

Karakteristik dan Pemutakhiran Model Sumber Gempa Indonesia di Sekitar Wilayah Flores

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Pokja Geologi Pusgen



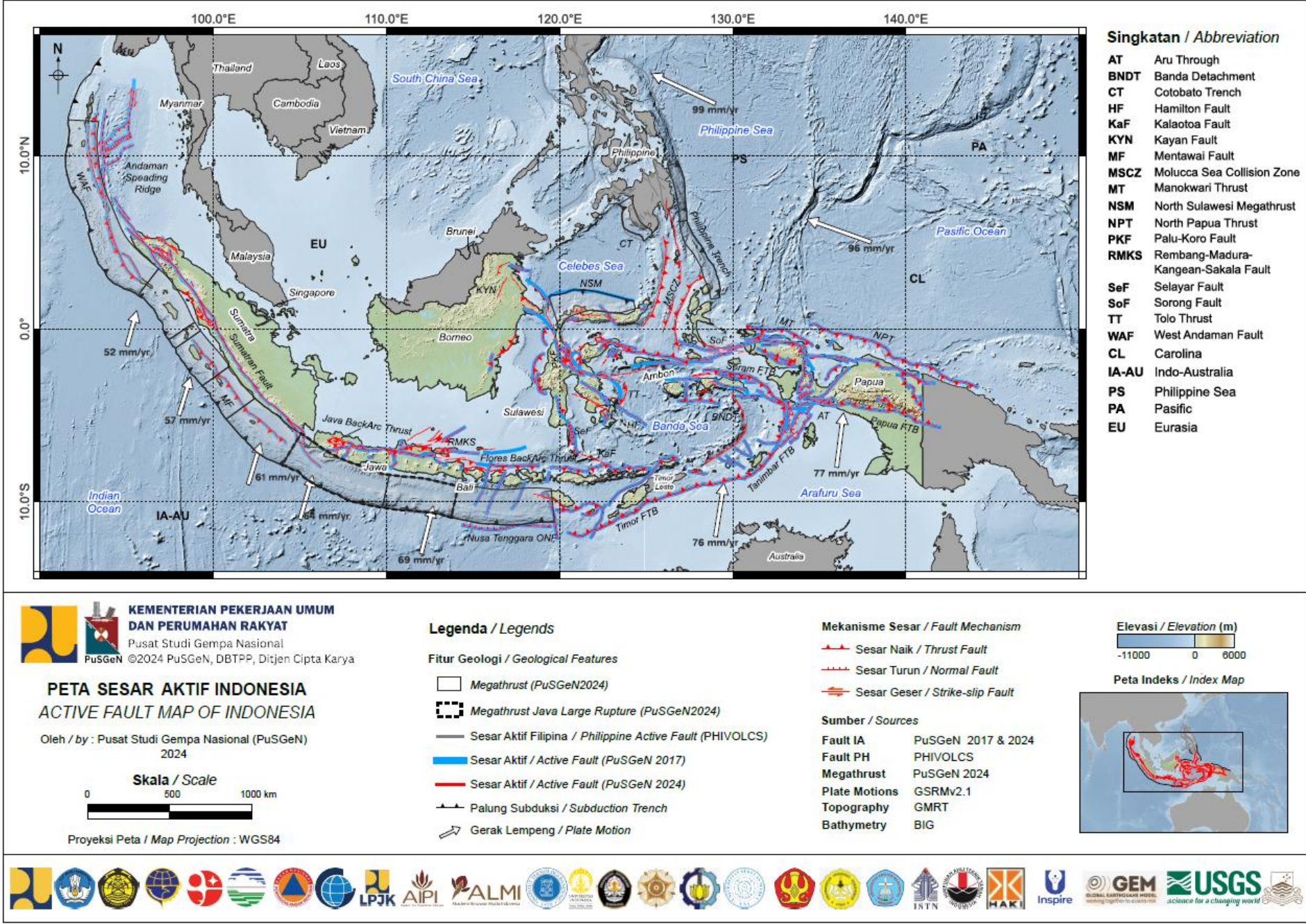
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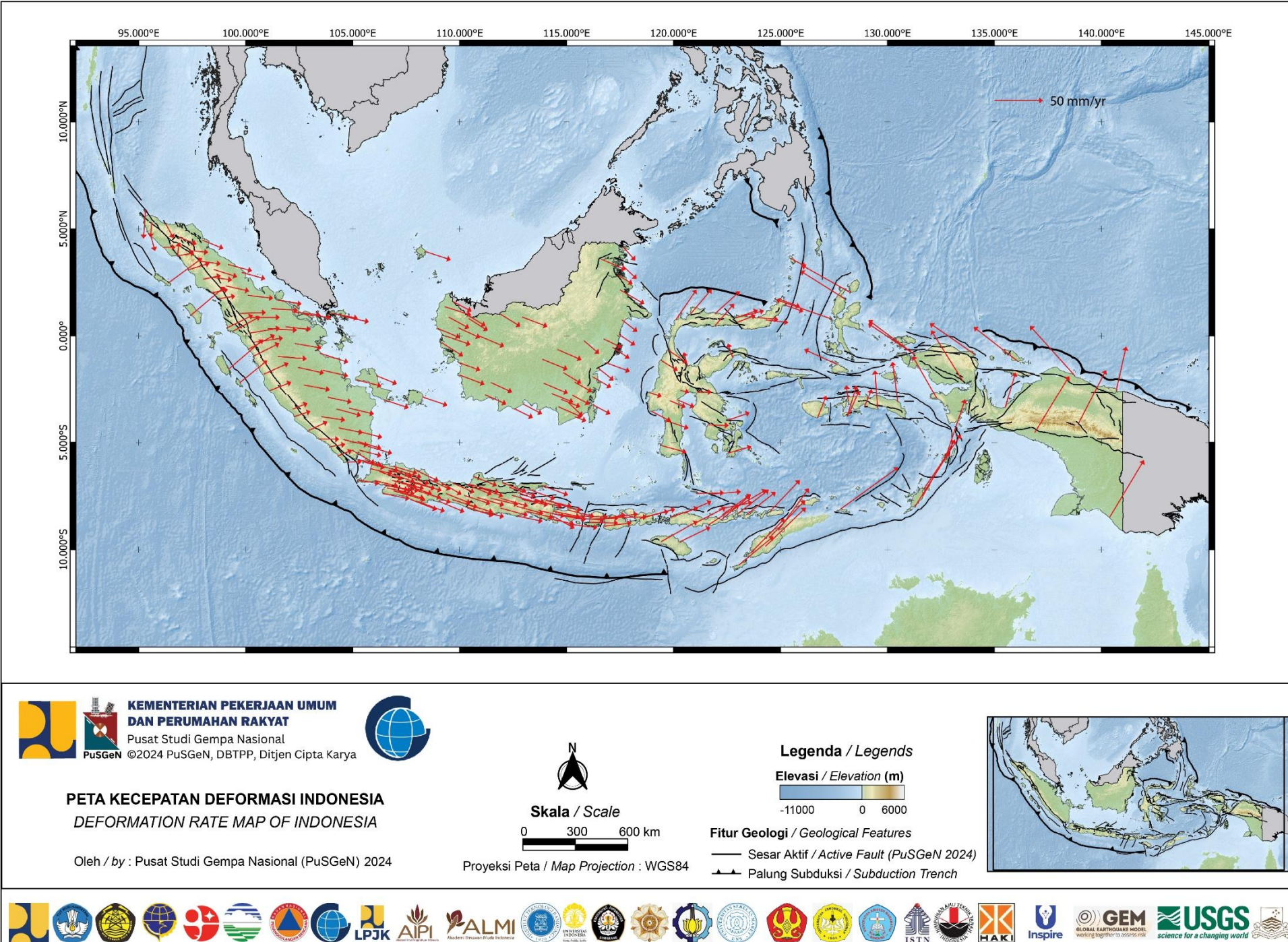
