

The 2025 M7.7 Myanmar Earthquake and How to Find the Epi-center?

Yoshio Okamoto

yossi.okamoto@gmail.com

<http://yossi-okamoto.net/>

Chiang Mai Univ. DS 3th Dec.2025

Today's Overview

- **Self-introduction**
- **About The 2025 M7.7 Myanmar Earthquake**
- **How to identify the epi-center of an Eq.**

Who are

- **Earth Science** high-school teacher
- Associate professor and part-time lecturer at **Osaka-Kyoiku University** 2010-2014
- Geo Science class at **KVIS, PCSHS, Chiang Mai Univ. DS, Phayao Univ.**
- **School Seismograph System** (at Loei, PCSHS NST, Chiang Mai Univ.)
- **3D seismicity maps, tsunami simulation**
- **Polarized microscope unit & Thin-Section**
- **3D printing** (2019-) and all-round
- **Linux Programming** (awk, C, Perl, etc.). Now with the use of Claudio

Yossi-Okamoto.Net

Teaching Tools Publish Resources Field Trip(World) Field Trip(Japan) Essay etc.

02:48:15
RAYS-COUNTER.COM

Teaching Tools. Feel Free to Use with Copy Left! (GNU). yossi.okamoto<at mark>gmail.com
日本語はこちら

What's New (25 August 2025)

- 25th Aug. 2025 2025Kushiro_GeoMag Poster(E ver. Page2) **New!**
- 25th Aug. 2025 2025Kushiro_Thai_Seis Inner Earth(E ver. Page2) **New!**
- 2nd Mar. 2025 2025 Jan-Feb. Thailand SHS visit **New!**
- 19th Nov. 2024 Thin-Section Photo System **New!**
- 15th Oct. 2024 Covid-19 Infection Simulation Part 4 **New!**
- 06th Sep. 2024 About my lectures on Geoscience in Thailand **New!**
- 31st Aug. 2024 Comparison of micro-controllers
- 05th Aug. 2024 2022GeoSciEdIX_Matsue,Japan
- 16th July 2024 BM1422GMV Magnetometer
- 10th Jun. 2024 ESP32 Micro-barometer making recipe
- 08th Jun. 2024 Reminder for micro-barometer data processing
- 06th Jun. 2024 Reminder for magnetometer data processing
- 03rd Jun. 2024 Old BASIC program Museum
- 27th May 2024 How to add timestamps for serial data
- 16th May 2024 QMC5883L Geo-magnetometer (prototype)
- 07th Apr. 2024 Wave Propagation Simulations for Classrooms
- 25th Feb. 2024 ESP32 Seismometer (prototype)
- 24th Feb. 2024 SCIUS 2023 Symposium Presentation
- 28th Jan. 2024 2023Dec-2024Jan Thailand Diary Whole_List
- 24th Jan. 2024 MUIGC2014 Excursion Diary
- 21st Jan. 2024 Satun Geopark Excursion Diary
- 07th Dec. 2023 My Seismograph History

Resources

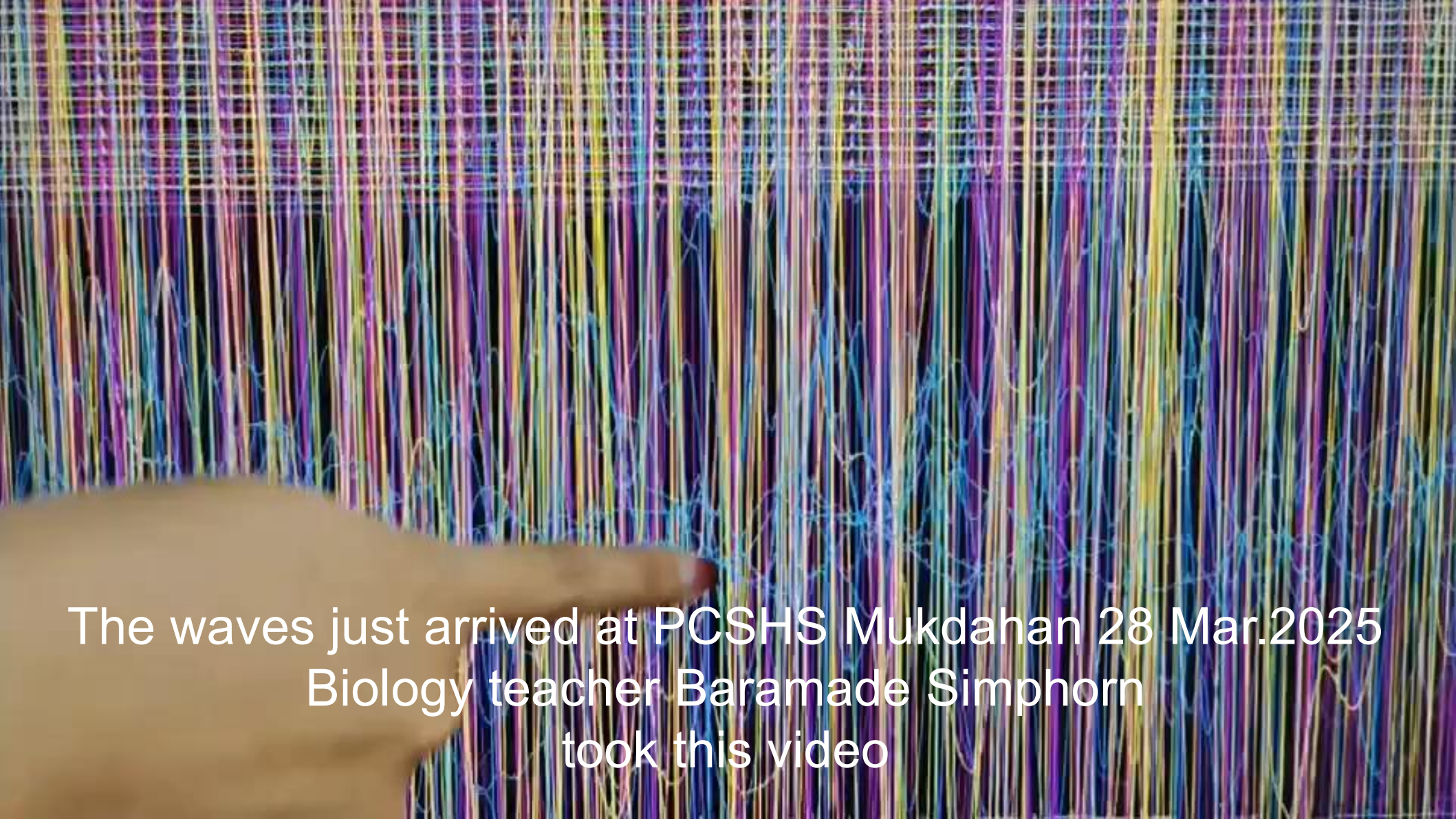
- for Thailand schools
- Conference Presenter
- for the GeoSciEdIX
- for the 5th KVIS-ISF
- Old contents

Seagull Lab & Factory

- Seagull Lab for Classroom
- Seagull Factory
- Thin-Section related
- 3D printer products

Old Miscerous

Old Topics

The background of the image is a dense, colorful pattern of vertical lines in shades of blue, green, yellow, and purple. A hand is visible on the left side, with the index finger pointing towards the center of the image.

The waves just arrived at PCSHS Mukdahan 28 Mar.2025
Biology teacher Baramade Simphorn
took this video



10min video recorded by Dr. Chachawal
(Phayao Univ.)



@yuming1219 via X

https://www.youtube.com/shorts/fXUPi8_BPzk

[/www.youtube.com/shorts/BWukoxZE3PA](https://www.youtube.com/shorts/BWukoxZE3PA)





Fig. 15 Severe damage observed at shear wall including vertical bar buckling and concrete spalling in the lower stories of a 25-story building due to lack of seismic detailing with horizontal reinforcing bars of about 300 mm spacing



Total Collapse – 1 Bldg (SAO bldg. during construction)

Structural damages – Approx. more than 10 Bldgs

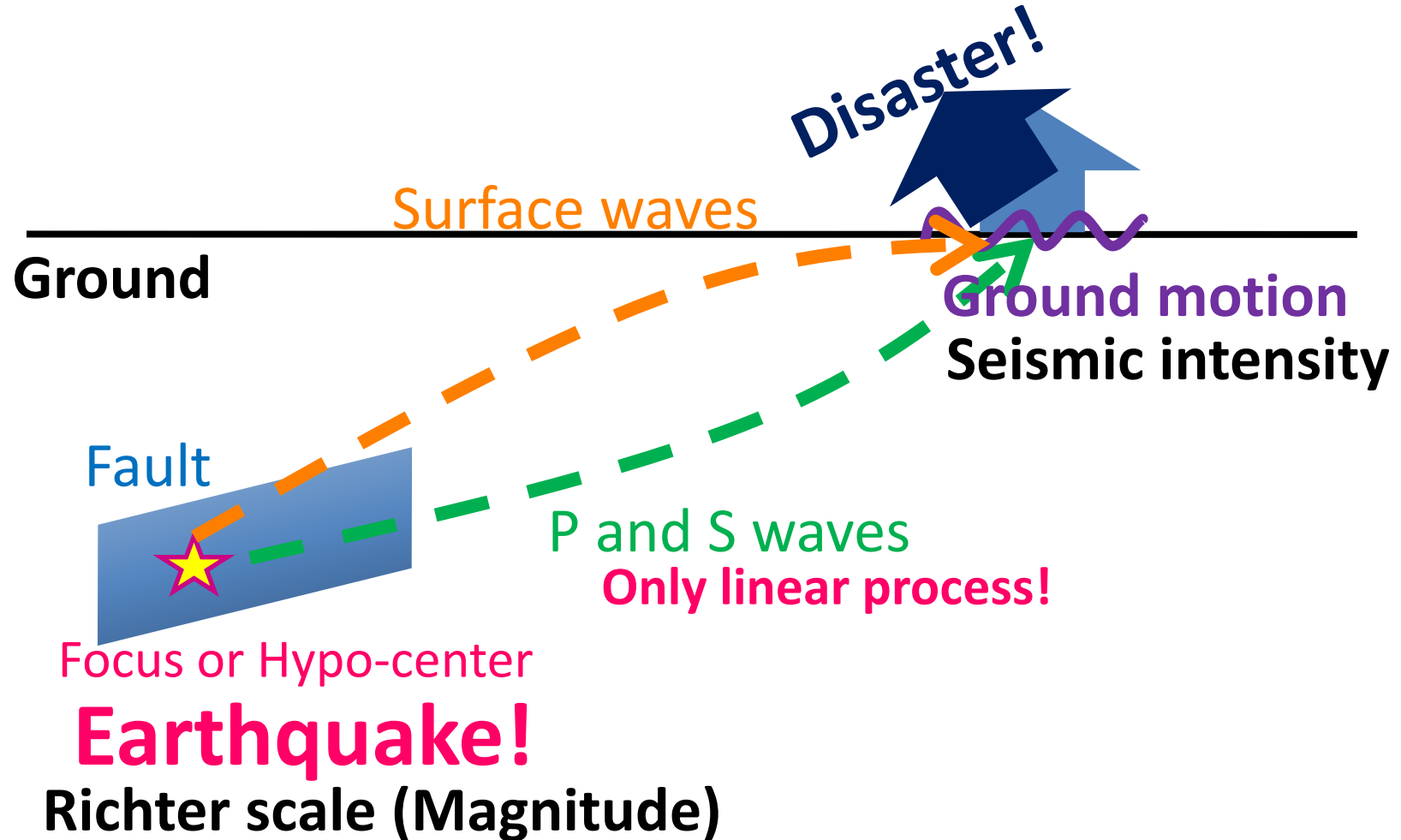
Non-structural damages – Approx. Several 100 Bldgs

