SEISMICITY OF ZAGATALA TERRITORY FOR 2019

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Seismological studies

The Zagatala-Balakan zone is one of the main seismic active zones in Azerbaijan. Tectonically, the Zagatala-Balakan seismic active zone is located in the north-western part of the Azerbaijani part of the Greater Caucasus.

Strong and tangible earthquakes have been occurred in the seismic zone in the past and modern times. The first information about the earthquake in this area dates back to 1880.In 1936, so far registered in this zone there was the most powerfull earthquake of 5,6 points. The intensity of the earthquake at the epicenter was 7 point (according to 12 points of 64-MSKscale). A map of the epicenters of historical earthquakes in the studied area has been shown in the Figure 1.

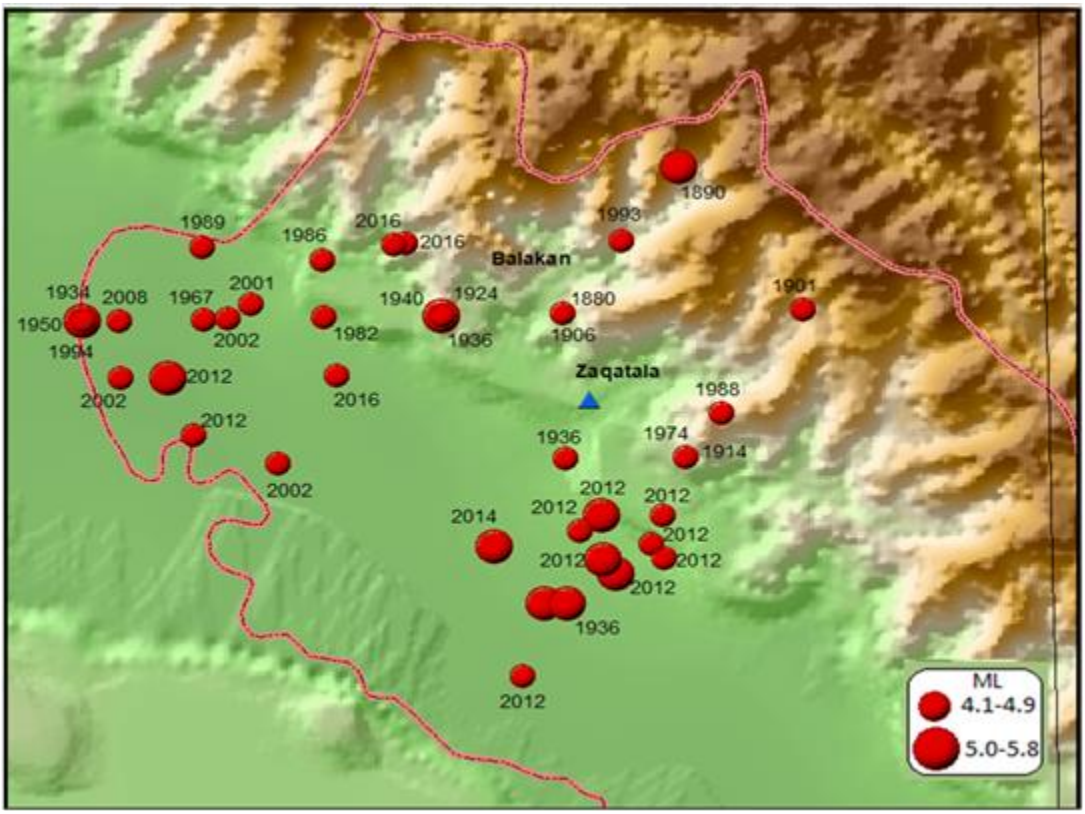

Figure 1. The map of the epicenters of historical earthquakes occurred in the studied area

Two shocks that occurred in Zagatala on May 7, 2012 , with a time difference of 10 hours apart played a special role in terms of seismotectonic and engineering-seismological study of the area. The magnitude of the first shock was 5.6, depth was 8 km and the magnitude of the second shock was 5.7, depth was 12 km. The intensity of both shocks at the epicenter was 7 points (according to 12 points of 64-MSK scale).

After these earthquakes, several strong earthquakes have been recorded in the Zagatala zone. The last strong earthquake in the area has been recorded on August 10, 2019, at 13:35 local time, in the 18 km south-west of Zagatala station. The magnitude of the earthquake was 4.9, the depth was h=5 km.

