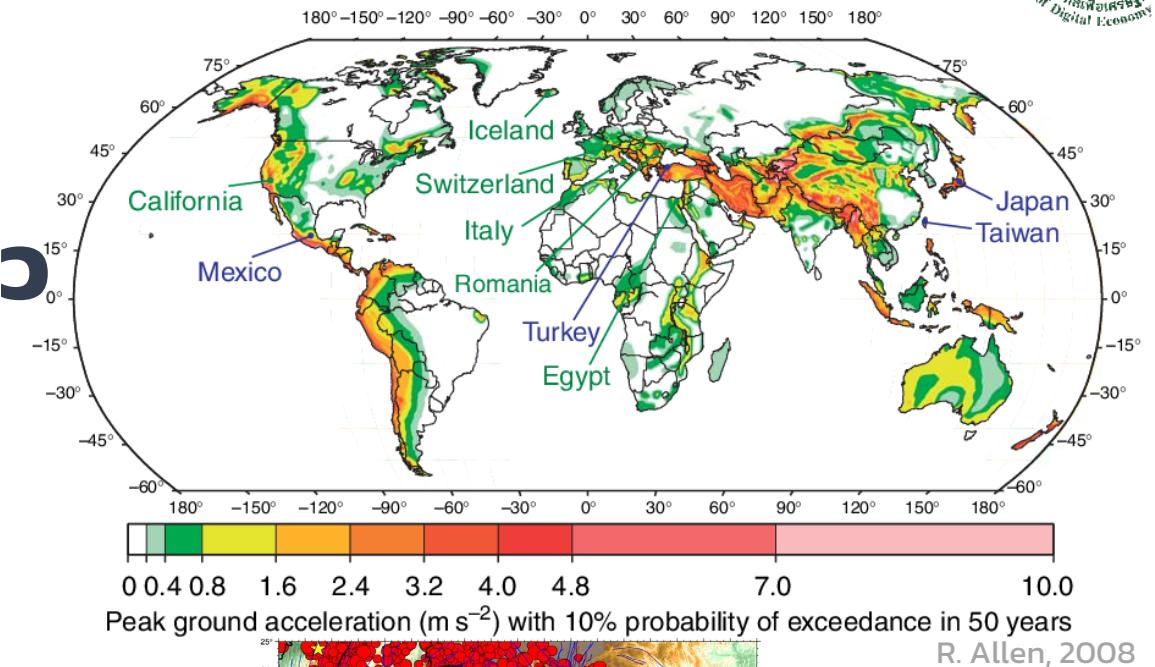




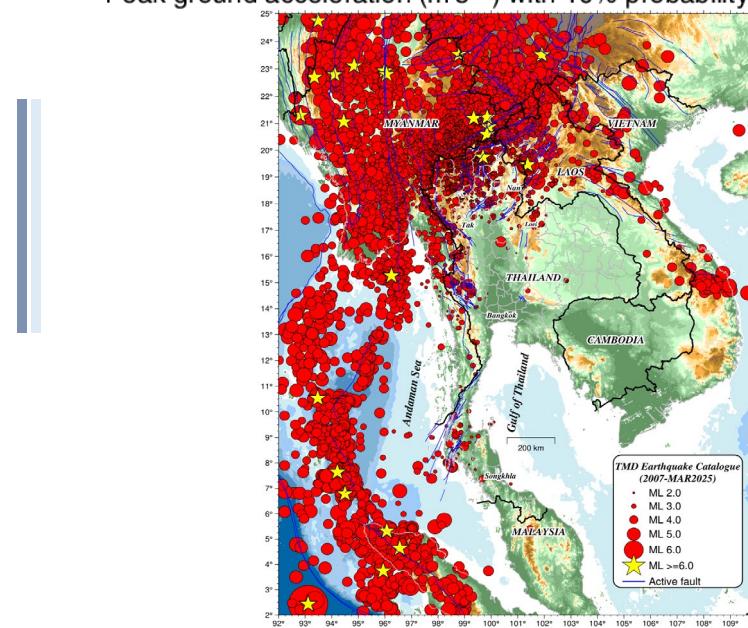
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แผนที่โอกาสเสี่ยงภัยแผ่นดินไหว ของประเทศไทย



Probabilistic Seismic Hazard Map of Thailand





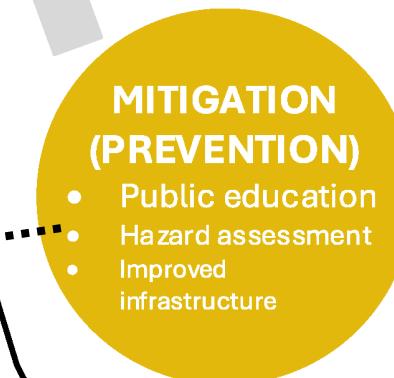
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DISASTER
STRIKES



DISASTER
MANAGEMENT
CYCLE



Pre-disaster

Post-disaster

TMD can do!

Earthquake prediction?

(To say that earthquake will happen definitely)



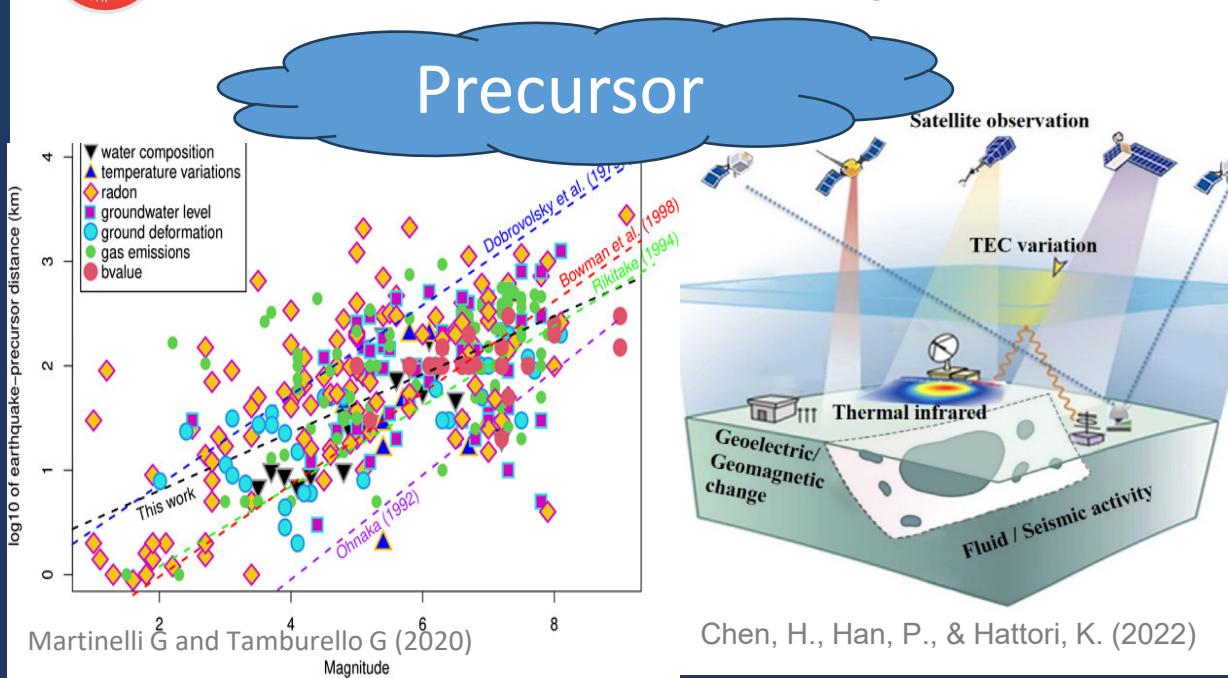
Time of Occurrence



Location of Earthquake



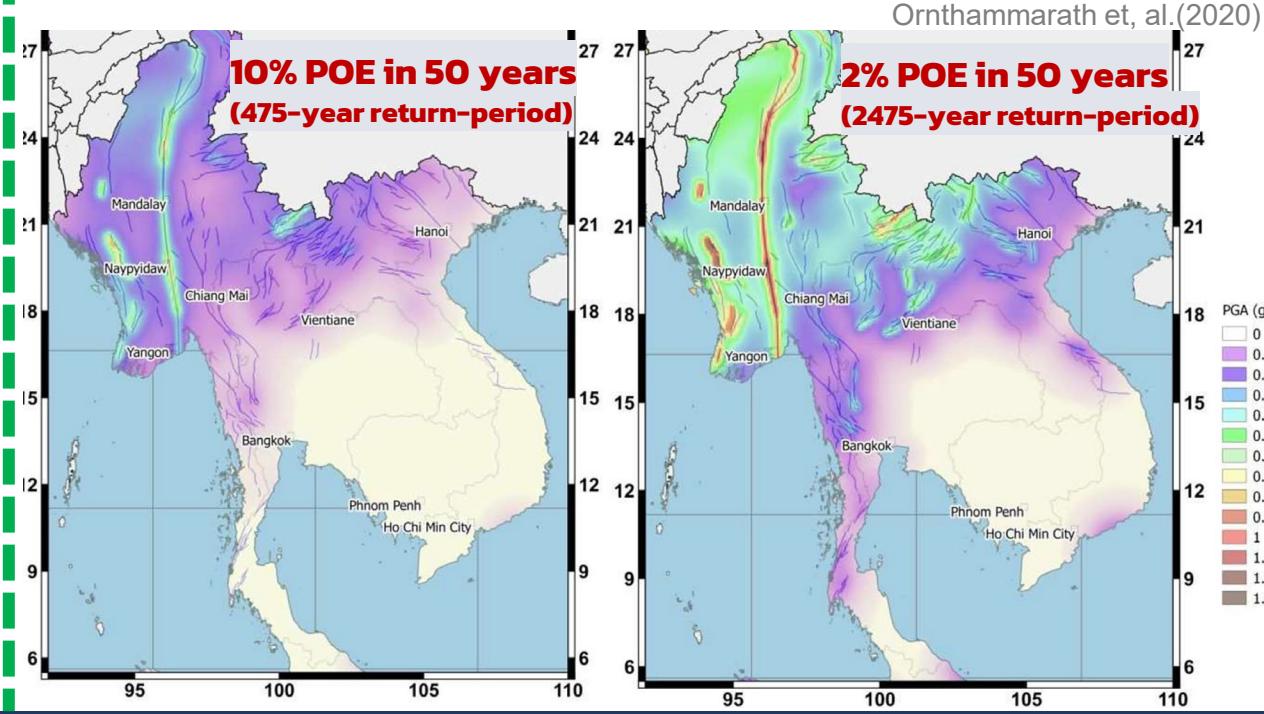
Magnitude of Earthquake



Earthquake forecast?

(To say that earthquake would happen probably)

- Provide the likelihood of earthquakes occurring within a certain timeframe and location.