All buildings in Bangkok, except collapsed SAO bldg, are safe from the earthquake with varying degrees of damages but no reported injuries or death, except the collapsed SAO bldg with around 100 laborers death or missing.

Pennung Warnitchai(2025)

Fig. 16 a) A partial failure of suspended ceiling in a high-rise building was commonly observed due to lack of horizontal bracing. b) non-structural damage to a large infill wall was also observed indicating out of plane failure pattern from the boundary frame

Earthquake: cause and result



P- and S-wave particle motion and relative speed

Example used: M6.0 Napa earthquake August 24, 2014

Particle wave motion: **P**  **S** 

P = 6 km/sec (3.7 mi/sec)

S = 4 km/sec (2.5 mi/sec)

Cause of the strong shaking in Bangkok

- I) Thick soft sediments amplify the shaking**
- ii) Resonance of the buildings at the free oscillation periods**
- iii) The long period waves survive at long distance.**

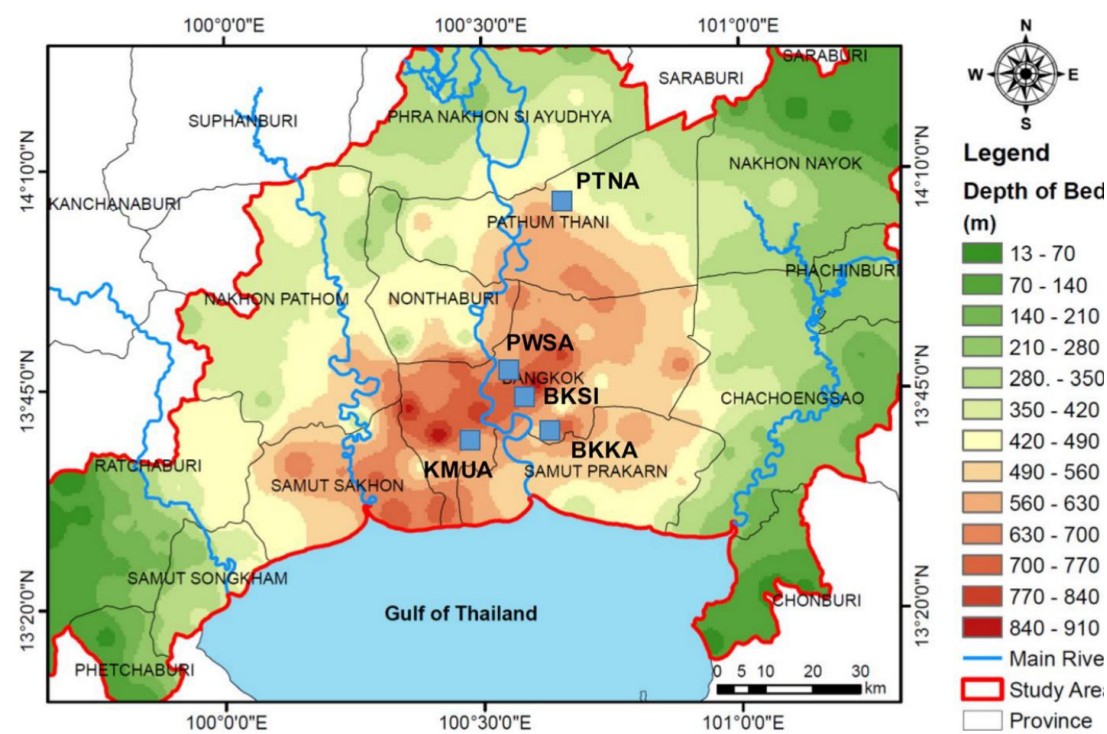


Fig. 3 Map showing five seismic stations located in the Bangkok basin and the depth to the bedrock (modified from Jirasakjamroonsri et al. 2018)

Warakorn Mairaing and Cherdpun Amonkul (2010)

Teraphan Ornthammarath et. al. 2025

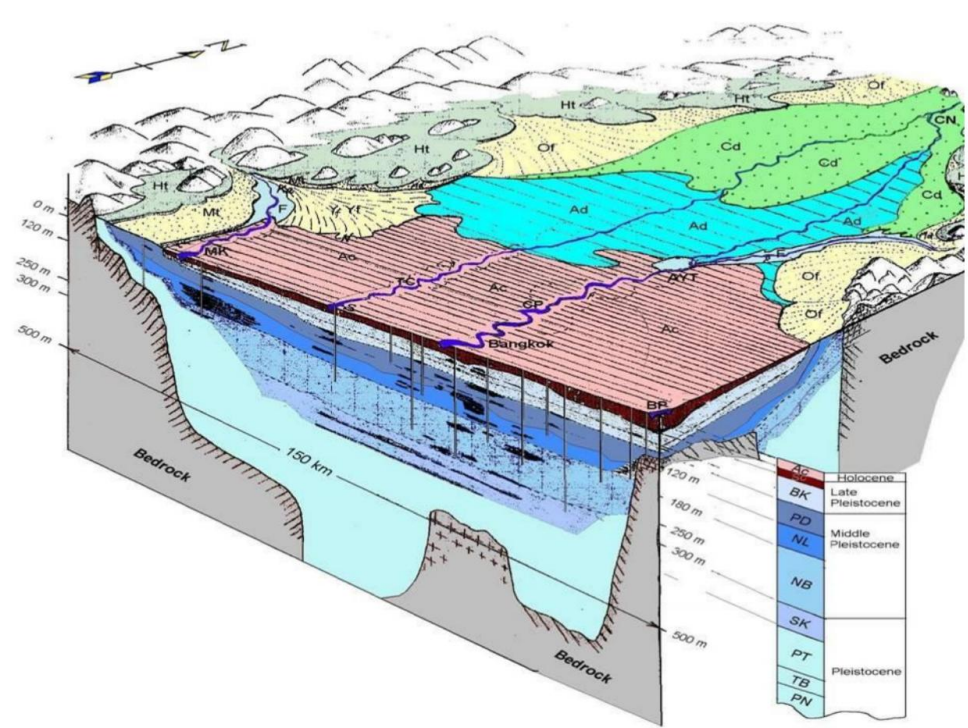
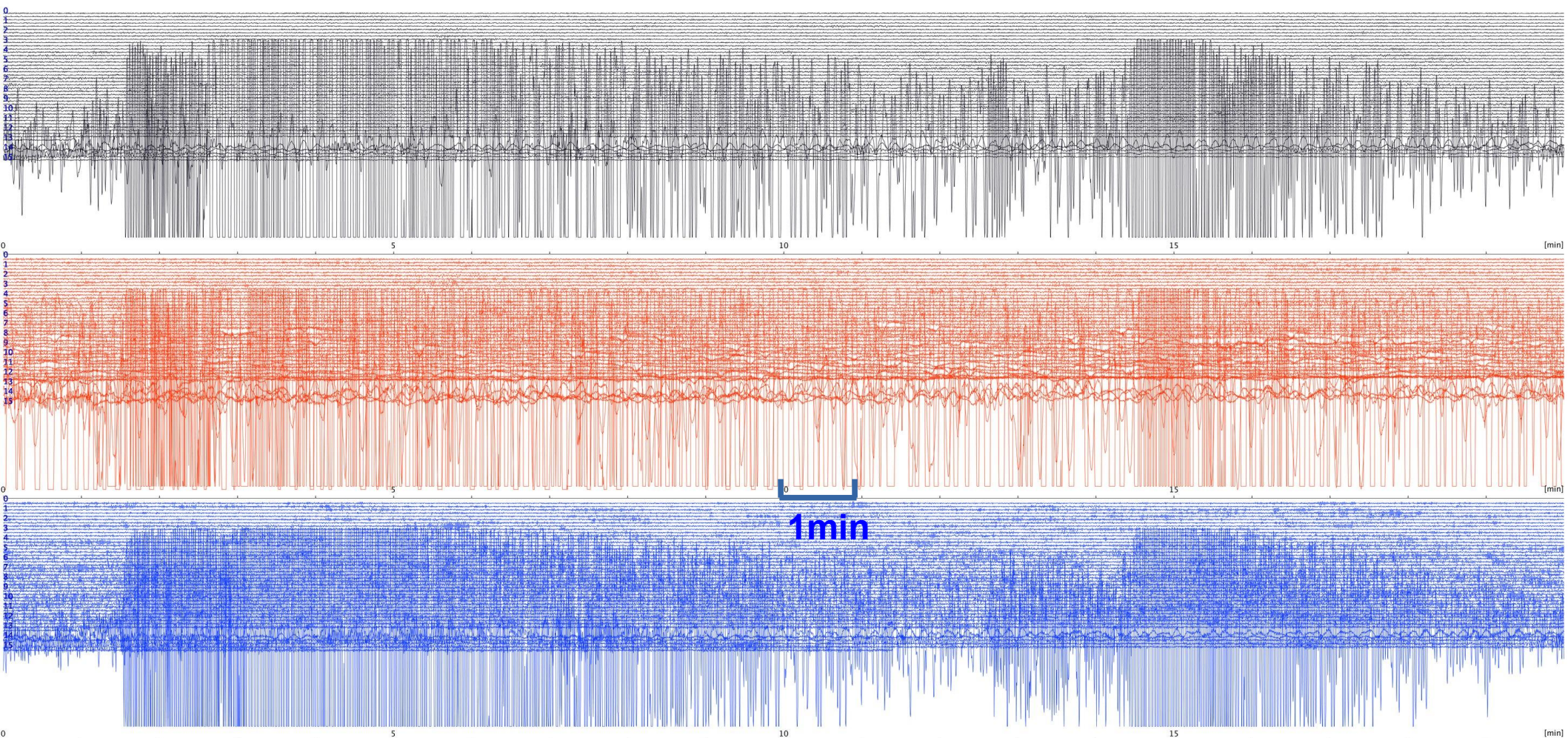