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In order to investigate the area seismotectonically, the distribution of faults and earthquakes in Balakan-Zagatala, Sheki, Gabala regions has been studied. As can be seen from the map, earthquakes in the Zagatala area and adjacent areas are located at the section zone of the depth faults in different directions (Fig. 2)

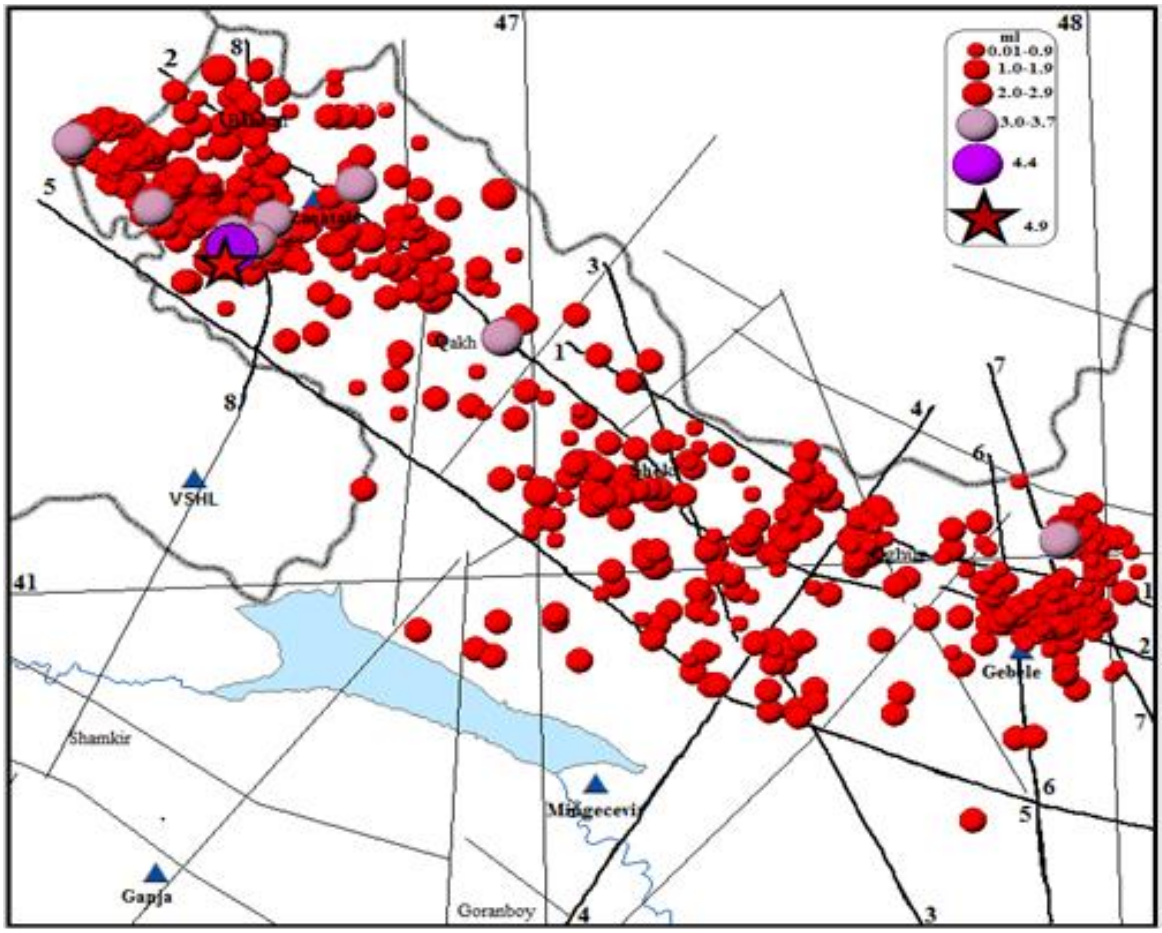

Figure 2.Map of epicenters of the earthquakes occurred in the Zagatala-Gabala region on faults.
Faults: 1. Dashgil-Mudrese 2. Vandam (lengthwise) 3. Akhvay (orthogonal) 4.Tartar-Oghuz (transverse) 5. Alazan-Ayrichay (lengthwise) 6.Chakhirli-Gabala (orthogonal) 7. Ismayilli-Sighirli (orthogonal) 8. Sharur-Zagatala (transverse)
(Author of faults: T.N.Kangarli)

A seismic transect has been constructed along the Balakan-Gabala I-I profile passing through the seismically active zone of Azerbaijan. The profile extends in all-Caucasian direction along the Ayrichay-Alat deep fault (Fig.3)

There are many hypocenters in the north-west of the section in the Zagatala-Balakan area. Earthquakes of magnitude mainly 0.01 had been occurred in the area. In contrast to 2018, an increase in earthquakes with a magnitude of ml 3.0 have been observed during the year, with the hypocenters located mainly at depths of 2-30 km. Earthquakes with a magnitude of 3.0 have been occurred within the sedimentary layer at a depth of 7-11 km. The epicenters were located in the effect zone of the depth faults in Vandam and Sharur. It is observed that the seismicity in Sheki and Gabala zones in the south-eastern part of section is weak and hypocenters are at a depth of 2-40 km.