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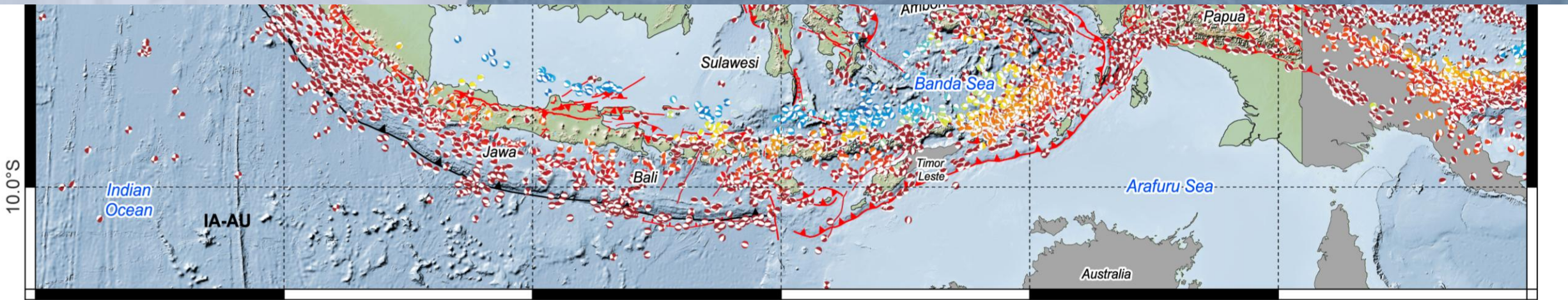
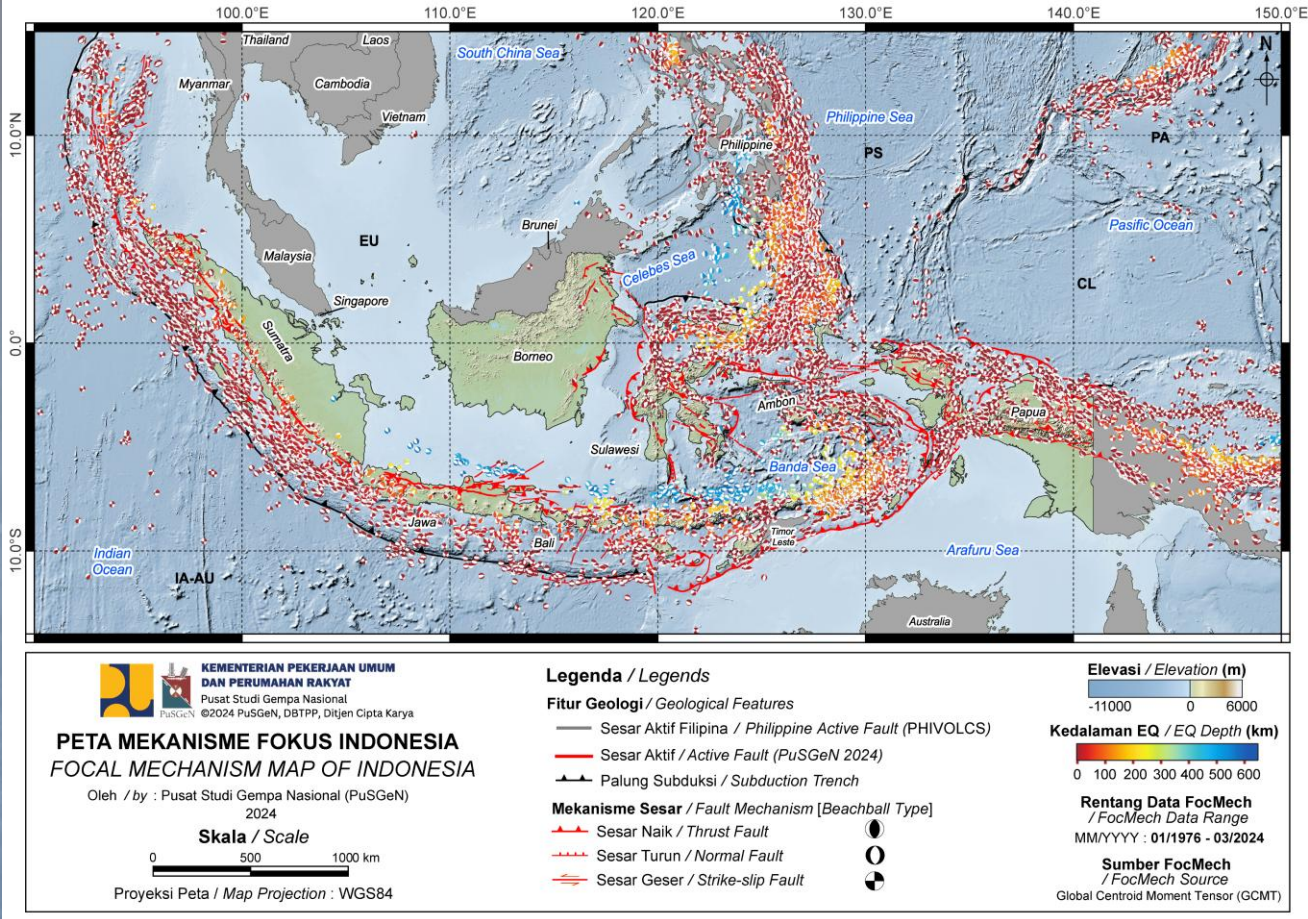
Tectonic framework



