

Some Features of Earthquakes Distribution in Turkmenistan

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¹ ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ УЧРЕЖДЕНИЕ НАУКИ ИНСТИТУТ ФИЗИКИ ЗЕМЛИ ИМ. О.Ю. ШМИДТА РОССИЙСКОЙ АКАДЕМИИ НАУК (ИФЗ РАН), Россия

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Most regions of Turkmenistan are not characterized by high seismicity, but some of its areas are still characterized by high seismicity. The famous destructive Ashgabat earthquake, which occurred on October 5, 1948 in the Kara-Dag region, is well known.

In the paper compares the distributions of earthquake hypocenters in Turkmenistan obtained from the ISC catalog data for the period from 1964 to 2021 and the results of recalculation of hypocenters according to the ISC bulletin data for the same period. In total, the ISC catalog for the specified period contains about 1000 events with a magnitude greater than 2.5. The authors recalculated the hypocenters of slightly more than 350 earthquakes. It is shown that the depths of earthquake foci in the areas under consideration can be located at depths of up to 600 km, while according to the ISC catalog; the maximum focal depths do not exceed 100 km.

Based on geological and seismotectonic characteristics, the territory of Turkmenistan can be divided into three regions: Prikopetdag region (Ashgabat region); Krasnovodsk district (Western Turkmenistan); Eastern Turkmenistan [Seismicity, 1968]. According to the results of earthquake observations, the highest seismic activity is observed in the region of Western Turkmenistan and the Ashgabat region [Rustamovich, 1967].

From the analysis of the ISC catalog data, it follows that the bulk of the hypocenters are located in the depth range of 0-20 km. There are two horizons at depths of 0 and 33 km, where earthquake foci are concentrated. Both of these horizons are most likely determined by the method used to determine earthquake hypocenters. Moreover, the location of the hypocenters at zero depth, in our opinion, is due to the fact that it was not possible to determine the true depth of the foci. The depths of earthquake foci mainly in the Krasnovodsk region reach 100 km.

The recalculation of earthquake hypocenters in Turkmenistan was carried out according to the methodology outlined in [Burmin, 2019]. As can be seen from a comparison of the catalog data and the results of recalculation, the distributions of epicenters differ mainly only in the density with which they are located on the surface.

At the same time, the results of the recalculation showed that the bulk of the foci are located in the depth range of 0-300 km. At depths from 300 to 500 km there are also a sufficient number of sources. And several foci are located in the range of 500-600 km.

In conclusion, we can say that the existence of deep earthquakes is not unique. Thus, for the Crimean-Black Sea region, earthquake foci with depths of up to 300 km have been recorded [Burmin, Shumlyanskaya, 2017], and in the Caucasus to depths of 500 km [Burmin et al. 2019]. On the territory of Turkmenistan, the depths of the foci reach 600 km.

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