.

Zagatala-Balakan, Sheki and Okhuz-Gabala seismoactive zones are located in the northwestern zone of the Azerbaijani part of the Greater Caucasus. The Zagatala seismically active zone is located in the extreme north-west of the Azerbaijani part of the Greater Caucasus. Conventionally, its border in the east should be considered the Zagatala-Shamkhor transverse uplift. In the north, west and south, the zone merges with the potentially highly active seismic zones of Southern Dagestan and Western Georgia. The area of the Zakatala seismically active zone within Azerbaijan does not exceed 3500 km^2. The first information about earthquakes in this zone dates back to 1853. From 1853 to 1933 in the Zagatala seismically active zone, only 55 earthquakes were recorded, felt in one or more populated areas (Malinovsky, 1940). The intensity of these earthquakes does not exceed 5-6 points. [2, 10]

The epicenters of earthquakes in this zone are localized along three parallel lines of latitudinal strike. The most powerful earthquakes, the intensity of which reaches 7 points, occur in the extreme northern epicentral line.

One of the characteristic features of the Zakatala zone is the high frequency of earthquakes from the same source zone and their low intensity. From a tectonic point of view, the earthquakes that occurred in the Balaken seismogenic zone are located in the southwest of the Azerbaijani part of the Greater Caucasus, surrounded by the Ayrichay-Alyat and Vandam deep faults. Note that the Tfan anticlinorium stands out as the central uplift of the Mesozoic core of the Greater Caucasus meganticlinorium, in the arch of which the most ancient Aalenian and Toarcian formations for the region are exposed. On the southern wing of the Tfan anticlinorium, the Zakatala-Kovdag synclinorium is distinguished, filled with Cretaceous formations. The southernmost structural element of the Mesozoic core of the Greater Caucasus meganticlinorium on the territory of Azerbaijan is the Vandam anticlinorium, composed of volcanic bajos in the core. This work is devoted to the study of

the modern geodynamic situation in the northwestern part of Azerbaijan according to the earthquake source mechanism data [14, 15].

Mechanisms of earthquake sources in the study area

In order to study the stress and deformation areas of the earth's crust, the parameters of the focal mechanisms were established, evaluated, the conditions of their formation, and the dynamic parameters of mechanisms and earthquake foci were analyzed (fig.1). Source mechanisms are supposed to be subjected to what type of displacement movements (horizontal displacement, breaking and falling, breaking and lifting) of the rocks in the source during an earthquake. The source mechanisms were built on the basis of P waves of 35 digital stations of earthquakes with ml≥4.0 in "Fa_major" and Moment Tensor software.