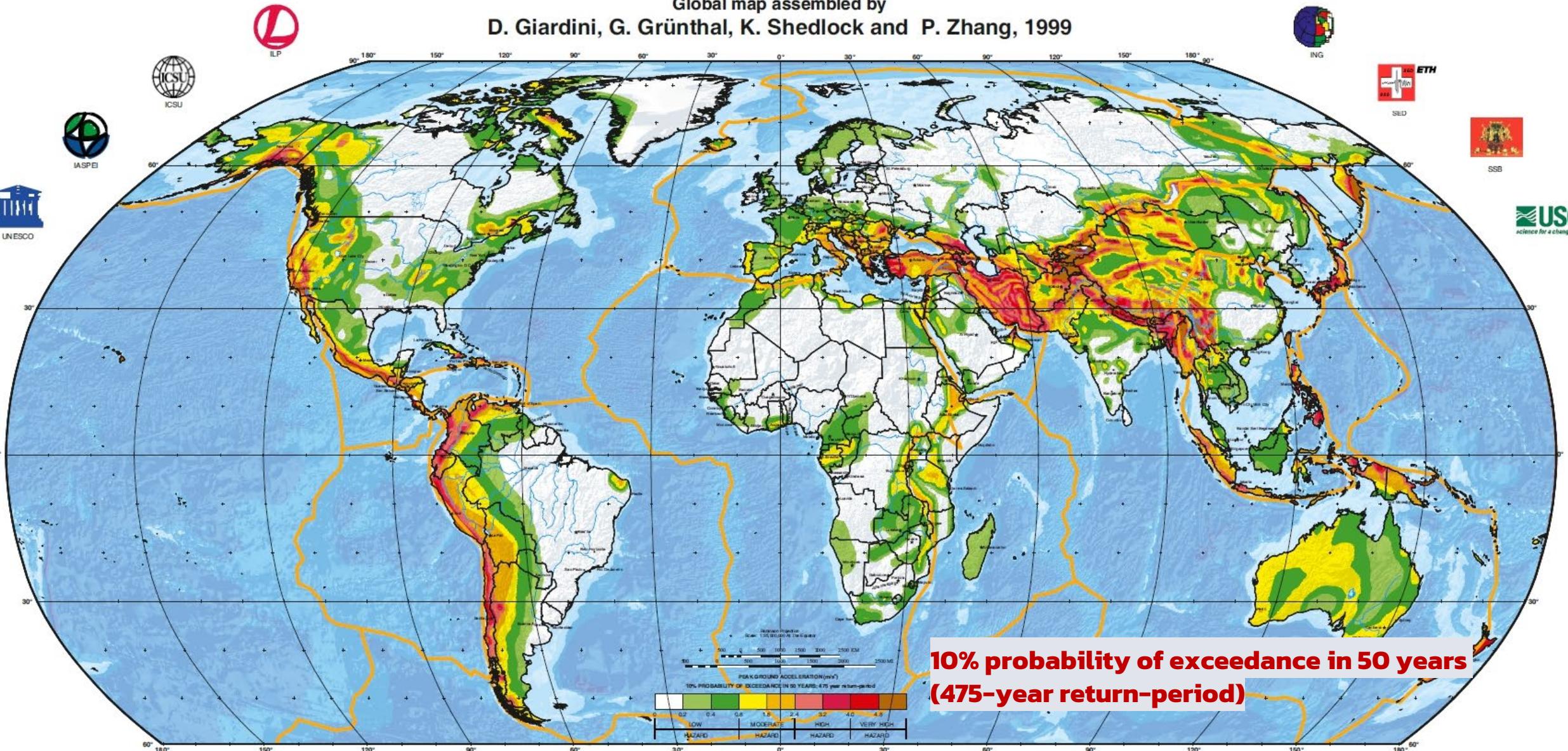
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Produced by the Global Seismic Hazard Assessment Program (GSHAP),
a demonstration project of the UN/International Decade of Natural Disaster Reduction

Global map assembled by

D. Giardini, G. Grünthal, K. Shedlock and P. Zhang, 1999



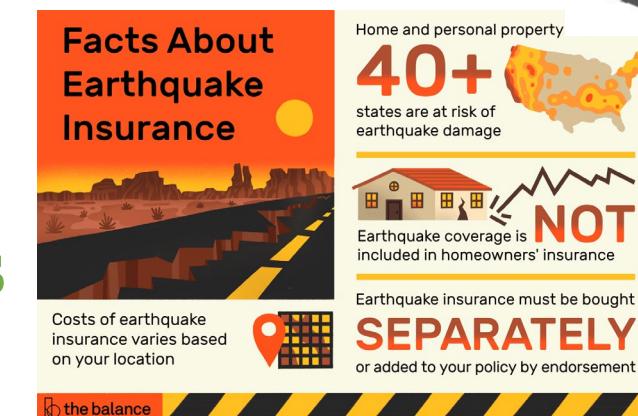
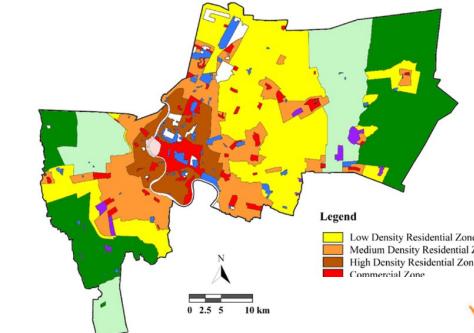


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Seismic Hazard Maps can be used for:

- **Land-use planning**
- **Prevention & Mitigation (Building codes)**
- **Emergency response**
- **Insurance rate structures**





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Input for Seismic hazard assessment



1. Past faults and earthquakes:

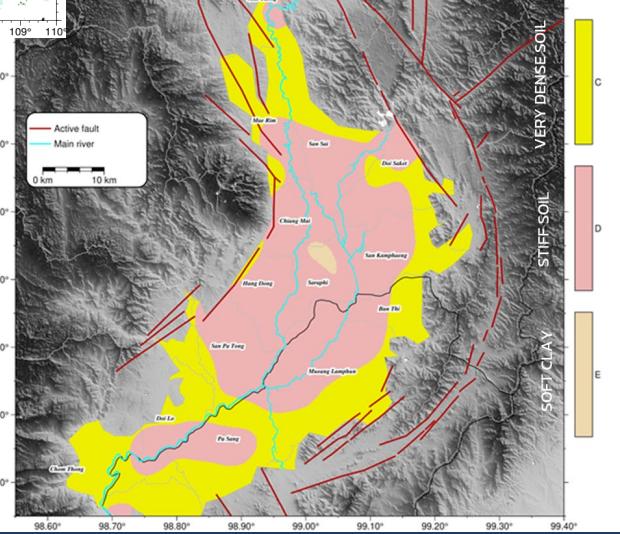
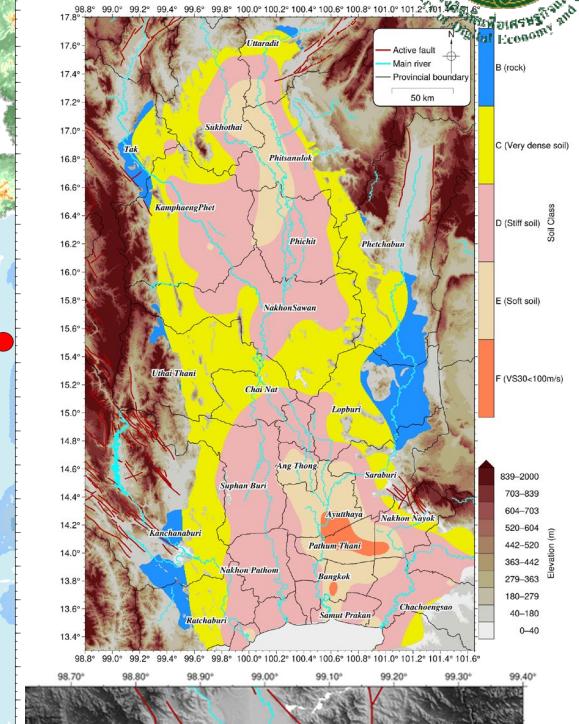
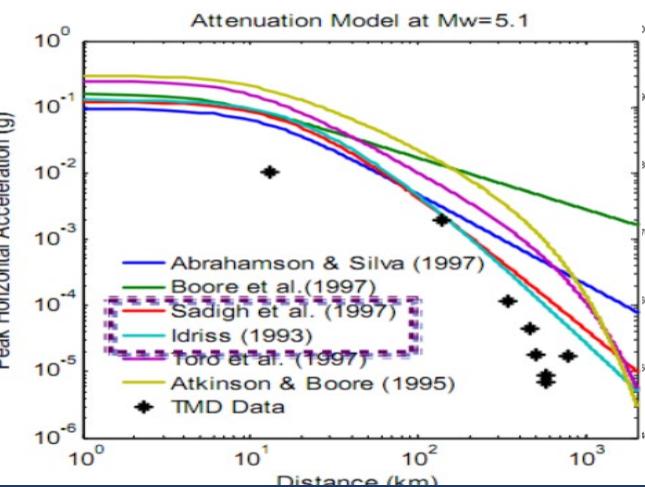
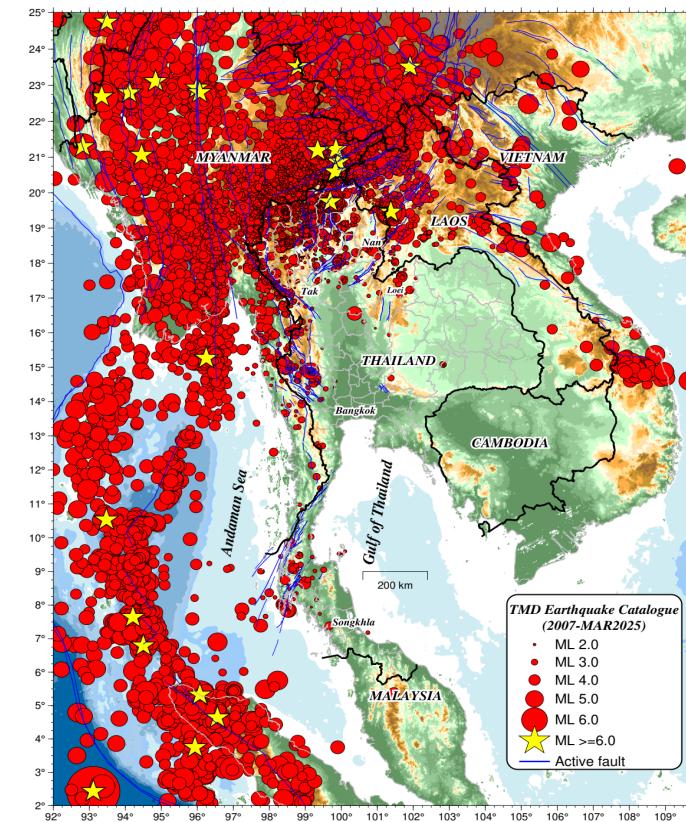
Analyzing historical earthquake data and fault lines helps identify areas with higher seismic activity.

