Report on Real Time Earthquake Location

From: Earthquake Monitoring Center (EMC) of NCS
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National Center for Seismology
Ministry of Earth Sciences
Government of India

Month: February 2025
Technical Report No: NCS/2025/2

Report of Earthquakes occurred in the month of February 2025

1) Introduction:

National Center for Seismology maintains a National Seismological Network of **166 stations** each having state of art equipment and spreading all across the country **(Figure:1).** Using these stations during the period 01st – 28th February 2025 a total number of 119 earthquakes have

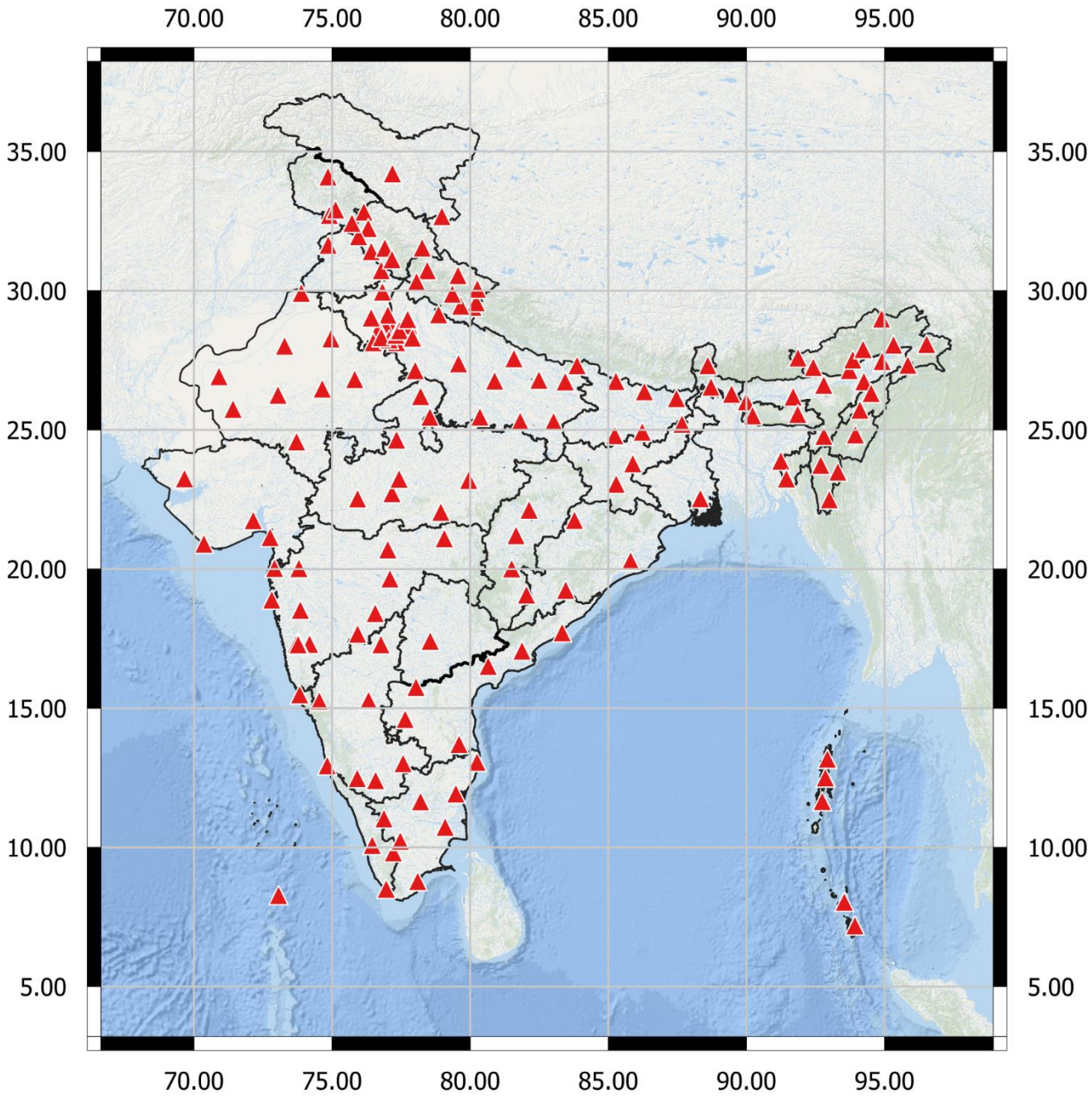


Figure 1: National Seismological Network (NSN) of 166 Stations

been located and disseminated from the center **(Figure:2)**, out of which 115 earthquakes has occurred in India and its neighborhood region bounded by the coordinates 0˚- 40˚N & 60˚-100˚E **(Figure:3)**.

