ACTIVE FAULT INVESTIGATION

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THAILAND

ACTIVE FAULT IN THAILAND

A fault that is likely to have another earthquake sometime in the future. Faults are commonly considered to be active if they have moved one or more times in the last 10,000 years.

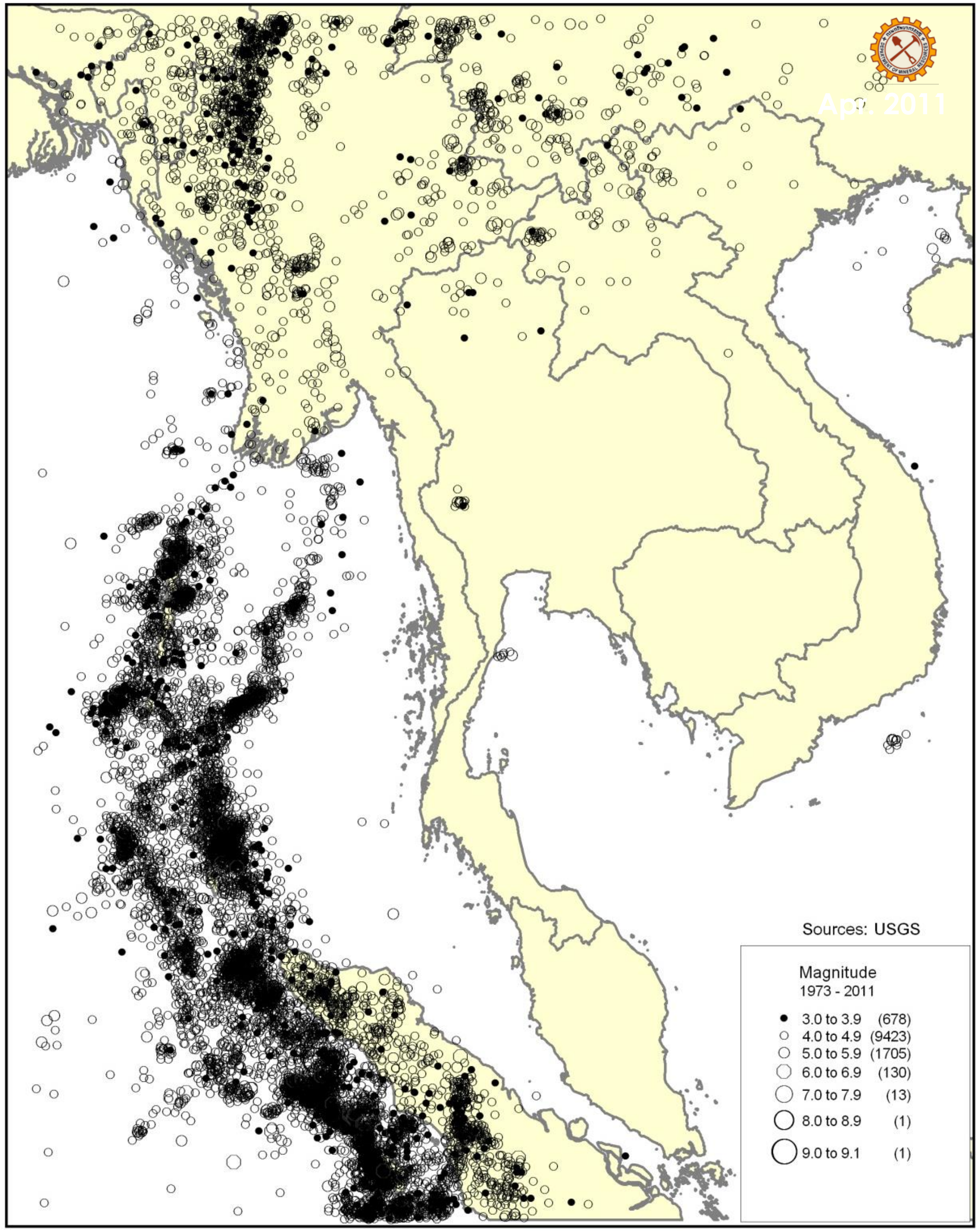
(USGS)

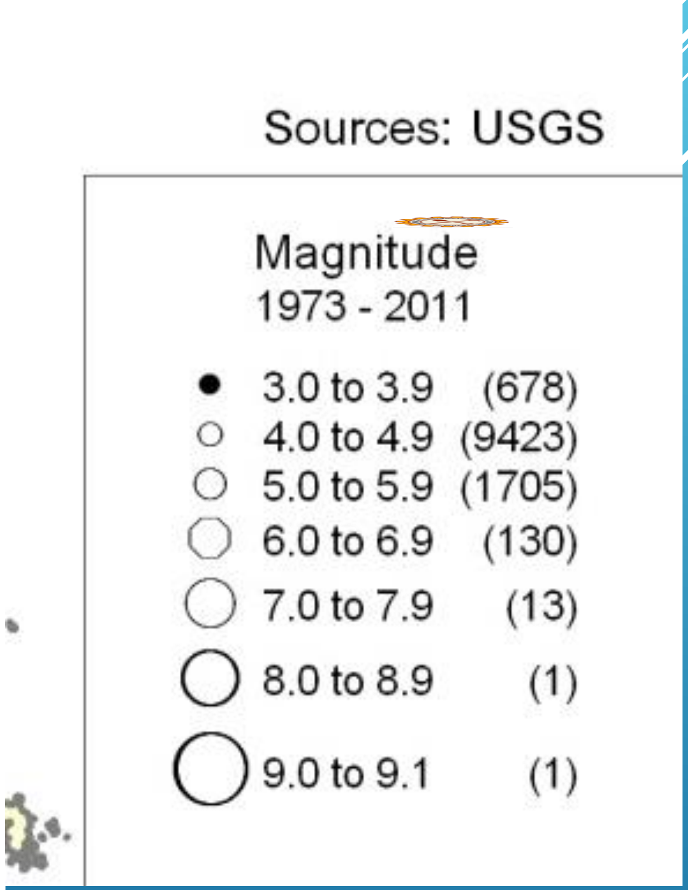
(http://earthquake.usgs.gov/learn/glossary/?term=active%20fault)

The Emerson fault, one of the segments that ruptured in the M7.2 1992 Landers, Calfornia earthquake. (Photo by Kerry Sieh, Caltech)

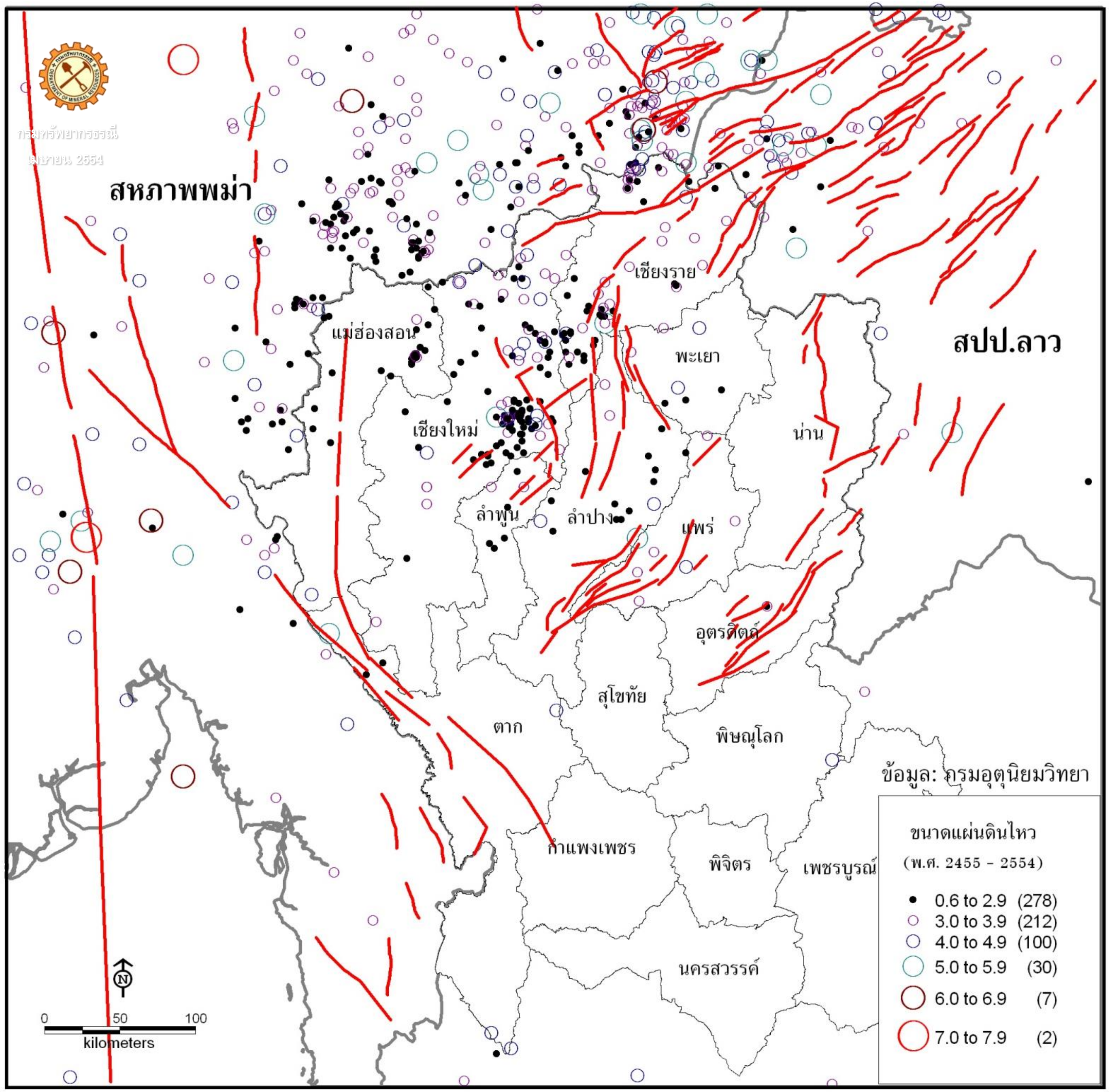
Earthquake in Thailand and others

Apr. 2011





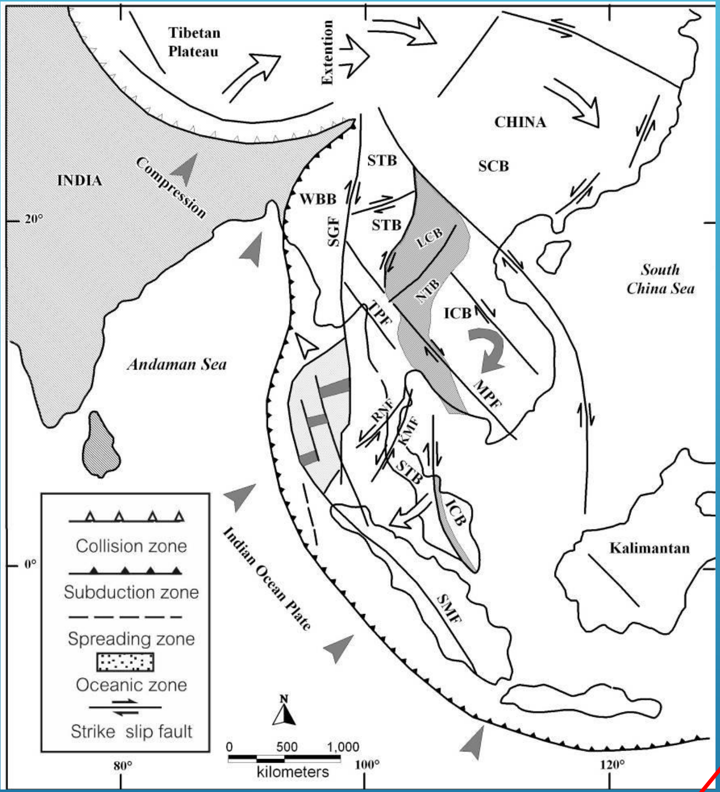
รอยเลื่อนมีพลังและแผ่นดินไหวในภาคเหนือของประเทศไทยและใกล้เคียง