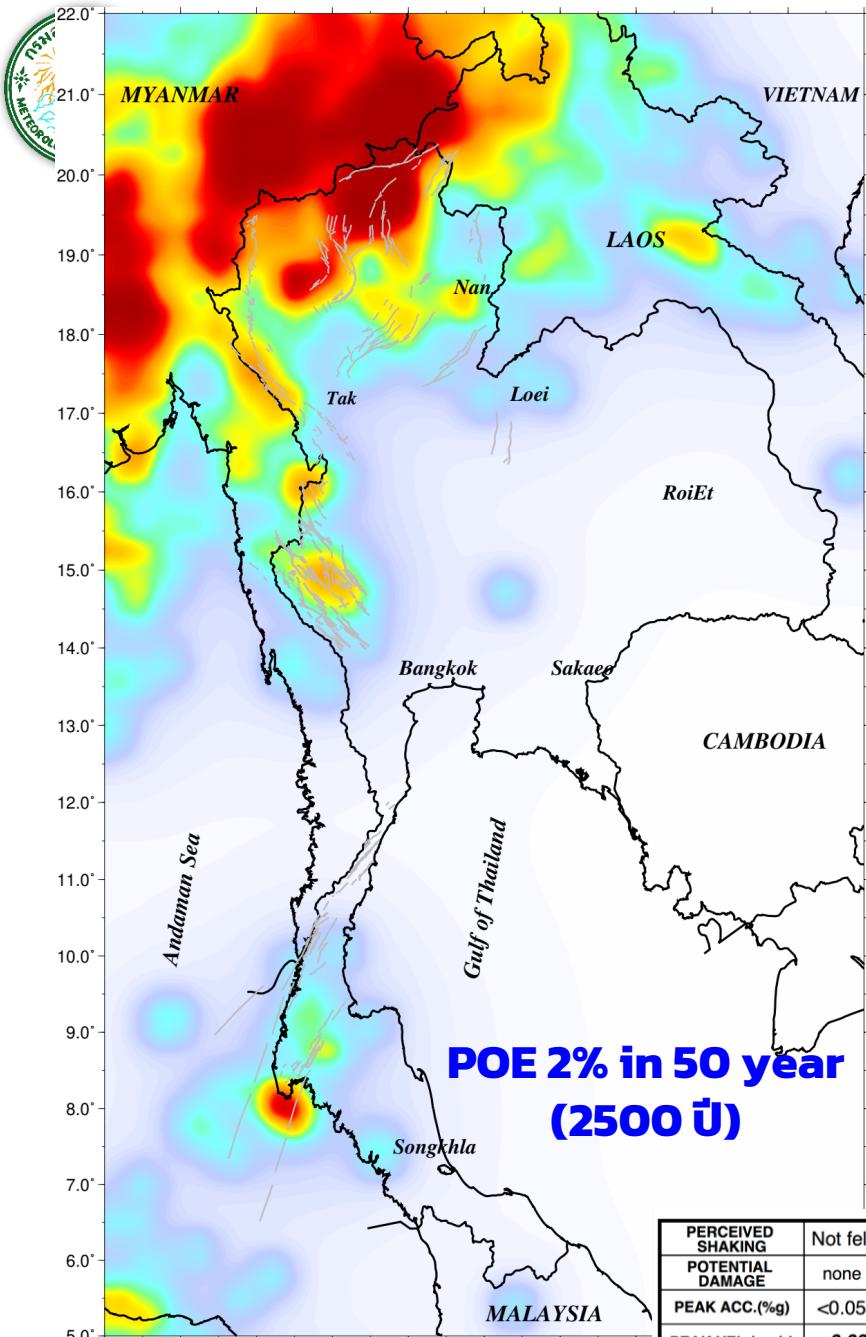
2. Seismic wave behavior:

Understanding how seismic waves travel through different types of ground helps assess the potential for ground shaking.

3. Site conditions:

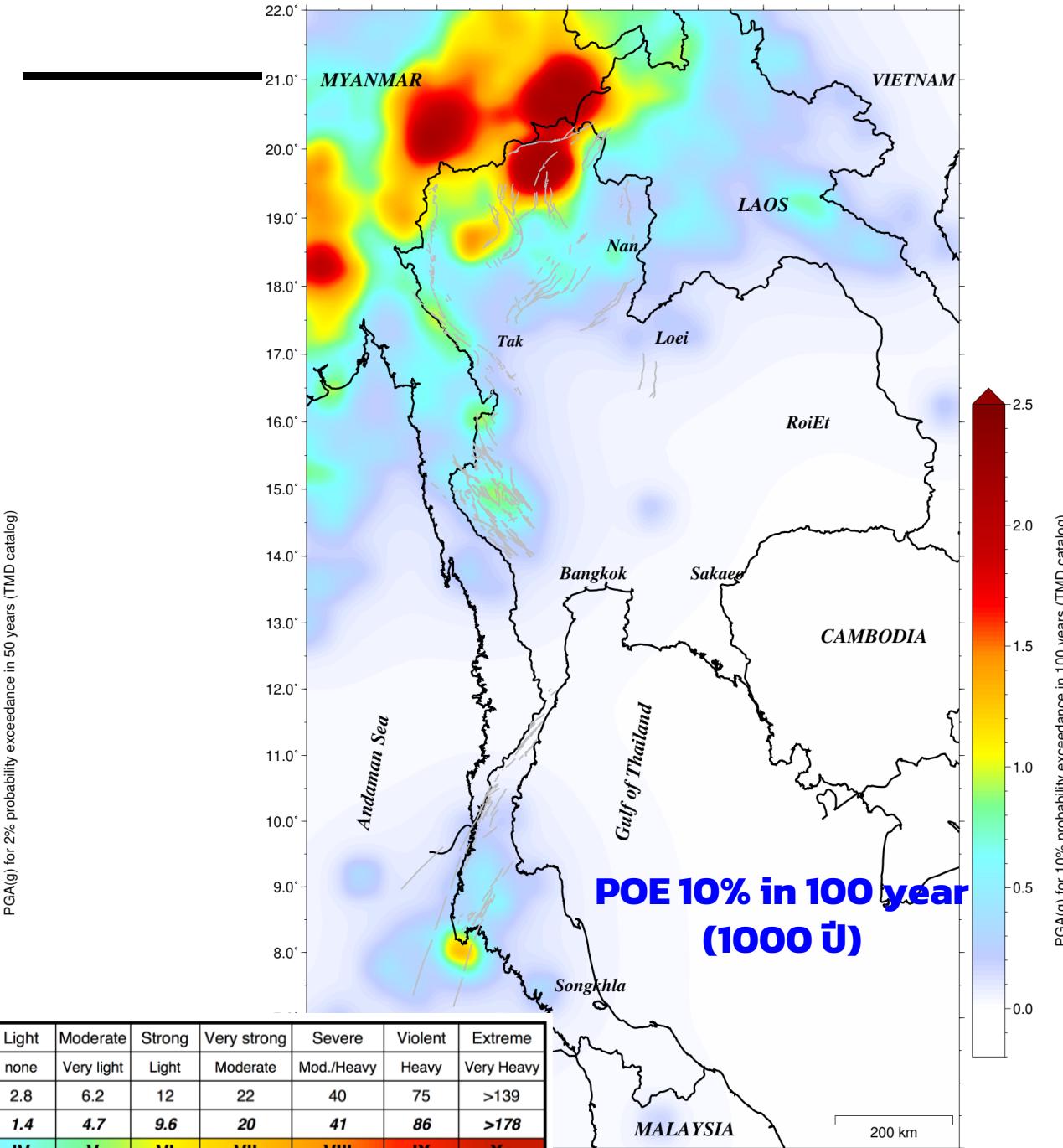
The geology and soil conditions at a specific location can influence the intensity of ground shaking during an earthquake.

