

The source and consequences of the Kungey earthquake on March 4, 2024 (mpv=5.8) in the Northern Tien Shan region

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On March 4, 2024, a strong earthquake occurred near the largest metropolises of Kazakhstan and Kyrgyzstan, Almaty and Bishkek correspondingly, which was felt over the vast territory of Kazakhstan and Kyrgyzstan.

The uniqueness of this earthquake is that: firstly, its hypocenter is confined to the zone of the Kemin earthquake of 1911, secondly, only one aftershock of weak energy was recorded, thirdly, the Kungey earthquake was felt in Almaty, Bishkek and its suburbs with intensity 5 points on the MSK-64 scale and had the most significant impact on the metropolises after the 1990 Baysorun earthquake.

The historical seismicity of the area, the macroseismic impact of the 1911 Kemin earthquake, as well as the modern seismic regime are considered in the report.

An interesting feature of the earthquake was the fact that before this event the seismicity formed a ring structure generated by earthquakes with depths of up to 33 km. Such ring structures were formed before strong and powerful earthquakes with magnitudes greater than 7, in various regions of the world, and were a clear prediction's feature. The formation of a ring structure of seismicity before earthquakes of lower energy is a unique fact.

On the northern shore of the Issyk-Kul lake, in Almaty, Bishkek and its suburbs the intensity was 5 points. The dependence of the intensity in points on the distance for this earthquake was shown. An analysis of records from strong motion instruments based on data from corresponding stations in Central Asia was carried out.

The fault plane solution of the Kungey earthquake on March 4, 2024 with $m_b=5.5$ was determined by the signs of the first arrivals of P-waves at 52 stations that well surrounded the epicenter and remote at distances $\Delta=88-2900$ km. Compression waves were recorded at 23 stations, and 29 sites registered tension waves. The earthquake occurred under the influence of submeridional near-horizontal compression, which is typical for sources in the Northern Tien Shan. As for deformation state, the area of research is well studied; here most of the events have a reverse type of motion with a strike-slip component. The type of motion in the source on March 4, 2024 along the steeply dipping plane NP1 with a southwestern strike is a reverse with a left-sided strike-slip component, along the plane of an eastern strike is a thrust with a right-sided strike-slip component.