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Explained: The dawn quake in Delhi

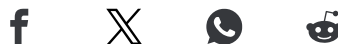
The capital lies in the Aravalli-Delhi Fold Belt, where deformed layers of rock sometimes release stress in the form of earthquakes. This mechanism is different from the one that triggers quakes in the Himalayan region.

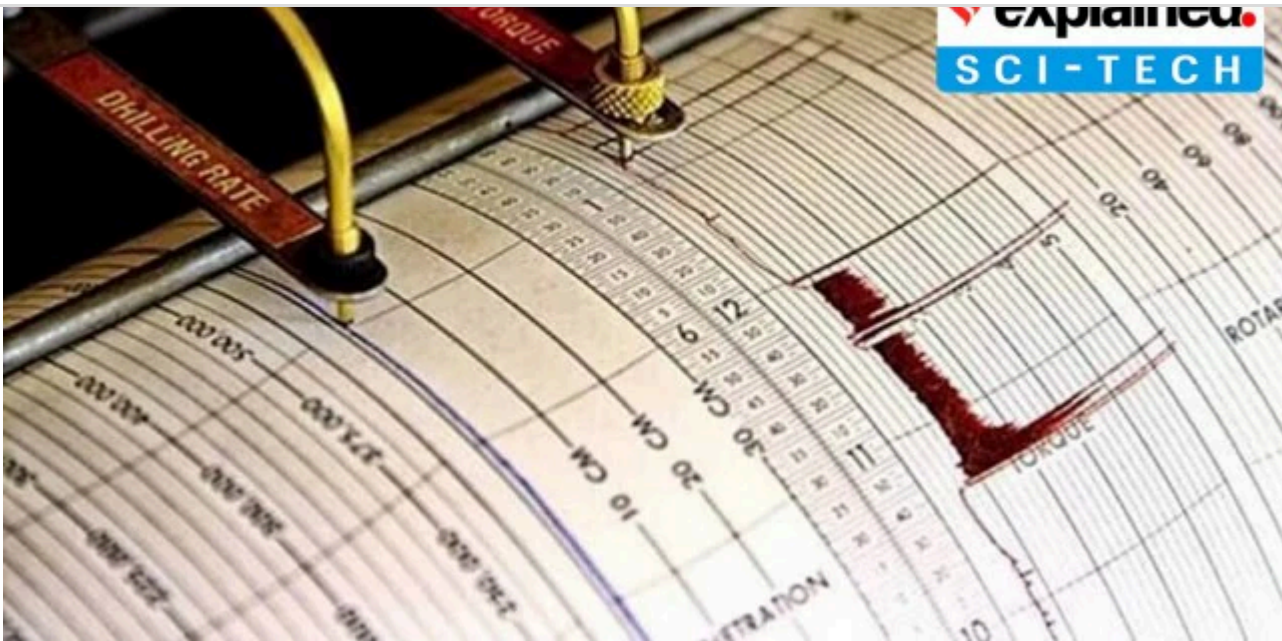
Written by [Amitabh Sinha](#) [Follow](#)

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6 min read





Many in Delhi reported having heard a peculiar sound as the earth shook on Monday morning. The sound convinced many that this earthquake was “different”.

Delhi is no stranger to earthquakes, but the one that occurred before dawn on Monday was slightly different.

Mostly, the tremors experienced in Delhi from time to time are from earthquakes that originate elsewhere, sometimes as far away as Afghanistan. Monday’s magnitude 4 earthquake was located in Delhi itself, somewhere close to the Dhaula Kuan area.

In fact, it was the strongest earthquake to have originated in Delhi in at least five years, data from the National Centre of Seismology showed.

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Another earthquake of similar magnitude occurred a couple of hours later near Siwan in Bihar. Magnitude 4 earthquakes are not very strong, and do not result in much damage. There were no reports of any damage due to Monday's earthquakes.

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People rushed out of their houses as earthquake tremors hit Delhi-NCR early Monday morning, Feb. 17, 2025. (PTI Photo)

Delhi lies in a seismically active area, and thus an earthquake originating here is not a surprise. In the last five years, areas in and around Delhi have produced several small earthquakes, with magnitudes ranging between 2 and 3 or lower (chart). These are barely noticed, except by seismometers.

India's official earthquake hazard map puts Delhi in Zone 4, the second highest classification of areas based on their susceptibility to shaking experienced during an earthquake.

