



**A brief technical report on June 22, 2022  
earthquake (M 6.1) of Afghanistan-Pakistan  
border region**

**(Report No.: NCS-NSN-06)**

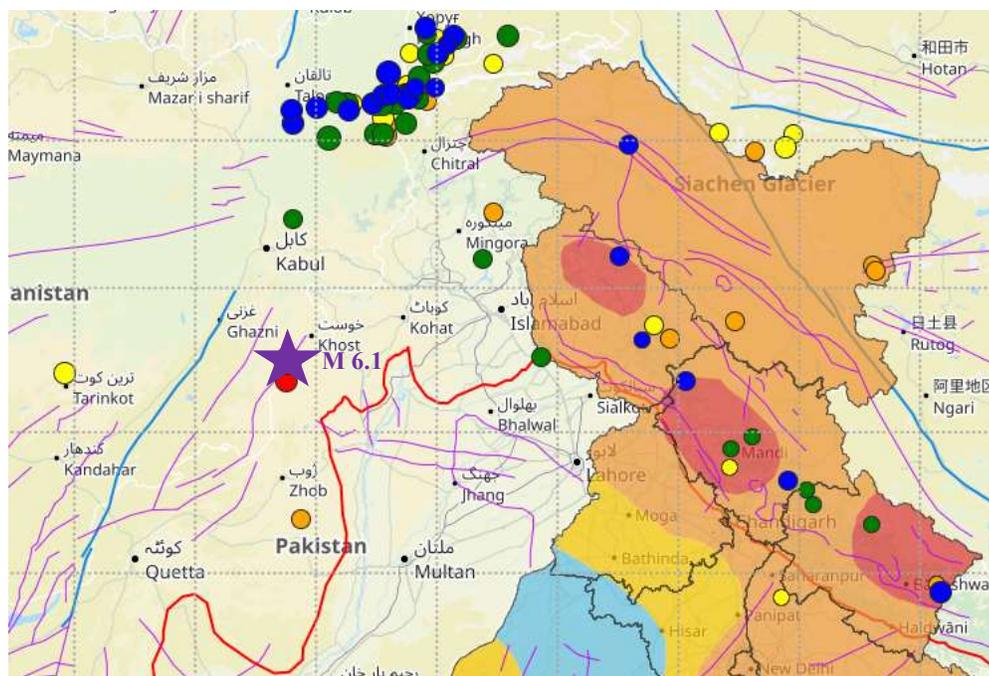


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June 22, 2022

## A brief technical report on June 22, 2022 earthquake (M 6.1) of Afghanistan-Pakistan border region:

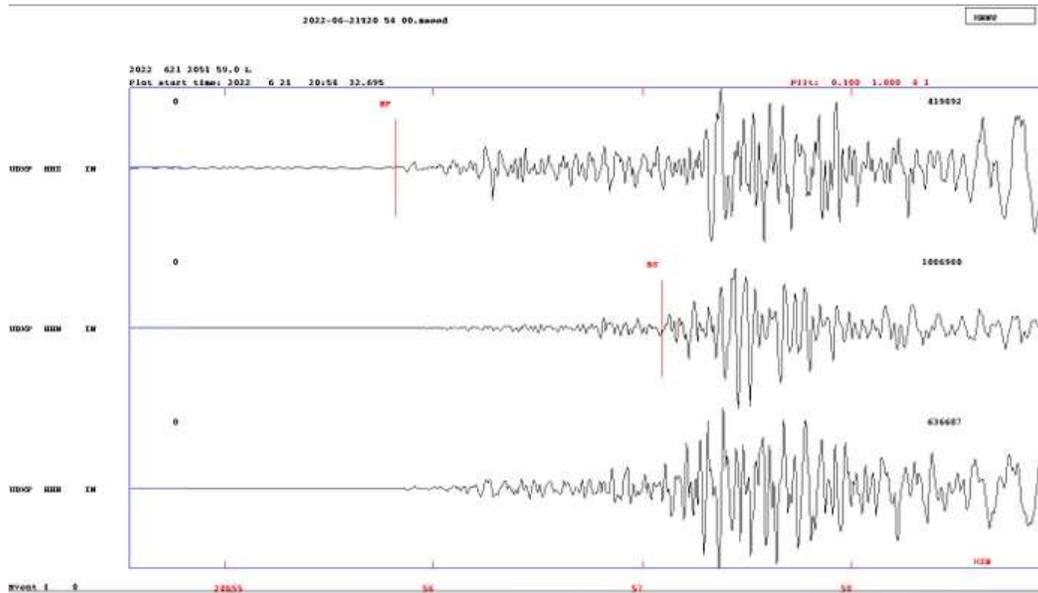
Earthquakes in the border region of eastern Afghanistan and western Pakistan along active faults are the results of NE moving Indian plate colliding with the Eurasia plate. The India plate is underthrusting beneath the Eurasia plate, causing mountains including the Himalayan, the Karakoram, the Pamir, and the Hindu Kush ranges. A system of NE-SW trending active faults, to the south of the Hindu Kush ranges, parallel to the plate boundary close to the Afghanistan-Pakistan border region appears to be the causative source for the earthquakes in this region. A shallow focused strong earthquake of magnitude M 6.1 (Fig. 1) epicenter at (33.06° N, 69.54° E) was witnessed in this region on 22.06.2022 at India local time 02:24:37 hrs IST (i.e., 20:54:37 UTC on 21.06.2022), which caused strong damage in the epicentral and surrounding regions.