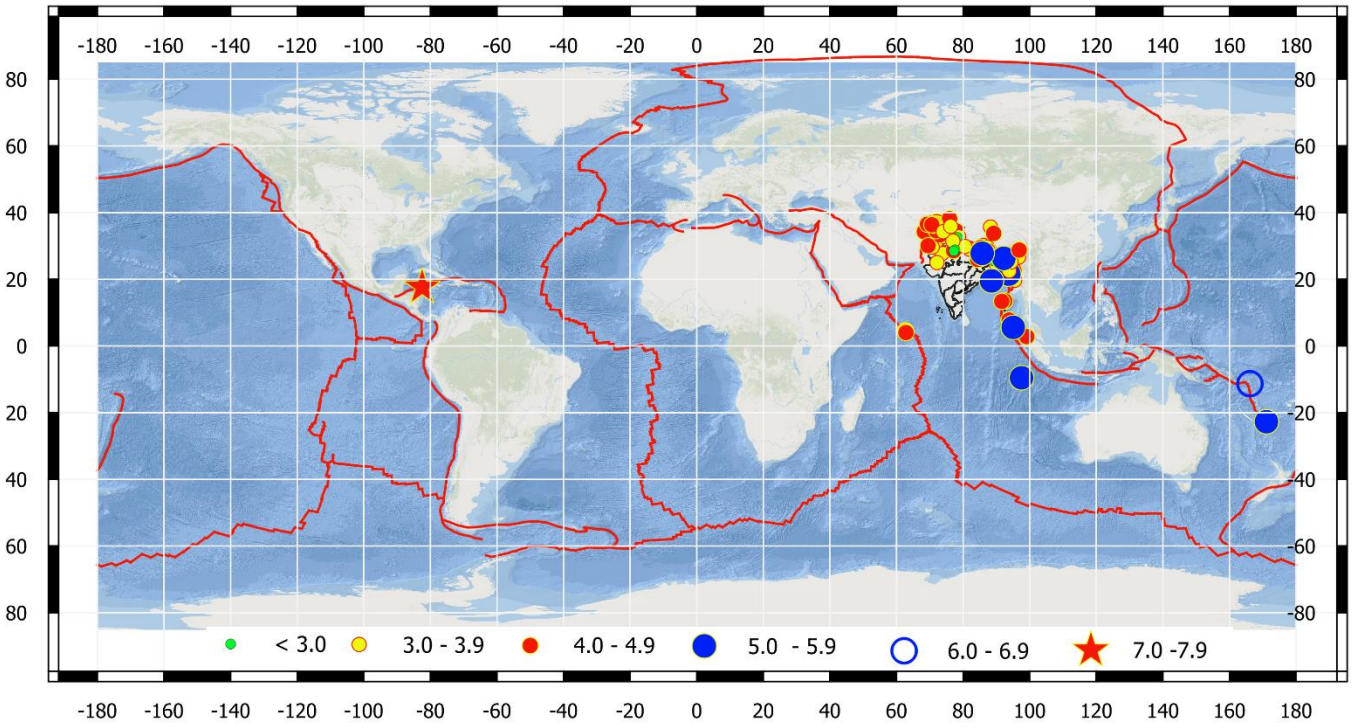


Figure 2: Earthquakes located and disseminated by NCS during 01st – 28th February 2025

2) Seismicity:

During the period, the majority of earthquakes within India and its neighbourhood region bounded by the coordinates 0-40^{0}N & 60-100^{0}E; were located in Hindu Kush region, North India (Jammu and Kashmir, Ladakh, Himachal Pradesh and Uttarakhand), North East India (Arunachal Pradesh, Assam, Meghalya and Manipur) as shown in **Figure 3**.

Few earthquakes of smaller magnitudes were also reported in northern (Rohtak in Haryana, New Delhi and South-East Delhi in NCT Delhi, Modinagar in Uttar Pradesh), western (Bikaner and Barmer in Rajasthan) and eastern (Siwan in Bihar and Cooch Behar in West Bengal) part of country. **Twelve** earthquakes of smaller magnitude (**M < 3.0)** comprising **10%** of all earthquakes occurred during 01st to 31st February 2025.

Five earthquakes of magnitude **M:5.0 and above** occurred during the month in the region; as detailed in **Table:1**.

Table:1 Earthquakes of M≥5.0 occurred during February 2025 within India and its neighbourhood

SN	Date	Time (IST)	Lat(^{0}N)	Long(^{0}E)	D (KM)	M	Region
1	2025-02-20	08:49:45	5.57	95.07	75	5.2	Andaman Sea
2	2025-02-22	16:03:30	21.55	93.74	110	5.0	Myanmar
3	2025-02-25	06:10:25	19.52	88.55	91	5.1	Bay of Bengal
4	2025-02-27	02:25:40	26.28	92.24	16	5.0	Morigao, Assam
5	2025-02-28	02:36:12	27.79	85.75	10	5.5	Nepal