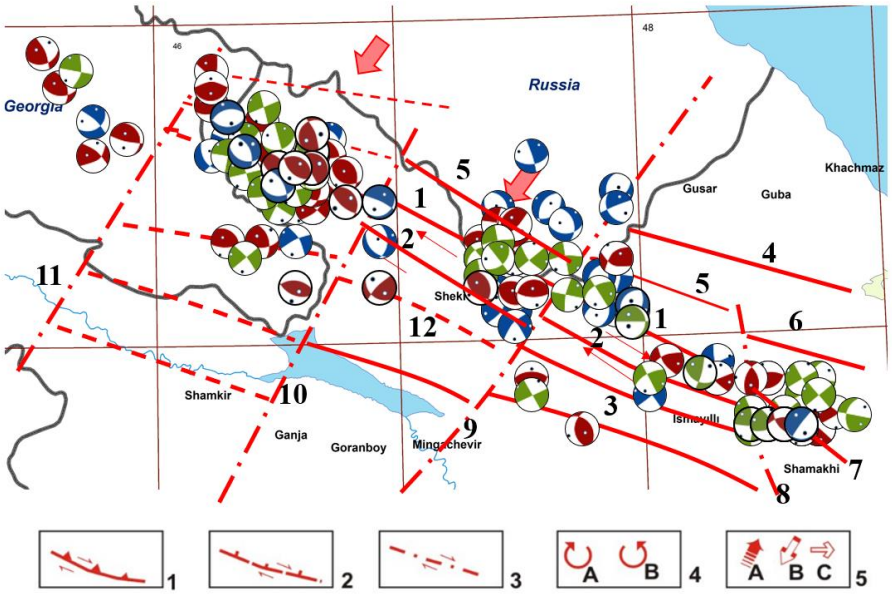

Fig. 1. Scheme of the fault structure and features of the geodynamic regime of the southern slope and southeastern subsidence of the Greater Caucasus and the mechanisms of earthquake foci for 2003-2023.

Symbols: The main seismogenic faults that determine the features of the geodynamic regime of the earth's crust: 1-reverse faults, 2-normal faults, 3-slip faults (arrows indicate the direction of horizontal movements). Reverse faults: 1-Dashgil-Mudresa, 2-Vandam, 3-Geokchay, 4-Siyazan, 5-Zangi-Kozluchay, 6-Germian, 7-Adzhichay-Alyat. Shifts: 8-West-Caspian, 9-Arpa-Samur, 10-Ganjachay-Alazan, 11-Kazakh-Signakh. Faults: 12-North Adzhinour, (Faults map compiled by: (Shikalibeyli [15])

Focal mechanisms of 49 earthquakes with magnitude ml≥4.0 and depth h=2-42 km were established in the North-Western part of Azerbaijan during 2003-2023. As can be seen from the map, faults and horizontal displacements are dominant in the Zagatala-Balakén zone, and horizontal displacement-type movements prevail in the Sheki, Oguz, and Gabala zones. 11 earthquakes with magnitude ml≥4.0 were recorded in Sheki, Oguz, Gabala zones. 9 of these earthquakes are dominated by horizontal displacement type movements and are aligned between the Pan-Caucasus right-sided Dashgil-Mudrasa, Vandam and Northern Acinohur faults, and are located at a depth interval of 11-21 km [8,13].

In 2012, 2014, 2015, earthquakes occurred in Zagatala, Gabala, and Okhuz territories with a magnitude of ml>5 (table 1). In 2012, an earthquake with a magnitude of ml=5.7 occurred in Zagatala region. On May 7, at 04:40:25, earthquakes occurred in Zagatala, Balaken, Gakh, Sheki, Okhuz, with a focal depth of ml=5.6, H=9 km, and an intensity of I0=7.0 at the epicenter at 14:15:13. It was

determined that the first Zagatala earthquake (GMT 4:40, M=5.6) was a fault-slip type, and the second earthquake (GMT 14:15, M=5.7) was a fault-slip type.[6, 7]

On June 29, 2014, at 17:26:07, an earthquake occurred in Zagatala region with a magnitude of ml=5.3 km, a focal depth of H=9 km, and an intensity of I_0=5 at the epicenter. As can be seen from the table, the direction of the compression axis P is vertical (PL=3), and the direction of the tension stress axis T is oriented in the plane close to the horizon (PL=18). A sharp drop was determined for the nodal plane (DP=79-75). The value of displacement in the hearth (SLIP=-15-(169)) indicates that displacement, fracture-falling type of movement prevails. Based on the above, as a result of the tension states, it was determined that the earthquake is of the fault-thrust-displacement type and coincides with the Gazakh-Signakh transverse fault. The Balakan earthquake on October 14, 2012 was characterized by horizontal (PLP=0°) tensile stresses with a southwestern orientation (AZM=239°) and near-vertical compressive (PLT=48°) with a northwestern orientation (AZM=329°) stresses (fig. 10, table 4). The type of movement on both (DP=57°) planes is normal fault with shear elements. Plane NP1 has an eastern strike (STK_1=115°), NP2 – a northern strike (STK_2=2°). Comparison of the strike of nodal planes with fault lines shows agreement of the second nodal plane NP2 with two transverse Kazakh-Signakh and Sharur-Zagatala faults [9].

