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A brief review of the recent Assam Earthquake

Abstract

The recent Assam Earthquake has been previewed in the context of the recent seismicity pertaining to Kopili Fault of northeast India. Kopili fault of northeast India is known for its active seismicity. The ground motion parameters in the context of peak ground acceleration, peak ground velocity and peak spectral acceleration stand out for their implications. Considering the strong magnitude of the event, there is imminent need for earthquake resilient buildings as well as hazard mitigation strategies in order to tackle post-earthquake scenarios.

Keywords: seismicity, resilient, peak ground acceleration, peak spectral acceleration

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Introduction

Northeast India (NER) is well known to the world for its' active seismicity. It is also characterized by the active tectonics which arises from the copious no of faults and lineaments prevalent in this region. The entire NER, India comes under the category of Zone V. With the advent of large seismic network, there has been considerable development in recording seismic events in NER, India. Of late, NER, India has been experiencing larger no. of events. Some of them were felt also. In recent weeks, there is evidence of high activity of the Himalayan Fault line. There are reports of more than 15 earthquakes recorded by states such as North Bengal, Assam, Mizoram, Meghalaya, and Arunachal Pradesh. This short communication highlights the recent Assam Earthquake. Ground motion parameters in the context of PGV (peak ground velocity), PSA (peak spectral acceleration) etc. are outlined along with their implication.

The event

In tune with the ongoing seismic activity, on April 28th, 2021, there was a massive jolt in Assam. It was so strong that it had been felt in the nearby states too. As per United States Geological Survey (USGS), USA, the event occurred towards 9km NNW of Dhekiajuli, India. The origin time was 02:21:26 (UTC) with the hypocentre at 26.782°N 92.436°E (Figure 1). Further, it was termed to be a shallow depth earthquake with a 34.0 km depth with a Magnitude 6.0. As per National Centre of Seismology, India the magnitude was 6.4 (M_W). The event has been followed by several aftershocks too. The first one occurred around 7:55 am and another a few minutes after that. The two aftershocks measured 4.3 and 4.4 (M_W). Figure 2 depicts the waveform of the event.[1]

Characteristics of the event and implications

The event had a longer S-P difference. The other parameters of engineering importance are enlisted in Table 1. It enlists PGA (peak ground acceleration), PGV, PSA and cumulative energy growth. The event possessed large PGA, PGV as well as PSA values which correspond to moderate to heavy shaking in the felt areas depending on the strata beneath. Moreover, the Intensity was considerably large. The cumulative energy growth which specifies the time resolved energy released as P-arrivals implicates a massive energy emanation, hinting at a complex rupture. Several houses and buildings were ravaged in Assam, India as the state suffered strong tremors on Wednesday morning. There were reports of liquefaction at certain places.[1]

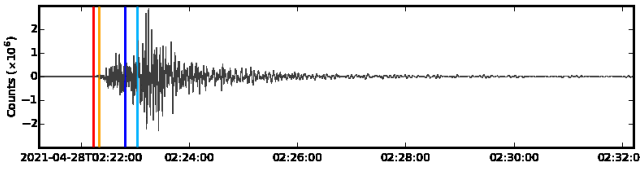

Figure 1 Seismic Waveform of the Large earthquake (Courtesy USGS).

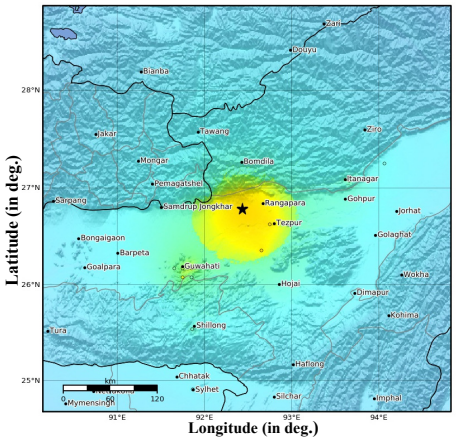

Figure 2 Location of the large earthquake (Courtesy USGS).

Table 1 Ground motion parameters of the earthquake

PGA(%g)	PGV (cm/s)	PSA(%g)	Cumulative Energy Growth (J/s)
~10	10	~2	1.43×1010

Current seismicity

Now, if the seismicity pattern in the vicinity of the origin of the event is considered, this event is no surprise. Kopili fault zone which host the origin of this event has been active, as evidenced in the recent instrumental records. As for instance, an earthquake of magnitude 4.7 occurred 17 km west-northwest of Tezpur (in the neighbouring region of Kopili Fault) on February 17, 2021. Strong tremors were also felt in state capital Guwahati. The earthquake occurred at Latitude 26.71^0 and Longitude 92.63^0. Likewise, another earthquake of 5.4 magnitude on the Richter scale struck near Sikkim's capital Gangtok. Above all, Assam remained witness to great earthquake of magnitude 8.6 in the year 1950 which resulted in huge casualties. It is pertinent to mention here that Indian tectonic plate is continuously wedging into the Eurasian plates at a speed of 44 mm/year which is a large contributor of strain build-up.[2-10]

Discussions

Several researchers opined that Kopili Zone has been witness to high seismic activities in the recent past. Attenuation studies as well as micro earthquake studies also evinces this assertion.[2–6] Additionally, major part of Assam is characterized by alluvium soils which make cities as well as locations more vulnerable to seismic waves. In the context of epicentral zone of this major event, Tezpur, India comes under direct impact of it. Recent studies indicate that Tezpur and its neighbouring region are characterized by low velocity zones at certain points. This poses as a major threat for seismic amplification.[3–8] Apart from this, resonance frequency estimates come in the range of 0.5 to 2.8 Hz which is further accompanied by larger amplification values in certain pockets.[10] All these increase vulnerabilities of major chunk of Tezpur and its surrounding region towards seismic risk.

Concluding remarks

In brief, the recent Assam Earthquake is overviewed here. All ground motion parameters pertinent to this event are appraised. Further, the seismicity is reviewed along with the implications. The epicentre and nearby regions have of late undergoing active seismicity as evidenced instrumental records of seismic events, implying the active tectonics of the region. Furthermore, the varying site effects prevalent in the epicentral region make the existing structures vulnerable to different values of swaying; eventually leading to large amplification at certain sites. The liquefaction observed at certain site post this event has been a testimony to these facts. In view of these facts, there is need of earthquake resilient structures as well as an effective hazard mitigation plan. As earthquakes cannot be averted, the effective way is to reduce the impending risk through proper mitigation strategy.

Acknowledgments

None.

Conflicts of interest

The author declares that there is no conflict of interest.

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