Fig.7 Schematic cross-section of lower Chao Phraya Basin (JICA, 1999)

https://www.gerd.eng.ku.ac.th/Paper/Paper_Other/Mairaing/%28EIT-Japan%29Soft%20Bangkok%20Clay%20Zoning.pdf

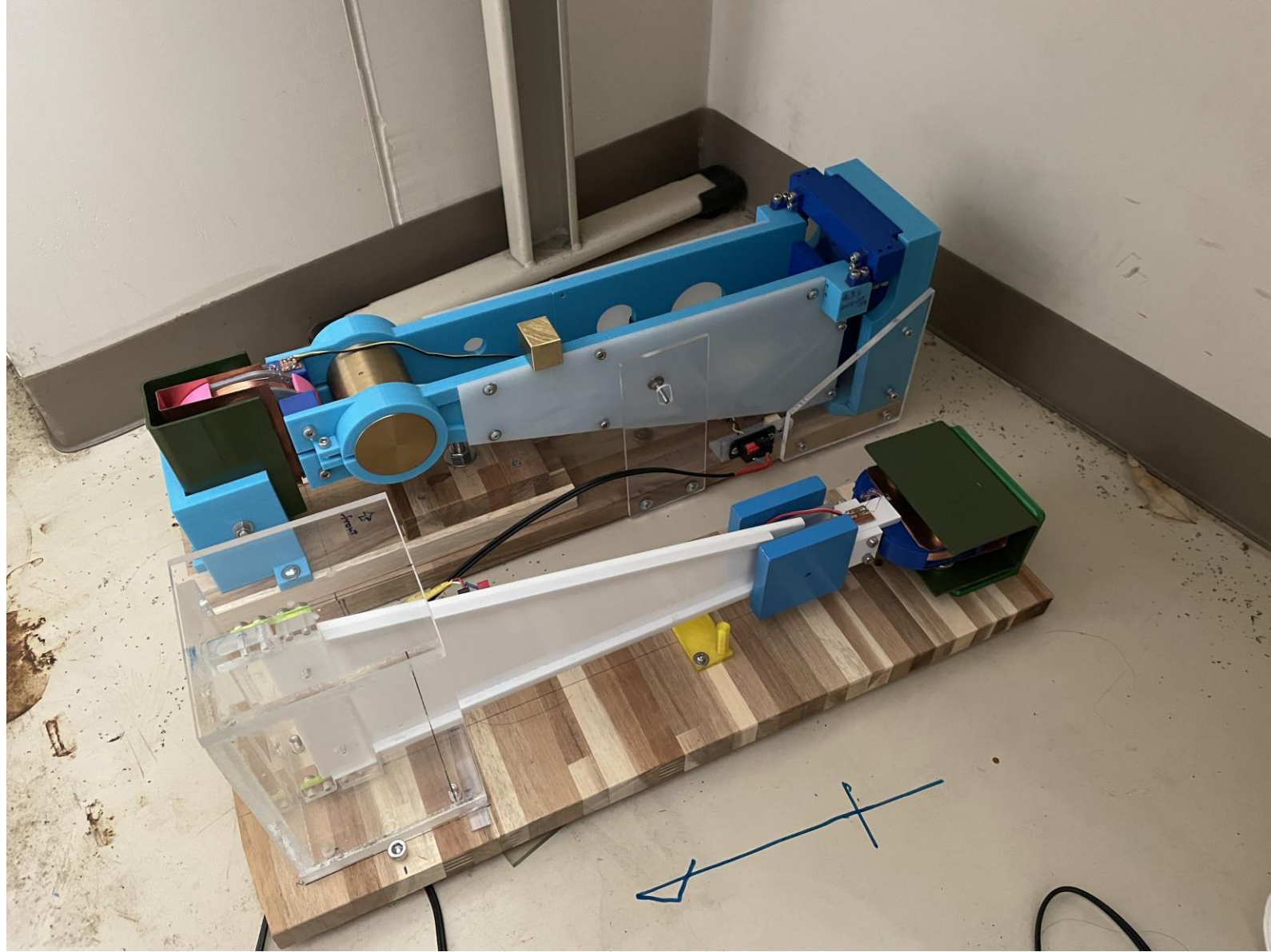


Our seismographs in Thailand
Prof. Ohm and our seismographs at Silpakorn Univ.
Physics Labo.