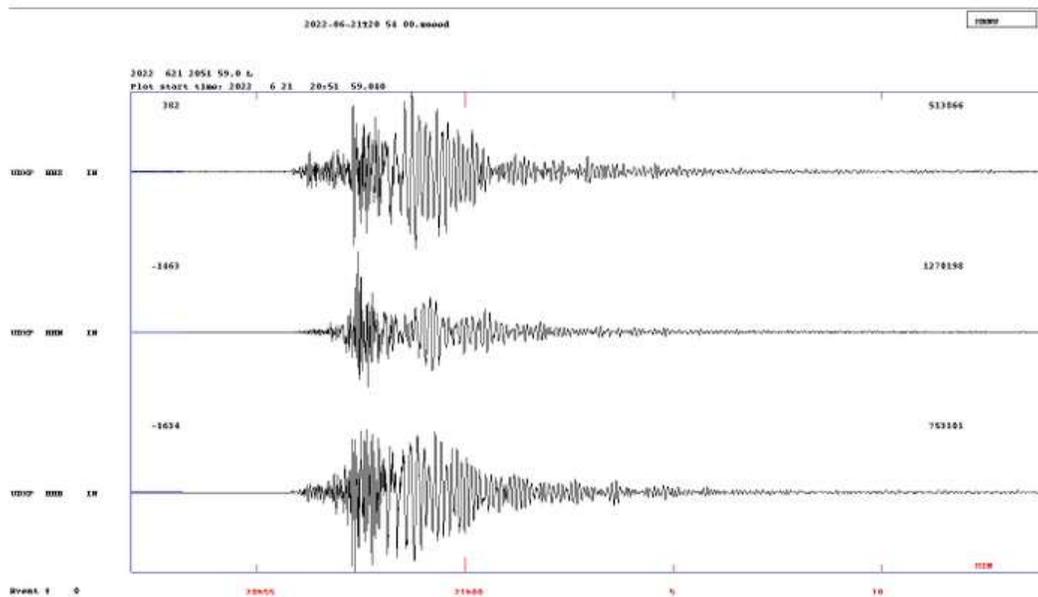
**Fig. 1:** Location map of June 22, 2022 (as per IST) earthquake (M 6.1) occurred near Afghanistan-Pakistan border region (purple star). Active faults (pink and blue lines) and located current events (filled colour circles) along the plate boundary are also depicted in the map.

The fault plane solution of the event indicated predominantly strike-slip faulting, either left-lateral slip on an NE-striking fault or right-lateral slip on a NW-striking fault. However, the NE-striking focal mechanism corroborates well with the orientation of the active faults in the

region. The event shook the region strongly and as reported by media, it killed around 1000 people in Afghanistan region and caused huge damage to property in the epicentral region. Significant damage in the Pakistan region is also reported, however, no deaths reported so far. Several seismological observatories of NCS, MoES India recorded the mainshock, including the Udhampur observatory that recorded the event as shown in Fig. 2.



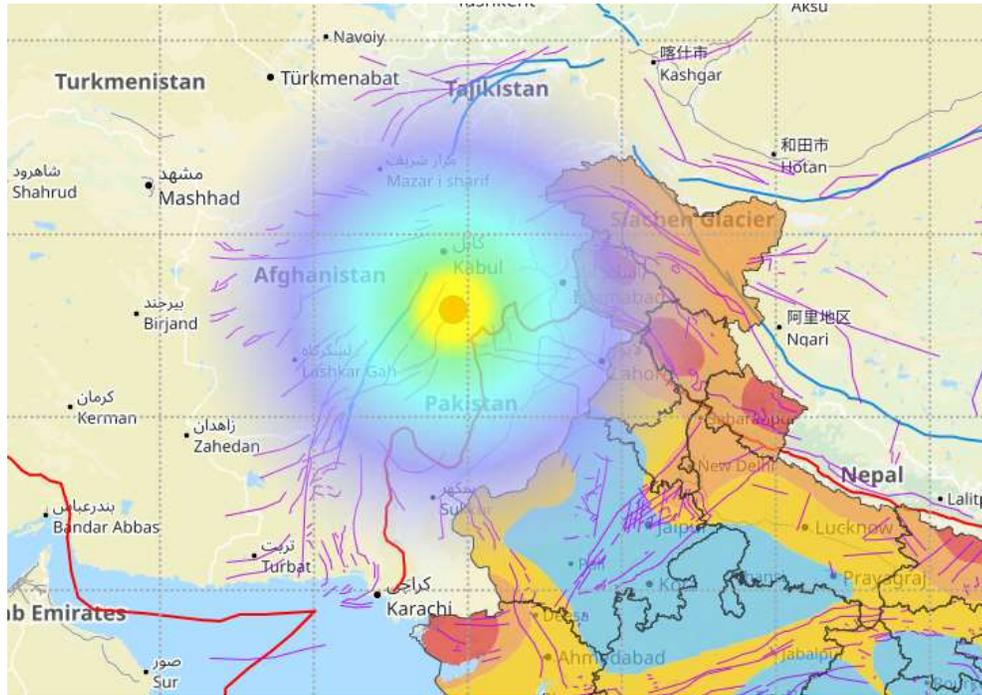
**Seismic Phases marked on Seismogram @ Udhampur Seismological Observatory**



**Seismogram (20 minutes record) @ Udhampur Seismological Observatory**

**Fig. 2:** Waveform data of June 22, 2022 earthquake (M 6.1) recorded at Udhampur Seismological Observatory of NCS, MoES.

Intensity map generated using empirical relationship (Fig. 3) indicate a strong shaking in the epicentral region. Evidently, the shaking was felt in different parts of Afghanistan and Pakistan. The damage pattern, as reported by media, corroborates well with rupture pattern of the earthquake along left lateral striking fault, steeply dipping westward.



**Fig. 3:** Empirical intensity map of June 22, 2022 (as per IST) earthquake occurred near Afghanistan-Pakistan border region. Yellow colour in the epicentral region corresponds to MMI scale Intensity VI-VII.

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