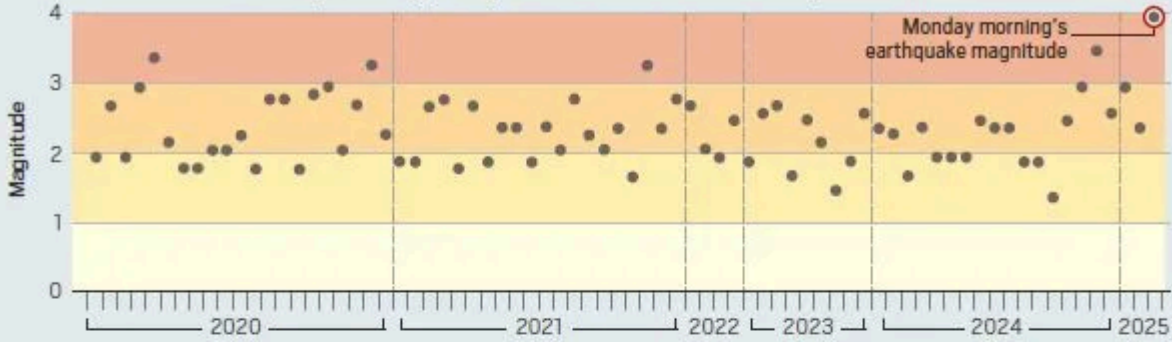
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Zone 4 in India includes areas that are expected to experience MSK-8-level intensity during an earthquake. The MSK, or Medvedev-Sponheuer-Karnik scale is a measure of intensity, rather than strength, or energy released, which is described by magnitude.

Simply put, the MSK scale measures the susceptibility of an area to an earthquake. Based on the local geology and other factors, two places can feel, and be impacted by, a quake very differently, even if they are equidistant from its epicentre.

Delhi falls in a region that has high susceptibility to quakes. MSK-8 means the area is vulnerable to major damage being caused to buildings and other infrastructure. Zone 5, the most vulnerable areas in India, correspond to MSK-9 levels of intensity or higher.

Earthquakes originating within a 40-km radius of Delhi, 2020-25

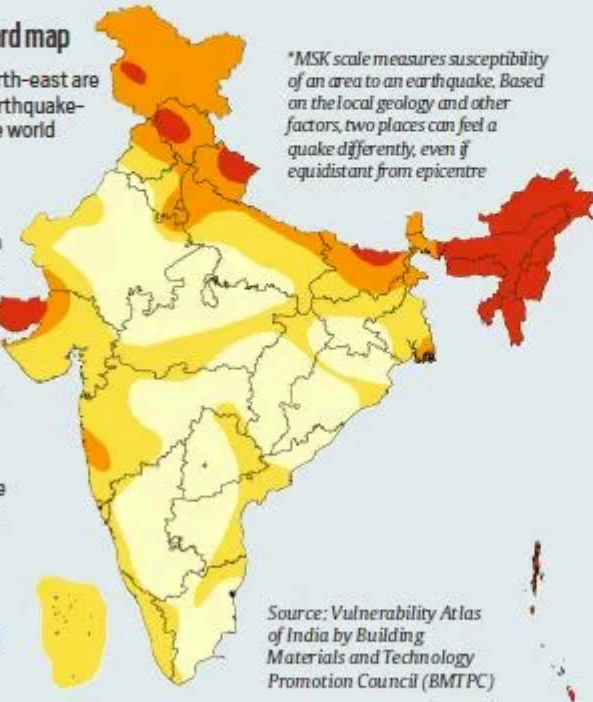


Source: National Center for Seismology

Earthquake hazard map

Himalayans and north-east are among the most earthquake-prone regions of the world

- ZONE V: Very High Damage Risk Zone (MSK* IX or more)
- ZONE IV: High Damage Risk Zone (MSK VIII)
- ZONE III: Moderate Damage Risk Zone (MSK VII)
- ZONE II: Low Damage Risk Zone (MSK VI or less)



*MSK scale measures susceptibility of an area to an earthquake. Based on the local geology and other factors, two places can feel a quake differently, even if equidistant from epicentre

Source: Vulnerability Atlas of India by Building Materials and Technology Promotion Council (BMTPC)

Important towns and earthquake zones they fall in

City	State	Zone
Bhuj	Gujarat	5
Darbhanga	Bihar	5
Guwahati	Assam	5
Imphal	Manipur	5
Jorhat	Assam	5
Kohima	Nagaland	5
Mandi	Himachal Pradesh	5
Port Blair	Andaman & Nicobar	5
Sadiya	Assam	5
Srinagar	Jammu & Kashmir	5
Tezpur	Assam	5
Almora	Uttarakhand	4
Ambala	Haryana	4
Amritsar	Punjab	4
Baharich	Uttar Pradesh	4
Barauni	Bihar	4

Source: Ministry of Earth Sciences

THE SOUND OF A QUAKE

MANY IN DELHI reported having heard a peculiar sound as the earth shook on Monday morning. The sound convinced many that this earthquake was "different".