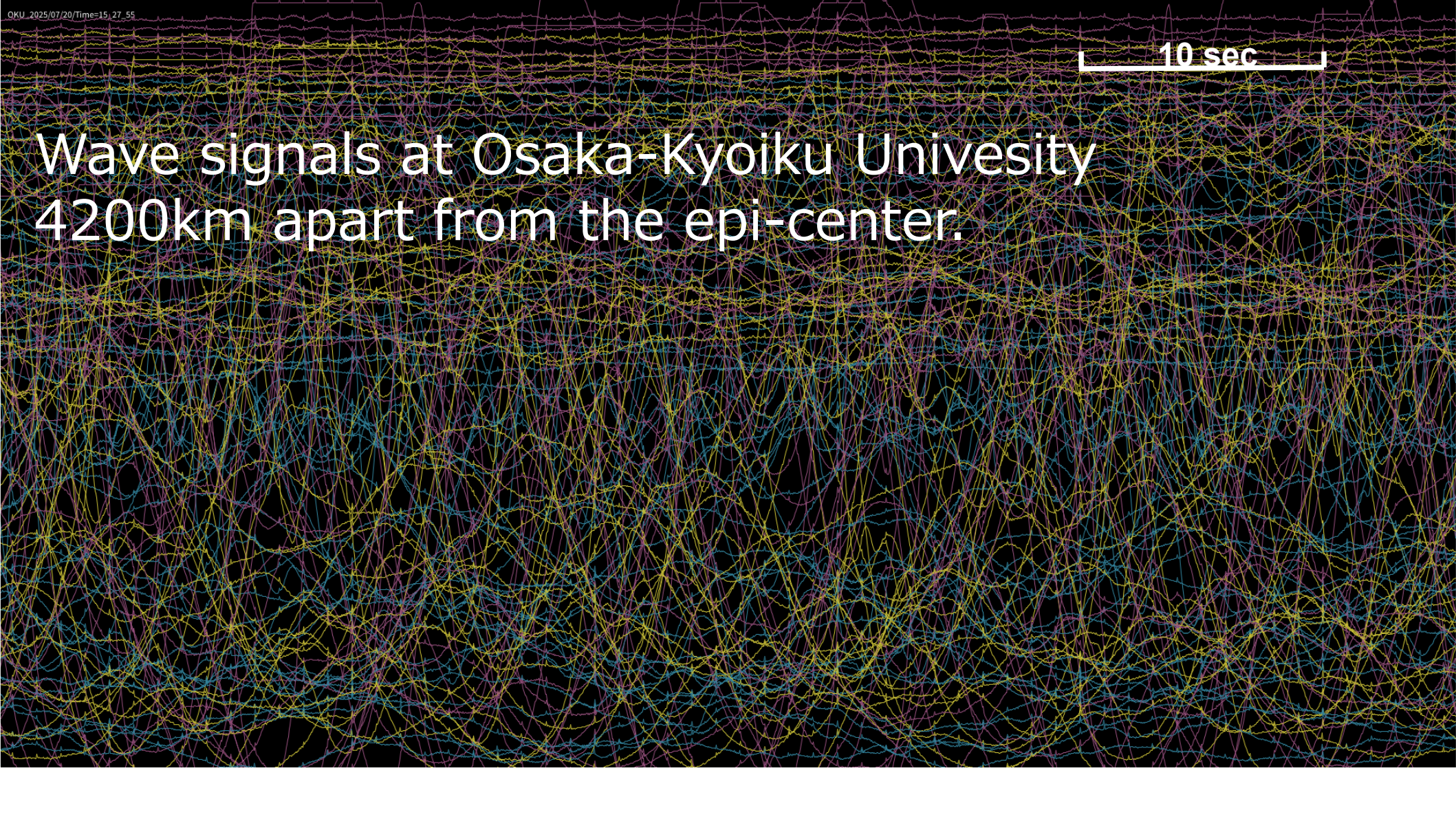


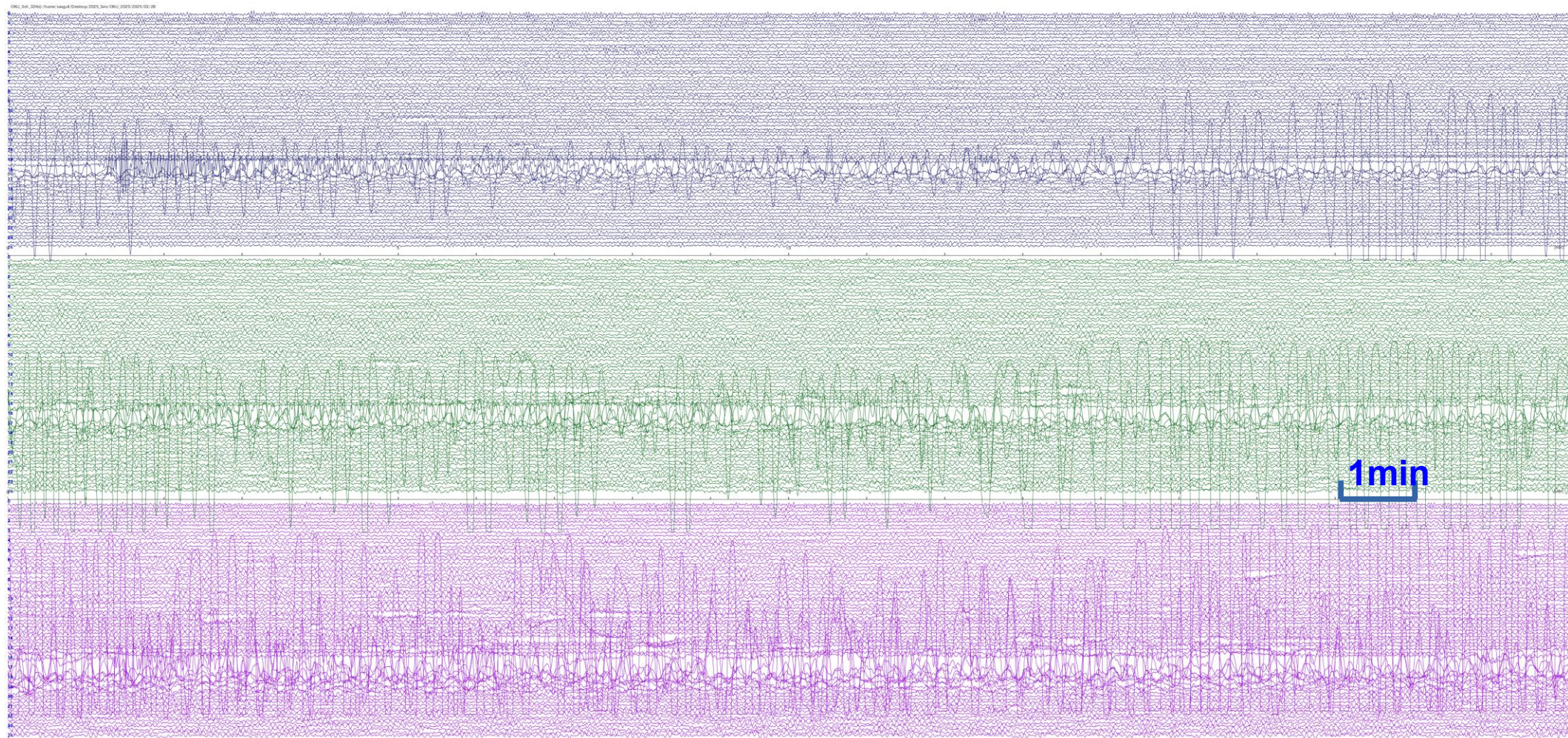
Our seismographs in Osaka-Kyoiku Univ.

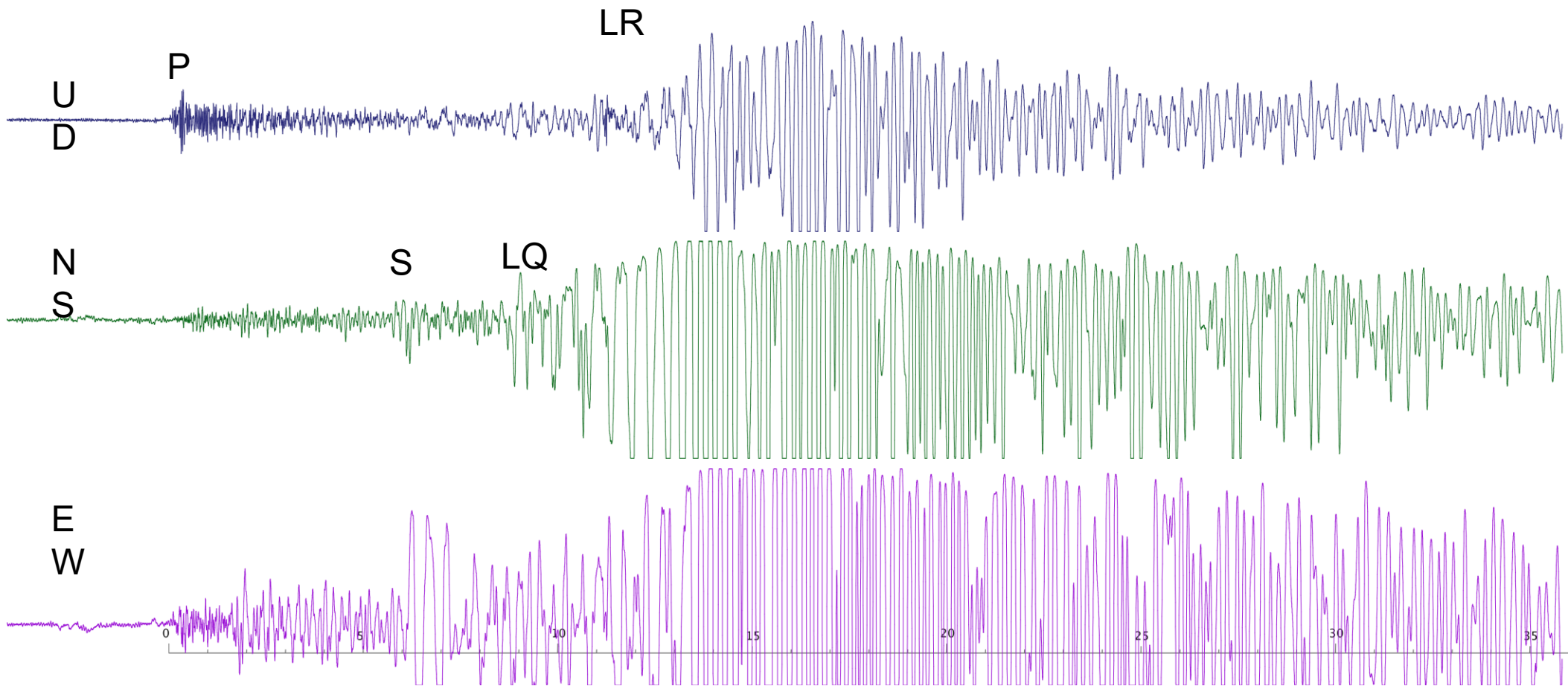


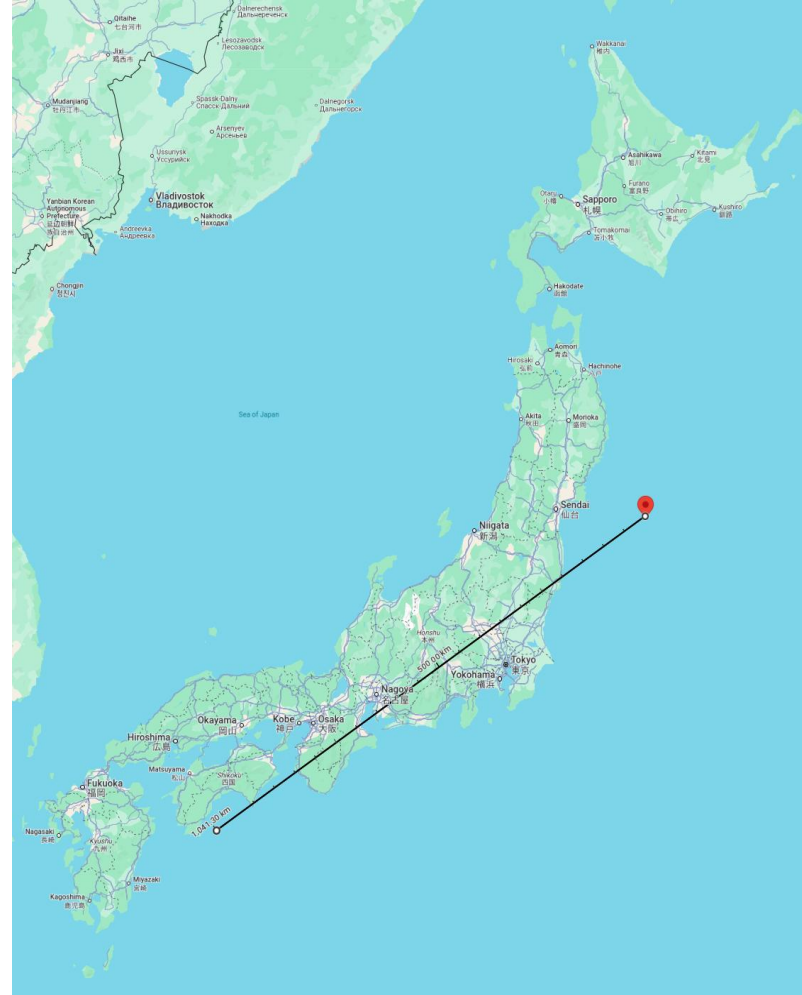
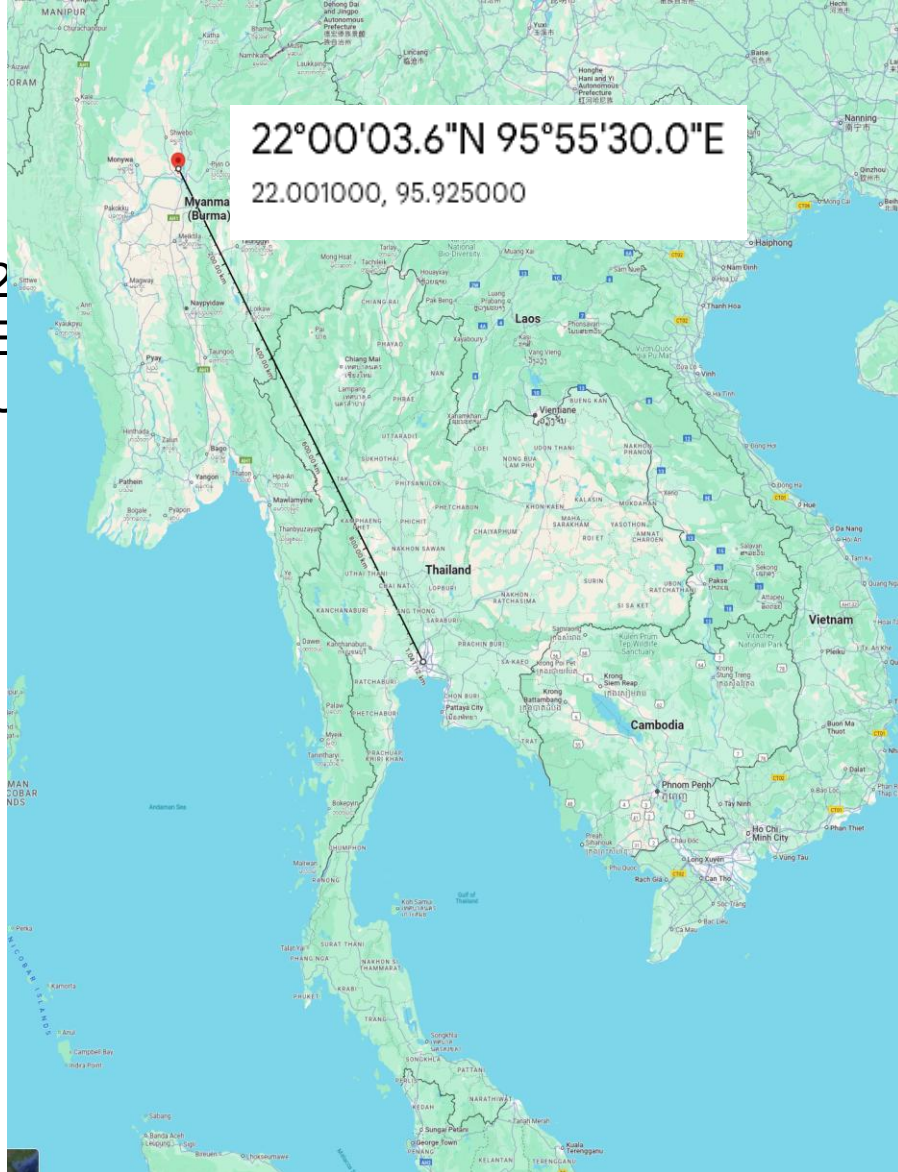
10 sec