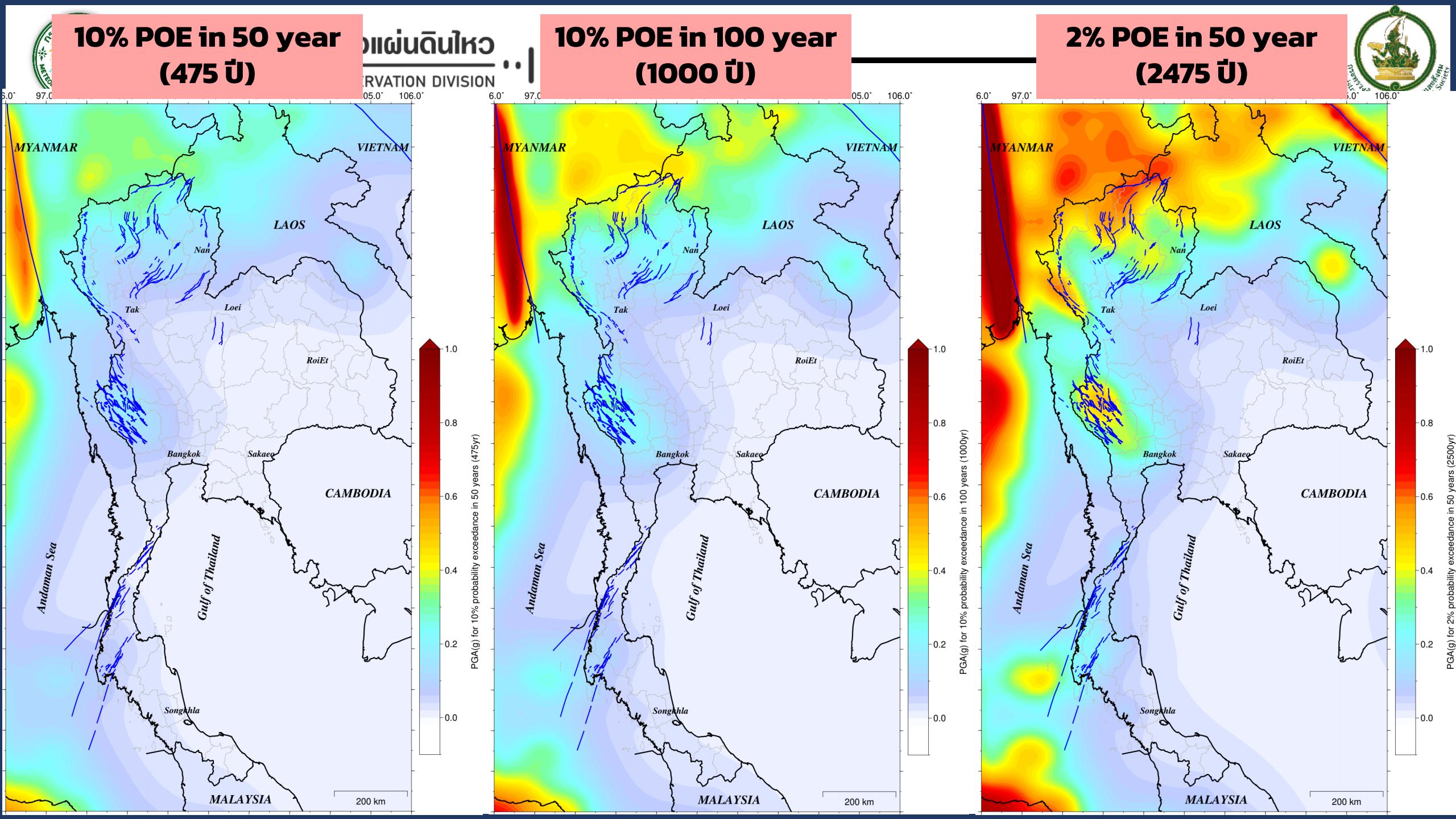


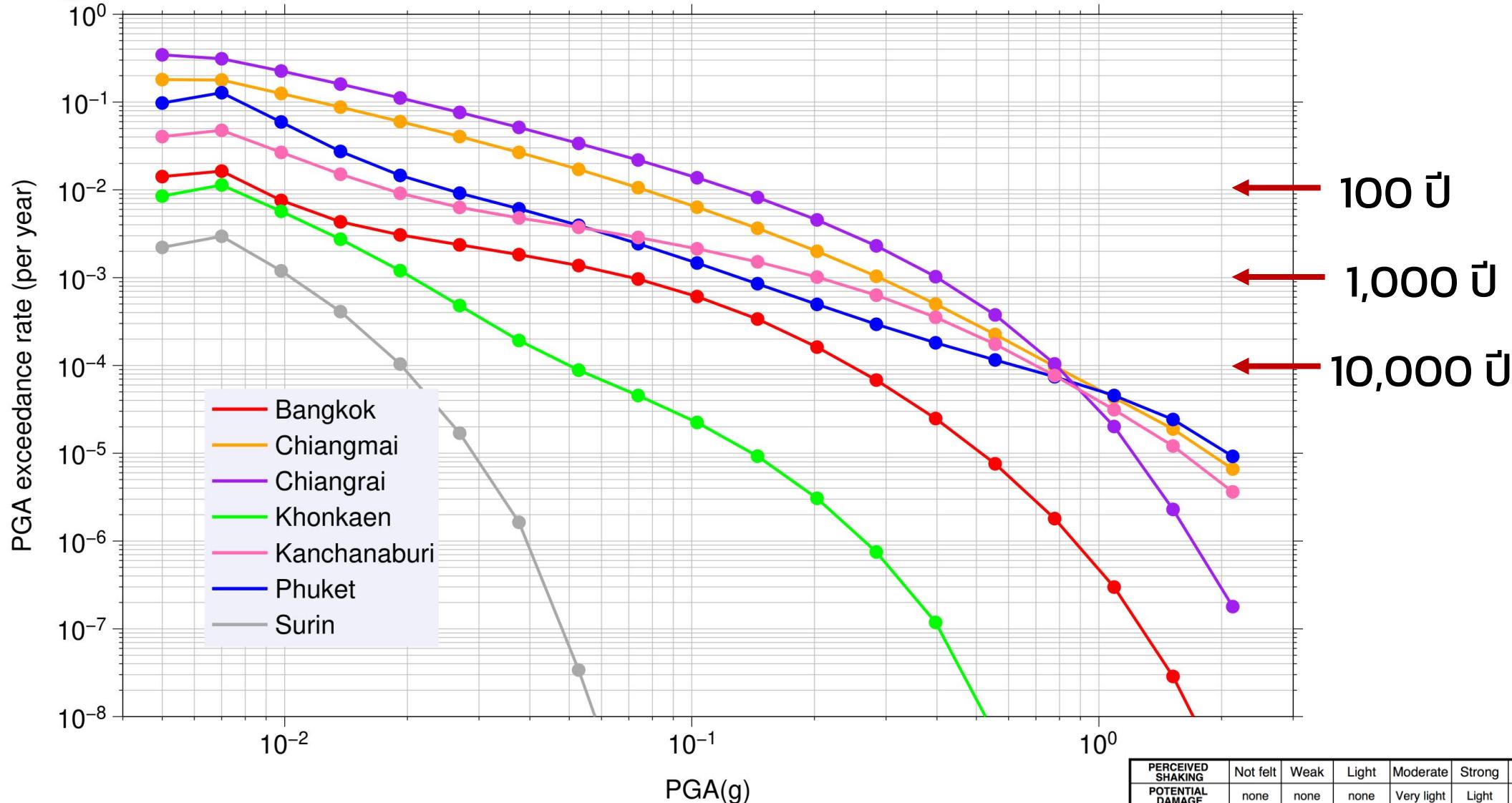


PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

PGA(g) for 2% probability exceedance in 50 years (TMD catalog)







PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
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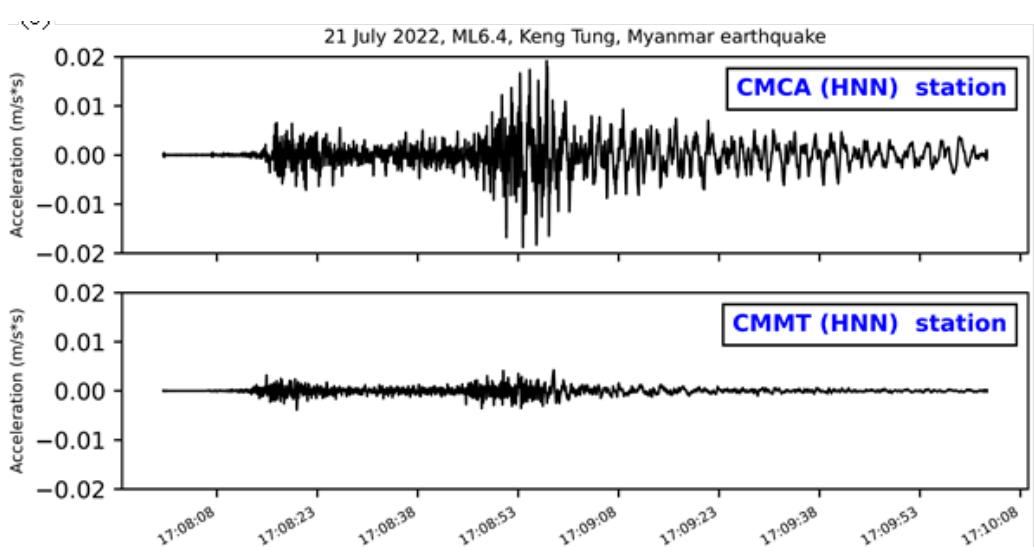
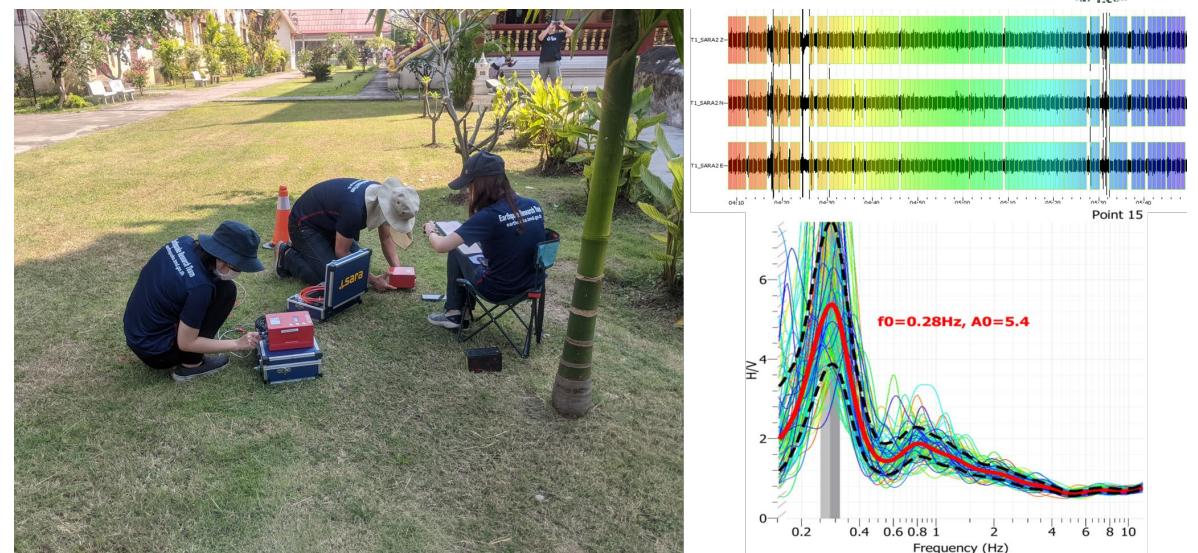
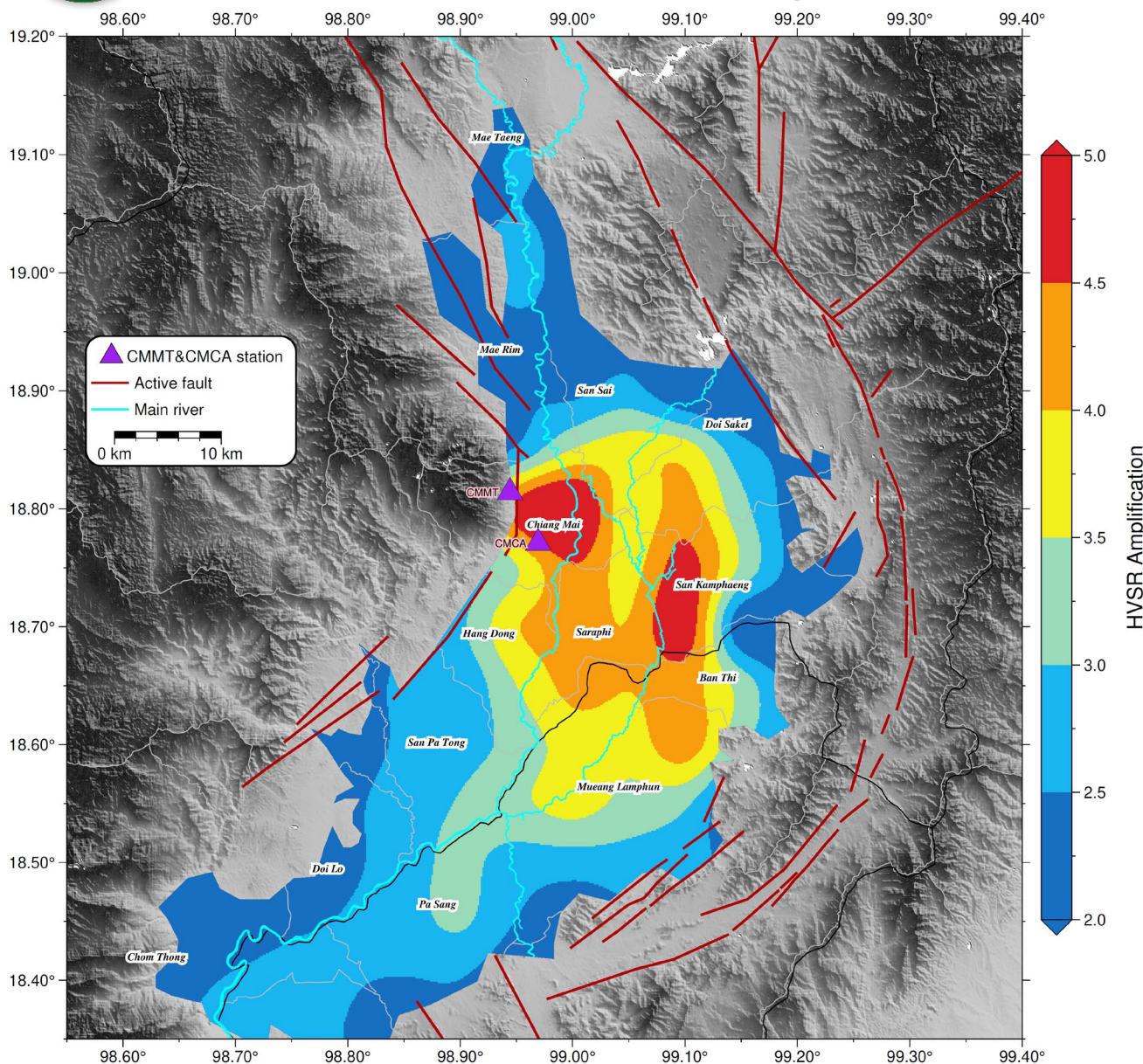