Analysis of the number of earthquakes in the Zagatala zone in 2019 and the distribution of the seismic energy by months shows that the seismicity was below the background level at the beginning of the year and the number of earthquakes increased from July to September. In August, there was a sharp rise in seismic energy. The high seismic energy is due to the occurrence of earthquakes with a

magnitude of 33.0 in this area. Starting in October, a decrease in the number of earthquakes and seismic energy was observed and the seismicity fell down below the background level (Fig. 4).

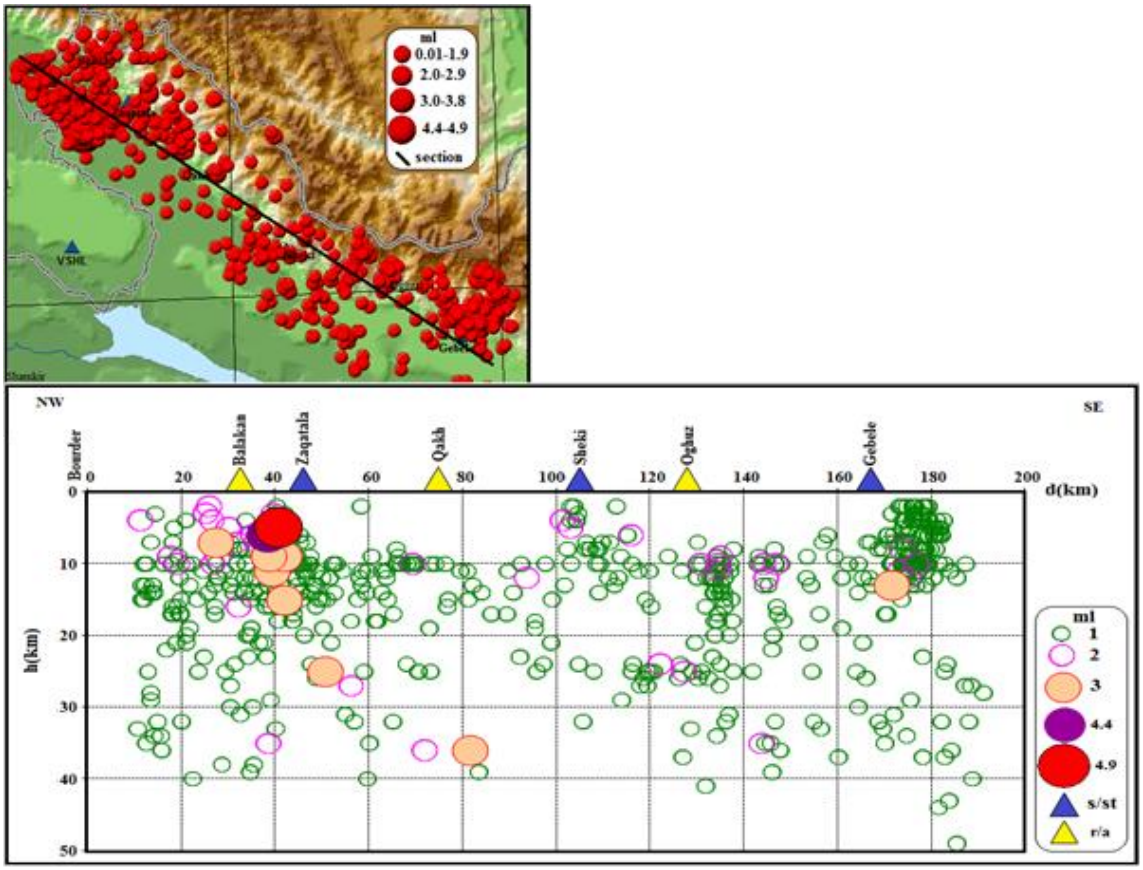

Figure 3. Seismological transect on I-I profile of Zagatala-Balakan Gabala zone

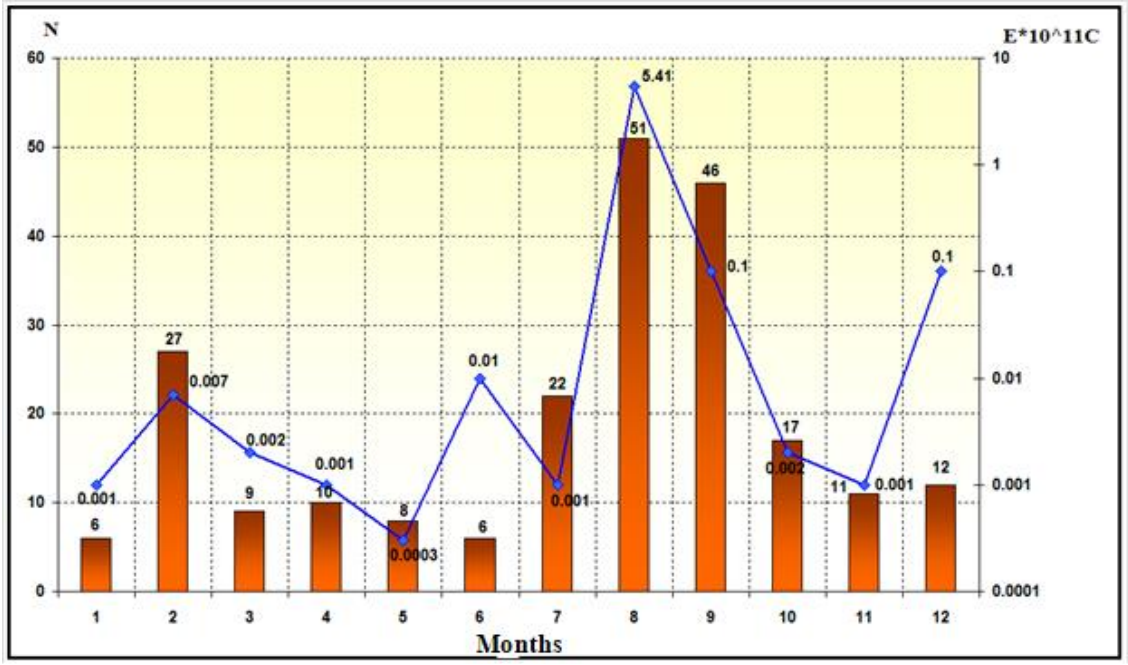

Figure 4. Histogram of the number of earthquakes in the Zagatala zone and the distribution of seismic energy by months.

Macroseismic studies

The earthquake with the highest intensity (magnitude of 4.9) in Zagatala has been occurred on August 10, 2019. The epicenter of the earthquake was located near the village of Danachi, Zagatala region, at a distance of about 3 km.

During the earthquake, people felt a strong shock and they fled to the yard in fear. There are houses damaged and unrepaired after the Zagatala earthquake on May 7, 2012 in the settlements near the epicenters of the