Use of IMS Stations to Provide a New Representation of Kazakhstan Seismicity

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Until the end of XX century it was believed that tectonically active are only south, south-east and part of central regions of Kazakhstan. This information was used for compilation of the earthquake catalogue and construction of seismic zoning maps of Kazakhstan. After new IMS stations were put into operation several regions of Kazakhstan were considered as tectonically active. Seismic activity in Karagandinskoye and Makanchi oil deposits is one of the most vivid examples. Unfortunately, till now the authors of the reports were not able to give a clear idea on the causes of seismic activity in the region or the origin of the strong motions. The region should be included to the list of tectonically active regions of Kazakhstan. This paper deals with a new representation of the seismicity of Kazakhstan and its application to the region around the Makanchi oil deposit.

Background: After the IGR RK station near Karaganda and the GS RAS station near Makanchi were put into operation in 2010 and in 2014 respectively the data were used to determine the parameters of the earthquakes that occurred there. The compilation of the earthquake catalogue for the area under study for the period of two years from 2010 to 2012 were obtained. The parameters of the earthquakes were determined using the IGR RK standard software (IRIS/DMC). For comparison the data are also obtained from the GS RAS station.

Seismicity of Central Kazakhstan

The territory of Central Kazakhstan is traditionally considered as aseismic. However, after the IGR RK station was put into operation several earthquakes were recorded at Central Kazakhstan. The largest earthquake occurred on 11.04.2012 at 13.11.42 UTC was recorded at the station near Karaganda. The earthquake intensity at the station was 6.0 BME-60 scale, magnitude 5.4.

Seismicity of Eastern Kazakhstan

Large complex for the area is the IMS station network consisting of Abakan (MKP), the station of the SFRJ network near Abakan, and the station of the IGR RK network near Karaganda. Seismicity of Eastern Kazakhstan is of high interest, in particular those occurring at Tunguska deposit distinguished by intense water-hydrocarbon production 

New data on Kazakhstan seismicity

According to the map of general seismic zoning of Kazakhstan territory included into the Construction frame and known data on seismic activity in Central Kazakhstan since 2000, the most part of the country's territory is considered as seismically passive. Namely, this area of high seismic risk is due to the presence of old tectonic structures, often connected with the results of tectonic processes that took place in the formation of the country. However, the data that were received from the stations in the region of Karaganda and Makanchi oil deposit indicated the presence of tectonic structures that were not considered till now. It is also worth noting that some stations seismic activity recorded varied significantly during the year, i.e., the stations recorded seismic activity in different time periods of the year.

For the selected territory the database for 350 earthquakes from historical times to 2013 was created. This database was used for compilation of the catalogue of the area and for developing the seismic hazard map. The catalogue was compiled using the IGR RK standard software (IRIS/DMC). Each earthquake was located using the IGR RK standard software (IRIS/DMC). Each earthquake was located by coordinate method. For stations with more than 10 earthquakes per year the geocentric coordinates were determined.

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