Table 1. Focal mechanisms of earthquakes felt in Balakan, Zagatala, Sheki, Oguz, Gabala areas in 2003-2023 Ml≥5.0

№	Data	Time	Coordinates		Principal stress axes						Nodal planes						ml	H, km
					T		N		P		NP1			NP2				
			φ°N	λ°E	PL	AZM	PL	AZM	PL	AZM	STK	DP	SLIP	STK	DP	SLIP		
1	20030601	6:09:43	40.96	47.32	0	252	90	8	0	162	207	90	0	297	90	-180	5.2	10
2	20120507	4:40:25	41.5	46.58	14	79	71	296	10	171	152	87	162	216	72	2	5.6	9
3	20120507	14:15:13	41.56	46.63	0	240	20	150	69	330	130	48	-117	349	48	-62	5.7	12
4	20120518	14:47:20	41.52	46.64	5	251	78	135	10	343	117	87	-169	27	79	-4	5.0	10
5	20120518	14:46:33	41.53	46.62	0	69	15	159	74	339	354	47	-68	144	47	-111	5.0	13
6	20140629	17:26:07	41.54	46.54	3	288	72	27	18	197	241	79	-15	334	75	-169	5.2	9
7	20140929	1:38:07	41.13	47.94	7	323	41	59	48	225	265	64	-43	17	53	-146	5.5	11
8	20141004	4:59:32	41.11	47.94	11	317	64	72	23	222	268	82	-25	1	65	-171	5.0	6
9	20150904	4:49:36	40.97	47.43	0	288	90	172	0	18	153	90	-180	63	90	0	5.9	16
1	20180	18:40:	41.5	46.6	0	28	19	19	71	14	17	4	-	32	4	-	5.	10

0	605	25	5	2		4		4			6	8	11 6		8	64	5	

In 2014, at 06:38:07 local time, a strong (ml=5.5) earthquake was recorded 22 km north-east of the city of Gabala. After the earthquake (ml=5.5), 79 aftershocks were recorded within a day. The sources are located at a depth of 5-19 km. It should be noted that the strong earthquake that occurred in Gabala region coincides with the Ismailli-Sighirli orthogonal fault. After that earthquake, at 08:55:52 and 09:19:08 local time, earthquakes of ml>3.0 were recorded 22 km northeast of Gabala city. The focal mechanisms of both earthquakes are aligned with the pan-Caucasus trend and the Dashgil-Mudrasa fault [8].

In 2015, the earthquakes of magnitude ml=5.9 at 04:49:36 on September 4 and ml=4.0 at 00:13:32 on October 13, 2015, show that the movement of the left side displacement type prevails. As can be seen from the table, the direction of the compression axis P is vertical (Pl=10) and the direction of the tension stress axis T is oriented in the plane close to the horizon (Pl=5). A sharp drop was determined for the nodal plane (DP=86-90). The value of displacement in the furnace (Slip=0-(-10)) indicates that displacement-type movement is predominant. According to the above, as a result of tension conditions, left-lateral horizontal displacement type movements are formed in NE directions and coincide with the Arpa-Samur transverse fault.

In the Balakan-Gabala seismogenic zones of Azerbaijan, earthquakes with a magnitude of ml≥3.0 share the core more closely at a depth of 3-25 km. 8 earthquakes with magnitude ml≥5.0 were registered. These earthquakes are recorded at a depth of 8-15 km.

On September 4, 2015, an earthquake occurred near the Oghuz region with an observed intensity of I0=7 points at the epicenter and I_0=7-3 points in nearby areas. In accordance with the map of epicenters of seismic events for 1900-2003 in the area of the earthquake, a number of strong earthquakes were recorded, with an intensity of 6 or more at the epicenter. The most significant of them are the earthquakes of 1953 and 1968 with I0=6-7 points, 1980, 1986, 1991 with I0=5-6 points, March 5, 2000 I0=5 points. The last noticeable event in this area was the earthquake on June 1, 2003 with I0=6 points at the source and 3-4 points in the Mingachevir and Kurdamir regions (table 2).