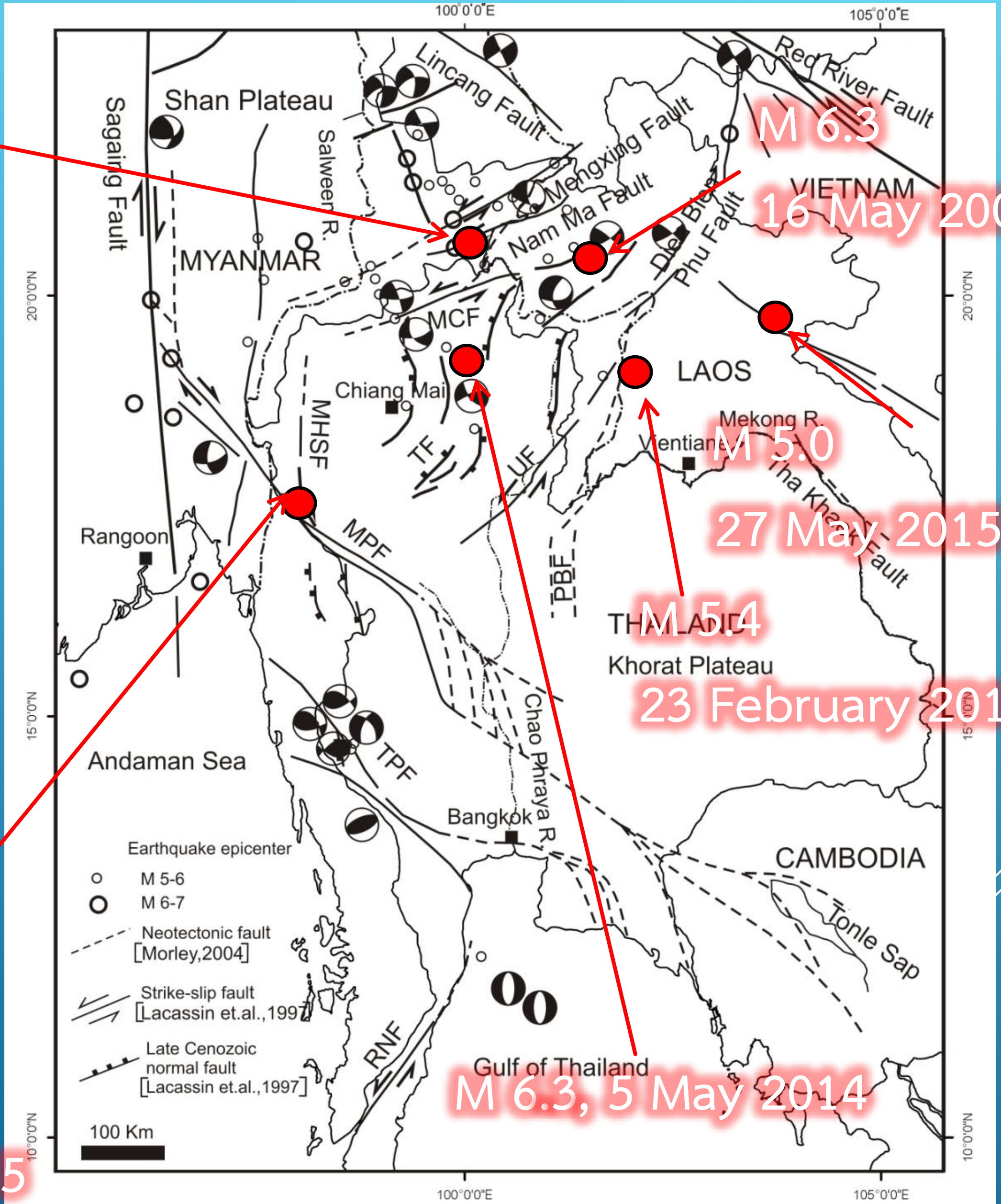
Regional tectonic, Active faults and Seismicity in Indochina

M 6.8

24 March 2011



(modified from Polachan et al., 1991)



Compiled from Lacassin et al.,(1998); Morley (2007)

M 6.3

16 May 2007

M 5.0

27 May 2015

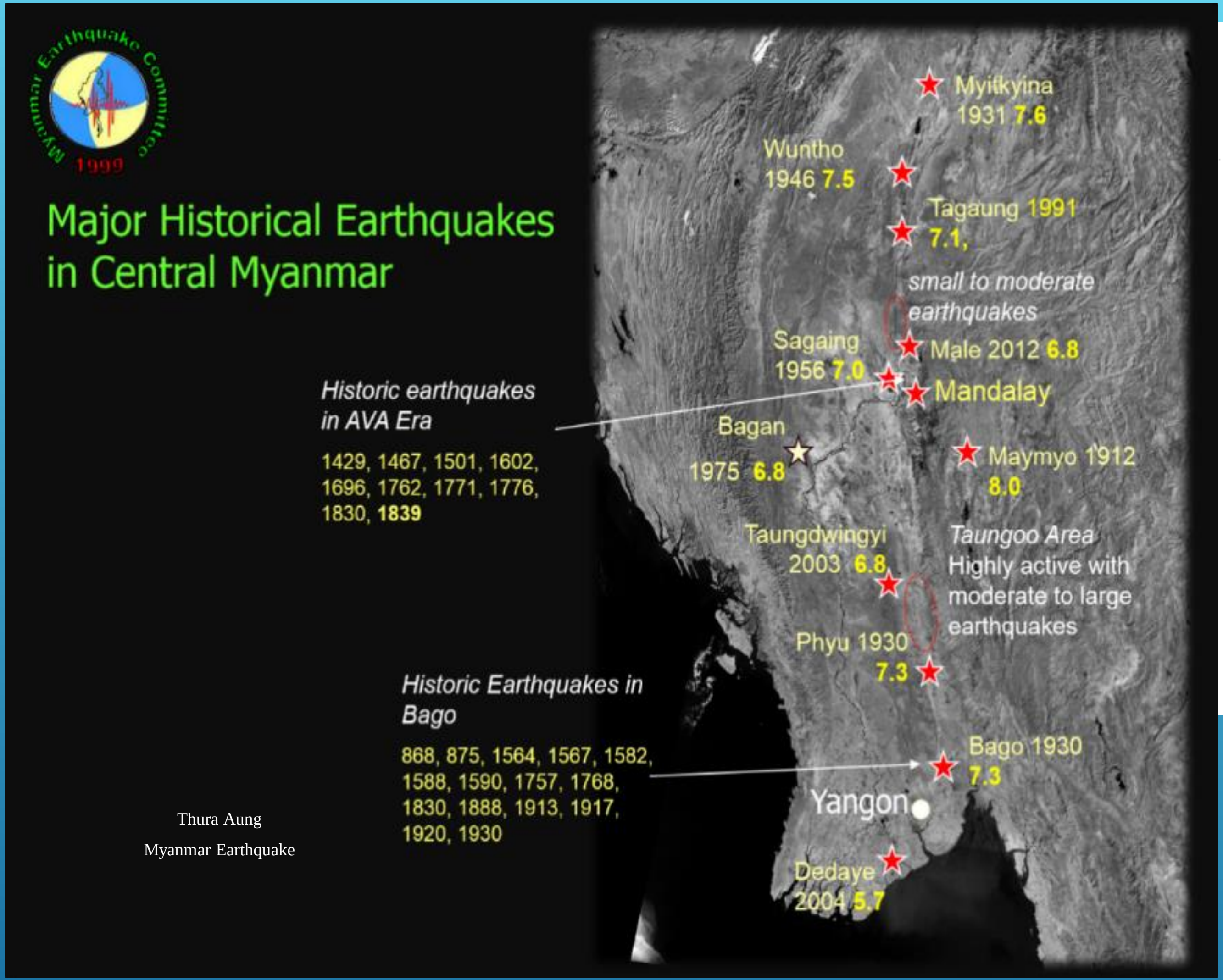
M 5.4

23 February 2011

M 6.3, 5 May 2014

M 5.6

17 February 1975



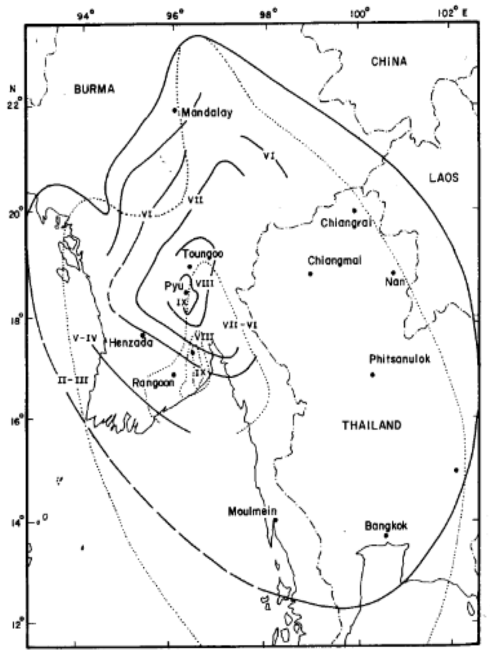


Fig. 6 Isoseismal Map of the Pegu Earthquake of 5 May 1930 (Dotted Lines) and the Pyu Earthquake of 3 and 4 December 1930 (Solid Lines) (after Brown & Leicester, 1933)

Ref. Prinya Nutalaya, Sopit Sodsri and E.P. Arnold (1985)

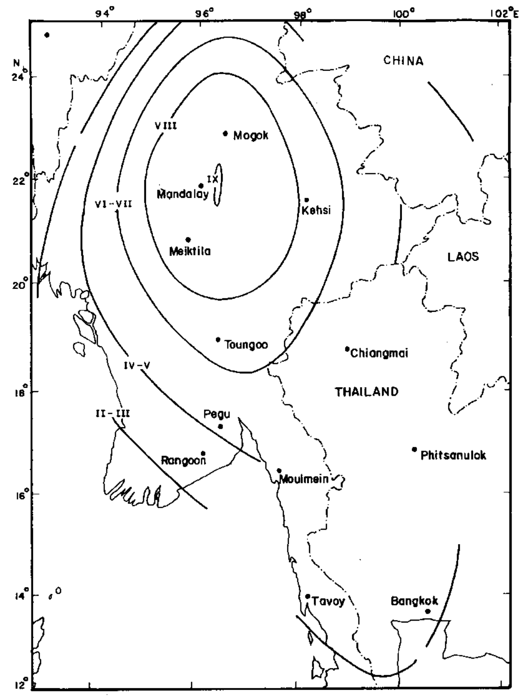
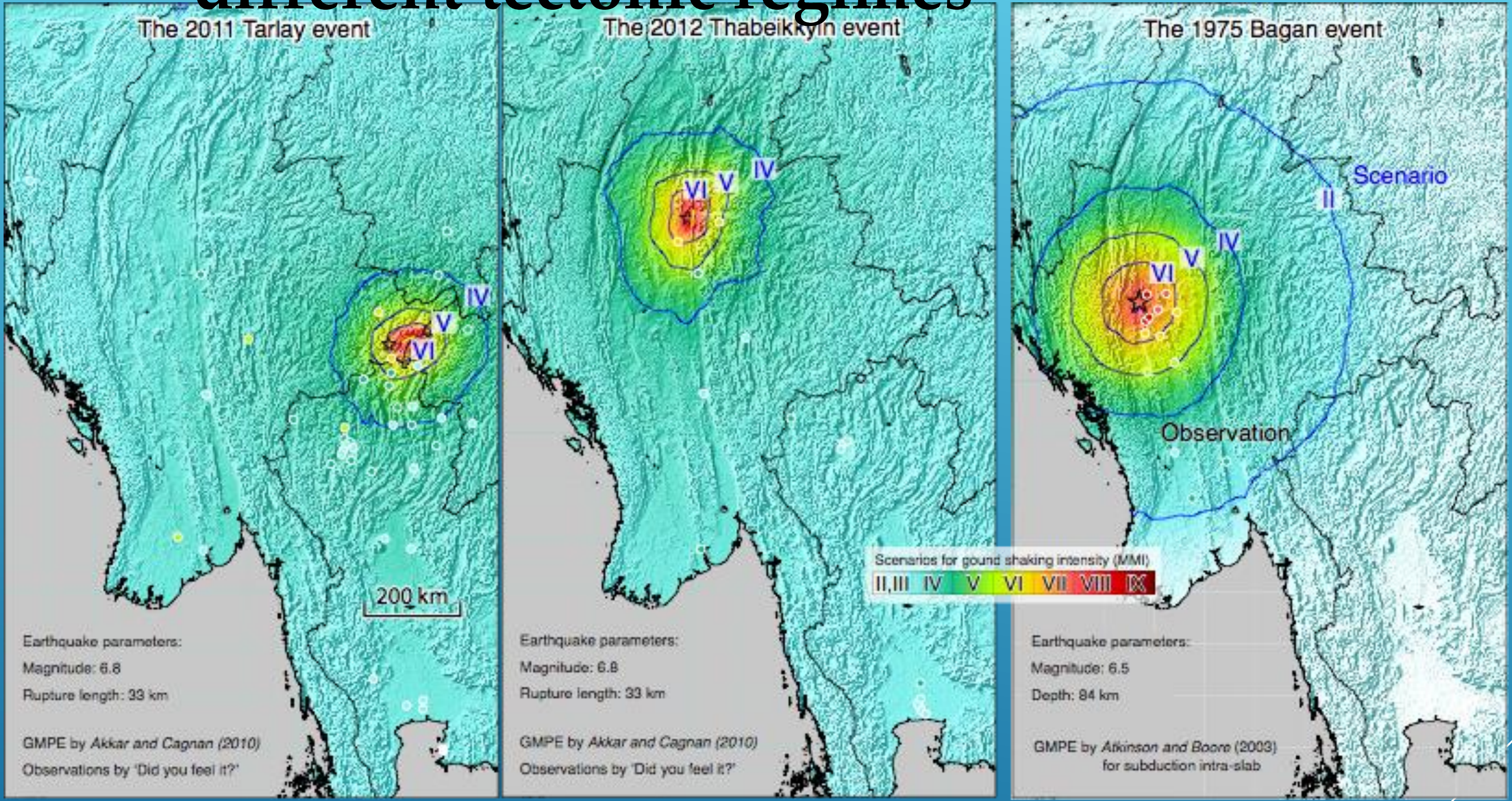