Wave signals at Osaka-Kyoiku University
4200km apart from the epi-center.







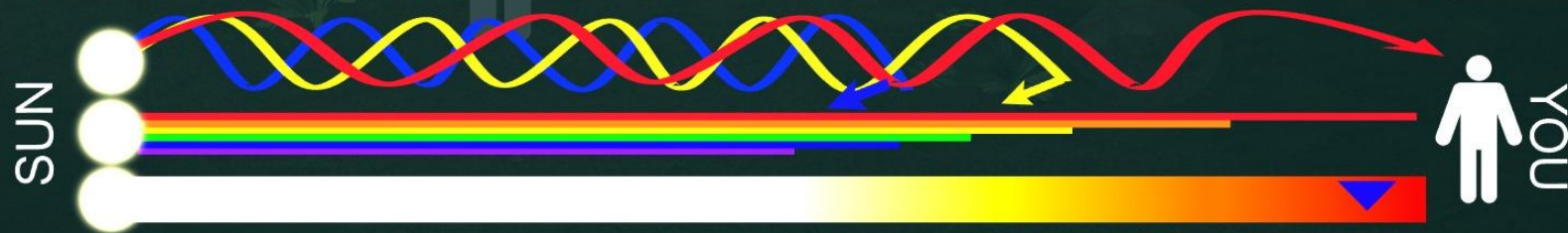


1000km: Why did damage occur despite the epicenter being so far away?

WHY ARE SUNSETS REDDISH?



Because blue/violet light have short wavelengths... they are most likely to be scattered by air/dust particles.

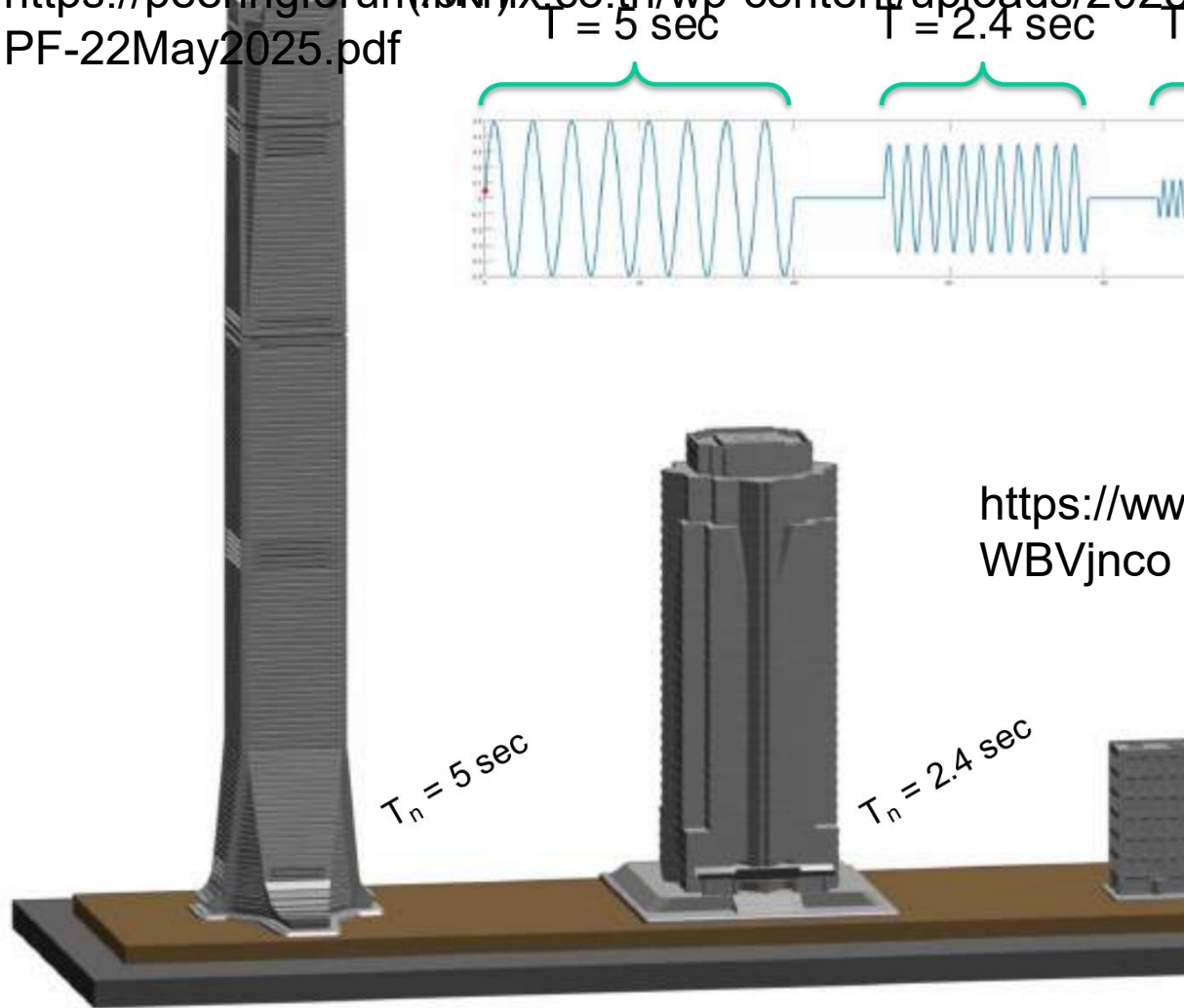


As the distance increases, most of the light left unscattered is red and orange.

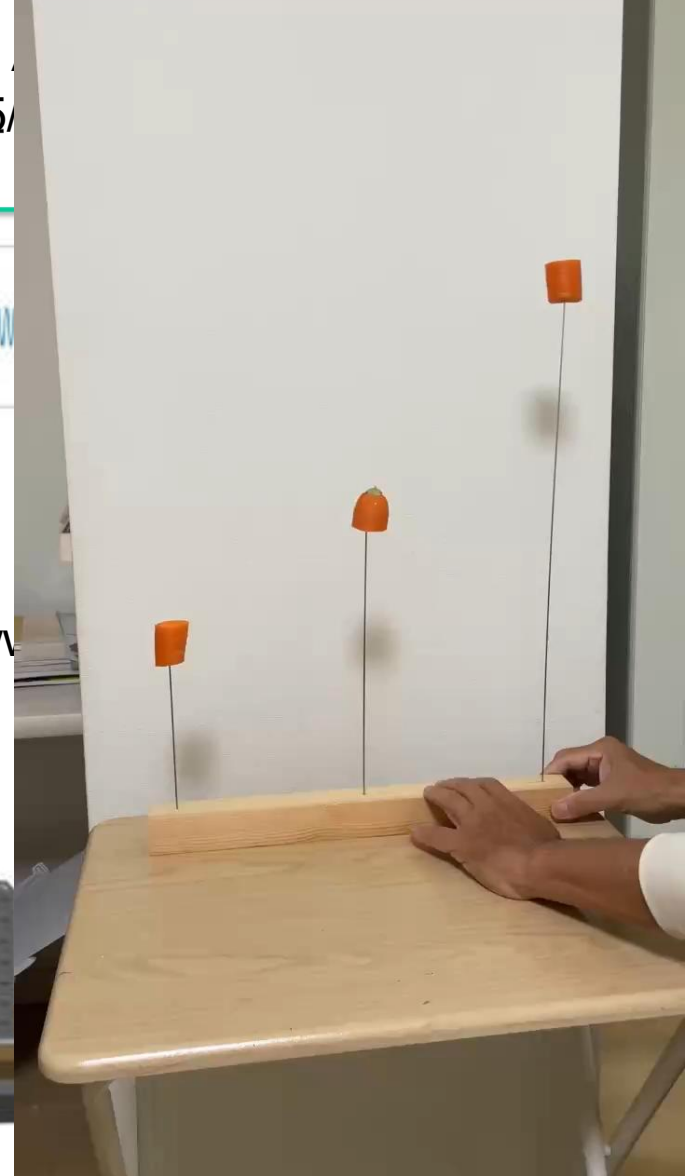
Resonance Effect

By Pennung Warnitchai, Professor of

<https://peeringforum.asix.co.th/wp-content/uploads/2025/05/PF-22May2025.pdf>



<https://www.WBVjnco>



How to find the epi-center?