Tectonic framework



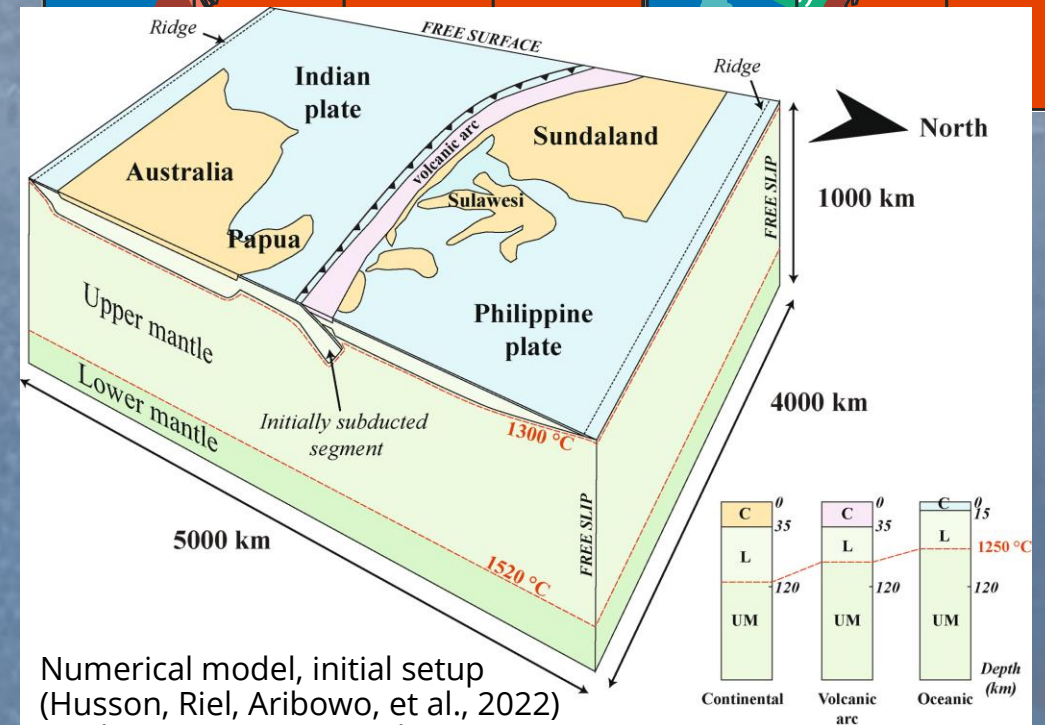
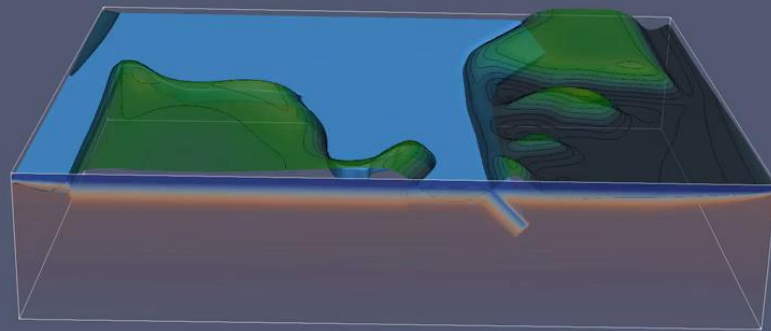
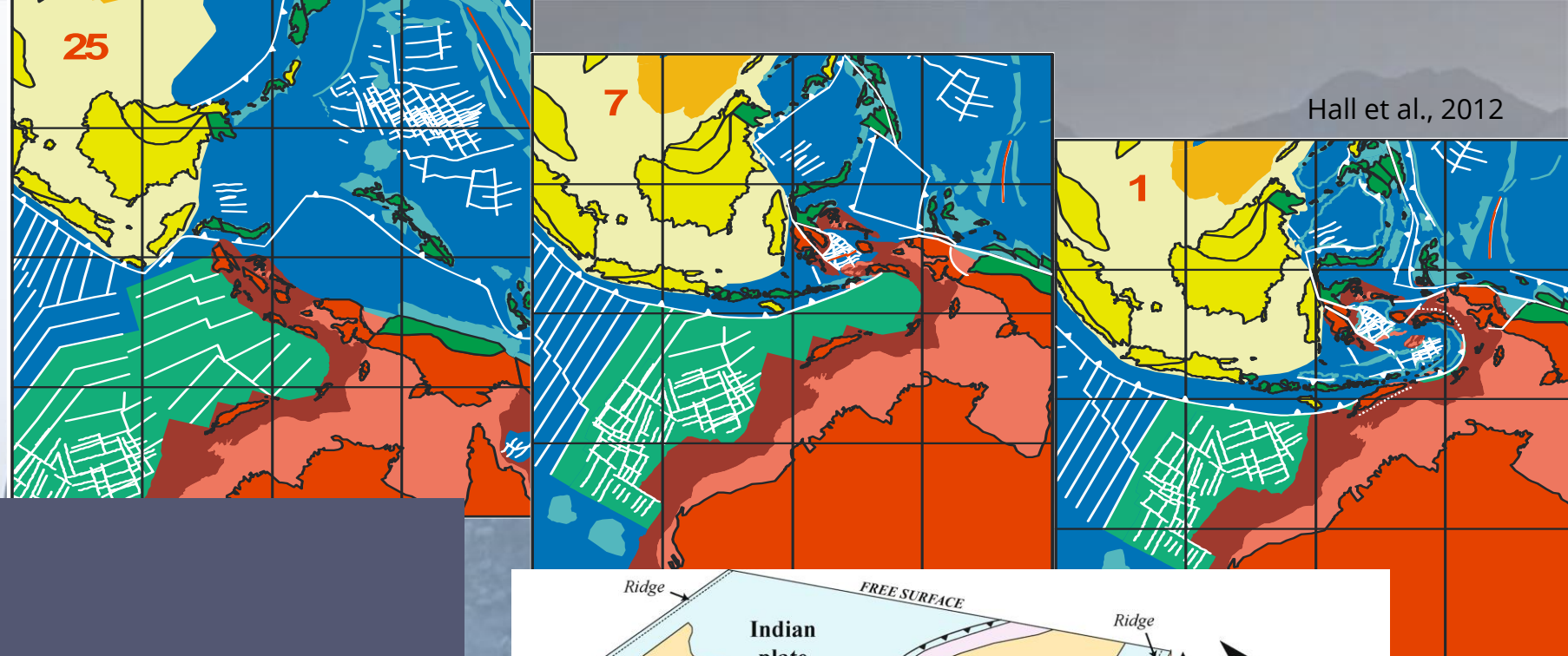
Earthquake sources around Flores