Table. 2. Strong earthquakes in Oghuz and nearby areas with an intensity of 5 or more at the epicenter.

Data			Time			Coordinats		Depth	Ml	Io points
year	mounth	day	hours	min	sek	lat	lon	км		
1953	9	2	00	36	01	41.10	47.40	5	5.1	7
1953	9	16	11	15	29	41.20	47.40	28	5.0	6
1968	5	11	11	29	40	41.00	47.60	15	4.7	6
1980	4	1	07	33	41	40.70	47.80	20	4.7	6
1986	6	02	15	16	13	40.97	47.77	22	4.6	5
1991	10	21	11	58	23	40.92	47.34	16	4.5	5
2003	06	01	06	09	42	41.05	47.27	22	5.0	6
2015	04	09	04	49	36	40.97	47.43	16	5.9	7

Based on macroseismic studies, it was revealed that the earthquake was felt with the greatest intensity in the territories of Oghuz and Sheki regions. Here, the intensity of the earthquake according to table MSK-64 was estimated at 7 points. The earthquake was accompanied by more than 80 aftershocks with a magnitude from 0.5 to 4, 33 of which occurred in the first day [3, 4]. The aftershock cloud spread up to 23 km in the south-north direction and 9 km in the west-east direction, but the area of the main mass of the earthquake cluster was 88 km^2. Despite the fact that the main source is located at a depth of 16 km in the granite layer, the depth of the aftershocks ranges from 11-34 km. As can be

seen in Fig.2, the epicenter of the earthquake is confined to the intersection zone of the longitudinal Dashgil-Mudresa and transverse Arpa-Samur faults [5]. It should be noted that the Arpa-Samur deep fault of ancient origin at all times from the Paleozoic to the present day has been a zone of active manifestation of tectonic movements, a conductor of magmatic melts, ore-bearing solutions and seismicity. According to Shikhalibeyli E.Sh. [6] The Arpa-Samur Trans-Caucasian seismically active metal-bearing fault zone unites the Mrovdag-Zod, Terter and Khachin faults of deep origin.

Analysis of the focal mechanisms of the earthquakes on 09/04/2015 with ml=5.9 (main shock) and on 10/13/2015 with ml=4.0 showed the predominance of two types of movements. The earthquakes that occurred in the Oghuz region on September 4 at 04:49 am and on October 13 at 00:13 am occurred under the influence of tensile and compressive stresses of similar magnitude.

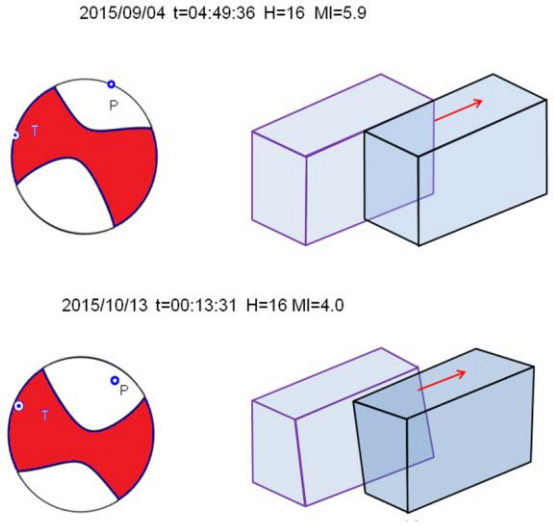

Fig. 2. Earthquake source mechanisms, as well as block diagrams of displacement along the NP2 plane

From Table 2 it can be seen that the first nodal plane of the rupture extends in the SE direction (153º) with a dip to the southwest at an angle of 86-90º, the second nodal plane has a NE strike (63º) with a dip to the southeast at an angle of 83-90º. In this case, the compression stresses in the earthquake source were oriented in the northeast direction (azimuth 18) and acted near-horizontally (angle with the horizon 0-7), and tensile forces were directed in the west-southwest direction (287-288) at an angle of 0-2 to the horizon. The type of movement of these earthquakes is strike-slip with a left-lateral horizontal component.

