

Seismicity Investigation in Chiang Mai basin, Northern Thailand

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ABSTRACT

Chiang Mai city stands as the largest urban area in northern Thailand. The city is in the Chiang Mai basin, surrounded by active faults. However, the seismicity in the area remains poorly investigated due to the limited coverage of seismometers. In this study, the seismicity in the Chiang Mai basin has been investigated by analyzing seismic signals of three seismic stations including CMMT, SMCM, and S1CM from February 1st, 2023 to June 30, 2023. First, the earthquake signals are detected from CMMT's raw seismic signals due to its high signal-to-noise ratio using the STA/LTA (Short-Term Average/Long-Term Average) ratio trigger. Then, false triggered events were manually discarded from the triggered events, resulting in 153 seismic events. Only 16 of these events had signals on the other two stations. This is linked to elements including cultural noise that affects S1CM and the station's greater distance from earthquakes, which results in weaker signals. The SEISAN algorithm is then used to locate earthquakes using the signals from these events that were captured across all three sites. This required choosing the P and S phases arrival times by hand. The analysis reveals that 13 events are in San Sai District, 2 events in Doi Saket District, and 1 event in San Kamphaeng District. Event local magnitudes range from 0.7 to 2.3. The epicenter distribution displays an NW-SE trend that coincides with the Mae Tha fault zone's Huai Mae Pon and Doi Sa Ket faults. Only three incidents, though, have epicenters on fault tracks. Uncertainties were contributed by a significant azimuth gap in the eastern direction and inaccuracies in picking phases from signals with low SNR. These uncertainties could be minimized by deploying additional seismic stations in the eastern Chiang Mai area along the NW-SE direction. By increasing station density and data collection time, more events can be detected and relocated, facilitating further study of seismic source characteristics in the Chiang Mai basin.

Keywords: Chiang Mai basin, Earthquakes, Microseismicity