Geodynamic Evolution

The origin of Flores backarc thrust has been attributed to several processes (Yang et al, 2020):

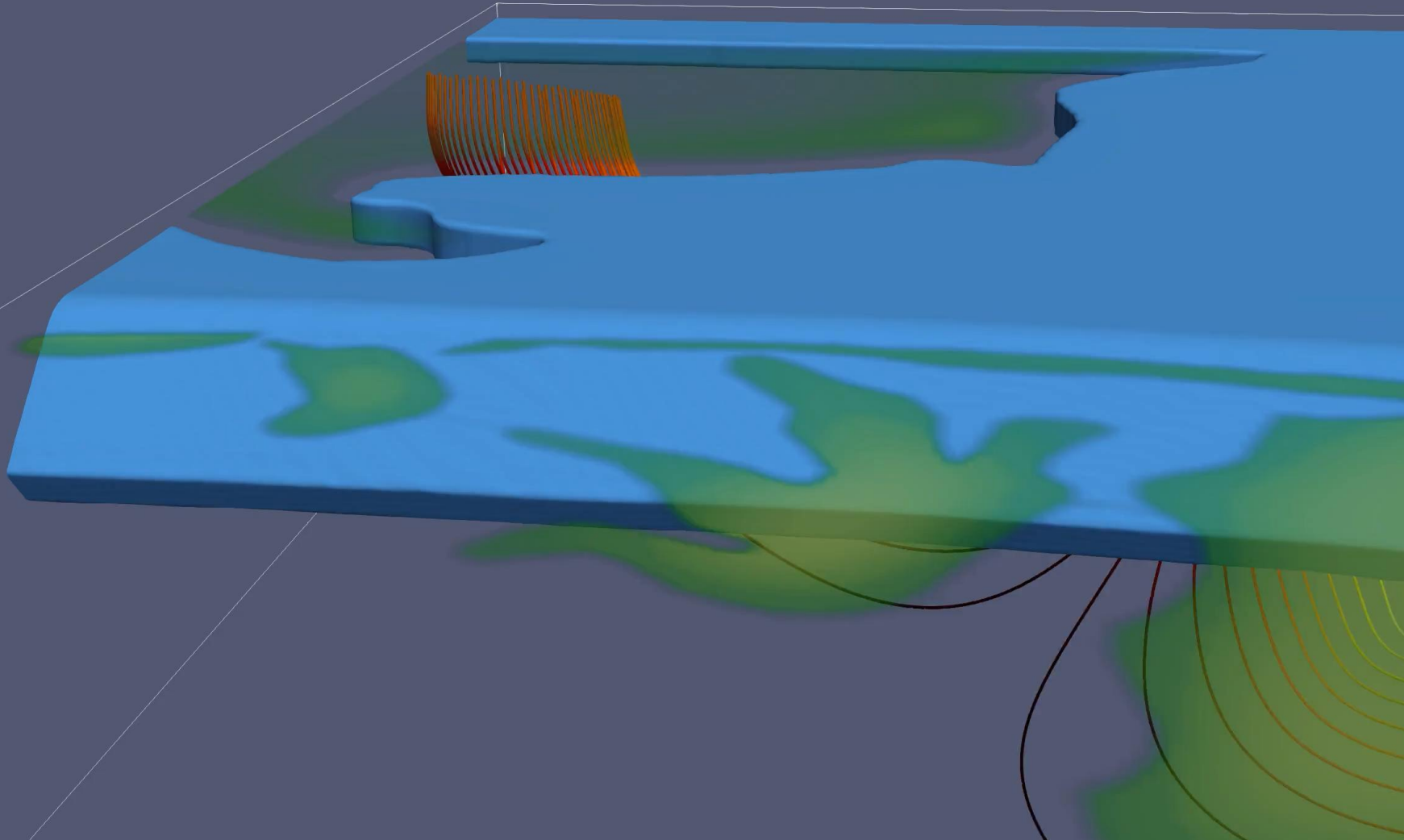
1. reversal of subduction polarity (Hamilton 1979);
2. Stress propagation through the arc (Silver et al. 1983);
3. magmatic intrusion in the arc (Hamilton 1979);
4. gravitational sliding or spreading in the backarc (Hamilton 1979; Breen et al. 1989);
5. stress transfer across the rigid arc-block (ten Brink et al. 2009),



Numerical model, initial setup
(Husson, Riel, Aribowo, et al., 2022)
(Code LaMEM, Kaus et al., 2016)

