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A Preliminary Report of 07th January 2025, Tibet Autonomous Region Earthquake (M 7.1)

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Earthquake Report on M 7.1, in Tibet Autonomous Region occurred on 07th January 2025

An earthquake of magnitude M 7.1 struck at 06:35:18 IST in Tibet Autonomous Region, with its epicentre located at 28.86° N and 87.51° E and a focal depth of 10 km. The epicentre was approximately 100 km northeast of Lobuche, Nepal; 175 km northwest of Gangtok, Sikkim; 430 km northeast of Patna, Bihar, 525 km northwest of Guwahati; and 380 km from Lhasa, the capital of Tibet. Following the mainshock, sixteen aftershocks with magnitudes ranging from 3.8 to 5.0 have been recorded till 13:00 IST. Figures 1 and 2 display the epicentre location and the earthquake's intensity map, respectively.

The epicentre of the earthquakes lies close to the ITSZ (Indus-Tsangpo Suture Zone), situated along the Indian-Eurasian plate boundary. Preliminary fault plane analyses suggest that the earthquakes were caused by normal faulting at shallow depths (Figure 1). The fault plane solution indicates that the rupture occurred along a plane oriented approximately in the North-South direction. This observation is strongly supported by the distribution of aftershocks, which aligns well with the inferred fault geometry.

A review of seismic activity over the past decade reveals that minor earthquakes have occurred in the vicinity of the mainshock region, as shown in Figure 1. This indicates a certain level of pre-existing seismicity in the area, potentially linked to the ongoing tectonic processes in the region.

The maximum observed intensity of the earthquake was reported to be VIII on the Modified Mercalli Intensity (MMI) scale, concentrated near the source region (Figure 2). In contrast, regions farther away, such as Bihar, experienced moderate intensity levels ranging from IV to V on the MMI scale. These intensity distributions highlight the significant energy release near the epicentral zone.

The earthquake was widely felt across several states in eastern and northeastern India, including Bihar, Sikkim, Assam, and West Bengal, as well as neighbouring regions. Within two hours of the event, more than 12 felt reports were submitted by residents from these states through the official website and mobile application. The reported intensities, based on the Modified Mercalli Intensity (MMI) scale, ranged from II to III, indicating light to very light shaking (Figure 3).

The maximum peak ground acceleration (PGA) recorded, is tabulated below:

Site	Maximum PGA	Distance from epicenter (km)
Gangtok	0.0013	175
Cooch Behar	0.0016	242
Madhubani	0.0170	316

responses suggest that the seismic waves propagated efficiently over a wide area, causing perceptible ground motion even in regions located at considerable distances from the epicenter.