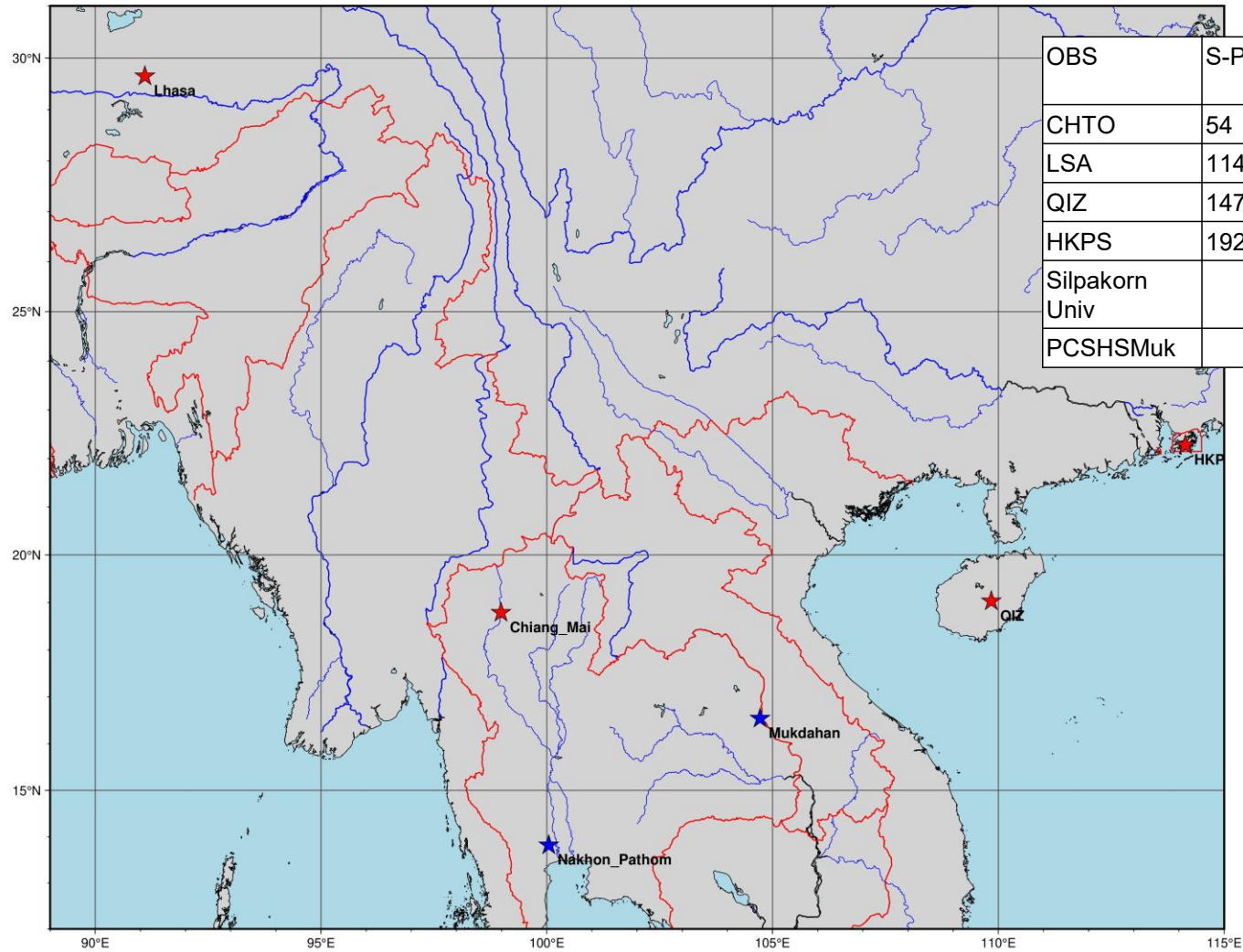
- Exercise

prepare: mathematical compass

- Seismograms

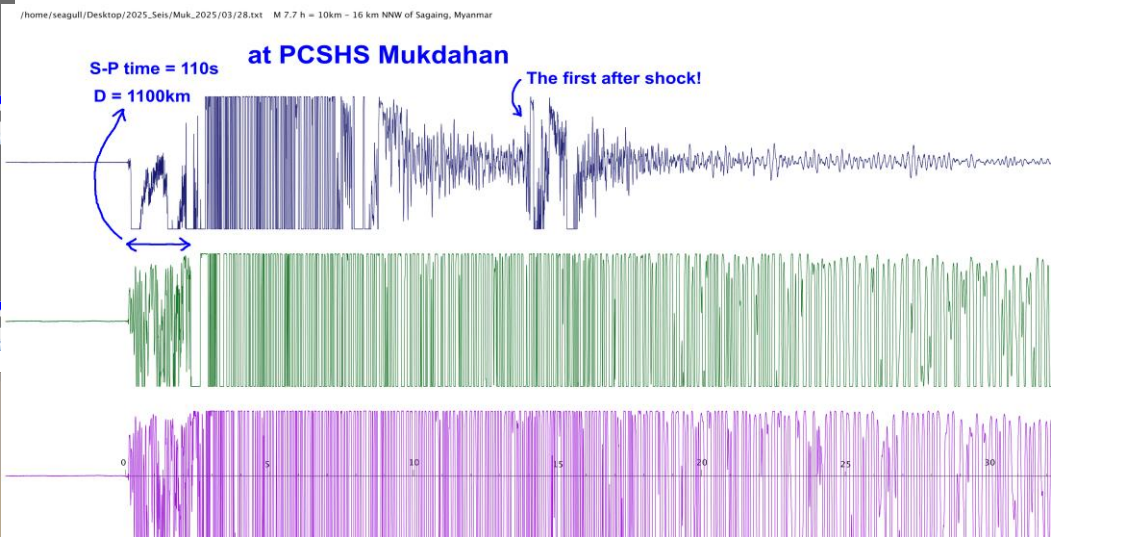
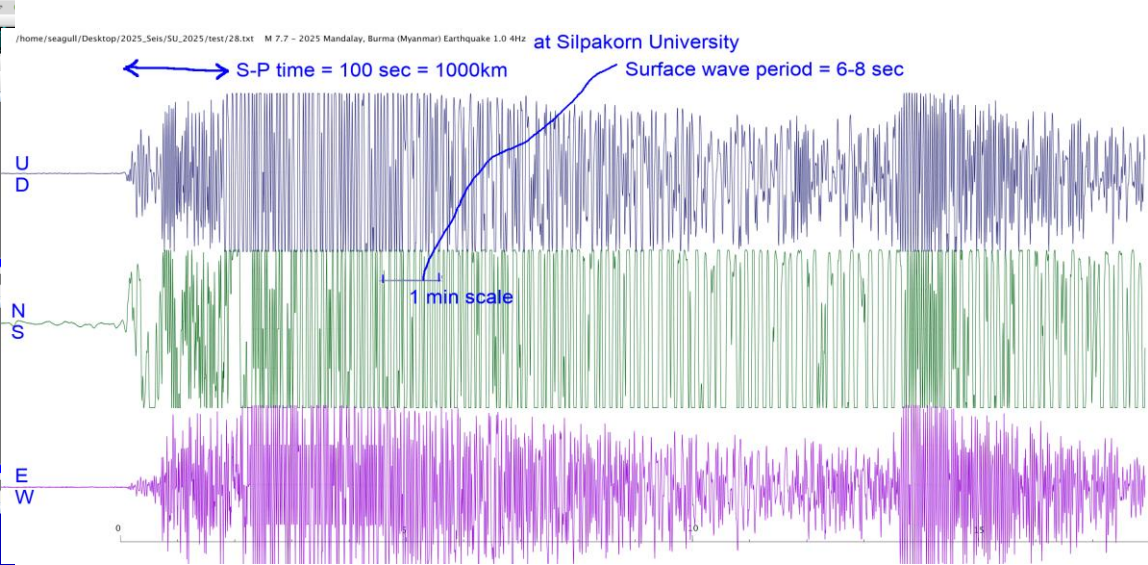
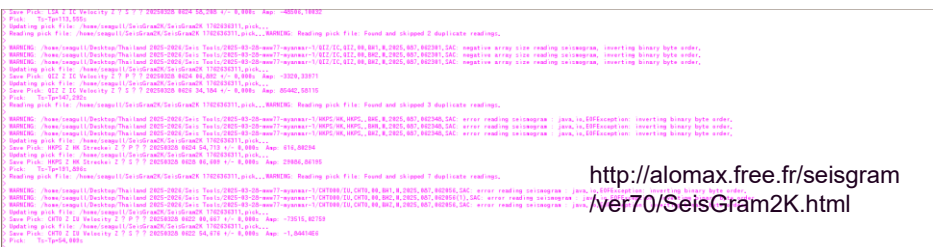


Around Thailand Seismic Stations Map

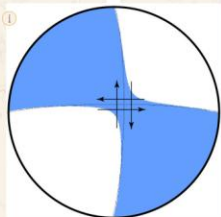


OBS	S-P Time[s]	Omori K[km/s]	Distance[km]
CHTO	54		
LSA	114		
QIZ	147		
HKPS	192		
Silpakorn Univ			
PCSHSMuk			

2000km



28 March 2025, M 7.7 Mandalay, Burma (Myanmar) Earthquake



Focal mechanism of the 28 March 2025, M 7.7 Mandalay earthquake determined from W-phase inversion (Dapet et al, 2012; See Appendix for a tutorial on focal mechanisms. Arrows show the direction of motion for each of the nodal plane (fault).

The 28 March 2025, M 7.7 earthquake (yellow star) near Mandalay, Burma (Myanmar), occurred in a region of the Sagaing fault that had not seen notable seismicity (M 5.5 and larger) since 1900. The focal mechanism of the mainshock combined with the distribution of aftershocks indicate that faulting occurred on the Sagaing fault.