Fig. 5 Isoseismal Map of the Mandalay Earthquake of 23 May 1912 (after Brown, 1914)

Ref. Prinya Nutalaya, Sopit Sodsri and E.P. Arnold (1985)

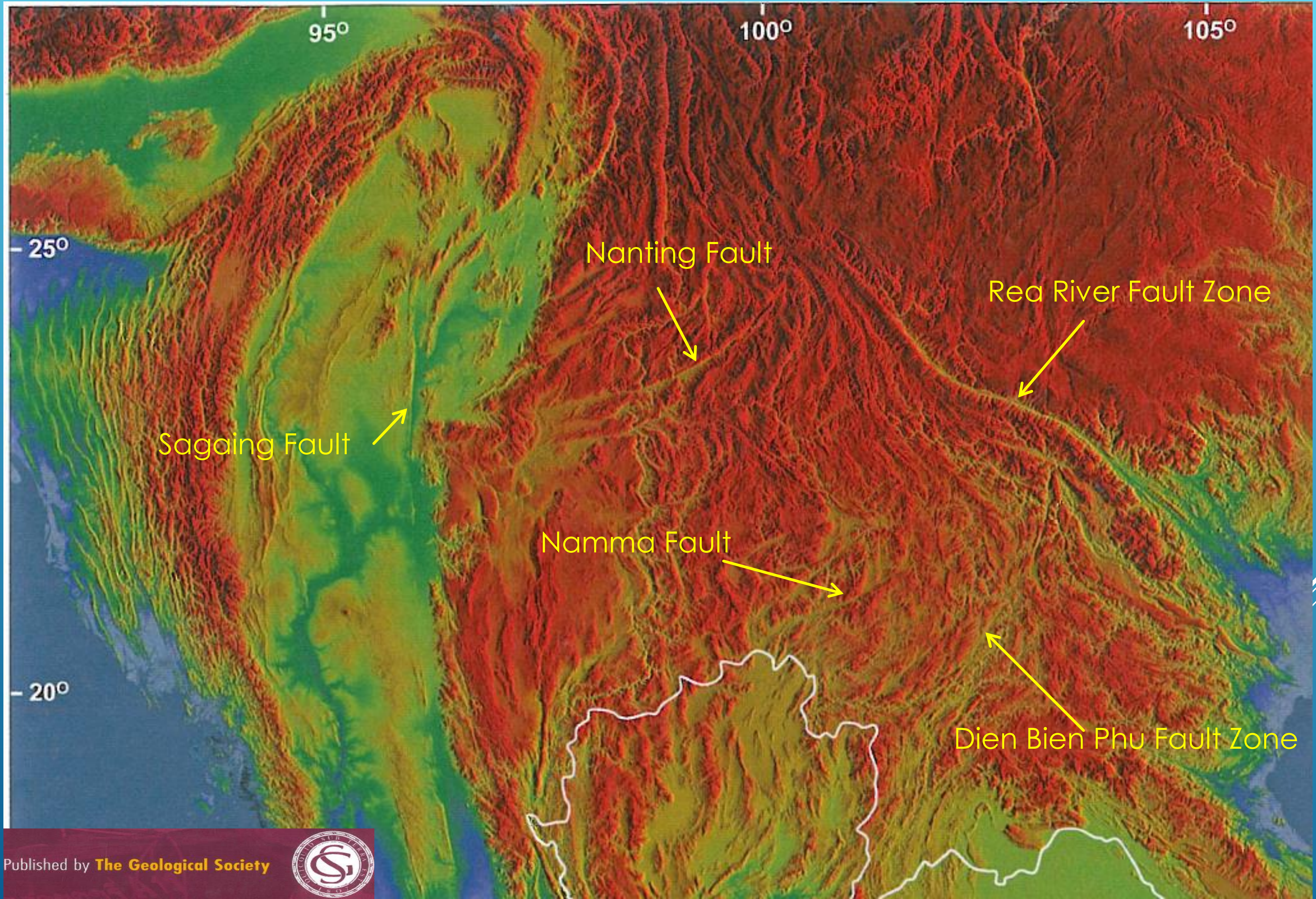
Ground shaking tests to determine the ground shaking behaviors in different tectonic regimes

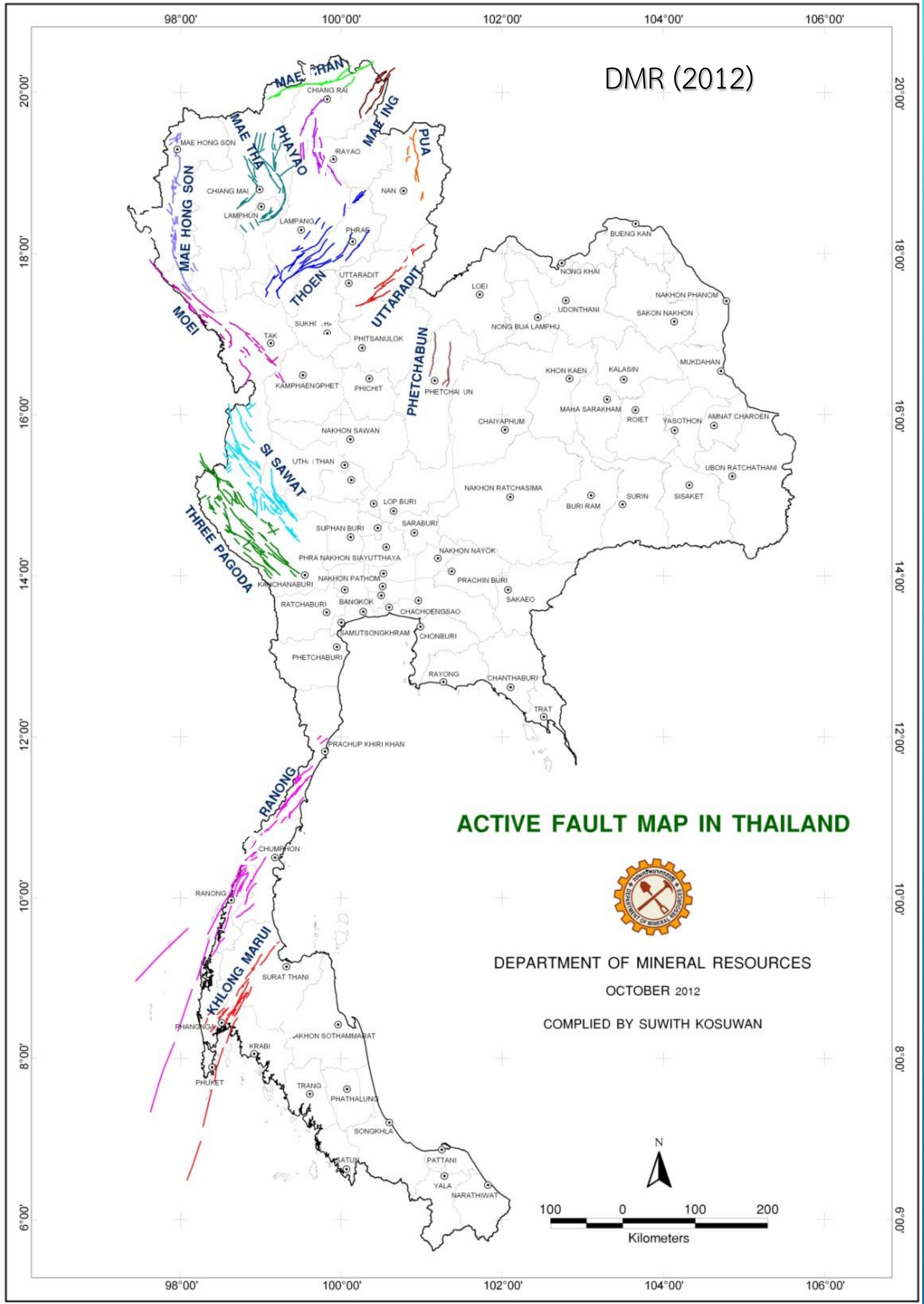


Event type	Crustal events	Subduction event
Best-fit GMPE	*Akkar & Cagnan* (2010)	*Atkinson & Boore* (2003)

Damage of the M 6.3 Mae Lao Earthquake (5 May 2014), Thailand

SATELLITE IMAGE (DEM) SHOWING MYANMAR, CHINA, LAO PDR, VIETNAM, THAILAND





ACTIVE FAULT MAP OF THAILAND

14 Active fault zones

1-Mae Chan

2-Mae Ing

3-Mae Hong Son (MHSF)

4-Moei (Mae Ping)

5-Mae Tha

6-Thoen

7-Phayao

8-Pua

9-Uttaradit (Dien Bien Phu)