region. During the earthquake, the cracks in many of those houses widened. In the village of Makov, a damaged wall of a house collapsed. There were almost no complications in the newly built houses. Based on materials collected from 22 settlements in the country, it was determined that the earthquake was felt at a magnitude of 6 at the epicenter, the geometric dimensions of the Pleistocene area were 14x16 km and the macroseismic area generally has an extension in the direction of the Greater Caucasus.

Figure 5. The collapse of the river stone wall of a house in the village of Makov

Figure 6. Old and new cracks on the wall of a house in Goyam village

Figure 7. Old and new cracks on the wall of a house in Goyam village

Schedule 1.
Macroseismic data of the Zagatala earthquake on August 10, 2020

№	Names of settlements and corresponding intensity, points	Epicentral distance, km	№	Names of settlements and corresponding intensity, points	Epicentral distance, km
6			4		
1	Danachi	3.0	13	Kadula	67.0
2	Makov	5.0	14	Sheki	71.5
3	Gamishtala	7.5	15	Goybulagh	81.0
4	Ititala	8.0	16	Dakhna	83.0
5	Ali Bayramlı	8.0	17	Shamkhir	89.0
5			3		
6	Mughanli	11.0	18	Balaken	18.0
7	Goyam	14.0	19	Gyulluk	26.0
8	Katekh	13.0	20	Kakhi	42.5
9	Shambulbina	16.5	21	Garatala	43.5
10	Zakatali	18.0	22	Salahli	49.5
11	Aliabad	20.0			
12	Yeni Suvagil	22.0			