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Site conditions: Chiang Mai Basin



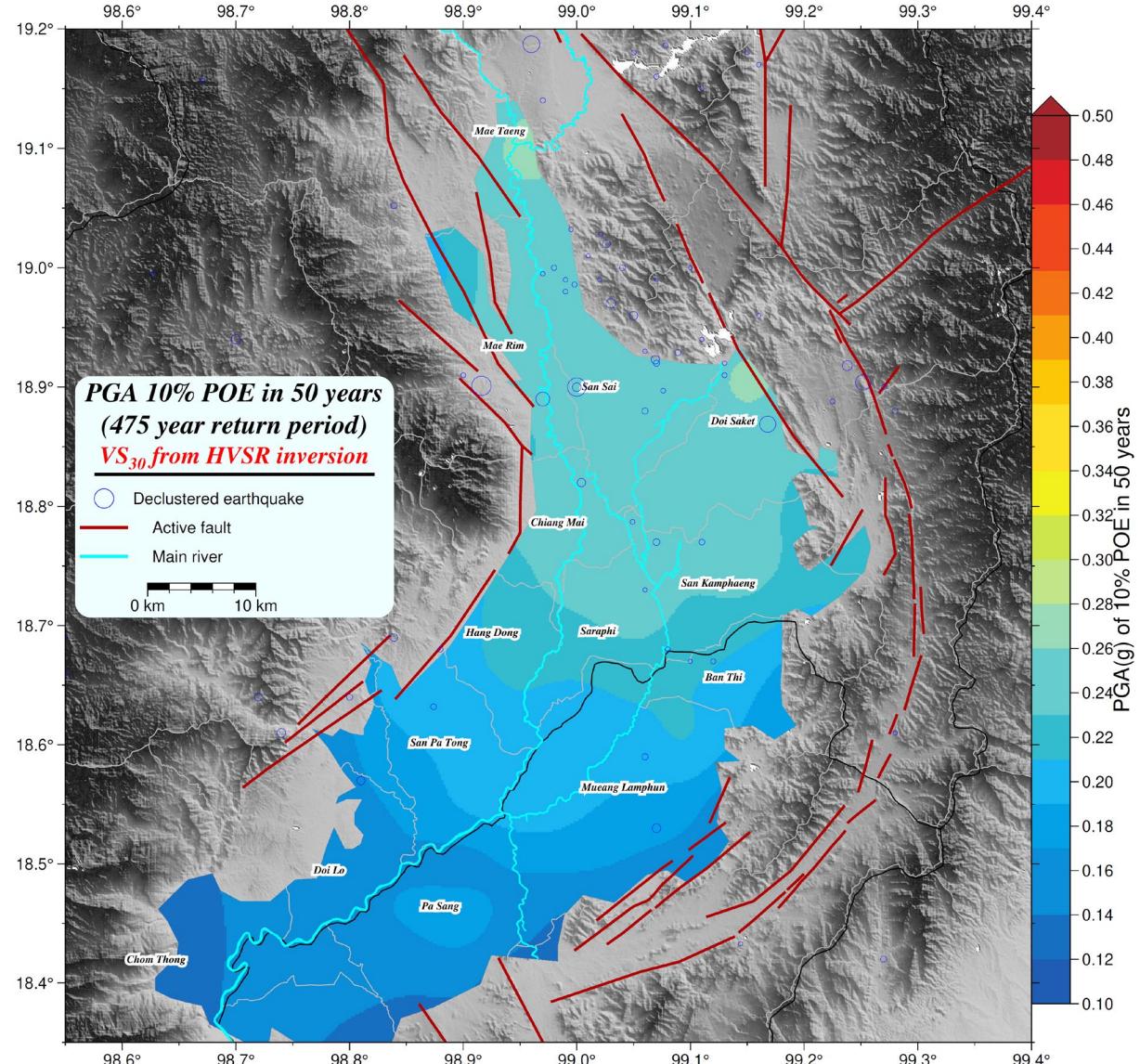
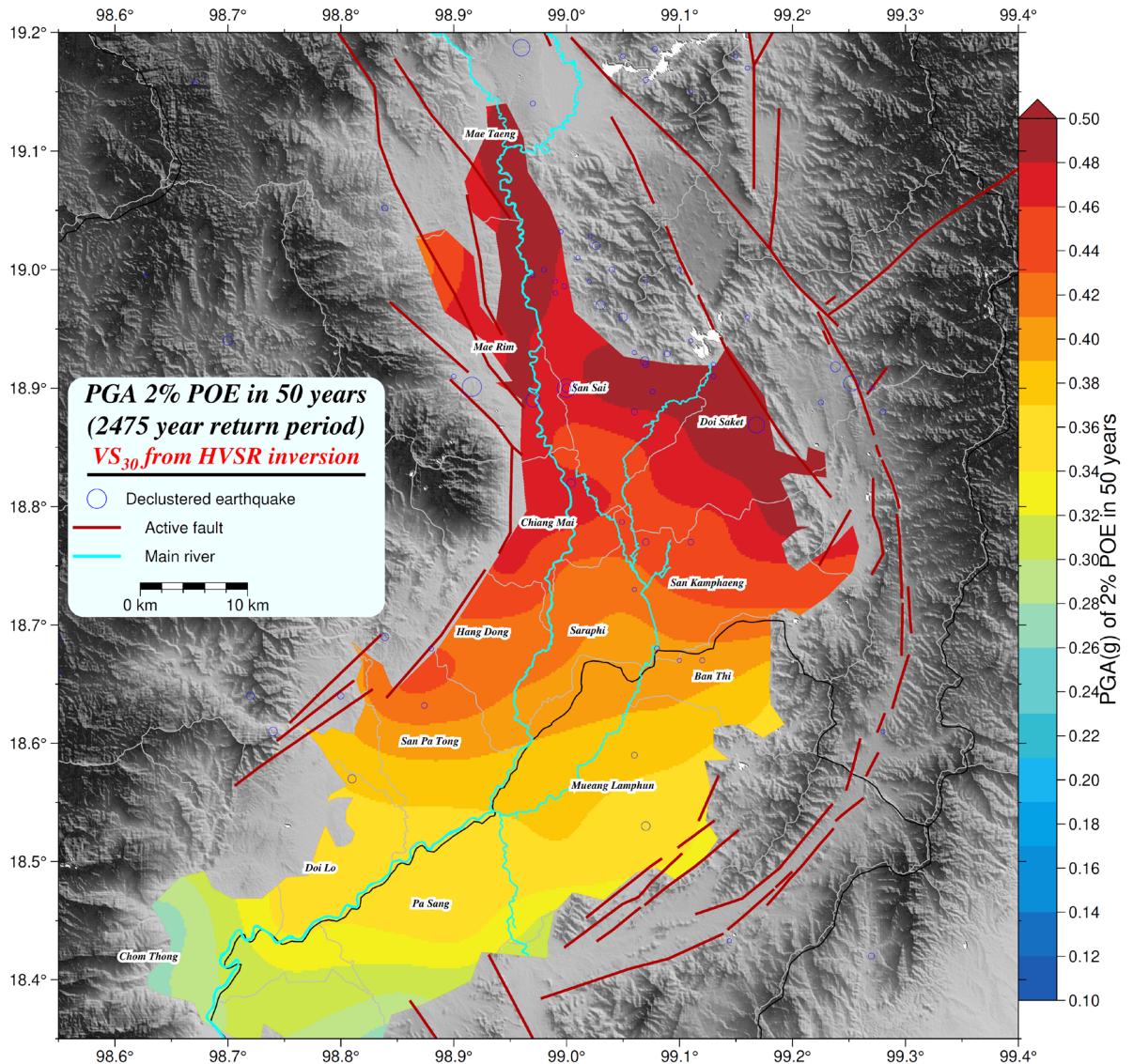


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Seismic Hazard Microzonation: Chiang Mai Basin