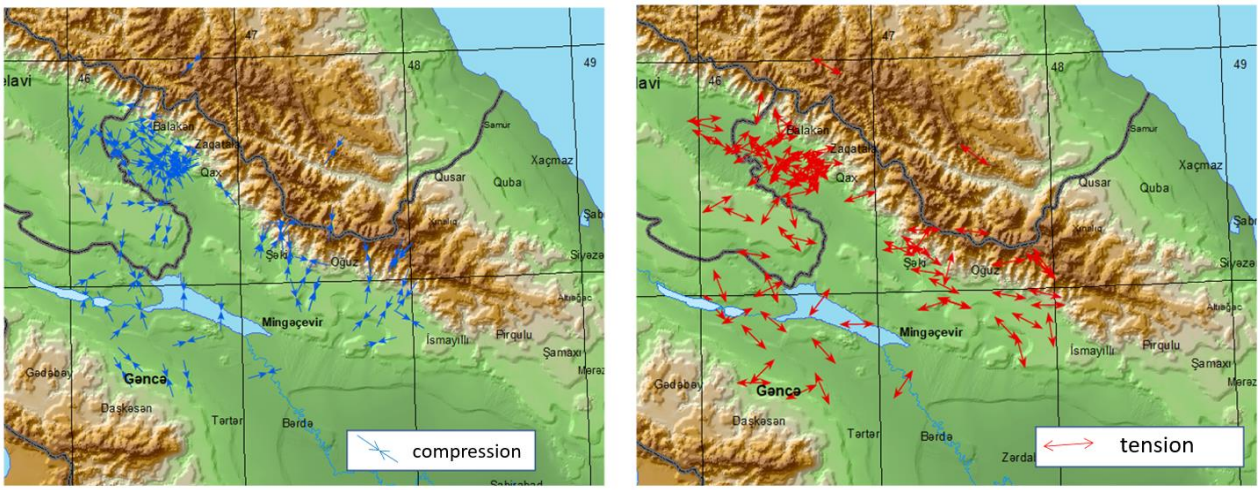

Fig. 3. Scheme of compression-tension axes of focal mechanisms of earthquakes with ml≥4.0 in Zagatala-Gabala area during 2003-2023

Stress and deformation areas of the Earth's crust in the North-Western part of Azerbaijan

During 2003-2023, the scheme of compression-tension axes was established based on the data of focal mechanisms of earthquakes with ml≥4.0 in Balakan, Zagatala, Sheki, Oghuz and Gabala areas (fig. 3).

On the map, blue color-compression, red color-tension arrows. The analysis of the orientation of the compression and extension axes showed the SW-NE orientation of the compression axes in the Sheki and Gabala-Oghuz seismogenic zones. A chaotic distribution is observed in the Zakatala-Balaken zone. This is due to the complexity of the tectonic structure. The main seismic tremors with a magnitude of more than 4.0 are associated with the following tectonic zones: the node of intersection of the Zagatala, transverse with the Ganyh-Ayrichai longitudinal fault; 2 - node of intersection of Zagatala with Shambul-Ismailly longitudinal fault. All these tectonic nodes are located in the Mazymgarishan-Sarybash sublatitude fault zone and are controlled by this fault. As a result of the orientation of the compression and tension axes, a distribution map of the Lode-Nadayi coefficient was constructed. On the map, the blue color shows the tension arrows, the red color shows the compression arrows. As can be seen from the map, the Zagatala, Balakan, Gabala region of the republic is characterized by tension. Compression stress is observed in Sheki and Oghuz regions (fig. 4).