10-Three Pagoda

11-Sri Sawat

12-Ranong

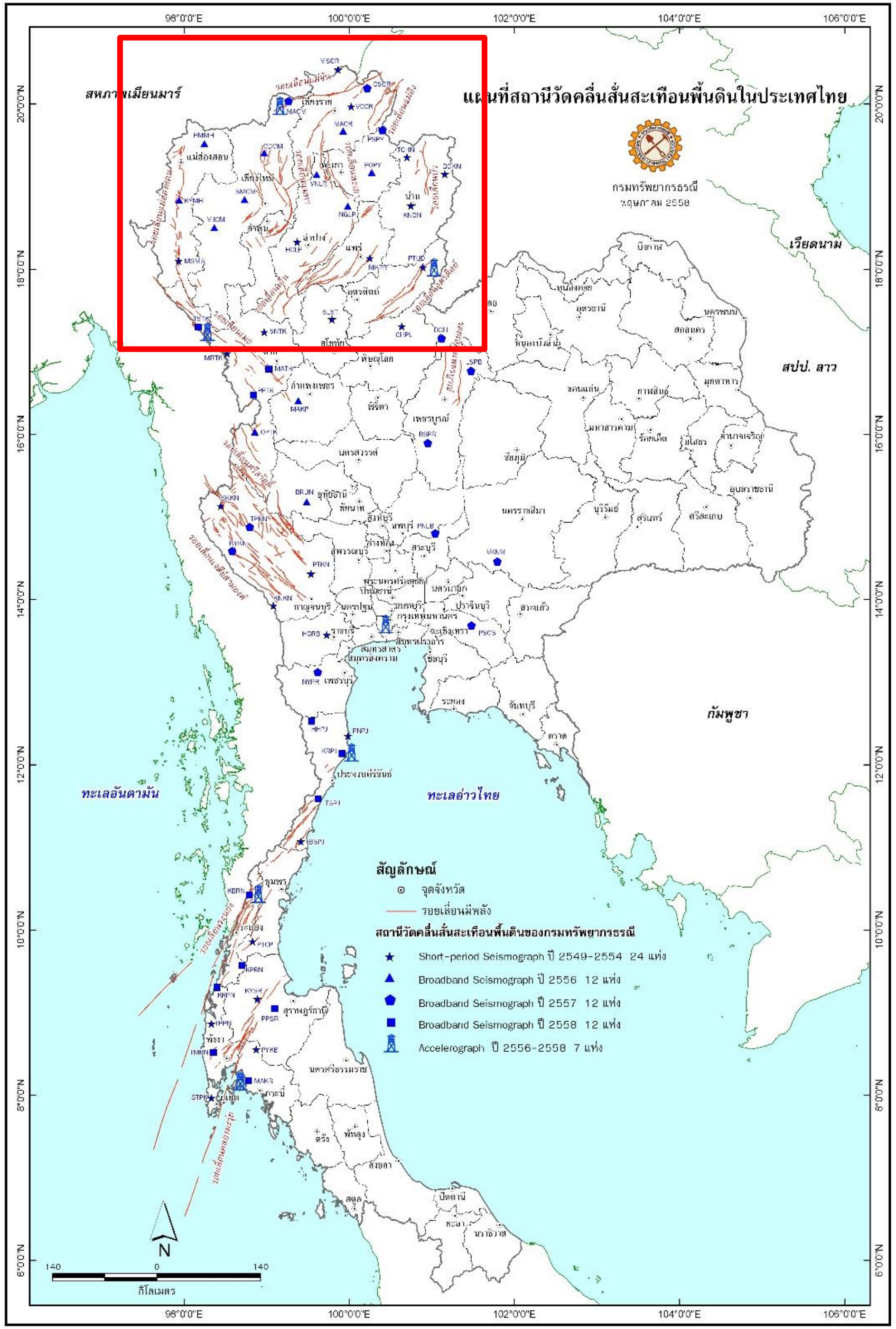
13-Klong Marui

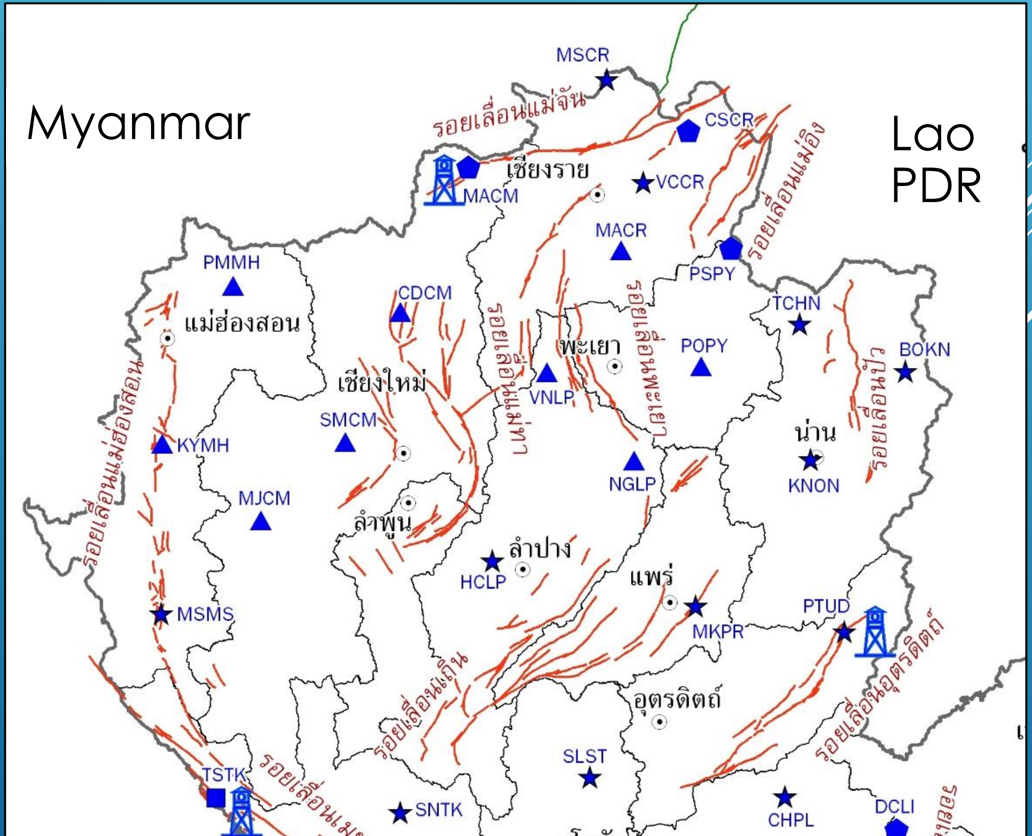
14-Phetchabun

DMR'S SEISMIC STATION

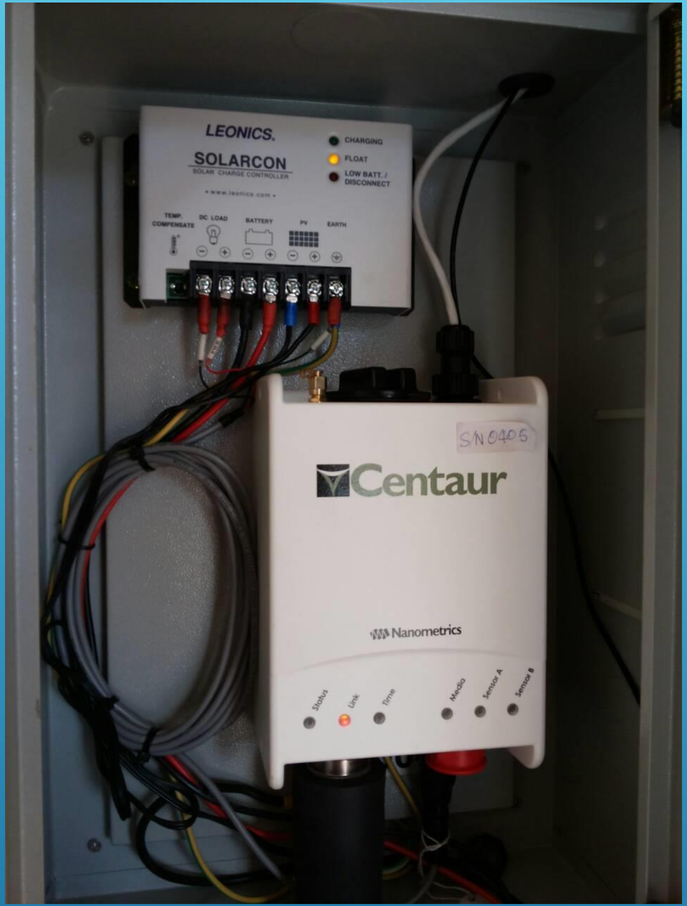
Seismograph 60 stations
-SP 24 sites
-BB 36 sites

Accelerograph 7 stations





Seismic Station of THAILAND



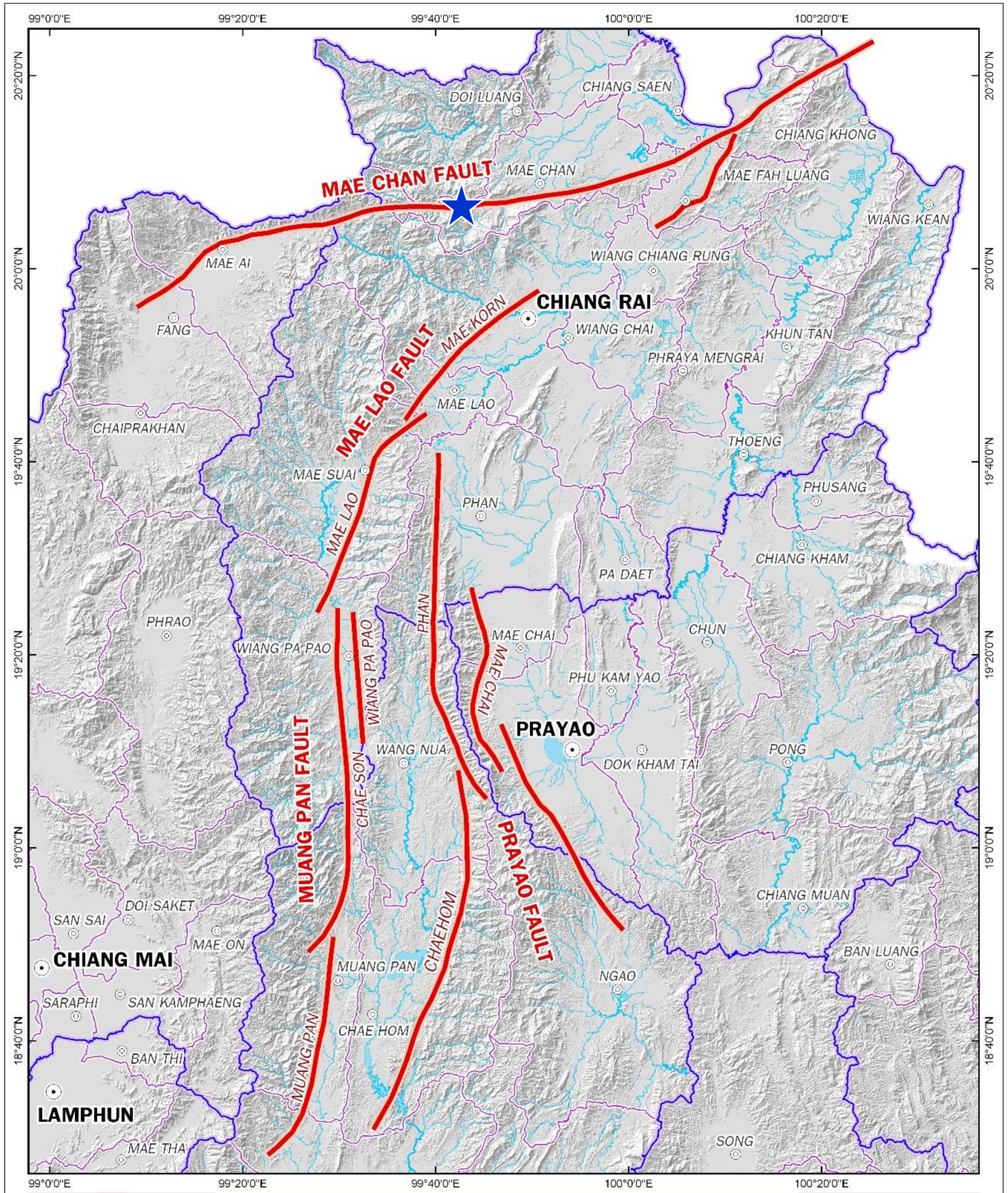
Data Logger

Seismometer Sensor

Acce

METHODOLOGY OF ACTIVE FAULT INVESTIGATION

1. The earthquake epicenters in the study area reported in the catalogs in both Thailand and the neighboring countries are collected.
2. The remote sensing data are analyzed in order to generate a lineament map for a geomorphological study of the active faults. The geologic map along the active faults are also generated.
3. Field investigations are conducted. It consists of detailed surveys to generate topographic maps, geophysical surveys (resistivity imaging and Ground Penetrating Radar). The sites are selected for trench excavation.
4. The sediment samples are collected for the C-14 AMS and the Thermoluminescence (TL)/OSL dating in order to identify the inferred faults ages.
5. The results are analyzed in order to construct an active fault map.

