

Earthquake Location Capability of the Thailand Seismic Network

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INTRODUCTION AND MAIN RESULTS

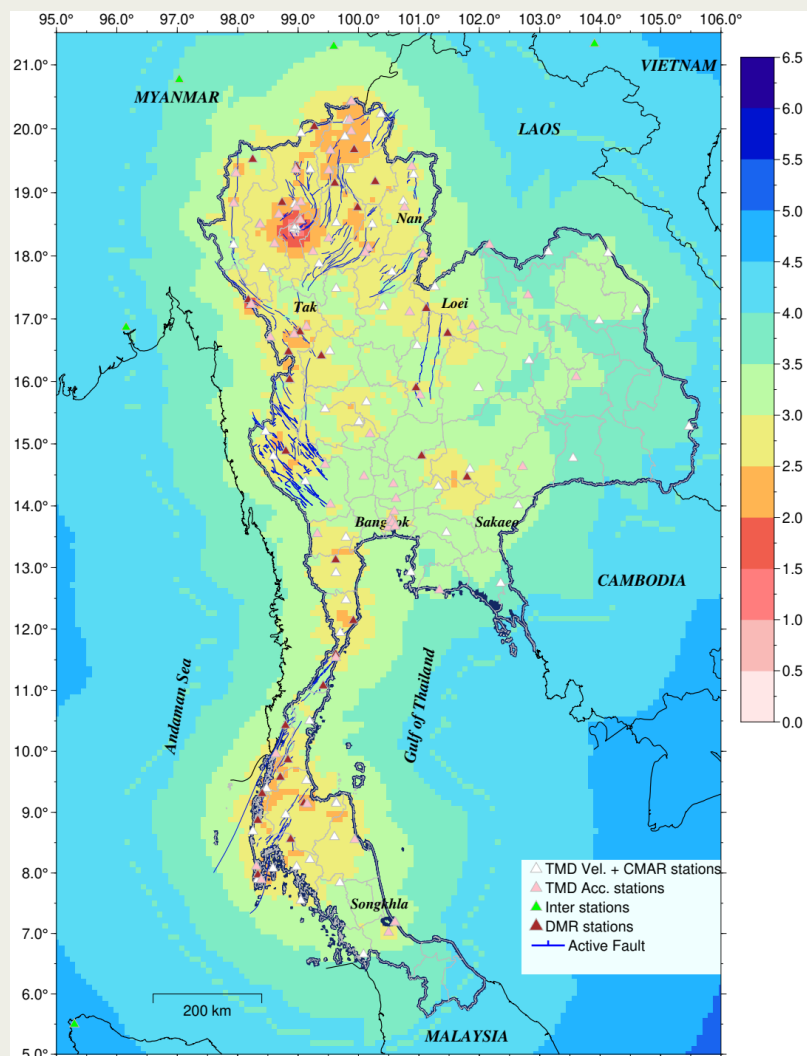
The analysis focused on the performance of earthquake detection and localization of Thailand's seismic network, including the TMD, DMR, and CTBTO's CMAR array stations. A total of 173 seismic stations were employed to assess the P-wave impulse amplitude, determining the detection threshold and magnitude of completeness M_c for the network. The average magnitude of completeness for earthquake localization is approximately 2.9, based on data from at least four stations. Notably, the Northern region, particularly Chiang Mai Province, exhibits the lowest M_c of 2.3, enabling detection of earthquakes below 1.5 due to the dense station network.

Introduction

The Thai meteorological department (TMD) serves as the main agency in Thailand responsible for detecting and locating earthquakes and disseminating earthquake information to the public. TMD responsibilities include the operation and maintenance of seismic monitoring stations that are distributed nationwide which began development and installation of their seismic network in 2008. The TMD earthquake monitoring system using a total of 173 seismic stations that include the station from department of mineral resources (DMR) and the CMAR array of the CTBTO. In this present work, we evaluate the detection and location performance of the Thailand seismic network.

Methods/Data

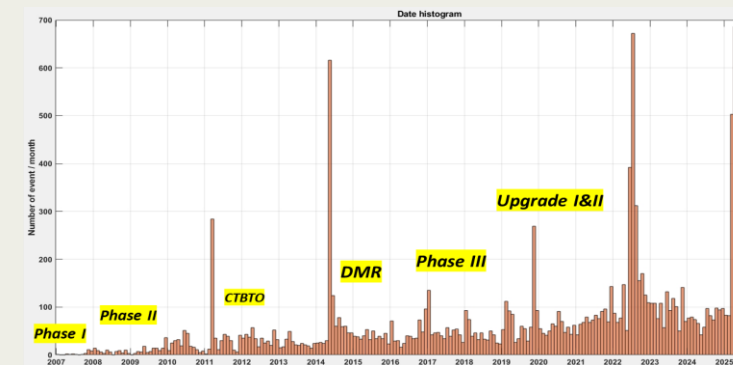
The idea of earthquake location is that we need a minimum of 4 recording stations to accurate location. We determine the amplitude of the seismic signal at the recording station as the P impulse amplitude, utilizing Brune's approximation for a point source with specified magnitude and depth, stress drop, and elastic properties of the medium (Tramelli et al. (2015)). The input parameters used in the analysis include stress drop 20 bars; medium density 2.8 g/cm³; S-waves average velocity 2.8 km/s; anelastic attenuation factor (Q) =150; earthquakes depth -2 km; minimum number of detecting stations=4 and Signal to noise ratio for detection of 1.5.



Map showing the completeness magnitude, M_c , of the Thailand seismic network based on minimum number of detecting stations of 4

Results / Conclusions

A total of 173 seismic stations distributed throughout the country were used to estimate the detection threshold of the seismic station or the magnitude of completeness M_c of seismic network. Based on data from at least 4 detecting stations, the average magnitude of completeness for earthquake localization in the Thailand seismic network is ~ 2.9 . The Northern part has the lowest M_c of 2.3, especially in Chiang Mai Province, we can locate earthquakes with a magnitude of less than 1.5 due to a dense station, including the CMAR array, which is utilized in the calculations. The TMD is expected to report an increase in the number of earthquakes each month as additional seismic stations are established.



Number of earthquakes for each month (2007-2025) reported by TMD.