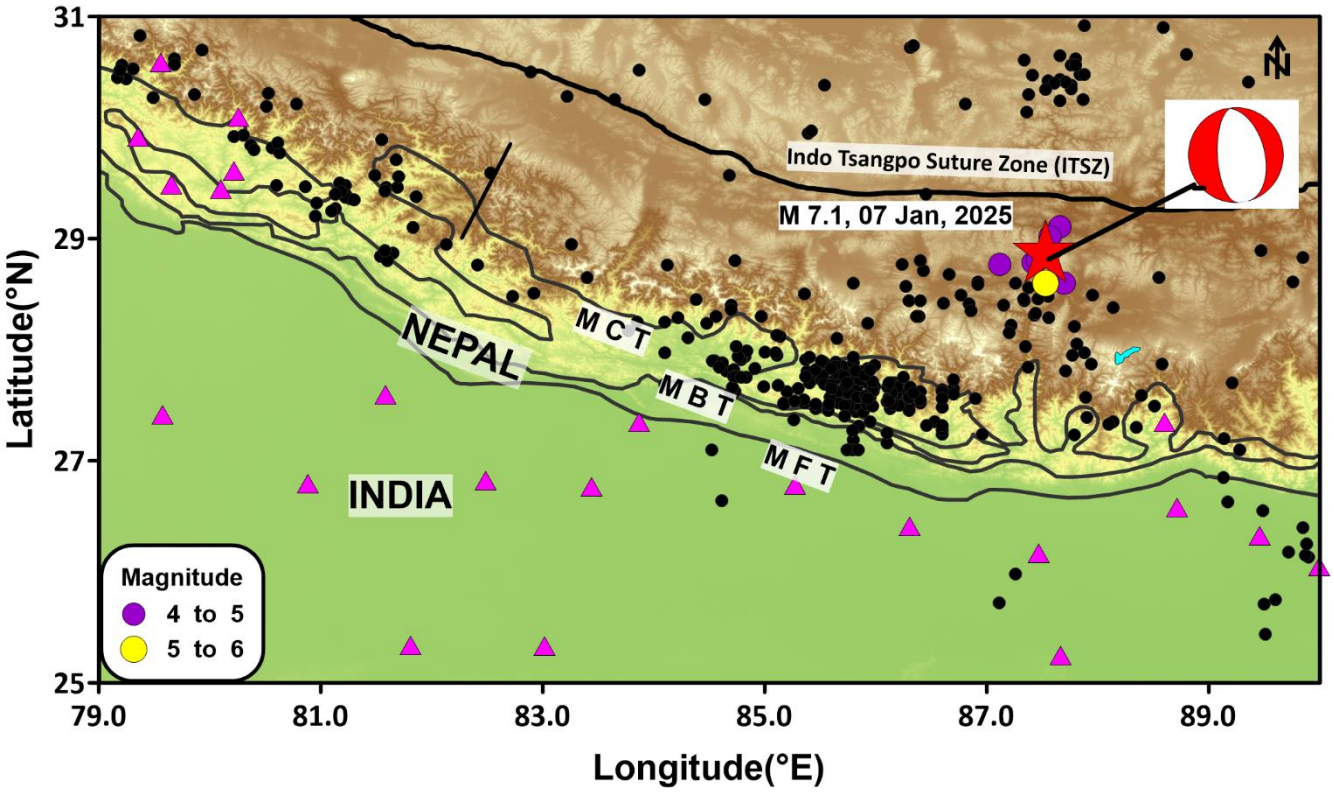

Figure 1: Map showing the location of the earthquake of M: 7.1 (Red Star) that occurred on 07th January 2025 in Tibet Autonomous Region. The continuous thick black lines are the major fault system surrounding the epicentral region. Filled yellow and violet circles are the aftershock events that occurred within a 120 km radius of today's epicentre. Black colour circles show the last 10-year earthquake, which occurred in and around today's earthquake epicentre.