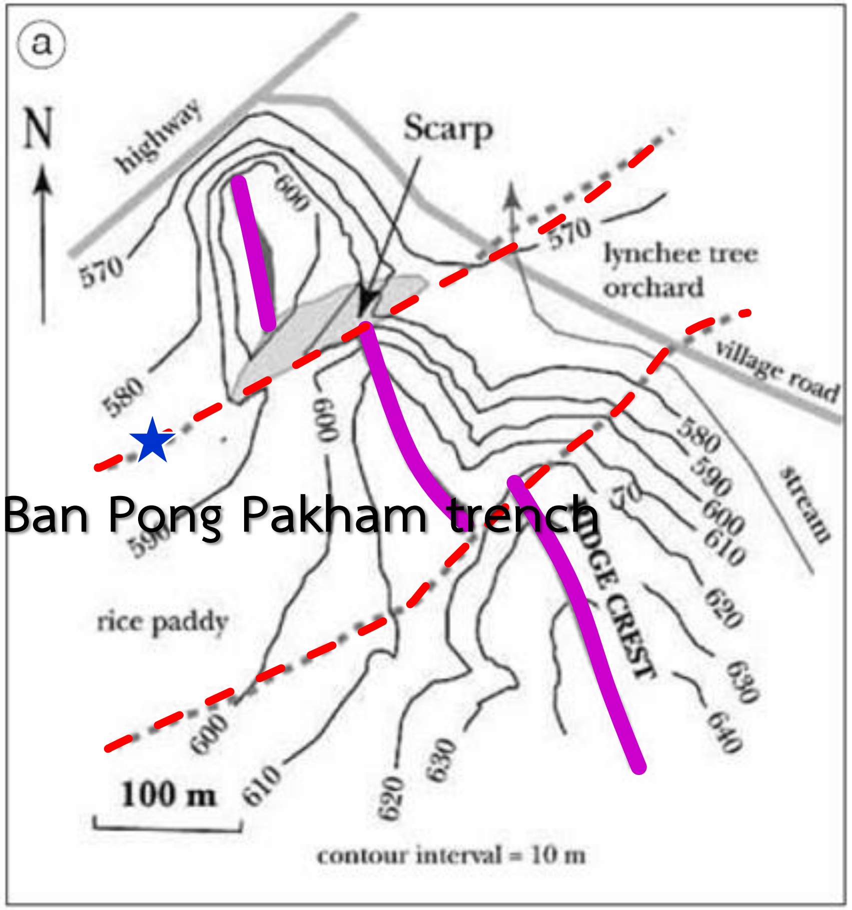


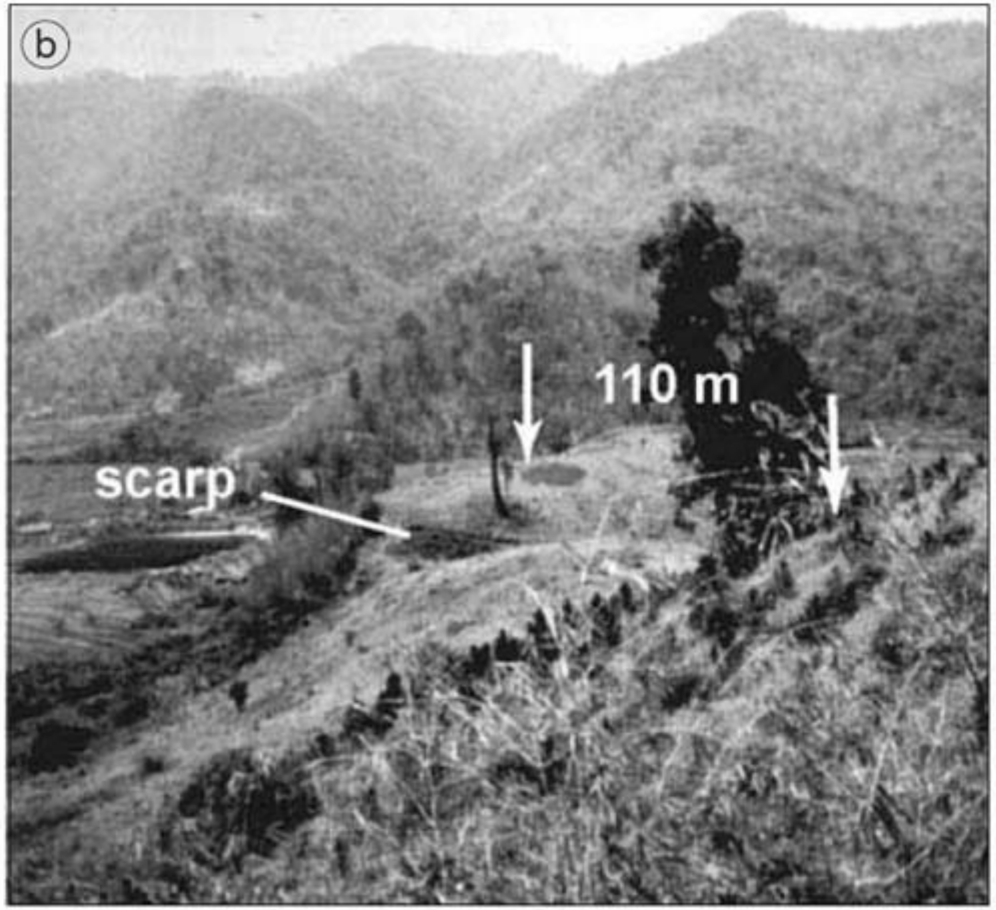
Ban Pong Pakham

MAE CHAN FAULT

Offset ridge crest

(Fenton et al., 2003)

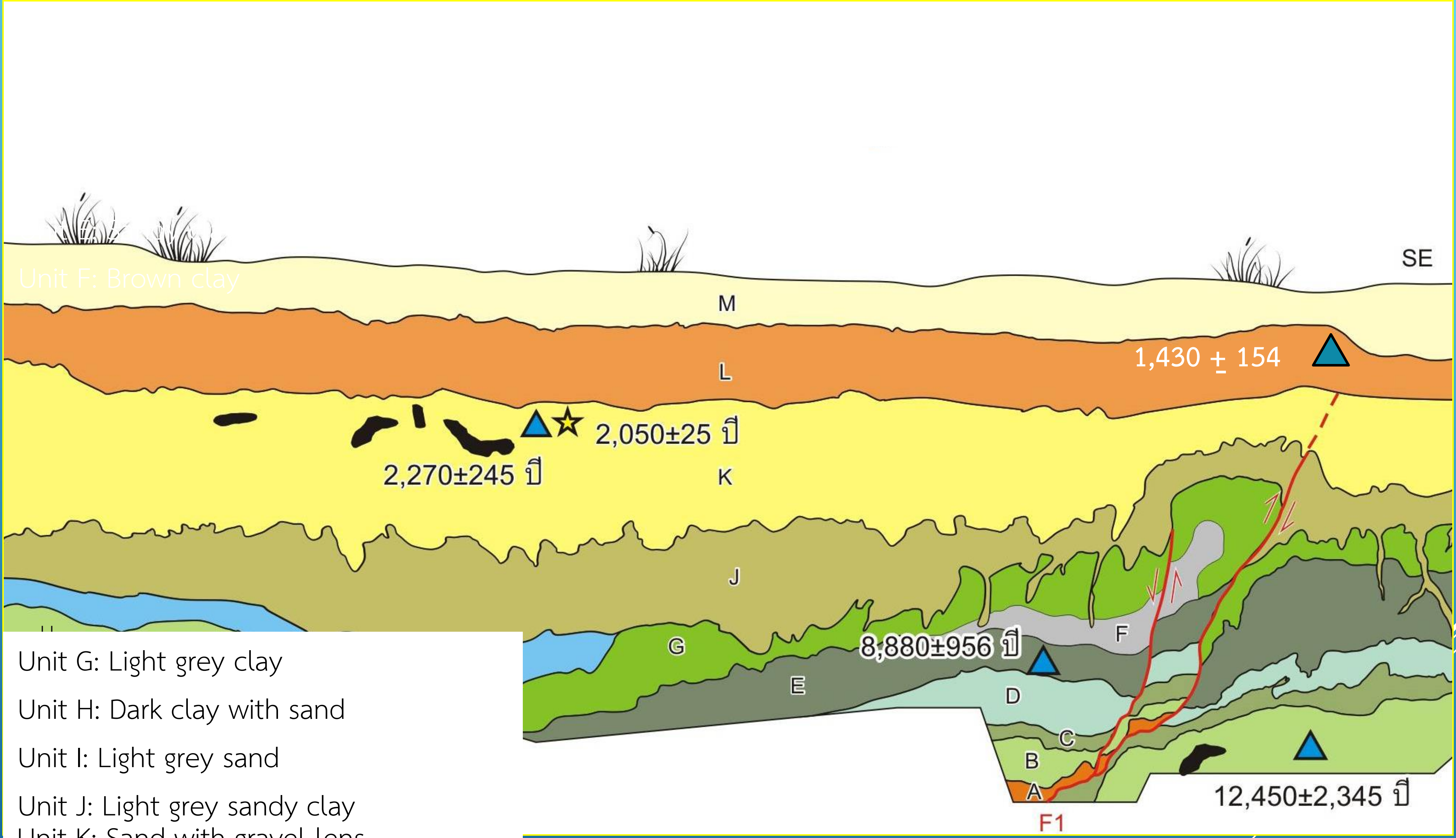




a) Ridge crest offset creating shutter ridge along the Mae Chan Fault at Ban Pong Pakham.

b) Looking north along the crest of the offset ridge crest.