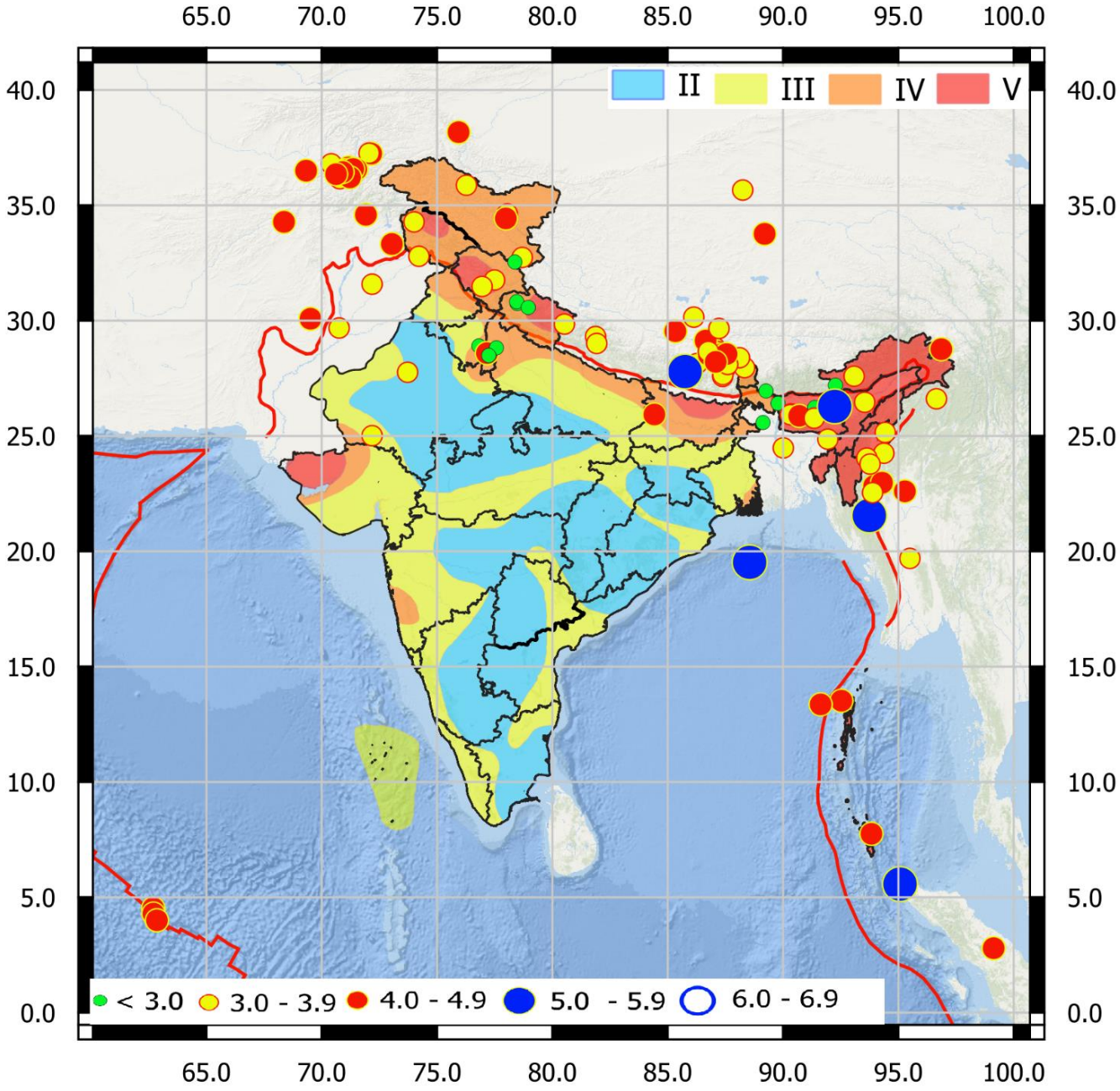


Figure 3: Map showing the seismicity during the period 01st – 28th February 2025 occurred in India and its neighbourhood region along with the seismic zone of India.

Out of total 119 earthquakes **45%** and **37%** earthquakes occurred in the magnitude range **3.0-3.9** and **4.0-4.9** respectively; whereas **seven** earthquakes in the magnitude range 5.0-5.9 occurred during the period of which two were outside the grid of 0- 40^{0}N & 60-100^{0}E as shown in **Figure 2.** One earthquake each magnitude of **M:6.0** and **M:7.5** were occurred outside the grid of 0- 40^{0}N & 60-100^{0}E; as shown in **Figure 2** and **Figure 4(a).** Detail list of earthquakes occurred during the month is available at www.seismo.gov.in .