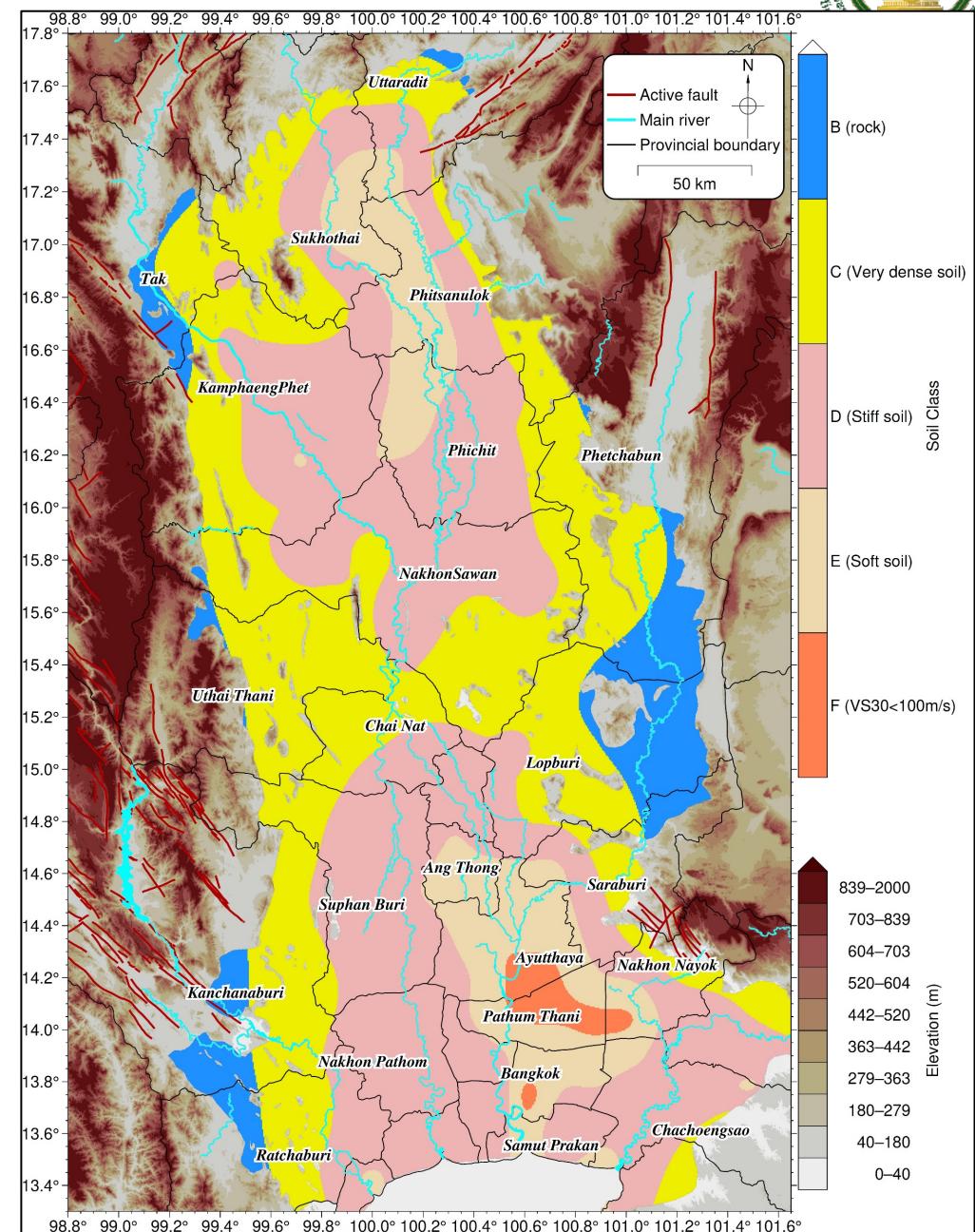
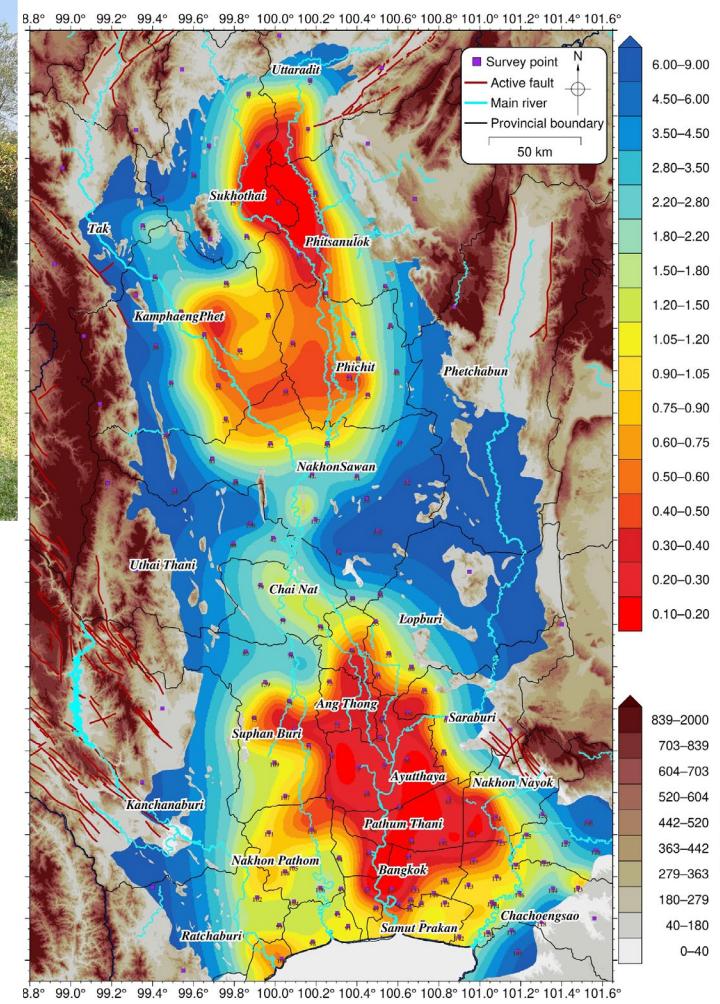
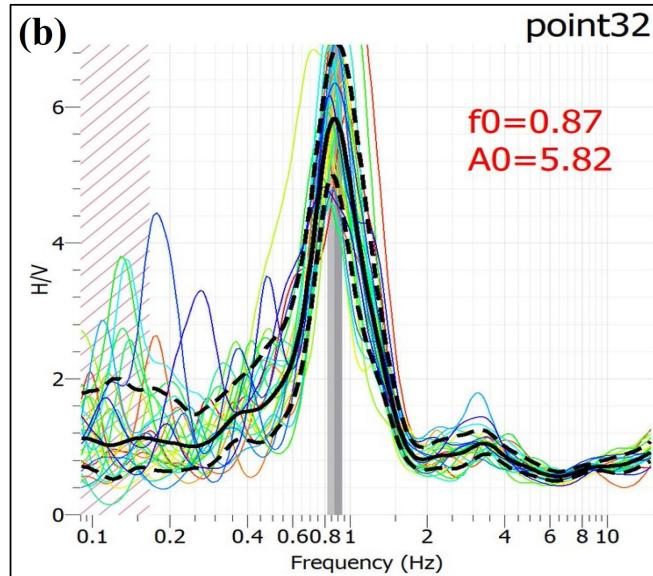




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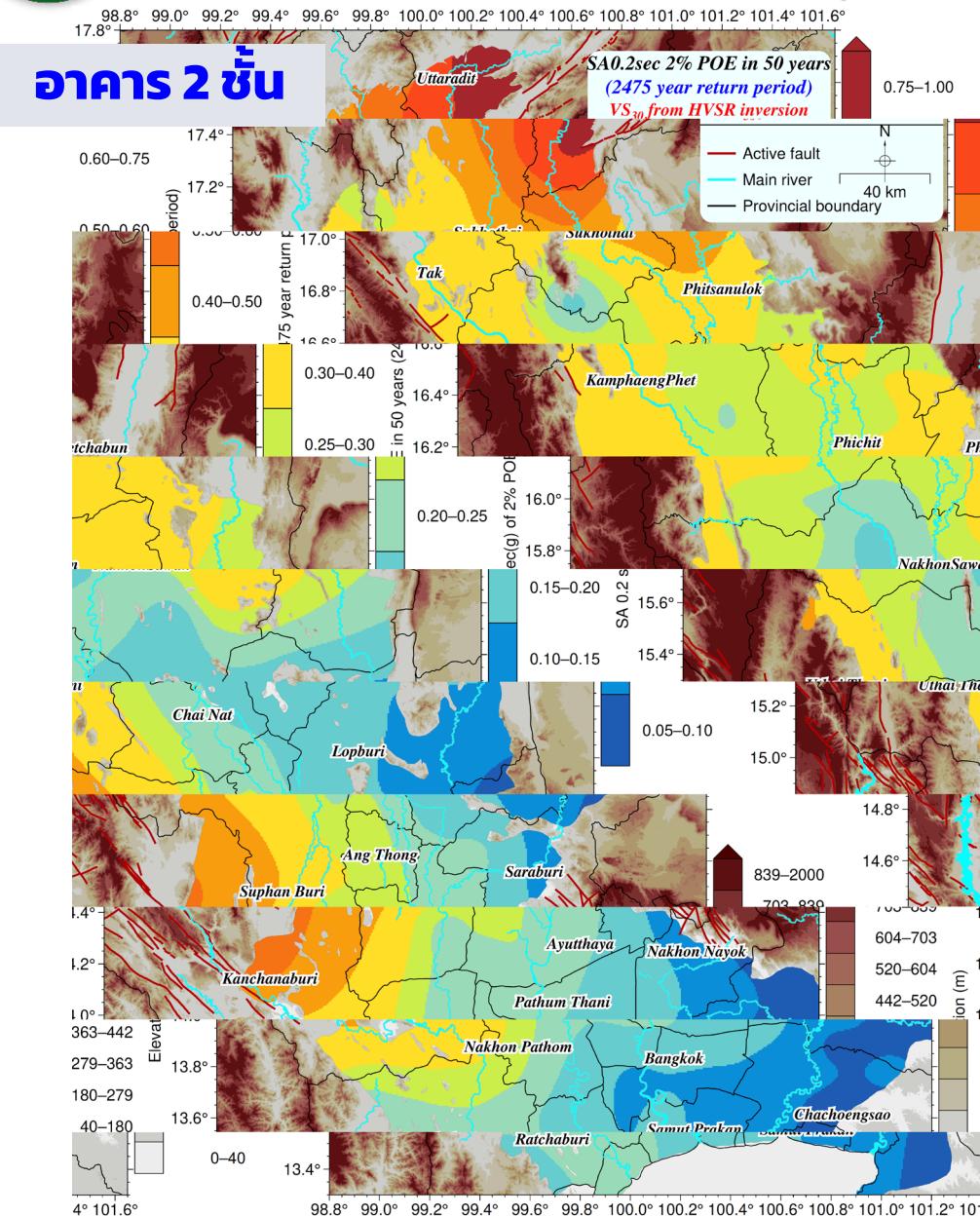
Site conditions: Central Plain



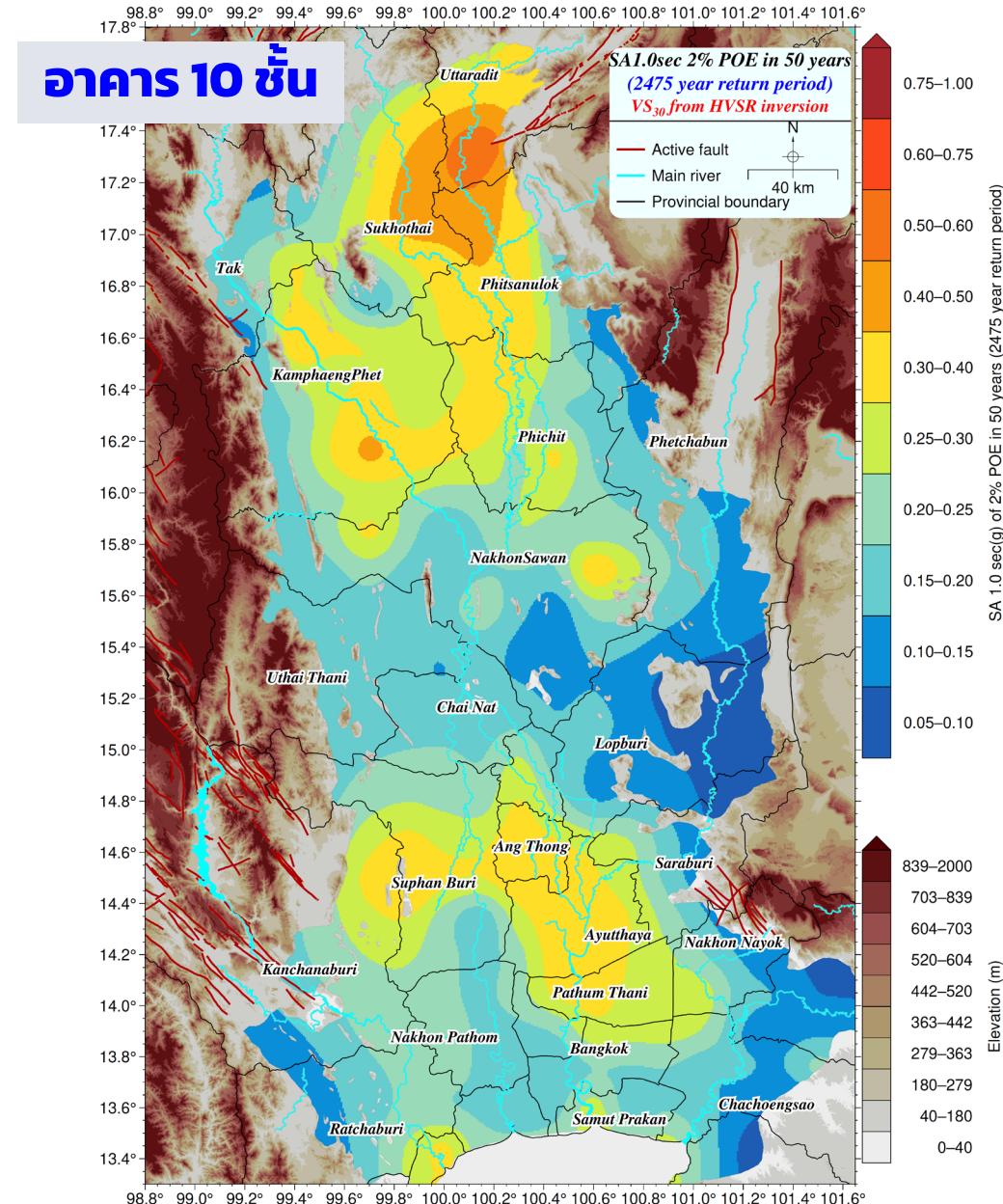


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Seismic Hazard Microzonation: Central Plain