Ban Pong Pakham trench, Mae Chan Fault



Unit G: Light grey clay

Unit H: Dark clay with sand

Unit I: Light grey sand

Unit J: Light grey sandy clay

Unit K: Sand with gravel lens

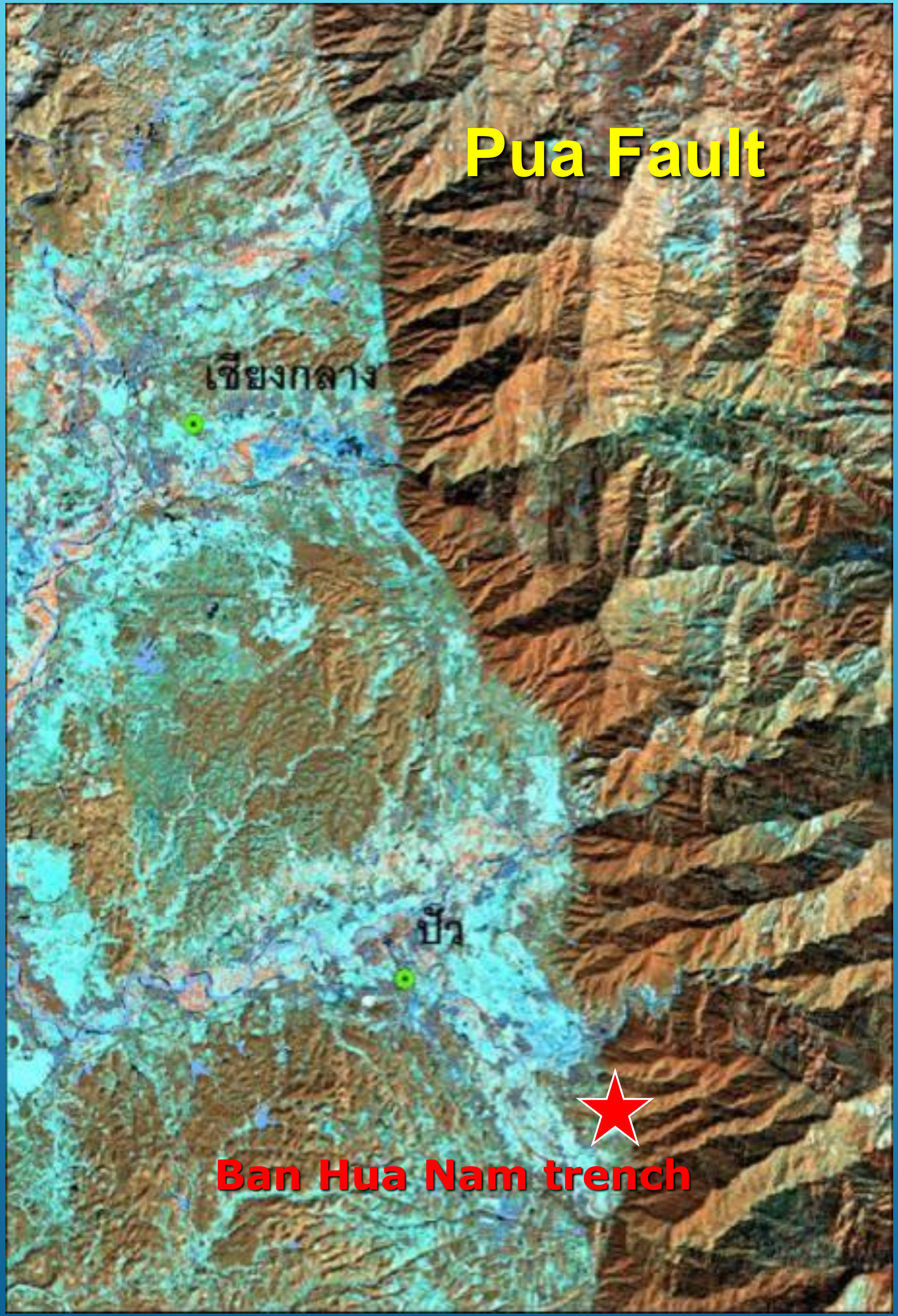
Unit L: Brown clayey sand

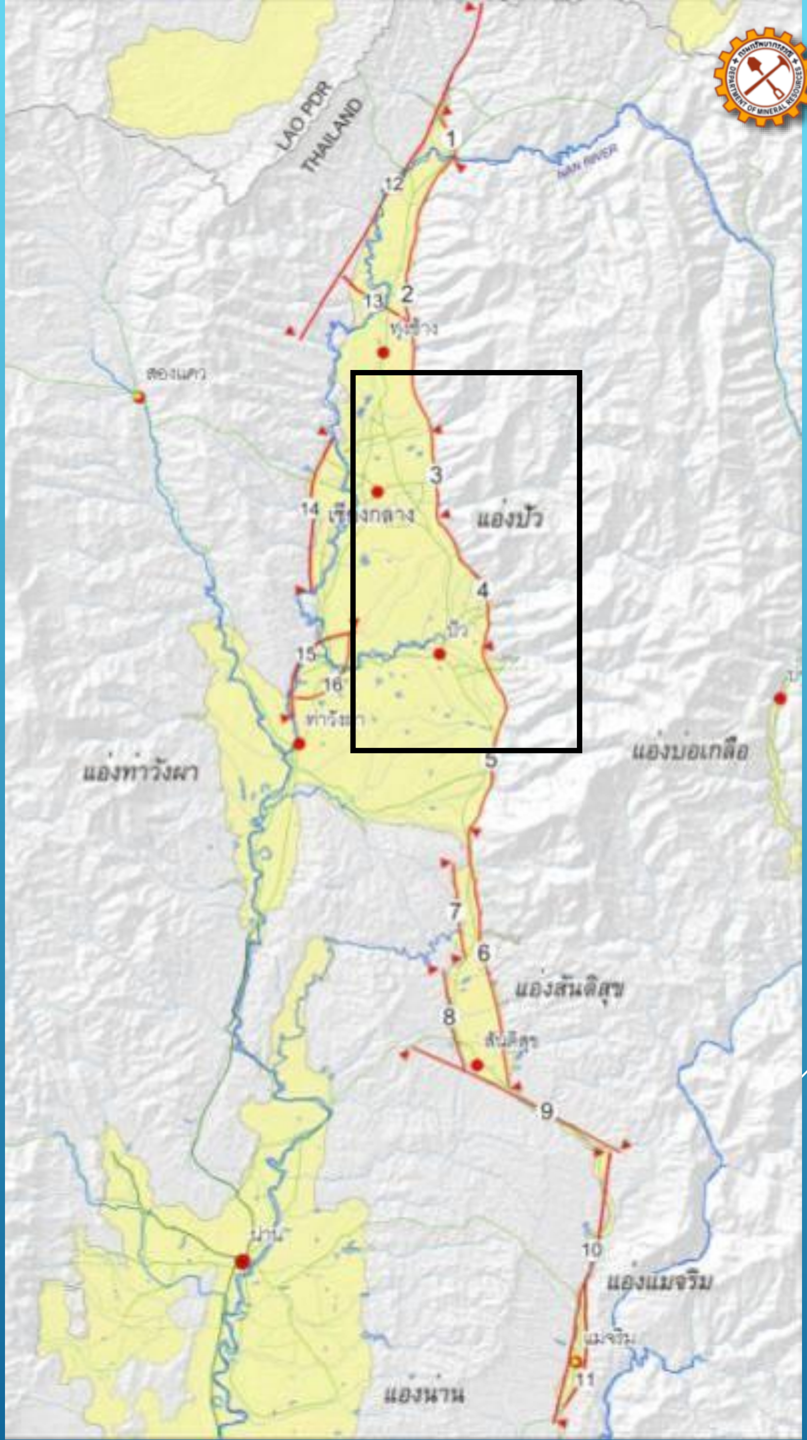
Unit M:Top soil

△ TL ages

☆ AMS C-14 ages

DMR (2009)


Pua Fault
เชียงกลาง
ปัว
Ban Hua Nam trench

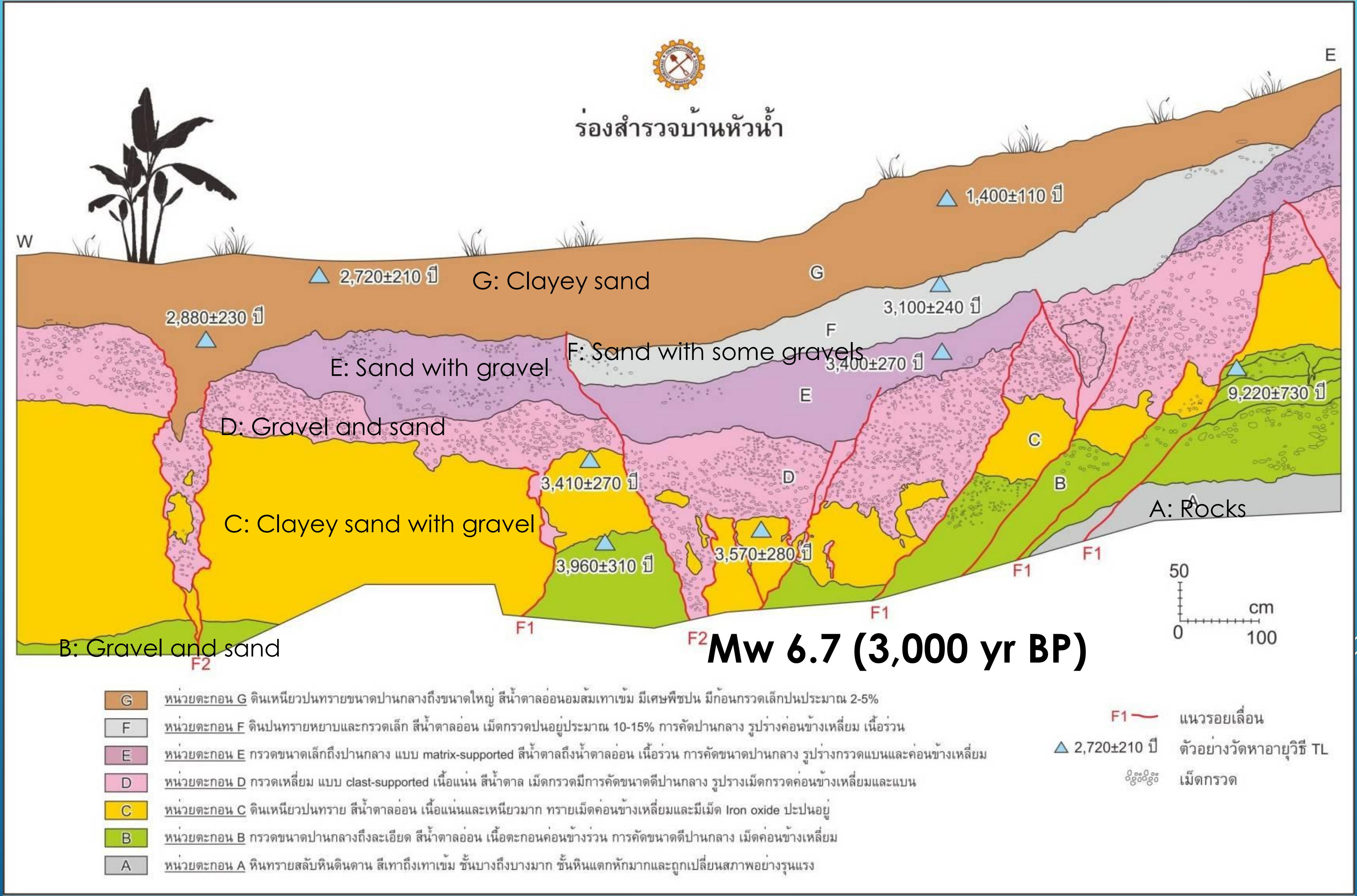

LAO PDR
THAILAND
แอ่งปัว
แอ่งท่าวังผา
แอ่งบ่อเกลือ
แอ่งสันติสุข
แอ่งแม่จริม
แอ่งน่าน