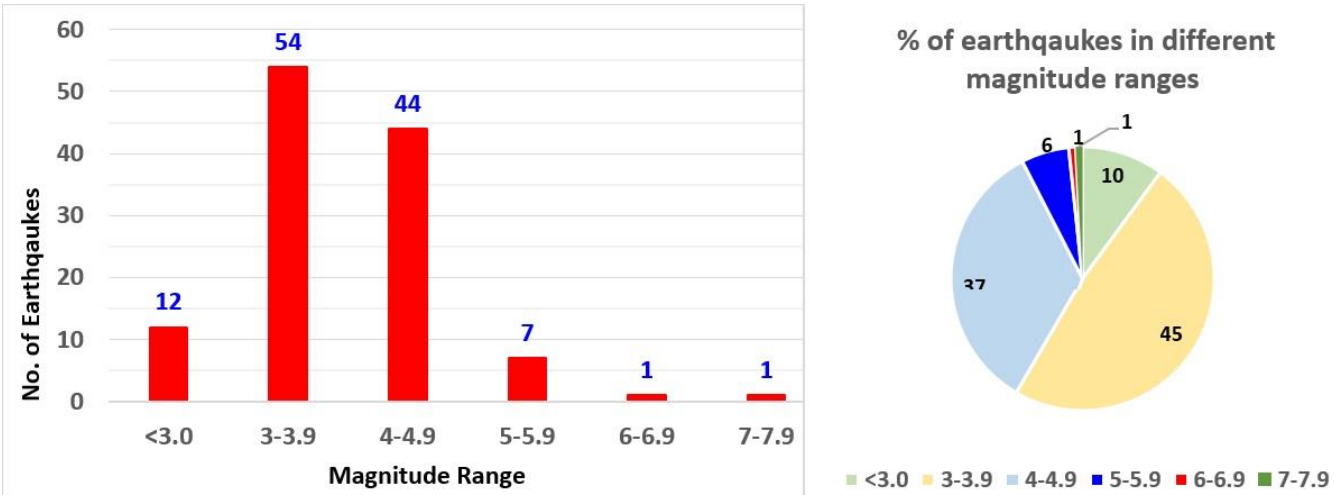


Figure 4 (a) : Distribution of earthquakes in the different magnitude range during 01st – 28th February 2025.

There is negative change in number of earthquakes with respect to previous month (January 2025) in the all the magnitude range; except of 7.0 – 7.9 as shown in Figure 4 (b).

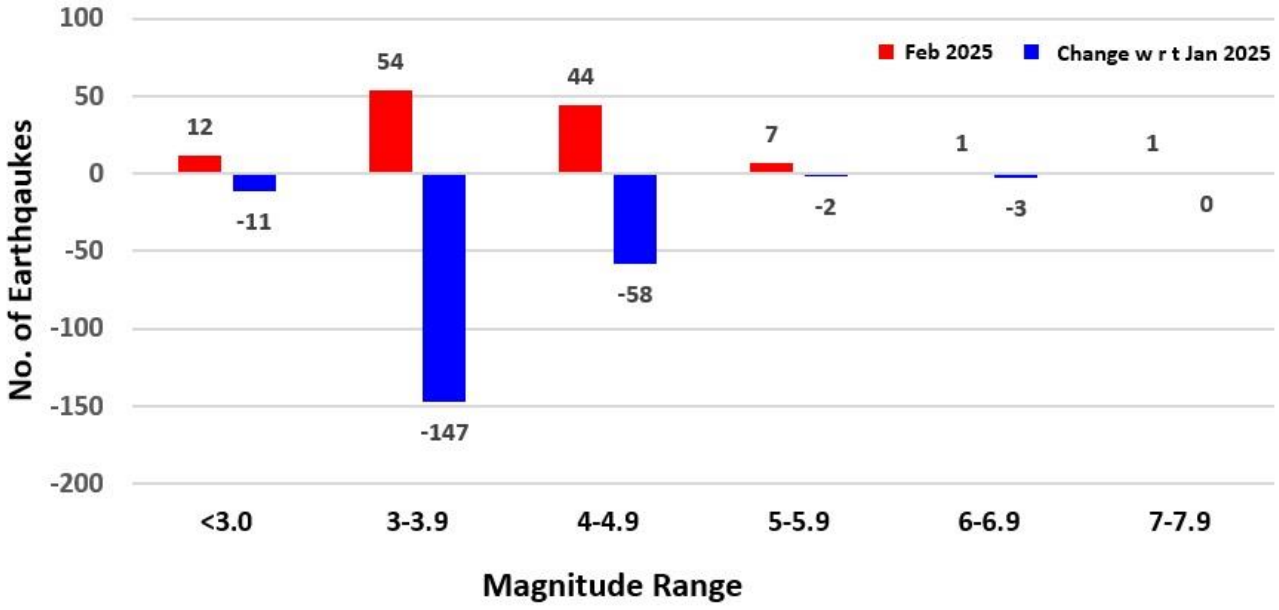


Figure 4 (b) : Change of occurrence of earthquakes in different magnitude ranges w r t previous month