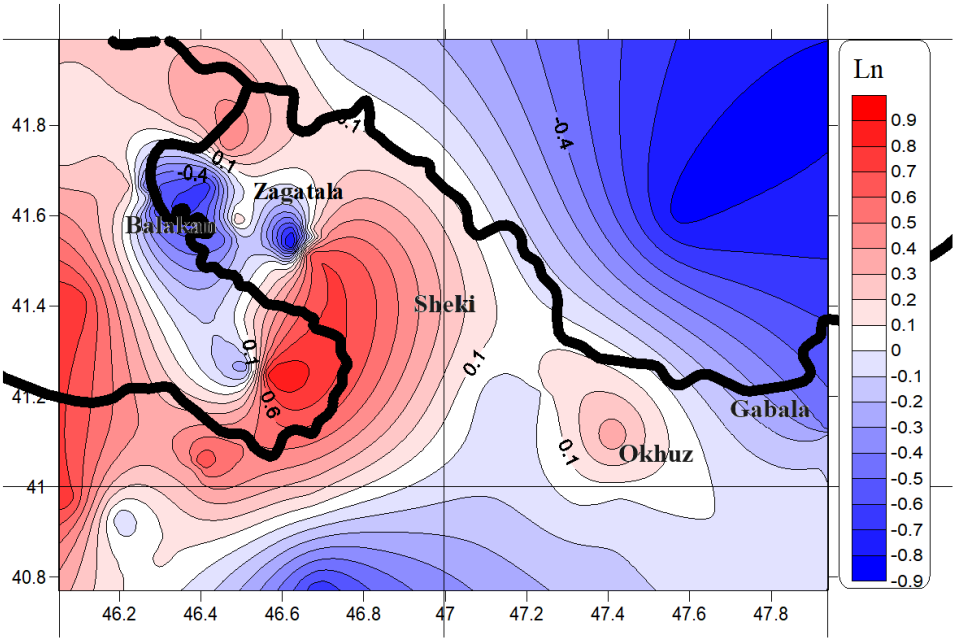

Fig. 4. Distribution map of the Lode-Nadai coefficient calculated on the basis of the focal mechanisms of the earthquakes that occurred in Zagatala, Sheki, Oghuz and Gabala in 2003-2023

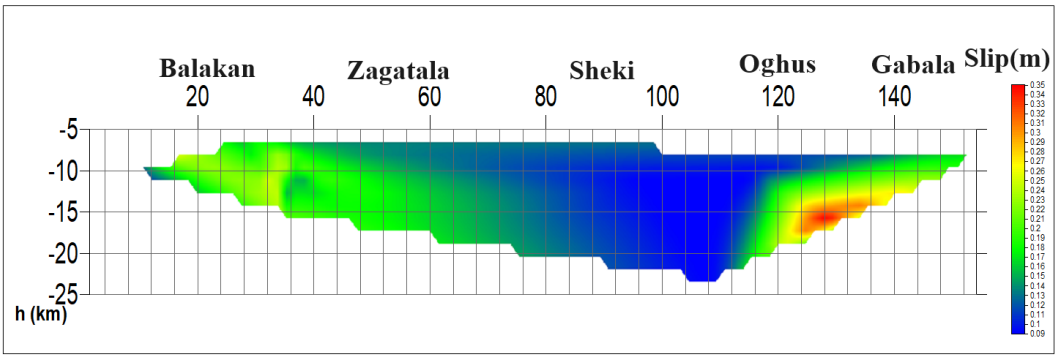

Fig. 5. In 2003-2023, the depth section of displacement values calculated based on the mechanisms of earthquakes with ml≥4 in Balakan, Zagatala, Sheki, Oghuz and Gabala regions

Thus, on the basis of the USA USGS Coulomb 3 program, a depth section of the displacement values of earthquakes with magnitude ml≥4.0 in Balakan, Zagatala, Sheki, Oghuz and Gabala regions in 2003-2023 was established (fig.5). As can be seen from the cross-section, the values of displacement in the Oghuz, Gabala, Zagatala and Balaken zones are high and vary in the range of 0.25-0.35 m. In Sheki, Oghuz, Gabala regions, the value of displacement is 0.26-0.35m at a depth of 12-19 km, and 0.15-0.27m is observed at a depth of 3-15 km in Zagatala and Balakan regions. The lowest value of displacement was recorded in Sheki area of 0.1-0.12m.