Ban Hua Nam trench, Pua Fault

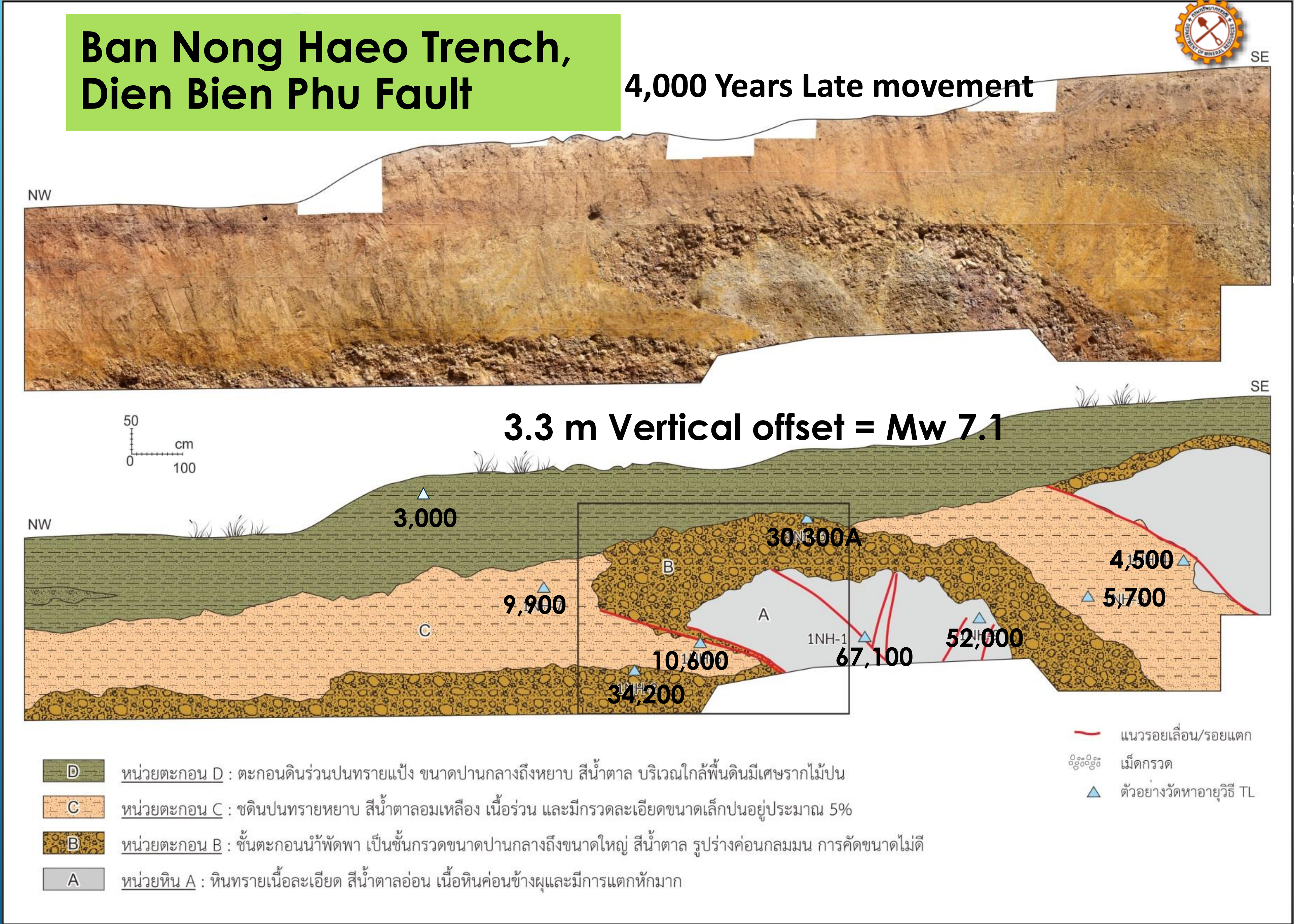
1 m

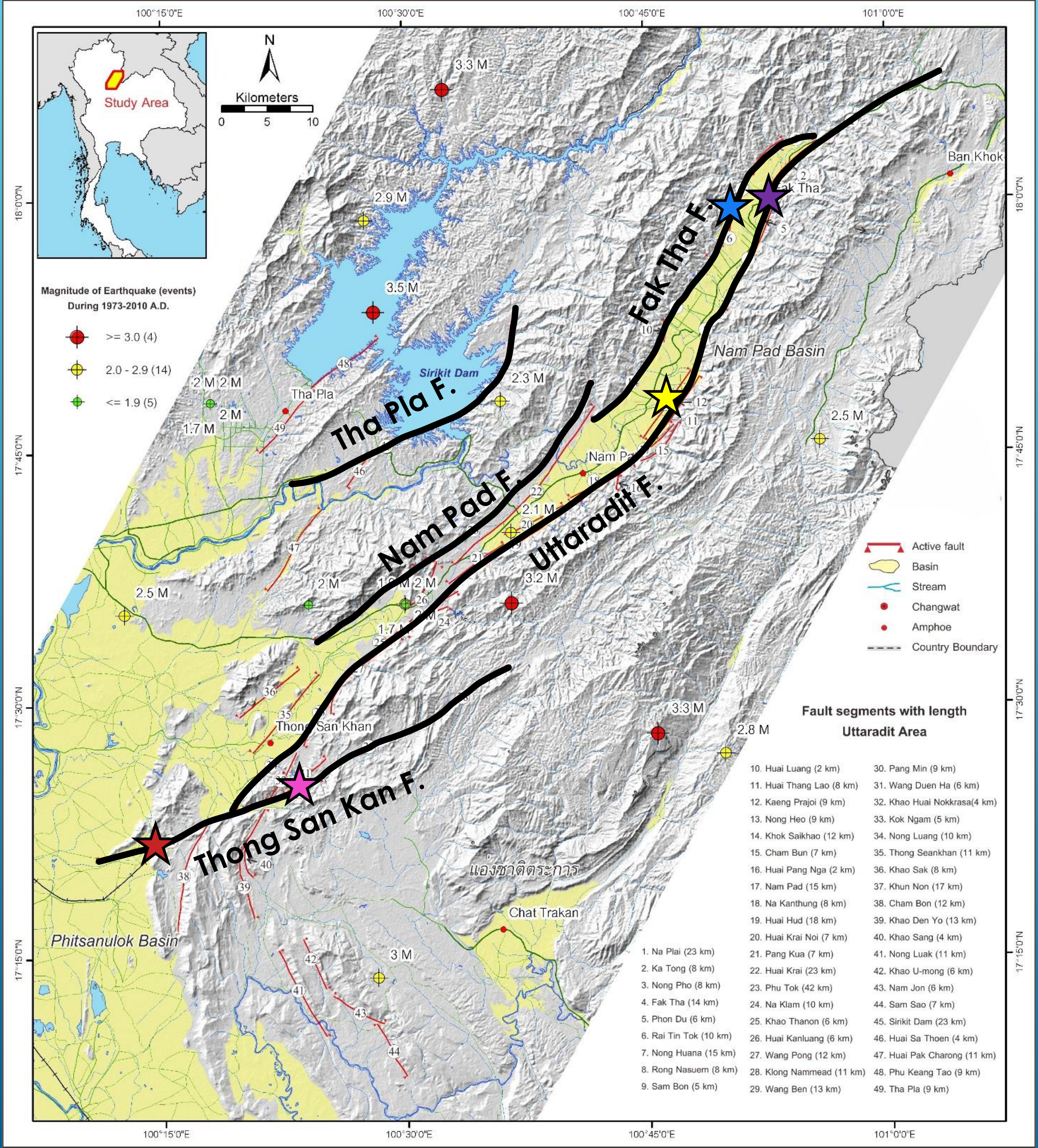
1 m

Ban Hua Nam trench, Pua Fault



Ban Nong Haeo Trench, Dien Bien Phu Fault





Long Term Slip Rate of DBPF

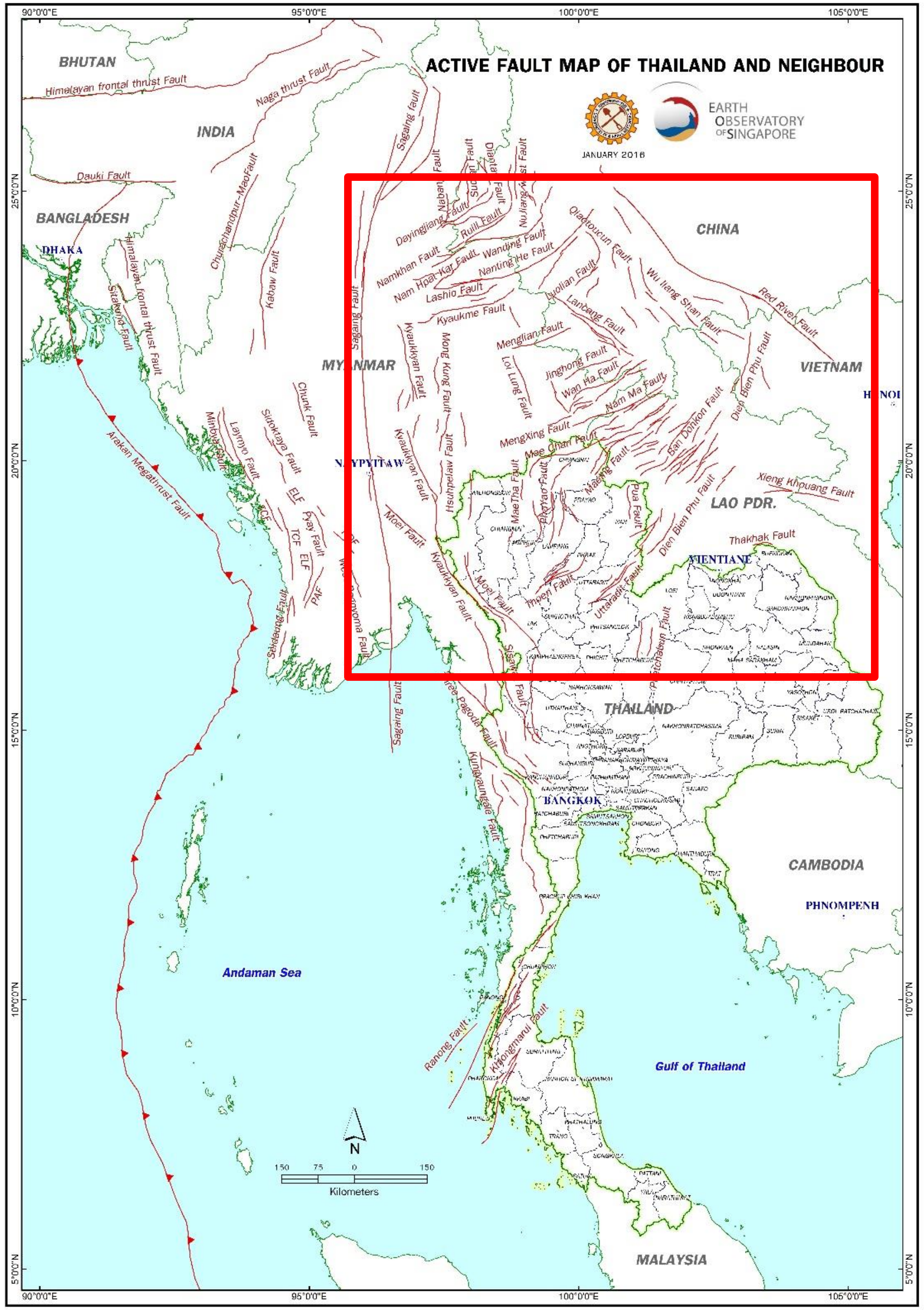
Fak Tha Fault = 0.1 mm/y
Tha Pla Fault = 0.1 mm/y
Nam Pad Fault = 0.2 mm/y
Uttaradit Fault = 0.3 mm/y
Thong San Khan Fault = 0.4 mm/y

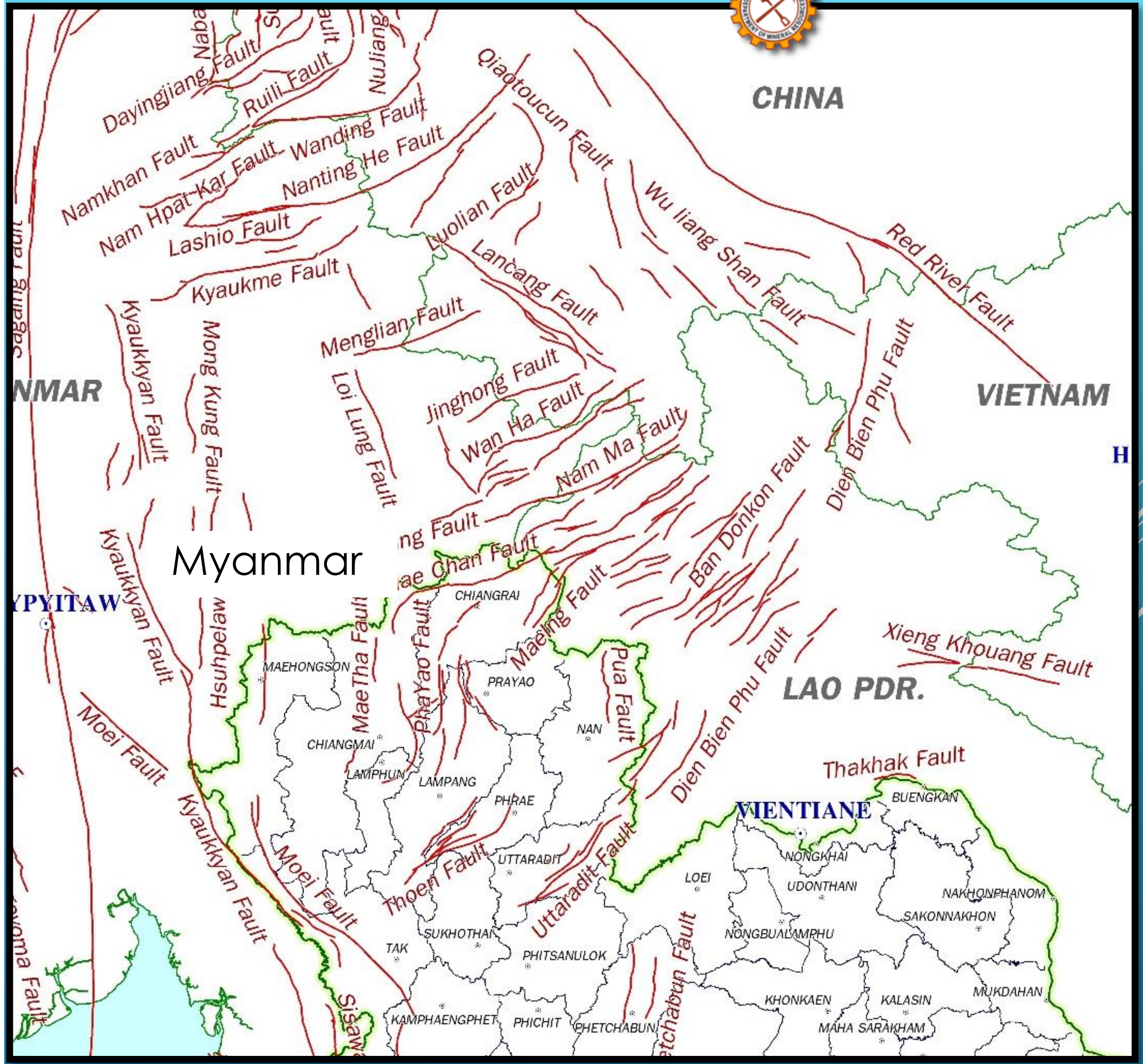
Late Movement , Mw in trench:

- ★ 10,000 Y, 7.0 Mw
- ★ 4,200 Y, 7.5 Mw
- ★ 4,000 Y, 7.1 Mw
- ★ 7,400 Y, 6.9 Mw
- ★ 2,500 Y, ...Mw