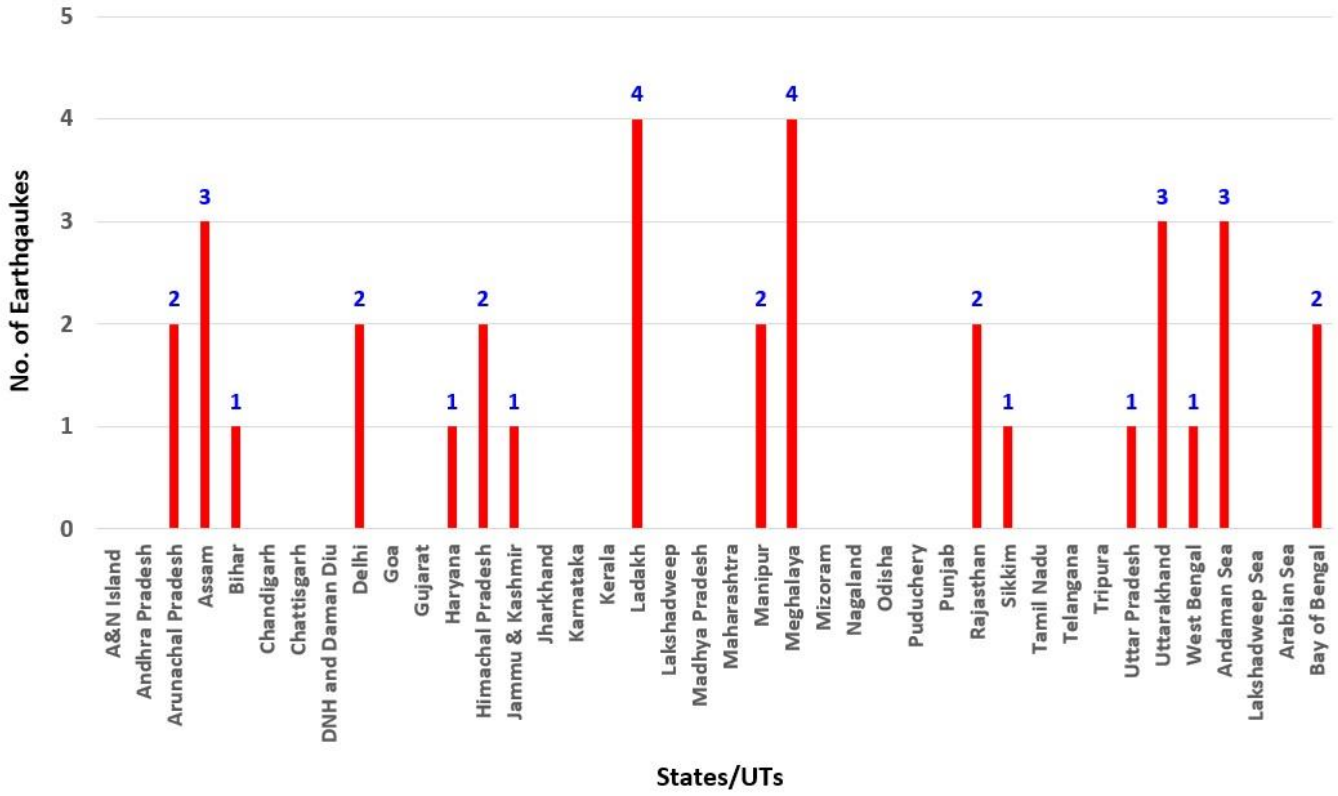


Figure 5: State wise distribution of earthquakes during the period 01st – 28th February 2025.

Total **35** earthquakes occurred within Indian territory; of which 4 earthquakes each occurred in Meghalaya and Ladakh during the period. Out of 35 earthquakes **14** and **12** earthquakes occurred in **North** and **North-East** region respectively. State/UT and region wise distribution of earthquakes occurred during 01st – 28th February 2025 is shown in **Figure 5** and **Figure 7** respectively**.** There was no activity in central and southern part of the country and spars activity reported in western and eastern part of the country during the 01st – 28th February 2025 **(Figure 3** and **Figure 6**).