Geodynamic origin of the Flores Back-arc Thrust

Time: 0.010000

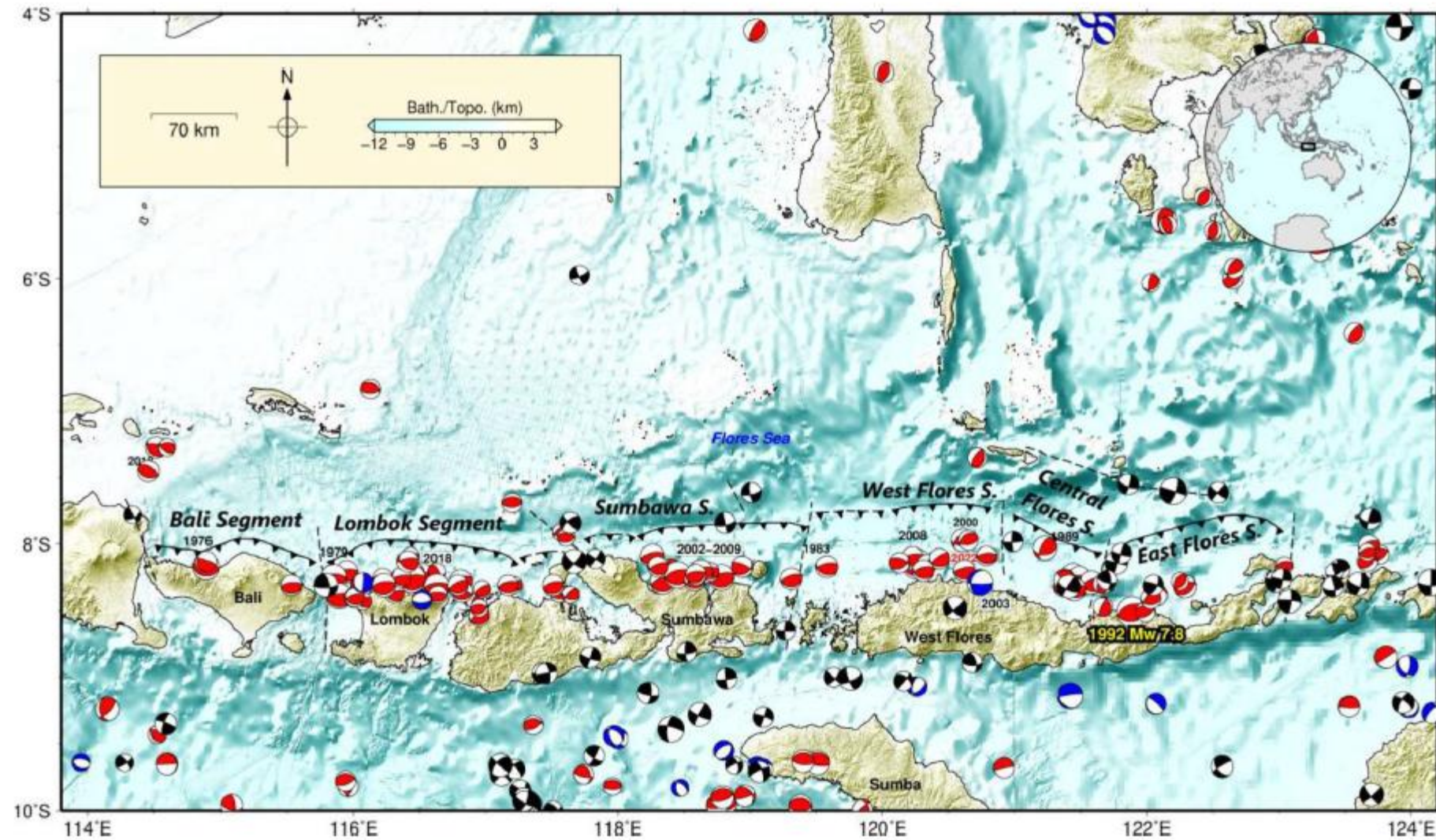


Mantle dynamics led to

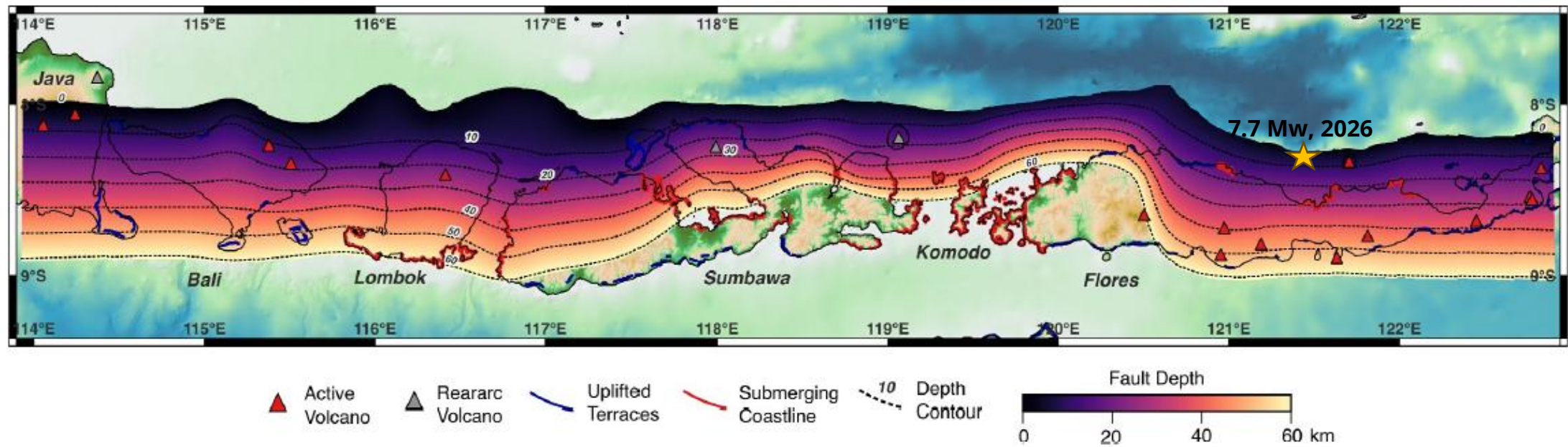
- Trench retreat
- Slab rollback
- Breakoff
- Westward propagation of the Back-arc Thrust