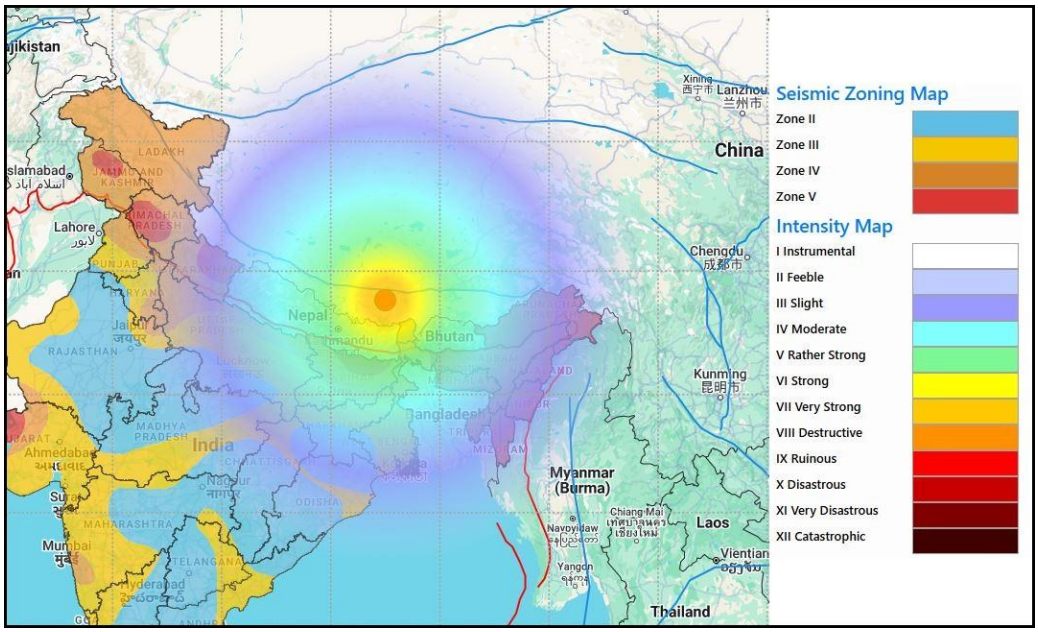

Figure 2: Expected Intensity map of the earthquake of M: 7.1 that occurred on 07th January 2025 in Tibet Autonomous Region.

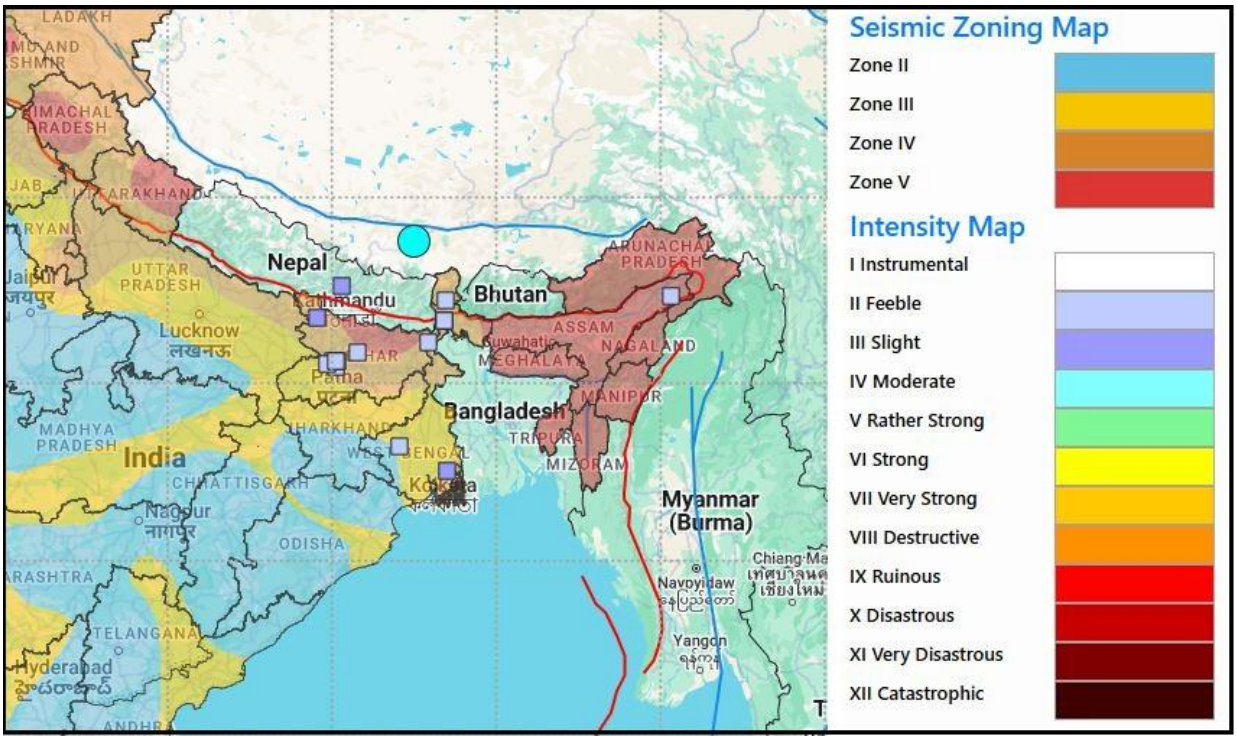

Figure 3: Felt responses (squares) of the 07th January 2025 earthquake of M: 7.1 (blue circle) received through www.seismo.gov.in and BhooKamp mobile-app. More than 12 responses were received within two hours from the time of occurrence of an earthquake.