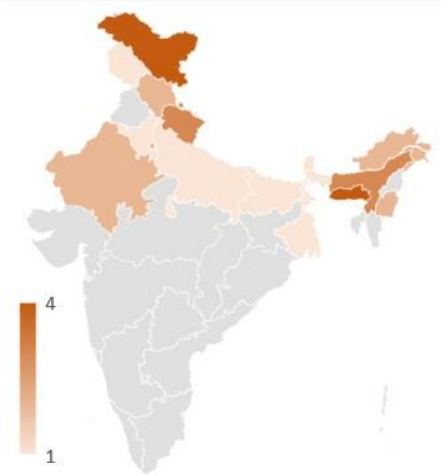


Figure: 6 Earthquake Density map

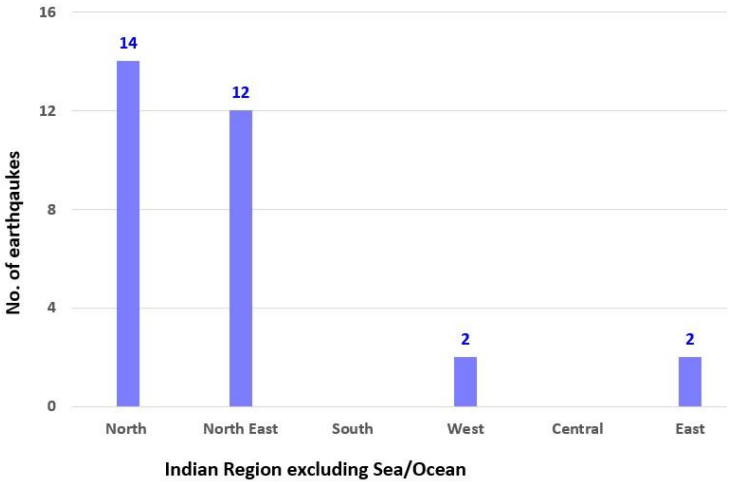


Figure: 7 Region wise distribution

3) Significant Activity:

A. **Delhi Earthquake:** An earthquake of **M:4.0** occurred at **05:36:55 IST** of **17th February 2025** in Jheel Park, Dhaula Kuan, New Delhi at 28.59° N and 77.16° E with focal depth of 5 km. The epicentre was approximately 10 Km SW of Red Fort and 7 Km NE of Indira Gandhi International Airport. This earthquake occurred along a NW-SE trending lineament; having the significant structural heterogeneity in and around the epicentral region. The variation in subsurface geological structures likely contributed to stress accumulation and subsequent rupture along this trend. An examination of past seismic activity within a 50 square kilometre radius of the epicentre reveals that a magnitude 4.6 earthquake occurred south of the current epicentre on December 25, 2007 within 6 km periphery of this earthquake. The preliminary fault plane solution, derived from moment tensor inversion, indicates that the earthquake was associated with a normal faulting mechanism. The fault plane is oriented along a NW-SE strike, consistent with the regional stress regime and geological structures. **Figure 8** depicts the expected intensity of this earthquake around the source zone. The earthquake was widely felt in and round Delhi. More than 300 felt responses reported through BhooKamp app and website as shown in **Figure9**. More information about this earthquake is available at the following URL https://riseq.seismo.gov.in/riseq/earthquake/event/c2l4S0JxcWRLck5lUXR3SEg5dXA3QT09/Reviewed

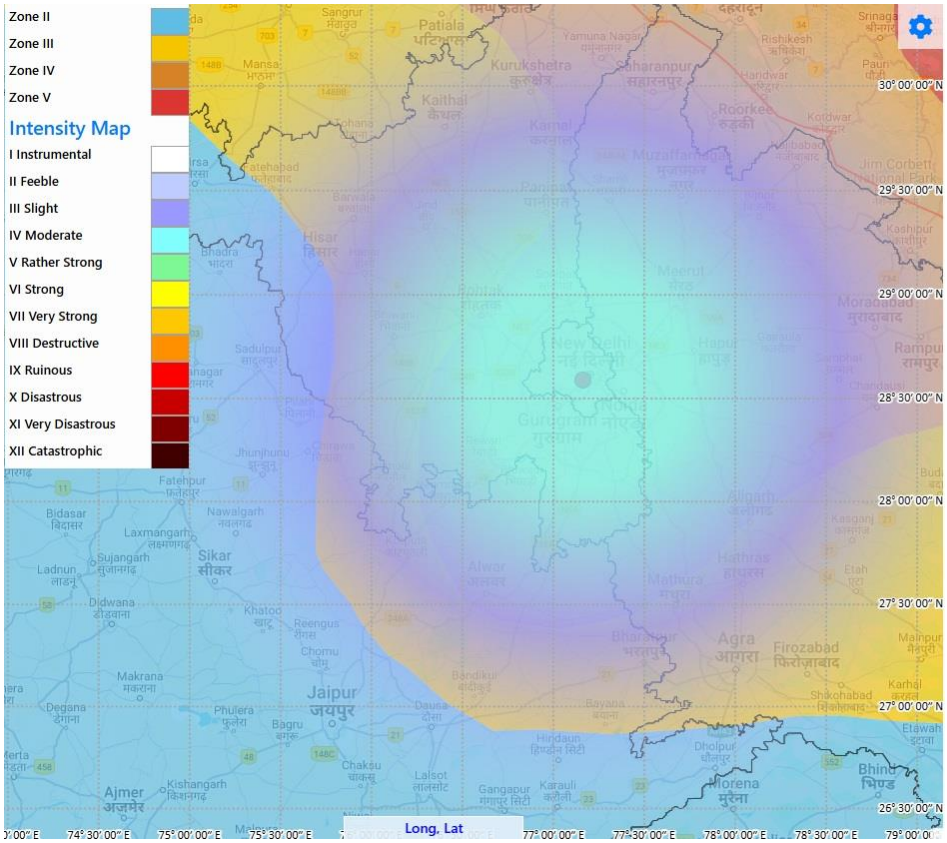


Figure 8:Intensity map of earthquake of M 4.0 occurred on 17th February 2025 in New Delhi.

