SECOND EUROPEAN CONFERENCE ON EARTHQUAKE ENGINEERING
AND SEISMOLOGY, ISTANBUL AUG. 25-29, 2014

SOME REGULARITY OF THE RECENT SEISMICITY ON CAUCASUS

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For the analysis of seismicity Caucasus us from various sources, a single catalog of earthquakes from 1962 to 2011. In this catalog are as energy classes of earthquakes and their magnitudes. Considering the resulting catalog, we noticed that in different years Caucasian magnitude earthquakes were determined in various ways, which resulted in a different class energy dependence of their magnitude earthquakes. Figure 1 shows the distribution of magnitude classes for different periods of observation.

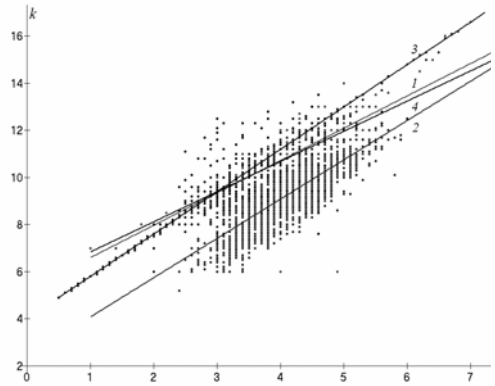

Figure 1. The dependence of the magnitude of the energy class for Caucasian earthquakes. 1 − distribution for the period from 1962 to 1982. 2 − distribution for the period from 1983 to 1996. 3 − distribution for the period from 2003 to 2010.

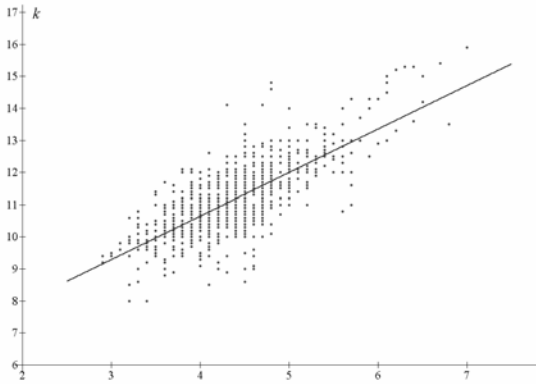

Figure 2. Dependence of energy classes away from magnitudes Caucasian earthquakes.

Figure 1 shows that during the period from 1962 to 1982 and 2011, depending on k and m are close [1]approximated by straight line segments of the form k_1=5.23+1.37m and k_4=5.56+1.28m. During the period 1983 to 1996 the distribution of points is approximated by a line segment of the form k_2= 2.41+1.67m. During the period 2003 to 2010 were determined by the magnitude of earthquakes energy classes depending on k_3=4.00+1.80m, which was adopted during the works Tajik Complex Seismological Expedition.

Obviously, this variation in the definition of magnitude is not possible to correctly carry out any analysis of seismicity Caucasus. In this regard, we have carried out the determination of the relation k and m

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independent data. For this event were taken from the catalog NEIC from 1973 to 2011 and the same events from the catalog, and the dependence of k m. The results of the constructions shown in Figure 2.

The distribution of the dots is approximated by straight-line segment: k=5.23+1.35m. Inverse relationship has the form: m=(k−5.23)/1.35.

After the catalog has been filled, we had plotted a frequency-magnitude relation (Figure 3). The straight-line Gutenberg-Richter frequency-magnitude relation is written as lg$N$=a−bm, where N − the average number of earthquakes over a certain period of time to study the territory, the magnitude of which lies in the interval [m−Δ m, m + Δ m]; a and b are the parameters of recurrence.

A free term a in frequency-magnitude relation characterizes the level of seismicity of the region under study in a given period of time, and the coefficient b is a parameter of self-similarity of the seismic regime in the region. To study the dependence of the annual seismicity Caucasus were built graphics change a parameter from year to year. This graph is shown in Figure 4. Segments of straight lines in the figure approximates a parameter change for the periods 1962 to 1984 and from 1985 to 2011. As can be seen from the figure 4 for 1962-1984 years, a parameter and hence, seismicity Caucasus tended to increase. Since 1985, the level of seismicity drops sharply and remains almost constant with a slight decrease from year to year. Changing the coefficient b is shown in Figure 5. As seen in Figure b varies synchronously with the parameter a.

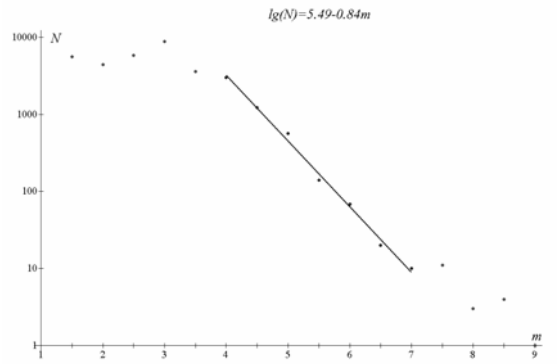

Figure 3. Schedule recurrence for earthquakes in the Caucasus from 1962 to 2011.

Figure 4. Changing the parameter a recurrence plot from year to year over the period 1962 to

Figure 5. Change in the coefficient b recurrence plot from year to year for the period 1962 to 2011

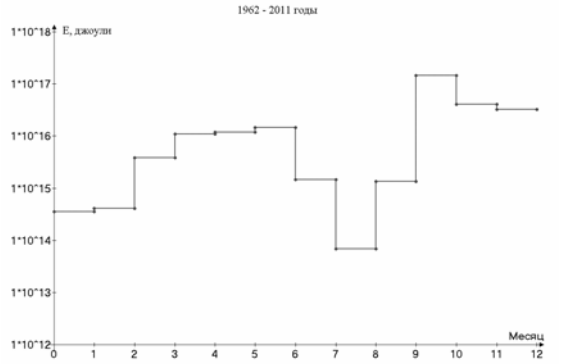

Figure 6. The energy distribution of earthquakes by month for the period from 1962 to 2011.

Of frequency-magnitude relation shows that are representative of earthquake magnitudes in the range of 4 to 7. Slope of repeatability in this area b equals 0.84, and the constant term a=5.49. Not typical behavior of the graph for magnitudes less than 4 and greater than 7 is connected, apparently, with heterogeneity, and it is better to say, with the imperfection of the catalog.

Relationship between magnitude m and energy E_{erg} (ergs) of seismic waves released during an earthquake is given by the Gutenberg-Richter: lgE_{erg}=9.4+2.14m−0.054m^2 or between class k and earthquake energy in joules E_{jou} : lgE_{jou}=k.

Figure 6 is a graph of the energy distribution of earthquakes by month, over the period from 1962 to 2011. From the graph clearly shows that the maximum intensity falls on the tenth month, i.e. October. Are sufficiently intense as April, May, June and November, December. Seismicity in the summer months and

slightly lower in the month of August has a deep minimum. In these works, unlike the Caucasus, the maximum of seismicity earth' crust accounts for the month of December.

From the analysis of Caucasus seismicity can be concluded that in the last fifty years of seismic activity in the region varied from year to year. Moreover, from 1962 to 1984, the seismic activity is markedly increased, and, since 1985, the seismic activity in the region has decreased dramatically over the years and is on the decline until 2005. Between 2006 and 2011, the seismic activity of the Caucasus as a whole has experienced sharp fluctuations. Possible but it is a consequence of the fact that not all data recorded in primary catalogs.

Curve of a seasonal dependence of seismicity shows that in the period from August to October, there is a significant increase of seismicity. In the rest of the year as a whole seismic activity does not change significantly.