Husson et al., 2022

Seismicity and Earthquake mechanism along the FBT

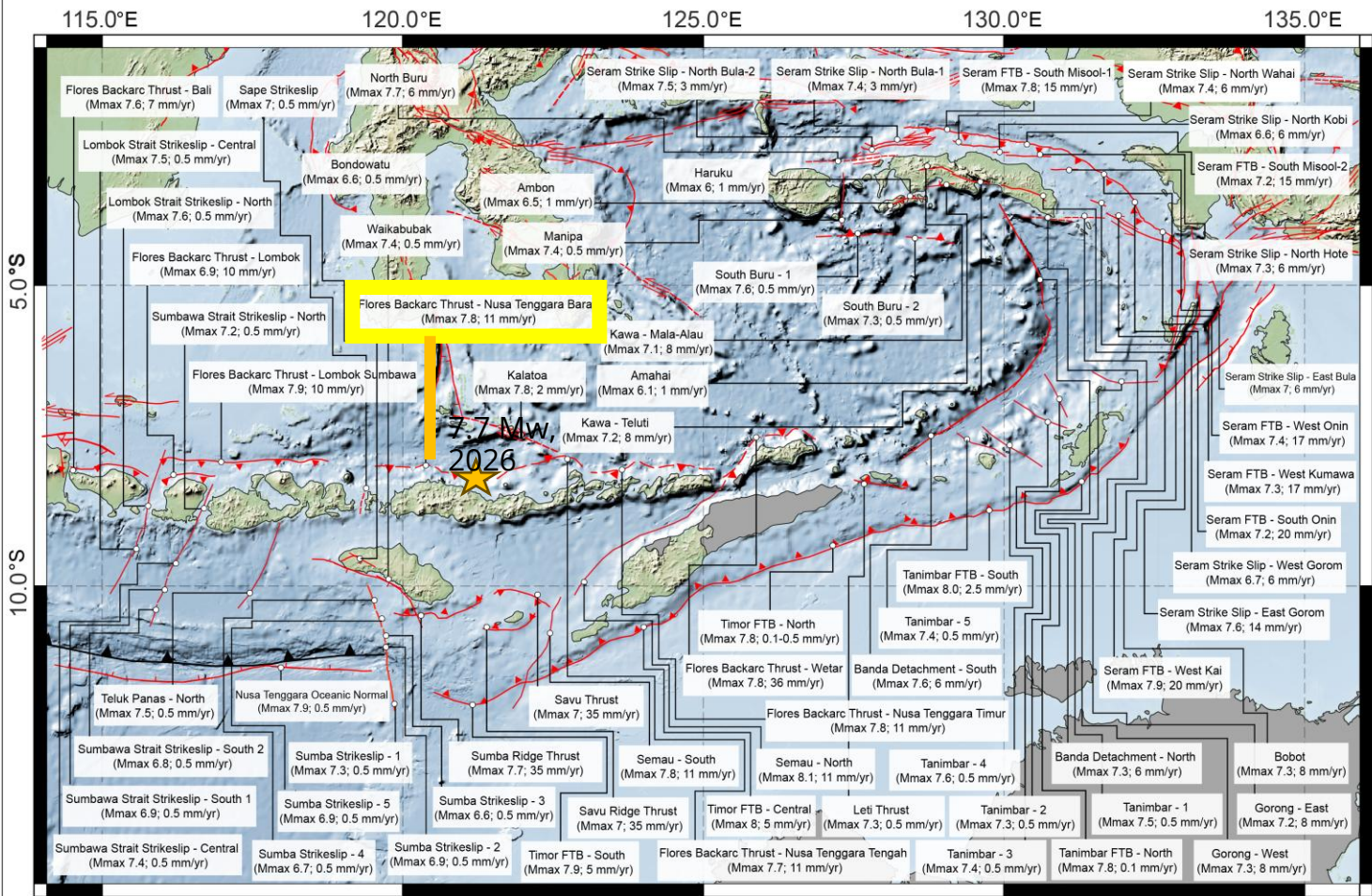


FBT Geometry



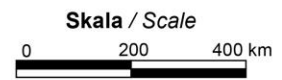
Andikagumi & Bradley, 2024

FBT segmentation



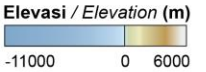