In the section of the Zagatala and Balaken zones, displacement values are characterized by higher values in the range of 0.18-0.26m at a depth of 6-16 km (Fig.6).

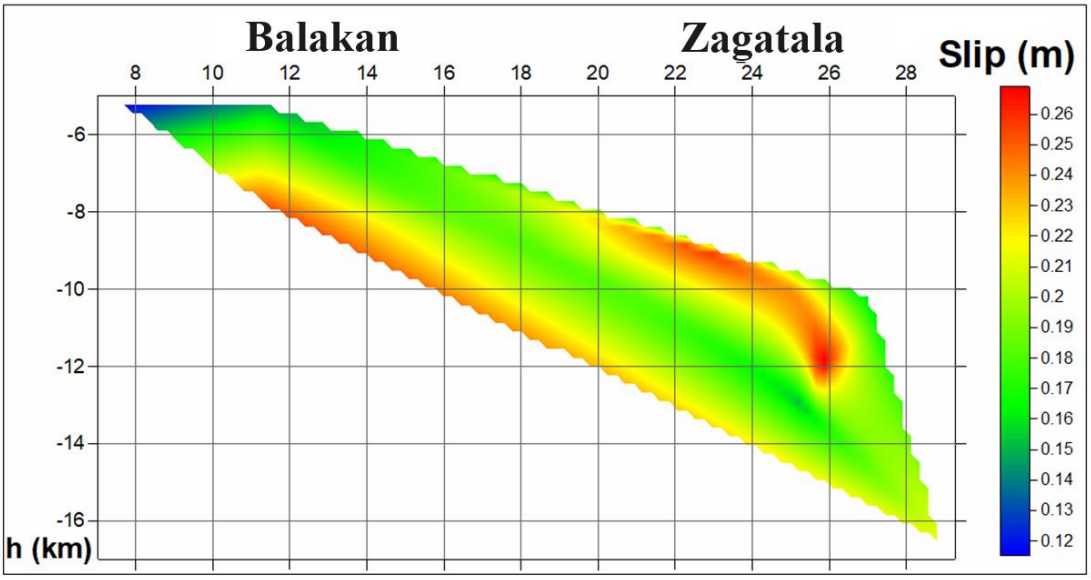

Fig. 6. Depth cut of displacement values calculated on the basis of mechanisms of earthquakes with ml≥4 in Balakan and Zagatala regions in 2003-2023

In Sheki, Oghuz, Gabala regions, the value of the displacement at a depth of 13-19 km is higher and is observed in the interval of 0.23-0.34m (Fig.7).