USGS Event Summary

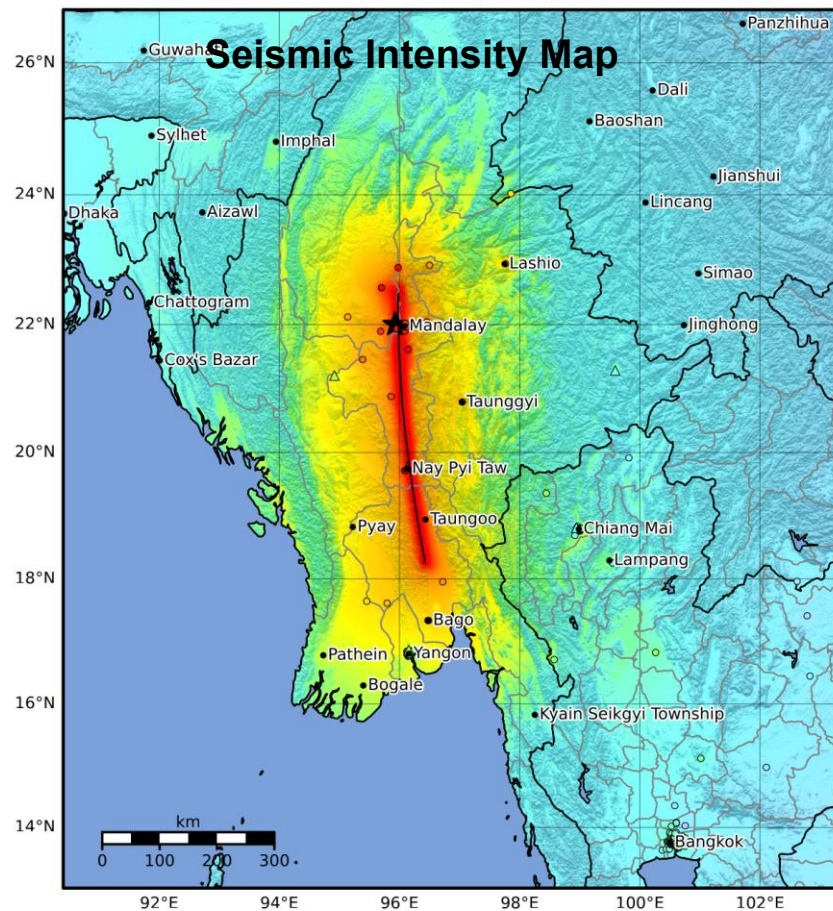
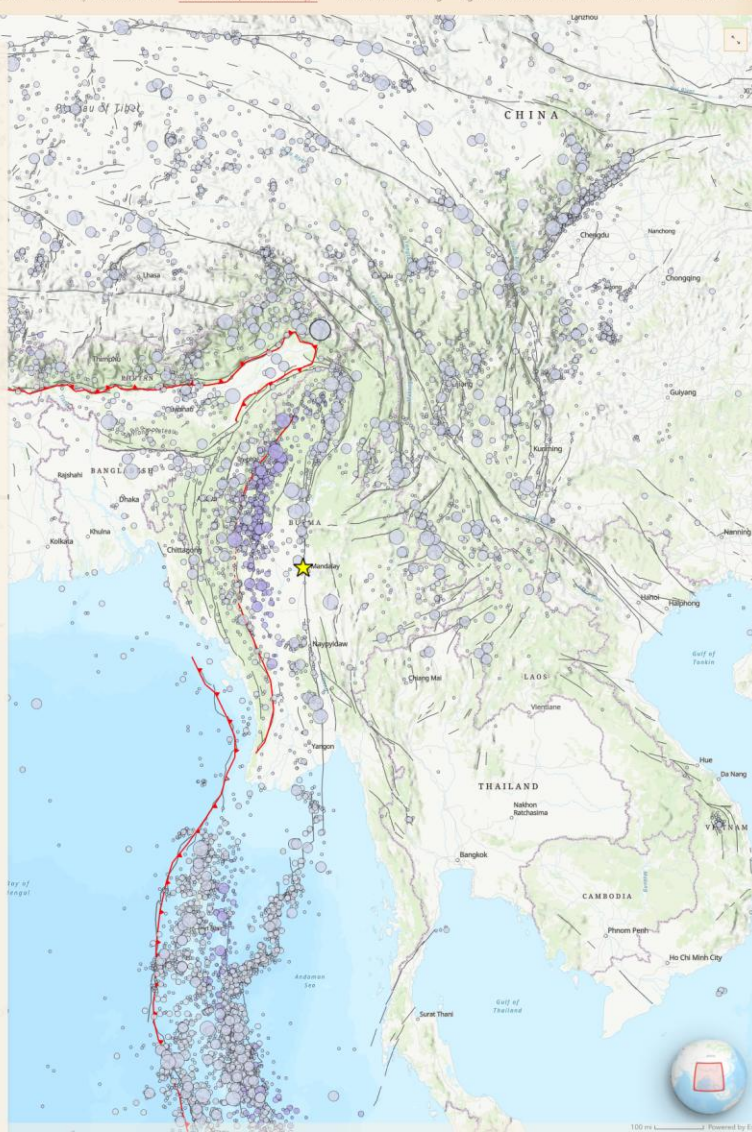
The full range of USGS earthquake information products related to this earthquake are found by clicking [here](#).

Click below to view the locations of the mainshock and M 4.5 and larger aftershocks located by the United States Geological Survey (USGS).

USGS mainshock and aftershocks

This general region has experienced similar large strike-slip earthquakes with six other M 7 and larger earthquakes occurring within about 150 miles (250 km) of the March 28, 2025 earthquake since 1900.

Click on "M 7 and larger earthquakes" to view the largest events in this broad region of southeast Asia.



SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	None	None	None	Very light	Light	Moderate	Moderate/heavy	Heavy	Very heavy
PGA(%g)	<0.0464	0.297	2.76	6.2	11.5	21.5	40.1	74.7	>139
PGV(cm/s)	<0.0215	0.135	1.41	4.65	9.64	20	41.4	85.8	>178
INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based on Worden et al. (2012)

△ Seismic Instrument ○ Reported Intensity

★ Epicenter □ Rupture

Version 21: Processed 2025-04-16T05:13:29Z

Question!

Today's method is an old-style
(legacy) method.

Now we use a more modern
method.

But Why?

P- and S-wave particle motion and relative speed

Example used: M6.0 Napa earthquake August 24, 2014

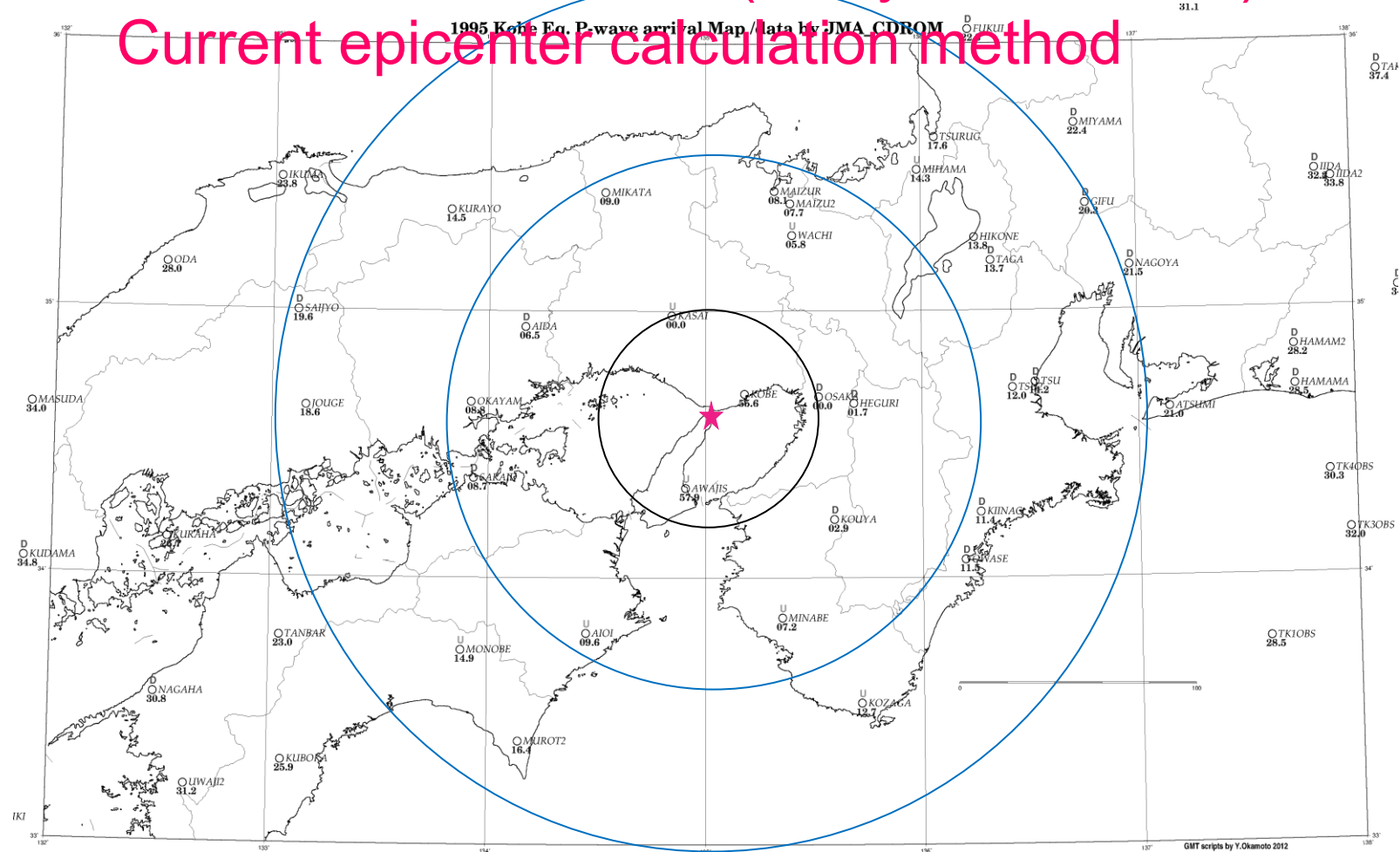
Particle wave motion: **P** $\longleftrightarrow$ **S** $\updownarrow$

P = 6 km/sec (3.7 mi/sec)

S = 4 km/sec (2.5 mi/sec)

Contours of P-wave arrivals (every 10 seconds): Current epicenter calculation method

U



How to estimate the depth of an earthquake?