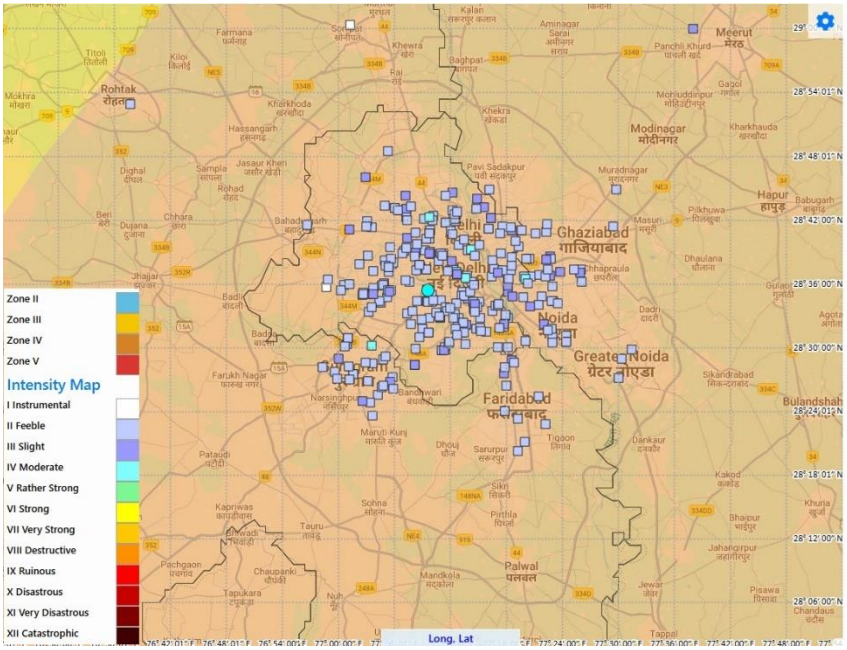


Figure 9:Felt resposnes of M: 4.0 New Delhi earthqauke occurred on 17th February 2025.

B. Assam Earthquake: An earthquake of **M:5.0** occurred at **02:25:40 IST** of **27th February 2025** in Marogaon, Assam at 26.28° N and 92.24° E with focal depth of 58 Km. The epicentre was 10 Km NE of Guwahati and 68 Km SE of Tezpur. This earthquake was located near the Kopili Fault and closer to the 28th April 2021 M: 6.4 Sonitpur earthquake. The preliminary fault plane solution derived from moment tensor inversion

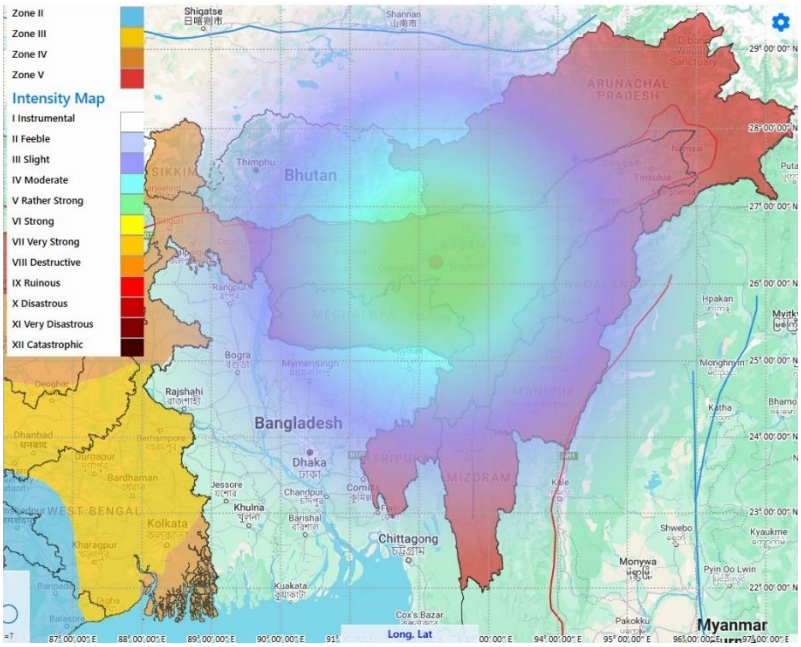


Figure 10: Intensity map of earthquake of M 5.0 occurred on 27th February 2025 in Assam.

suggests a strike-slip fault. The occurrence of earthquakes in the region is attributed mainly to the tectonic sources in the Himalaya such as Himalayan Frontal Thrust (HFT), Main Boundary Thrust (MBT) and Main Central Thrust (MCT), Kopili Fault and Dhubari Fault. Seismologically as well as geologically, it is evidenced that the region has been quite active. The Assam region falls in the high seismic zones V of the seismic zoning map of Bureau of Indian Standards (BIS). **Figure 10** depicts the expected intensity of this earthquake around the source zone. The earthquake was widely felt in the NE region including Bihar. More information about this earthquake is available at the following URL https://riseq.seismo.gov.in/riseq/earthquake/event/YVR3T3dMUVBBQVE4WXZTM0hVVHNwQT09/Reviewed