EARTHQUAKES sometimes produce sound, but it is not always heard. Earthquakes are energy waves travelling through the ground, causing vibrations along the way.

VIBRATIONS and shaking do sometimes produce low-frequency sounds that are beyond the hearing capacity of human beings. Sounds in the audible range are relatively rare.

Aravalli-Delhi Fold Belt

Delhi lies in what is known as the Aravalli-Delhi Fold Belt, a seismically-active geological belt extending from southern and eastern Rajasthan to Haryana and Delhi.

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This region is characterised by the presence of deformed layers of rock that have been folded or bent due to geological processes hundreds of millions of years ago. These deformities have created stress which is sometimes released in the form of earthquakes.

This is a very different mechanism from the one that triggers earthquakes in the Himalayan region, which is one of the most quake-prone regions in the world. The Himalayan region has been witnessing the subduction of the Indian tectonic plate under the Eurasian plate — one pushing against the other — which results in a lot of stress building up.

The Aravalli-Delhi Fold Belt was much more seismically active in the past than it is now. Over the years, the tectonic activity in the region has slowed down considerably, leading to greater geological stability. But some faults still remain, which give rise to occasional mild earthquakes.

“It is like old scars flaring up once in a while. In the past, this area has witnessed significant geological processes, but these have largely stopped now,” said Vineet Gehlot, Director of Dehradun-based Wadia Institute of Himalayan Geology.

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On an average, about 25 earthquakes of magnitude 2.5 or higher, approximately five of which are around magnitude 3.5, are produced in and around Delhi every year, according to a 2022 research paper that Gehlot had co-authored with Rajeev Yadav of the National Geophysical Research institute in [Hyderabad](#) and Stacey Martin of Australian National University, Canberra.

A peculiar sound

Many people reported having heard a peculiar sound during the earthquake in Delhi, a sound that was not known to have accompanied the earlier quakes that were felt in the capital. It was this sound that led some to speculate that the nature of Monday's earthquake was different in some way.

The fact is earthquakes do sometimes produce sound — but it is not heard most of the time. Earthquakes are energy waves travelling through the Earth, causing vibrations as they pass. These vibrations and shaking do sometimes produce low-frequency sounds that are beyond the hearing capacity of human beings. Bigger earthquakes can produce sounds in the audible range, but these are relatively rare events.

“Earthquakes sounds are a real thing. They exist. But it is very unlikely that you would ever hear them,” Gehlot said.

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“Most of the times people mistake other kinds of sounds as the sound of the earthquake. Big earthquakes, for example, can result in buildings and other things vibrating. This shaking can produce different kinds of sounds, and these are very often confused with the sound of the earthquake. I am not sure what people heard in Delhi, but not much should be read into this,” he said.

Large quakes unlikely

Gehlot said Delhi had a “good history” of quakes, but not large earthquakes of the kind that are witnessed in the Himalayan region.

“There is a mention in some historical records of a strong earthquake having occurred in Delhi around 1720. Another big earthquake is reported to have happened in 1803 in which the Qutub Minar is said to have suffered major damage. This one is supposed to have occurred around Mathura.

“Some of these past events are being reassessed now with newer data and technology. For example, it is now understood that the 1803 earthquake most likely happened in the Srinagar-Devprayag region of Uttarakhand and was felt in Delhi. The features of that earthquake are almost typical of a Himalayan quake,” he said.

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The chances of a large earthquake originating in Delhi are quite slim, Gehlot said.

“There is always this discussion whether Delhi can be hit by a big earthquake. Indeed, a large earthquake could result in very heavy destruction in a densely populated and heavily built-up region like Delhi.



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“But based on what we know of the area, I would say such an event is extremely unlikely. The tectonic setup, the structures underneath the surface, the energy stored, the stress are all not conducive to produce a big earthquake in or around Delhi,” he said.

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