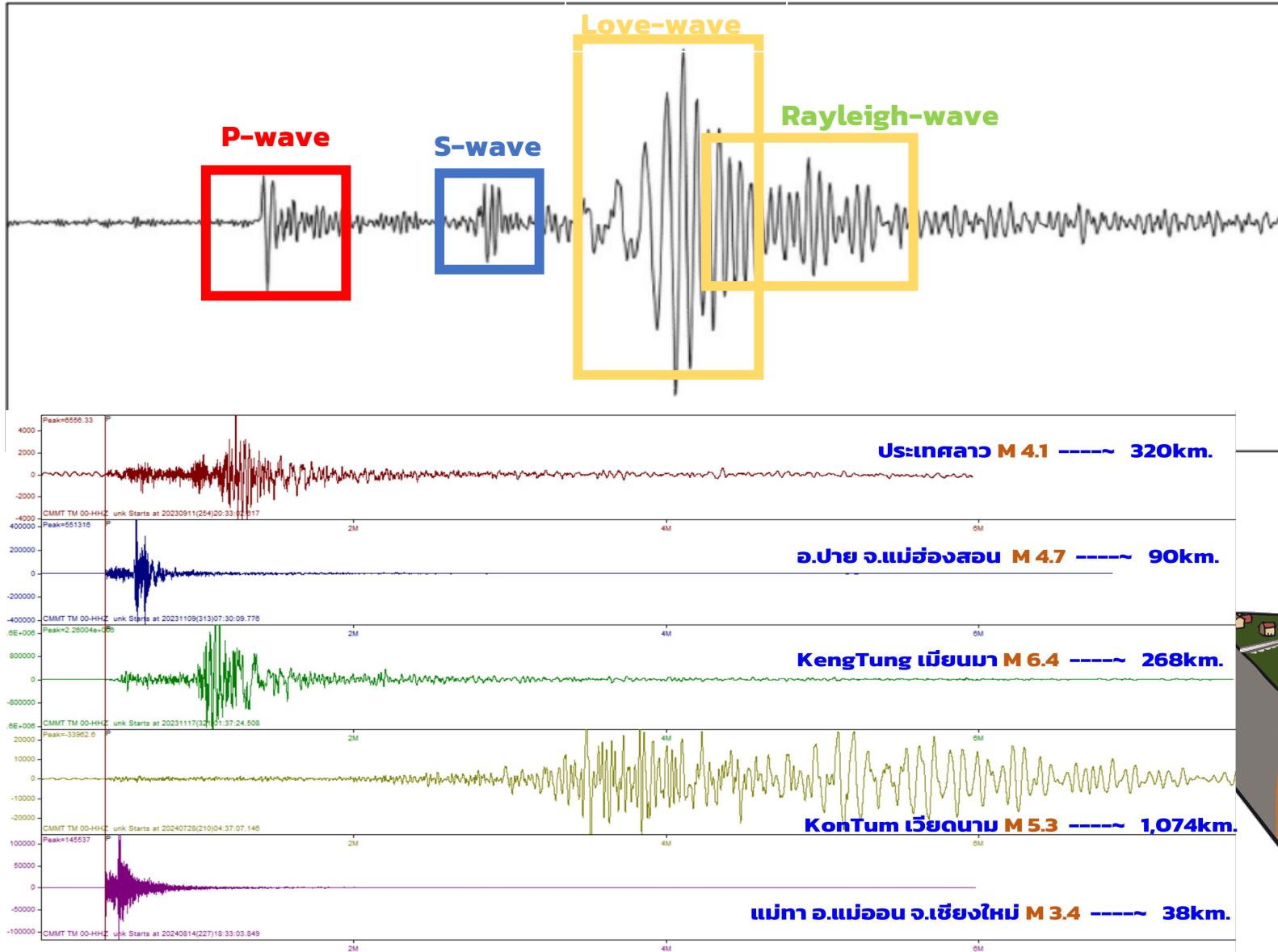




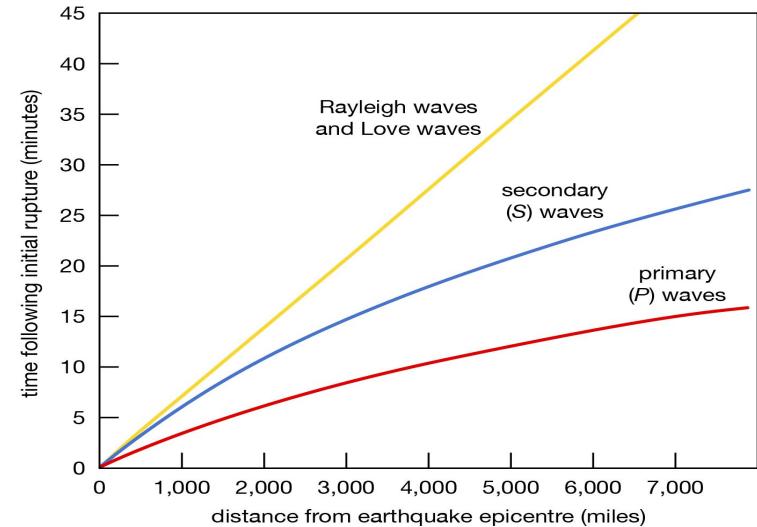
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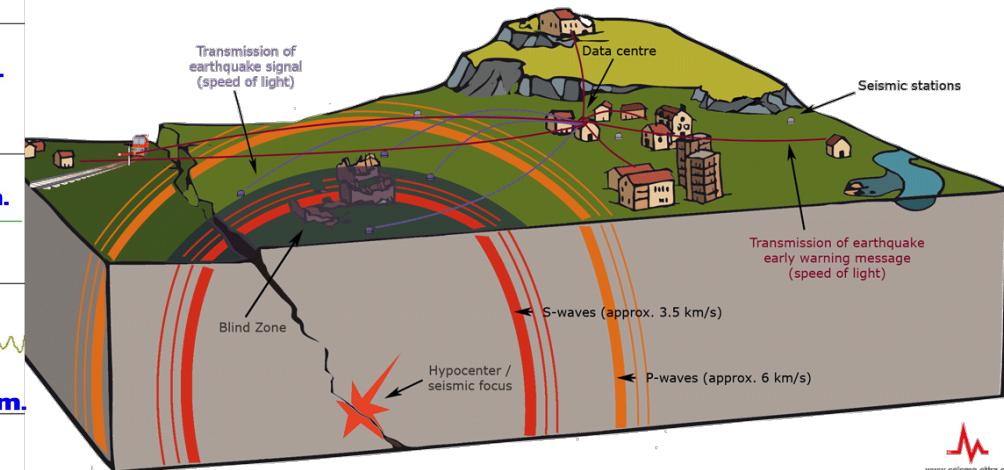
Earthquake Early Warning (EEW)



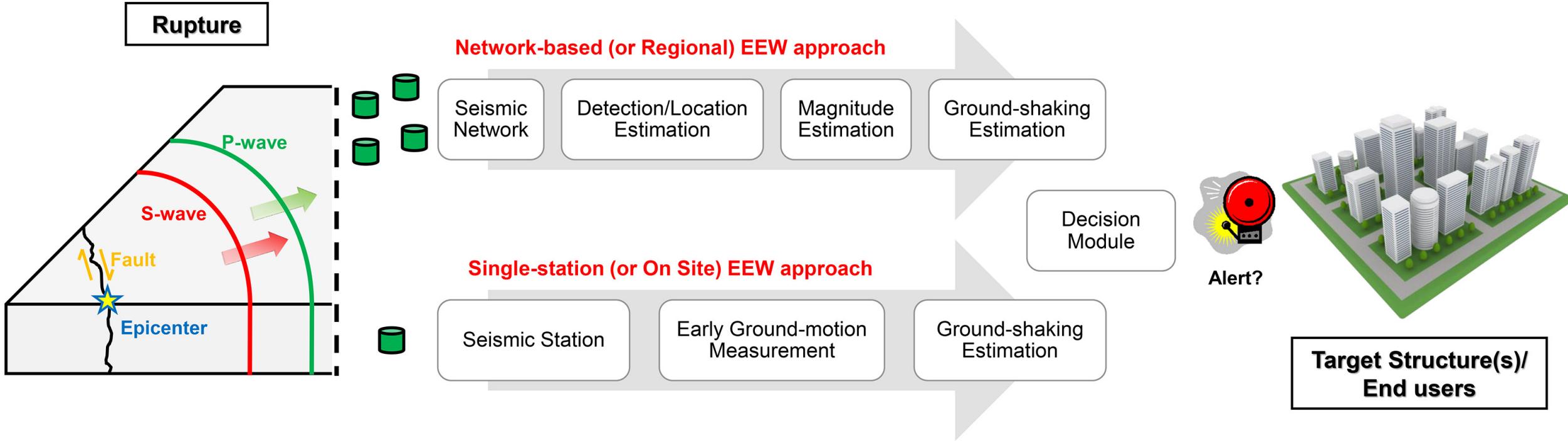
Generalized travel-time curve for seismic waves



Source: Incorporated Research Institutions for Seismology (IRIS), "Travel Time Curves" (2014).