C. **Nepal Earthquake**: An earthquake of **M:5.5** occurred at **02:36:12 IST** of **28th February 2025** in Chautara, Sindhupalchowk of central Nepal at 22.79° N and 85.75° E with focal depth of 10 km. The epicentre was approximately 45 Km NE of Kathmandu; 130 km N of Sitamarhi, Bihar and 265 km ENE of Gorakhpur, Uttar Pradesh. This earthqauke is 45 km NW to M:7.3 12th May 2015 Nepal earthquake and 120 Km SE of M:7.9 26th April 2015 Gorkha earthquake. This earthquake occurred on Main Central Thrust(MCT) which is in the collision zone of Indian and Eurasian plate. The preliminary fault plane solution derived from moment tensor inversion suggests a thrust fault with low dip angle. **Figure 11** depicts the expected intensity of this earthquake around the source zone. The earthquake was widely felt in the source region of Nepal, and neighbouring states of India such as Bihar, Sikkim, UP, West Bengal.More information about this earthquake is available at https://riseq.seismo.gov.in/riseq/earthquake/event/UlM2dmNxYU1nN0hWRHplSGo4Tkc1QT09/Reviewed URL.

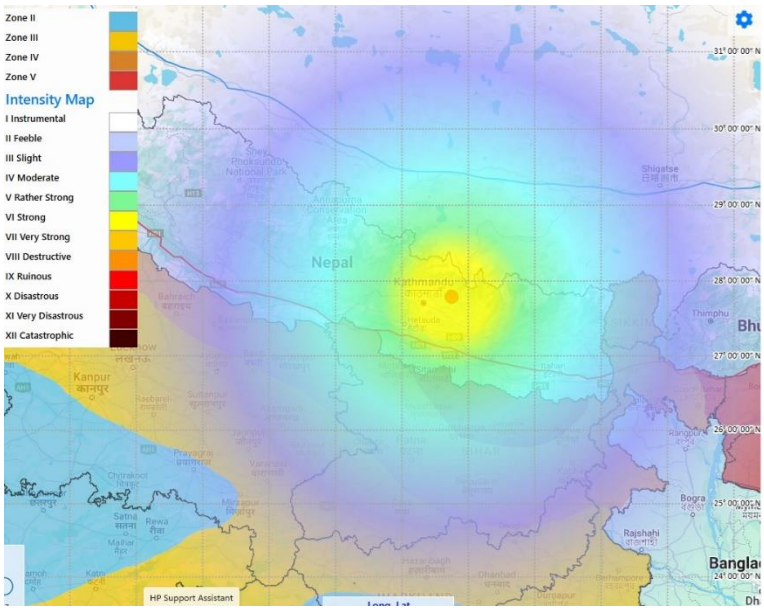
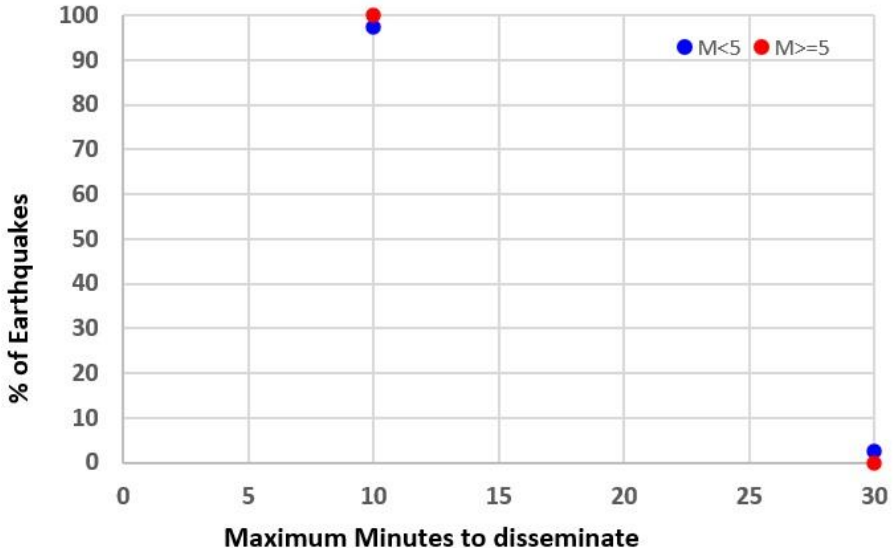


Figure 11: Intensity map of earthquake of M 5.5 occurred on 28th February 2025 in Nepal.

4) Dissemination Performance:



More than **90%** earthquakes of **M<5.0** and **100%** earthquakes of **M>5.0** occurred within India and its neighbourhood region bounded by the coordinates 0-40°N & 60-100°E were disseminated within 10 minutes as shown in **Figure 12.**

Figure 12: Dissemination of earthquakes within different time ranges during 01st –28th February 2025.