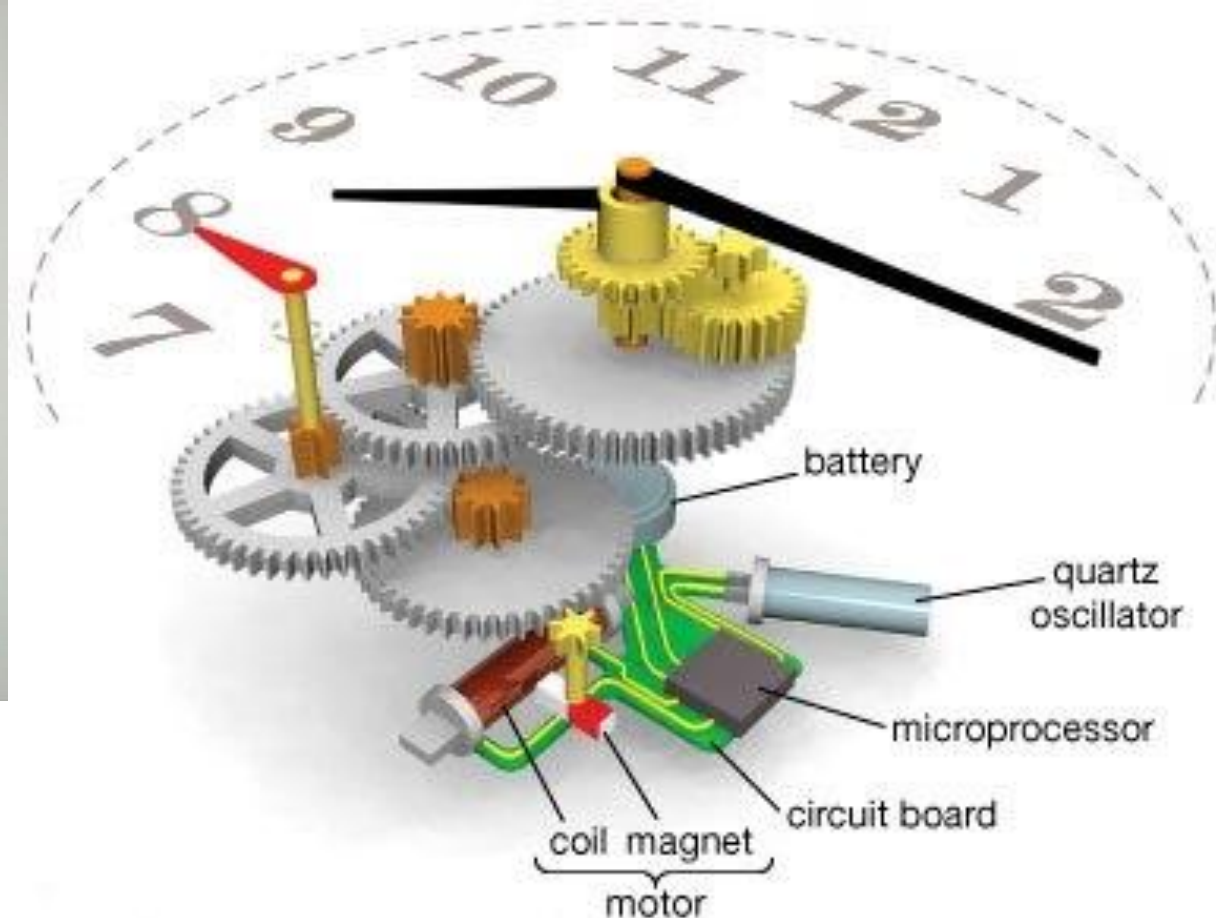


<http://finebbq.link/58/>



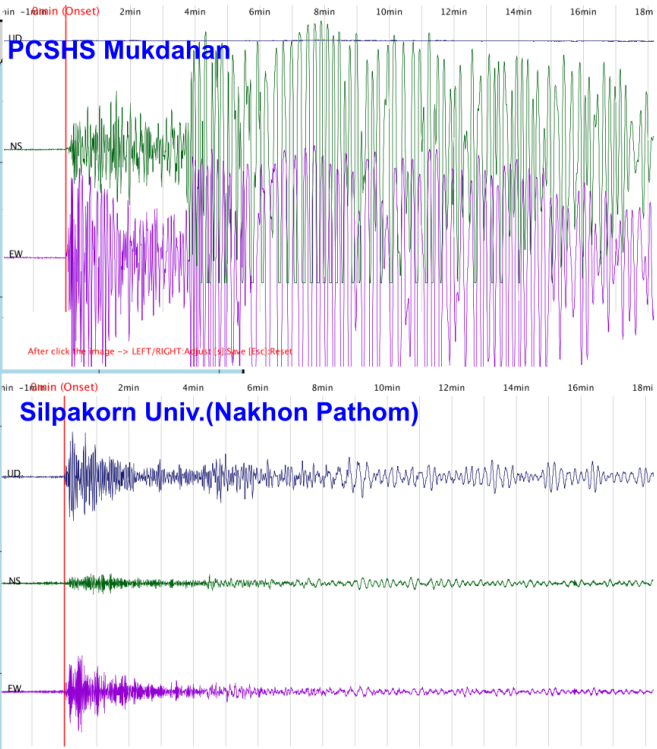
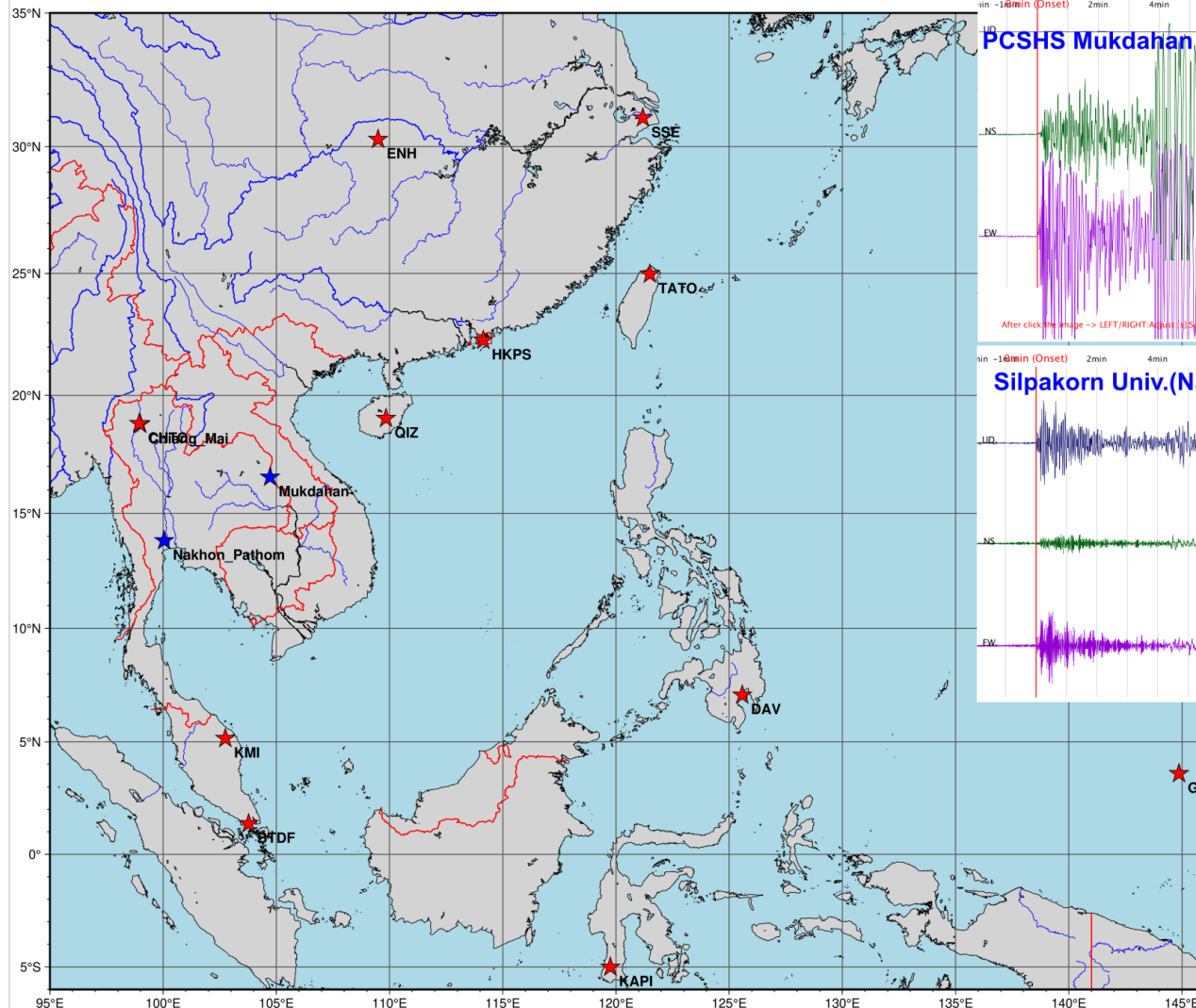
<http://www.asahi-net.or.jp/~va6n-ab/toukenohasiradokei.htm>

<http://www.bridgebearing.net/ja/bridge-expansion-joints.html>

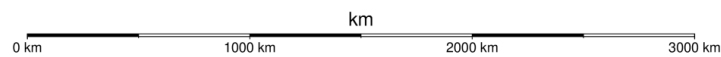


<https://www.timesticking.com/quartz-movements/>

Around Thailand Seismic Stations Map



OBS	S-P time[s]	Omori K[km/s]	Distance[km]
DAV		10 [km/s]	
TATO	168	x 10	= 1680km
HKPS			
QIZ			
KAPI			
GUMO			
SU			
Muk			



2025 SEP 30 (273) 13h59m48.020s
IU DAV Trillium BH1 10 Lexis, Philippin (2)

