An earthquake of high magnitude likely in Himachal Pradesh in future: Study

Himachal Pradesh could be hit with an earthquake of magnitude equal to or greater than 8.0 on Richter scale in the future, a study has suggested.

The study could have major implications in terms of planning in the face of seismic hazard, earthquake predictions and understanding the source genesis of great earthquakes beneath active collision zone.

Recent incidences of earthquake in the Northern part of India have caused concern among scientists and planners. It is in this context an earlier study has caught attention. This study suggests that there is enough amount of strain energy still stored below the Himalayas. This is because very minimal amounts of strain energy is released in the form of microseismic and megathrust earthquakes till now.

The occurrence of moderate and microseismic activities has increased the strain accumulation along with the Main Himalayan detachment fault, which is already due for a large rupture event and can host a magnitude 8.0 earthquake anytime in the future.

“As the entire Himalayas is vulnerable to earthquakes, therefore in order to avoid damage due to earthquake, we need to make efforts to build an earthquake resilient society through earthquake preparedness and enforcement of good construction practices. It is also important that earthquake early warning systems be installed, which may mitigate the risk in high population density regions in the Himalayan arc,” said Dr. Sushil Kumar, Scientist 'G' & Head Geophysics, WIHG who was part of the study.

The study also suggests that if an earthquake occurs beneath the Himalayas and involves the whole of the Himalayan detachment fault in its generation process then its moment magnitude can be up to 8.0 (Mw).

A group of researchers from Wadia Institute of Himalayan Geology (WIHG), Dehradun, an autonomous institute under the Department of Science and Technology, Government of India, & CSIR-National Geophysical Research Institute (NGRI), Hyderabad analysed microseismicity, tectonics, and seismic potential in the Western Himalayan segment, NW Himalaya, India. The team consisting of Dr. Sushil Kumar, Scientist 'G'& Head Geophysics, WIHG; Dr. Mahesh Parija, Researcher, WIHG & NGRI; Dr. Shubhasmita Biswal, Researcher, WIHG& IIT KGP; Dr. V.M. Tiwari, NGRI, Director NGRI & Dr. N. Purnachandra

Rao, Chief Scientist, NGRI; and Dr. Narendra Kumar, Scientist, WIHG estimated a slip deficit greater than or equal to 8.0 in the western Himalayan seismic gap lying between the epicentral zone of 1905 Kangra earthquake and the 1975 Kinnaur earthquake.

This, the scientists said is because the total amount of energy released since the last great event is only a fraction (3-5%) of the accommodated energy which is equal to that released during a single magnitude 8.0 earthquake. The study was published in 2018 in the *'Journal of Asian Earth Sciences'.*

The observed seismicity in the region signifies a higher level of tectonic activity in this region. This also explains the reactivation of the major fault called 'the Kauirik fault' that can lead to a considerable number of earthquakes in Himachal Pradesh.

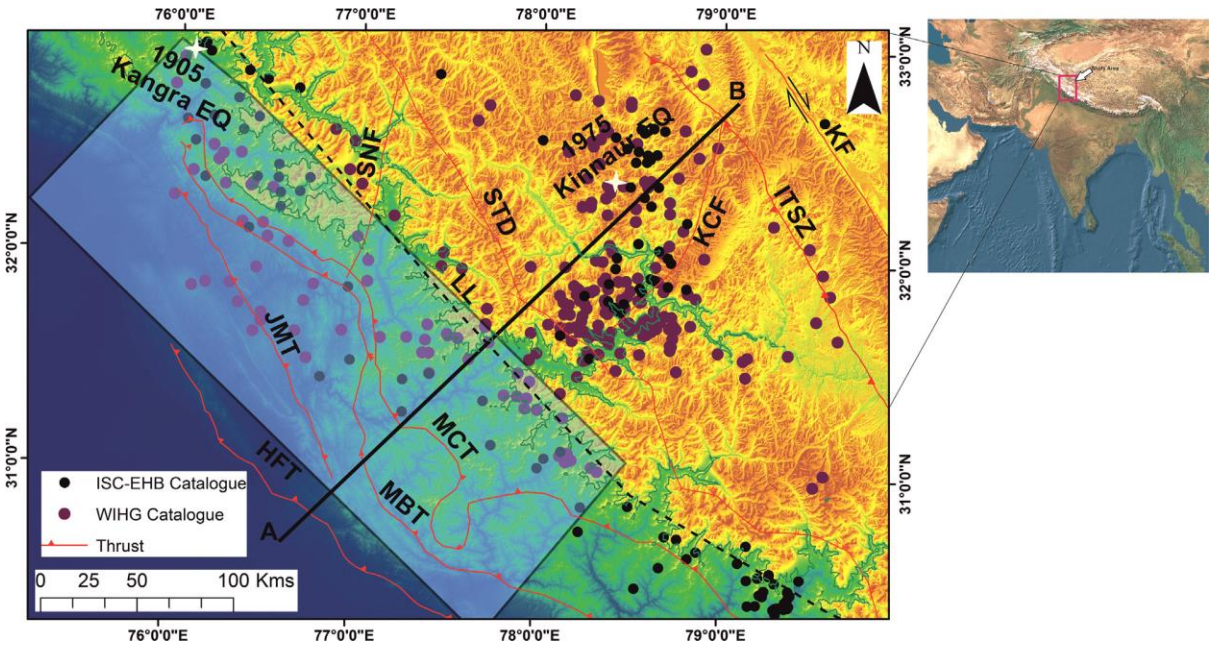

Figure: General Seismotectonic map of the NW Himalaya showing the epicenter of 1905 Kangra earthquake and 1975 Kinnaur earthquake. Major tectonic breaks ITSZ: Indus-Tsangpo Suture Zone; MCT: Main Central Thrust; MBT: Main Boundary Thrust; HFT: Himalayan Frontal Thrust; JMT: Jwalamukhi Thrust; KCF: Kaurik-chango Fault; SNF: Sundarnager Fault along with the topography as well as the focal mechanism solutions of some major earthquakes that occurred in the region in the past (Modified after GSI, 2000). The map also shows the relocated earthquake epicenters. LL: The dotted line is designated as locking line (Bollinger et al., 2004). The shadow rectangle signifies the western Himalaya seismic gap between the epicenter of the 1905 Kangra earthquake (Mw = 7.8) and the 1975

Kinnaur earthquake (Mw = 6.8). The NE-SW transect AB is also shown in the figure. The right-hand upper panel shows the India map with the solid red rectangle highlighting the study area shown below.

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