www.seismo.ethz.ch



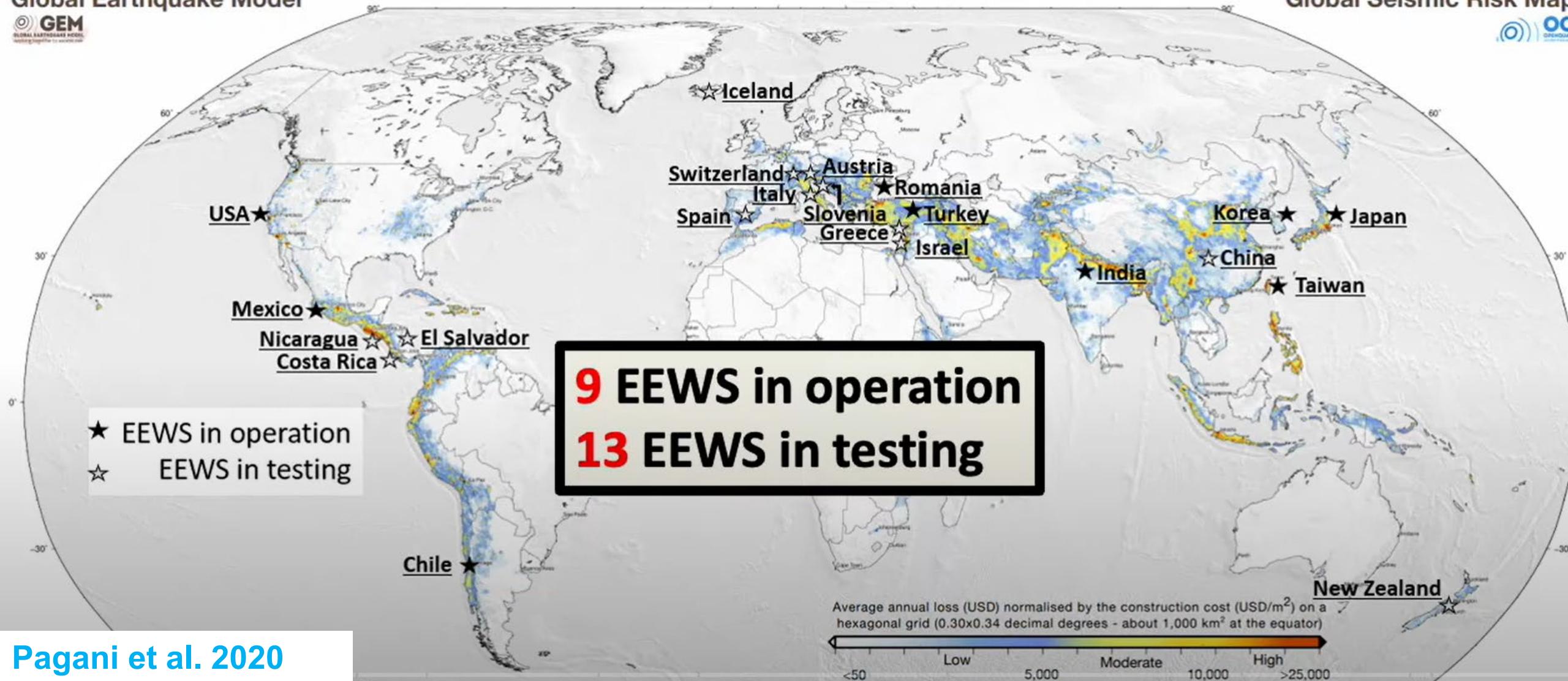
A set of **physical sensors** and **mathematical model / algorithms** designed to process and disseminate real-time information about ongoing earthquakes

EEW Systems (EEWS) around the World

Global Earthquake Model



Global Seismic Risk Map

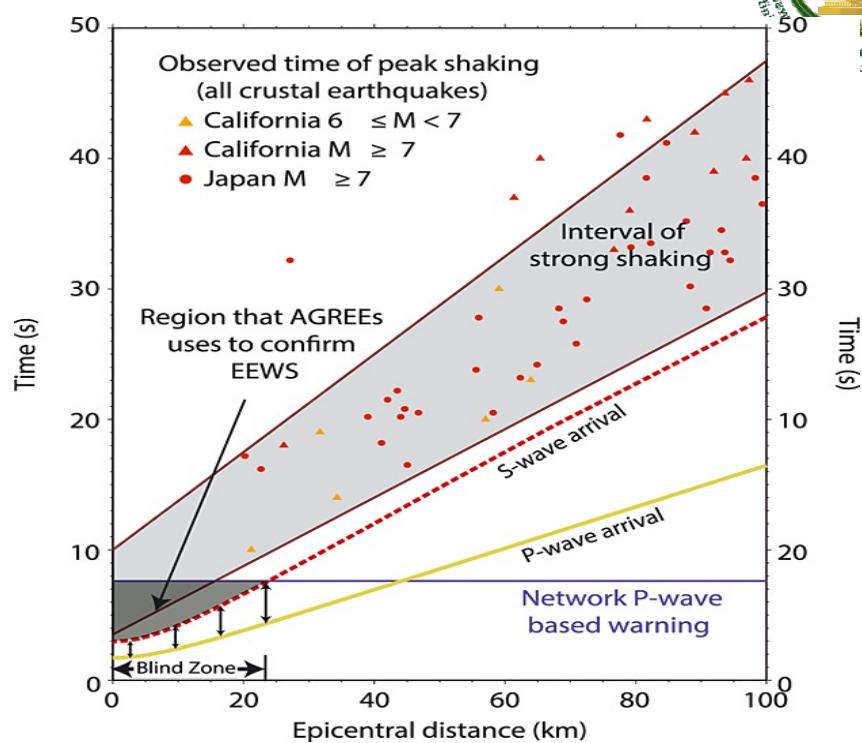
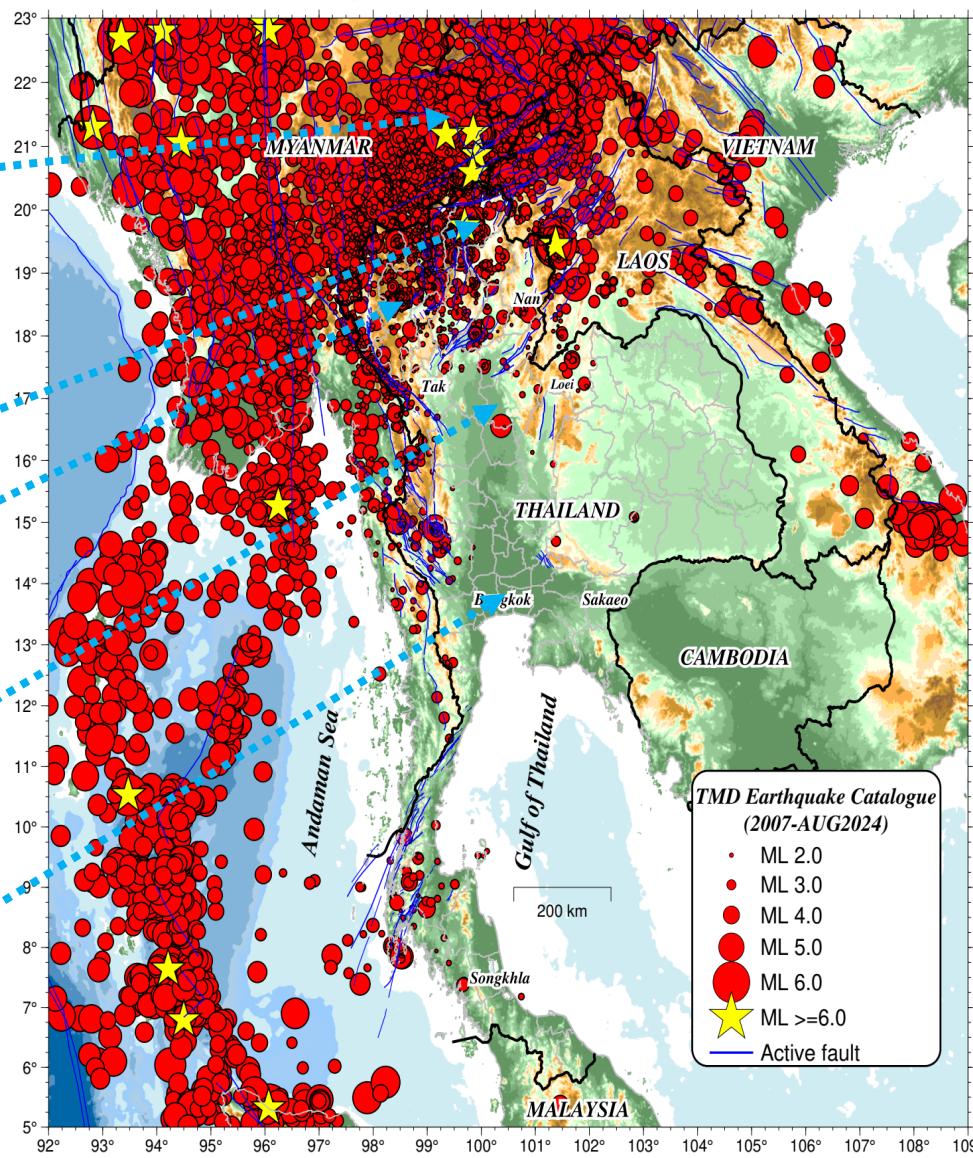
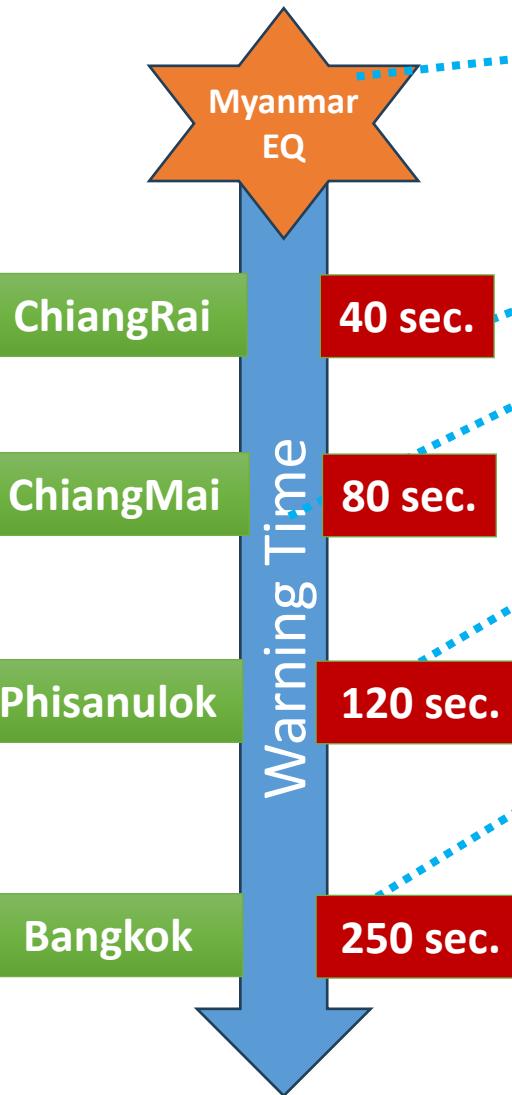




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Earthquake Early Warning



- Communication, Network streaming
- Density of seismic station?
- EEW software? Fast estimation!
- small packet sizes
- Small sample rates
- Direct to EEW server

Times



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End of presentation