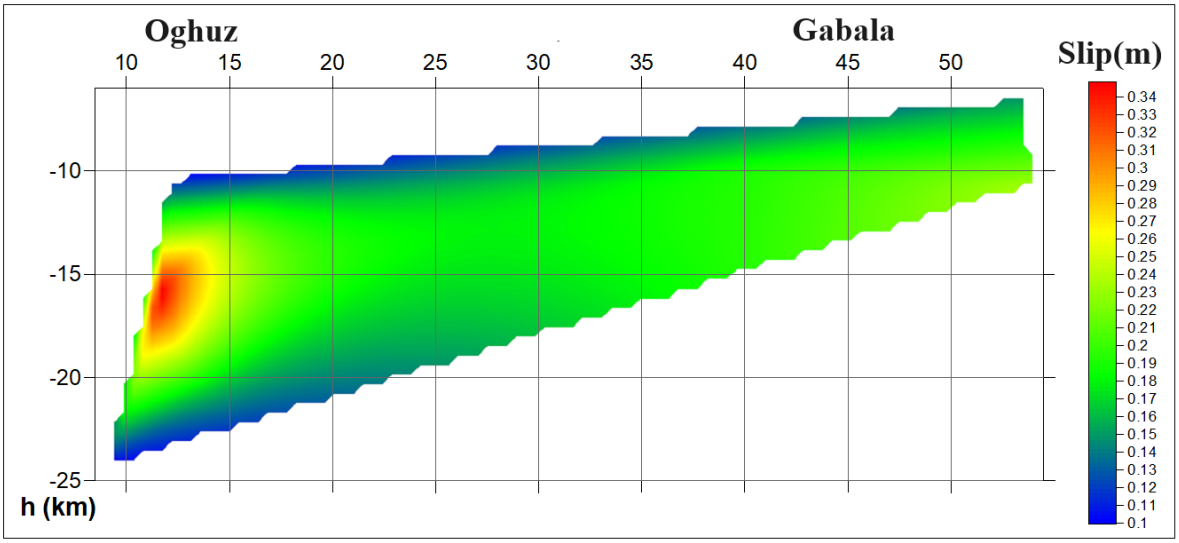

Fig.7. Depth cut of displacement values calculated on the basis of mechanisms of earthquakes with ML≥4 in Oguz and Gabala regions in 2003-2023

Results:

The study of the spatio-temporal sequence of seismic shocks of various magnitudes in each seismic focal zone leads to conclusions about the similarity of individual seismically active zones of the Azerbaijani part of the Greater Caucasus, observed not only in their tectonic conditions, but also in

the nature of the manifestation of seismicity. The epicentral zones of most of the listed earthquakes are located in the foothills in the Vandam structural zone. The spatial distribution of epicenters demonstrates that the events of 2014-2015 with ml≥5.0 are confined to transverse (northeast-trending) disjunctive dislocations, but the epicentral zones generally have a "pan-Caucasian" elongation and are located along the Vandam tectonic zone along the Ganykh-Ayrichay-Alyat deep thrust. It can be assumed that the sources of the Gabala, as well as Oghuz earthquakes are confined to the extension zone and their mechanism is determined as the result of right-sided shear deformation in the zone of geodynamic influence of the left-sided Arpa-Samur fault. The structure of the Kura Basin is observed to shift under the structure of the Greater Caucasus.

Analysis of the orientation of the compression and extension axes showed the SW-NE orientation of the compression axes in the Sheki and Gabala-Oghuz seismogenic zones. On the territory of the Zakatala-Balaken zone, a chaotic distribution is observed. This is due to the complexity of the tectonic structure. The main seismic tremors with a magnitude greater than 4.0 are associated with the following tectonic zones: the intersection of the Zagatala transverse fault with the Ganykh-Ayrichay longitudinal fault; 2 - intersection point of the Zagatala with the Shambul-Ismayilli longitudinal fault. All these tectonic nodes are located in the zone of the Mazymgaryshan-Sarybash sublatitudinal fault and are controlled by this fault.

As a result of the orientation of the compression and tension axes, a distribution map of the Lode-Nadayi coefficient was constructed. As can be seen from the map, the regions of Zagatala, Balakan, and Gabala are mainly characterized by tensile stress. Compression stress is observed in Sheki and Oghuz regions.

Thus, in 2003-2023, depth sections of displacement values of earthquakes with magnitude ml≥4 in Balaken, Zagatala, Sheki, Oghuz and Gabala regions were established. As can be seen from the cross-section, the values of displacement in the Oghuz, Gabala, Zagatala and Balaken zones are high and vary in the range of 0.25-0.35 m. In Sheki, Oghuz, Gabala regions, the value of displacement is 0.26-0.35m at a depth of 12-19 km, and 0.15-0.27m is observed at a depth of 3-15 km in Zagatala and Balakan regions. The lowest value of displacement was recorded in Sheki area of 0.1-0.12m.

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