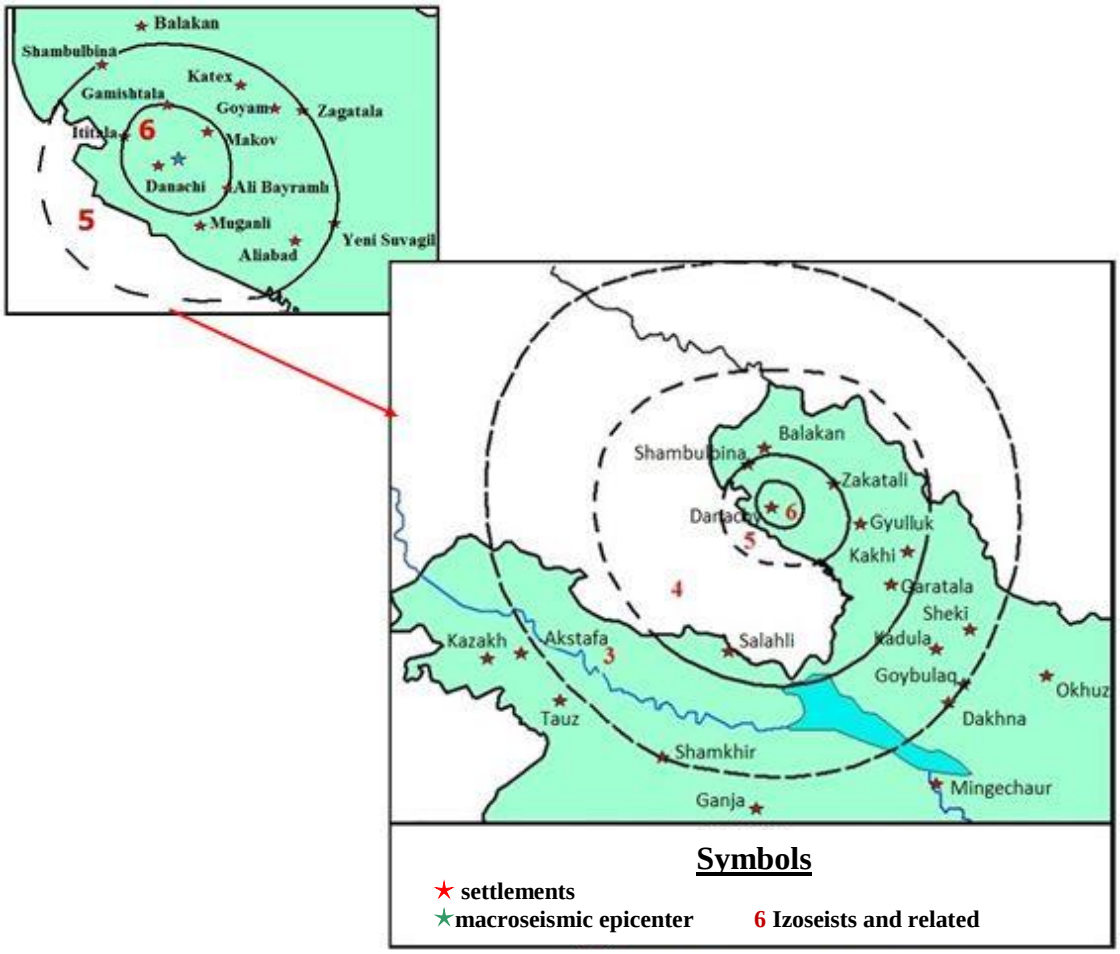

Figure 8. Macroseismic area of the Zagatala earthquake occurred on August 10, 2019

Conclusion

- It has been determined that the sources of the earthquake in the Zagatala zone were located in the effect zone of the Vandam and Sharur-Zagatala depth faults and the earthquakes with a magnitude of 3 were located within the sedimentary layer .
- In 2019, compared to 2018, seismicity have been higher than the background level. The number of earthquakes with a magnitude of ml 3 have been increased and the ∑E=5.64 x 1011 C release of energy from the Earth's crust during the year has been determined.
- It has been determined that the geometric dimensions of the Pleistocene area of the earthquake were 14x16 km, the intensity was 6 points in the epicenter and macroseismic area of the earthquake was extended in direction of the Greater Caucasus.

REFERENCES

1. Новый каталог сильных землетрясений на территории СССР Отв. редактор Н.В.Кондорская, Н.В.Шебалин. М.:Наука, 1977.