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Uqturpan earthquake with Mw=7.0 on January 22, 2024, in the south of the Tien Shan

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The first results of the analysis of instrumental and macroseismic data of the large earthquake on January 22, 2024, (Mw=7.0) in the south of the Tien Shan in the Gissar-Kokshaal fault zone are presented in the report. The area under study was characterized by seismic calm for many years. The most significant in terms of energy, the Suusamyr earthquake of 08/19/1992 with Mw=7.3 occurred at a distance of more than 200 km from the epicenter of the Uqturpan earthquake.

The earthquake was preceded by a ten-year period of increased seismicity in a wide region of Central and South Asia, which began with 2 large earthquakes (Mw = 7.7) in the Makran region in 2013, after which an increase in subhorizontal stresses was recorded in the region, which led to the more rapid preparation of a series of strong earthquakes.

The characteristics of seismicity in the Central Tien Shan region are considered, it is observed that before the earthquake of January 22, 2024, ring structures of seismicity were formed in two depth ranges: 0–33 and 34–70 km, which indicate the presence of earthquake precursors, by analogy with others seismically active areas.

The intensity of shaking at the epicenter of the main shock of the Uqturpan earthquake in Xinjiang province reached 8-9 points. On the southern coast of the Issyk-Kul lake it was 5-6 points, in Almaty and its suburbs - 5 points. The earthquake was felt in Kyrgyzstan, Kazakhstan, Tajikistan, Uzbekistan, Turkmenistan, Azerbaijan, Russia, and India. 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 showed that the highest amplitudes of PGA accelerations equal to 30–43 cm/s^2 correspond to an intensity of 6 points and were recorded from 88 to 182 km from the epicenter.

The main shock was followed by a large series of aftershocks: on January 22, 179 events were recorded, on January 23 – 459 ones, in total, as to the end of February, 2024, 2883 aftershocks were already recorded, the strongest of them was the event with mpva = 5.9. The process of stress relaxation continues to this day.

The obtained fault plane solutions of the main shock and the strongest aftershocks showed the domination ща reverse-thrust type mechanisms, the strike of nodal planes along the Gissar-Kokshaal fault was identified, which is consistent with the northeastern orientation of the cloud of aftershocks and, in general, with the geodynamic situation of the Tien Shan and Tarim Basin junction zone.

The dynamics of the rupture in the source was complex; several sub-foci of different energies were presumably identified. This was reflected in the discrepancy between the parameters of the hypocenters, especially depth, according to the data of different seismological centers.