CONCLUSION OF DBPF STUDY IN THAILAND

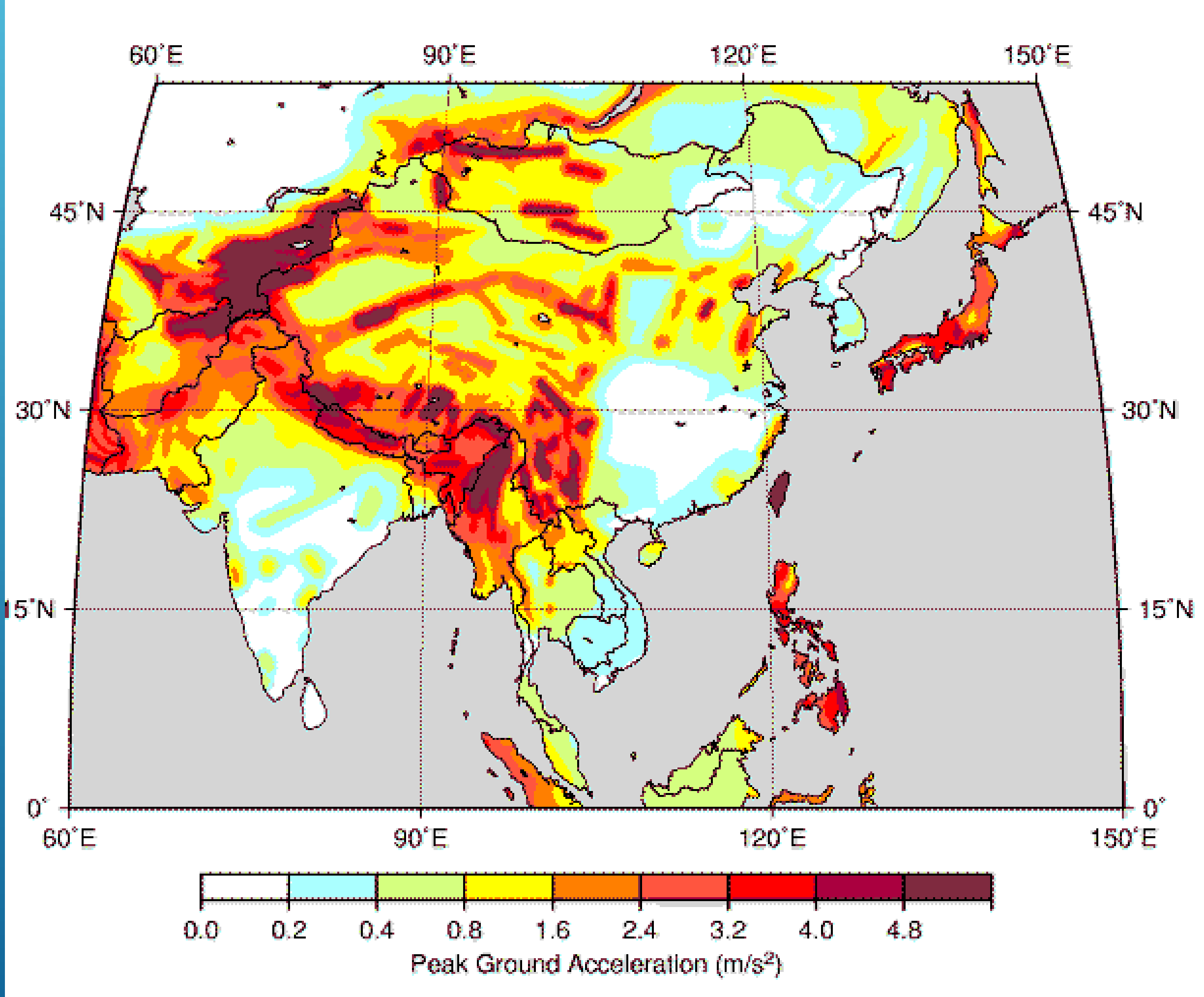
- Good field evidence indicated to Max Earthquake was Mw7.1, for 4,000 years ago.
- Long Term Slip Rates are 0.1 – 0.4 mm/y.
- Recurrence interval is about 2,500 years.

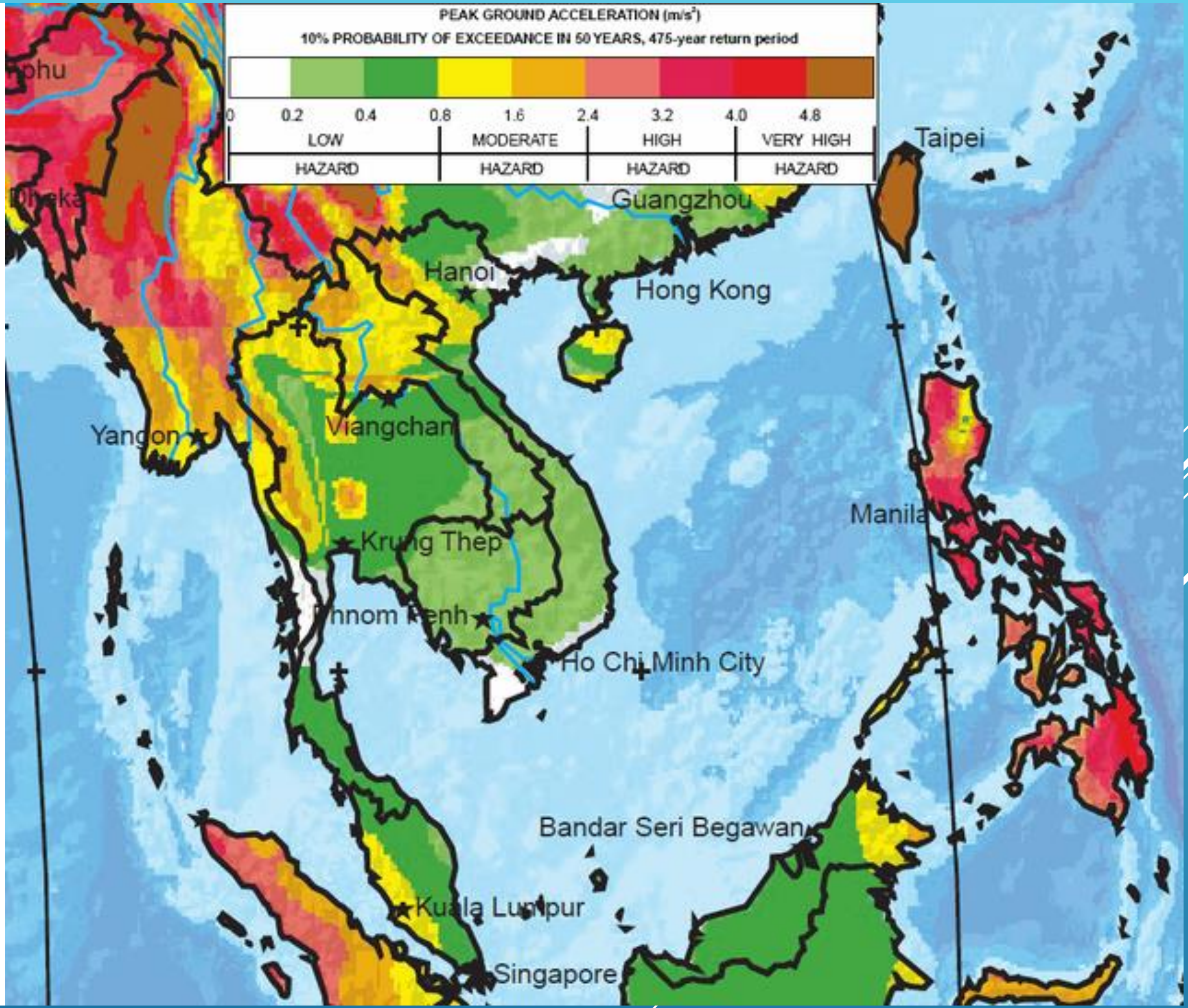




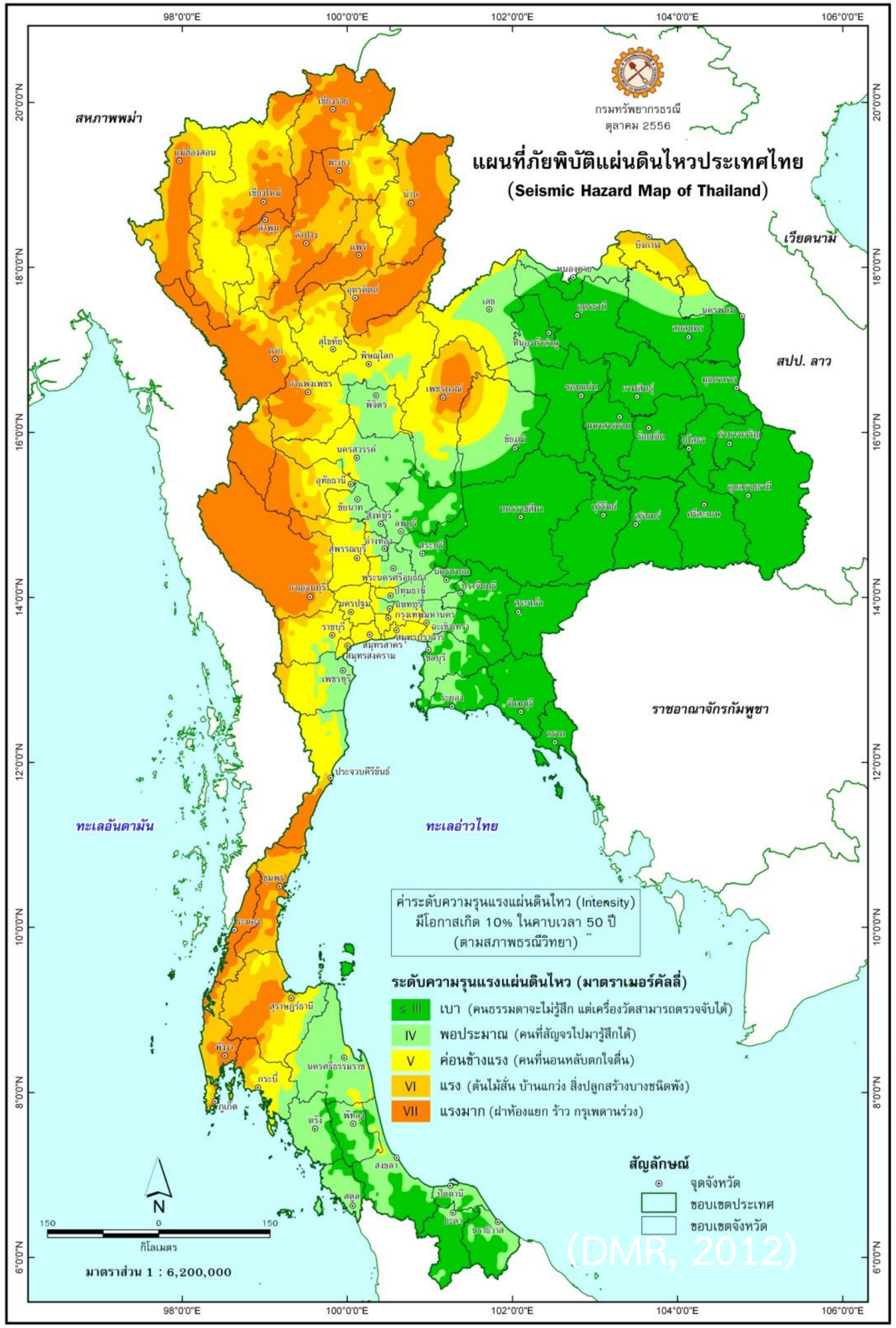
January 2016

Seismic hazard Map of SE Asia





USGS



(DMR, 2012)

Seismic Hazard Map of Thailand (1st Version)

10% exceeding in 50 Years

(Mercalli Scale)

MMI Value	Summary Damage Description Used on Maps	Description of Shaking Severity	Full description shortened fromElementary Seismology
III	Not mapped	Not mapped	Felt by almost all indoors. Hanging objects swing. Vibration like passing of light trucks. May not be recognized as an earthquake..
IV	Not mapped	Not mapped	Vibration felt like passing of heavy trucks. Stopped cars rock. Hanging objects swing. Windows, dishes, doors rattle. Glasses clink. In the upper range of IV, wooden walls and frames creak.
V	Light	Pictures Move	Felt outdoors. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing. Pictures move. Pendulum clocks stop.
VI	Moderate	Objects Fall	Felt by all. People walk unsteadily. Many frightened. Windows crack. Dishes, glassware, knickknacks, and books fall off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster, adobe buildings, and some poorly built masonry buildings cracked. Trees and bushes shake visibly.
VII	Strong	Nonstructural Damage	Difficult to stand or walk. Noticed by drivers of cars. Furniture broken. Damage to poorly built masonry buildings. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices, unbraced parapets and porches. Some cracks in better masonry buildings. Waves on ponds.