PETA SESAR AKTIF INDONESIA: BALI-BANDA
ACTIVE FAULT MAP OF INDONESIA: BALI-BANDA

Oleh / by : Pusat Studi Gempa Nasional (PuSGeN)
2024



Proyeksi Peta / Map Projection : WGS84

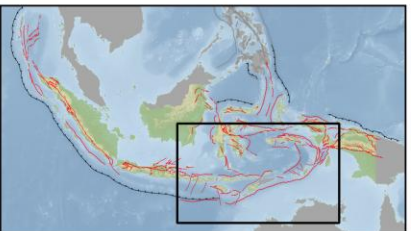
Legenda / Legends



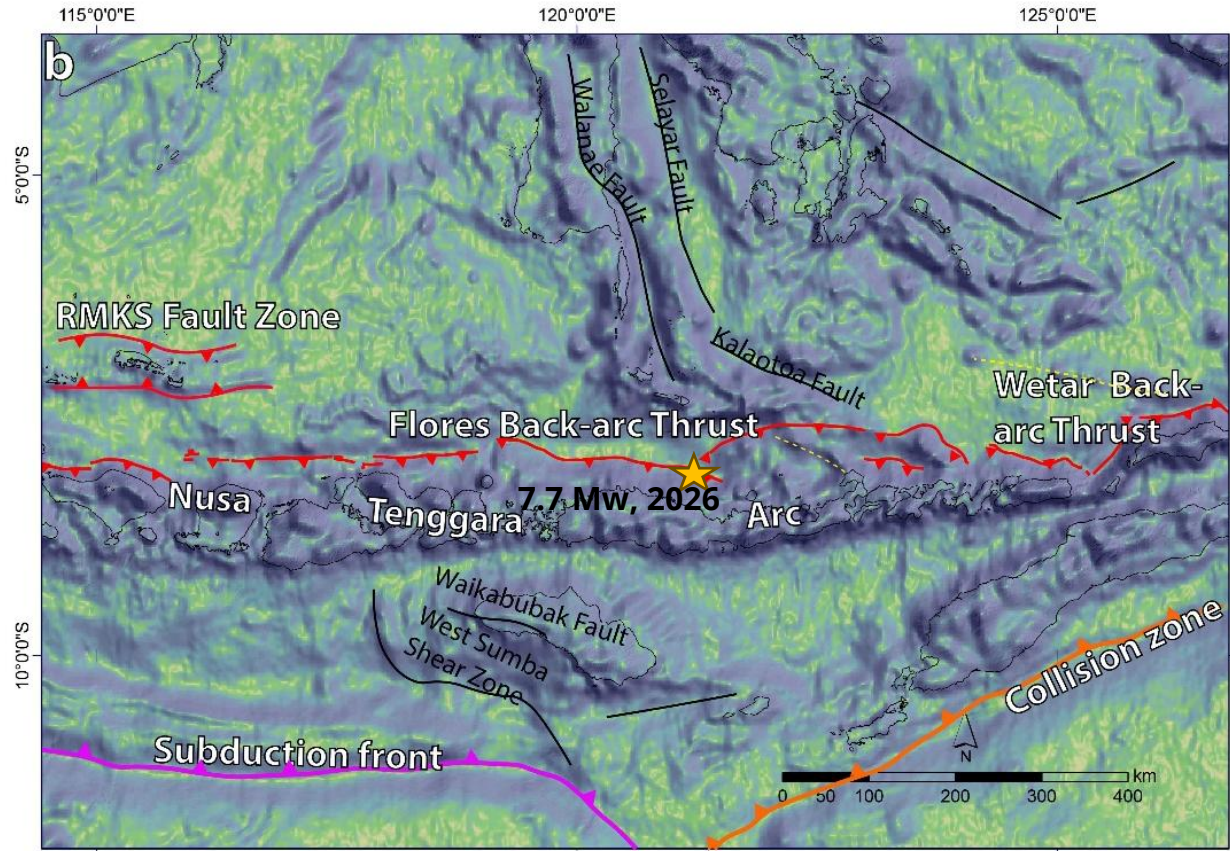
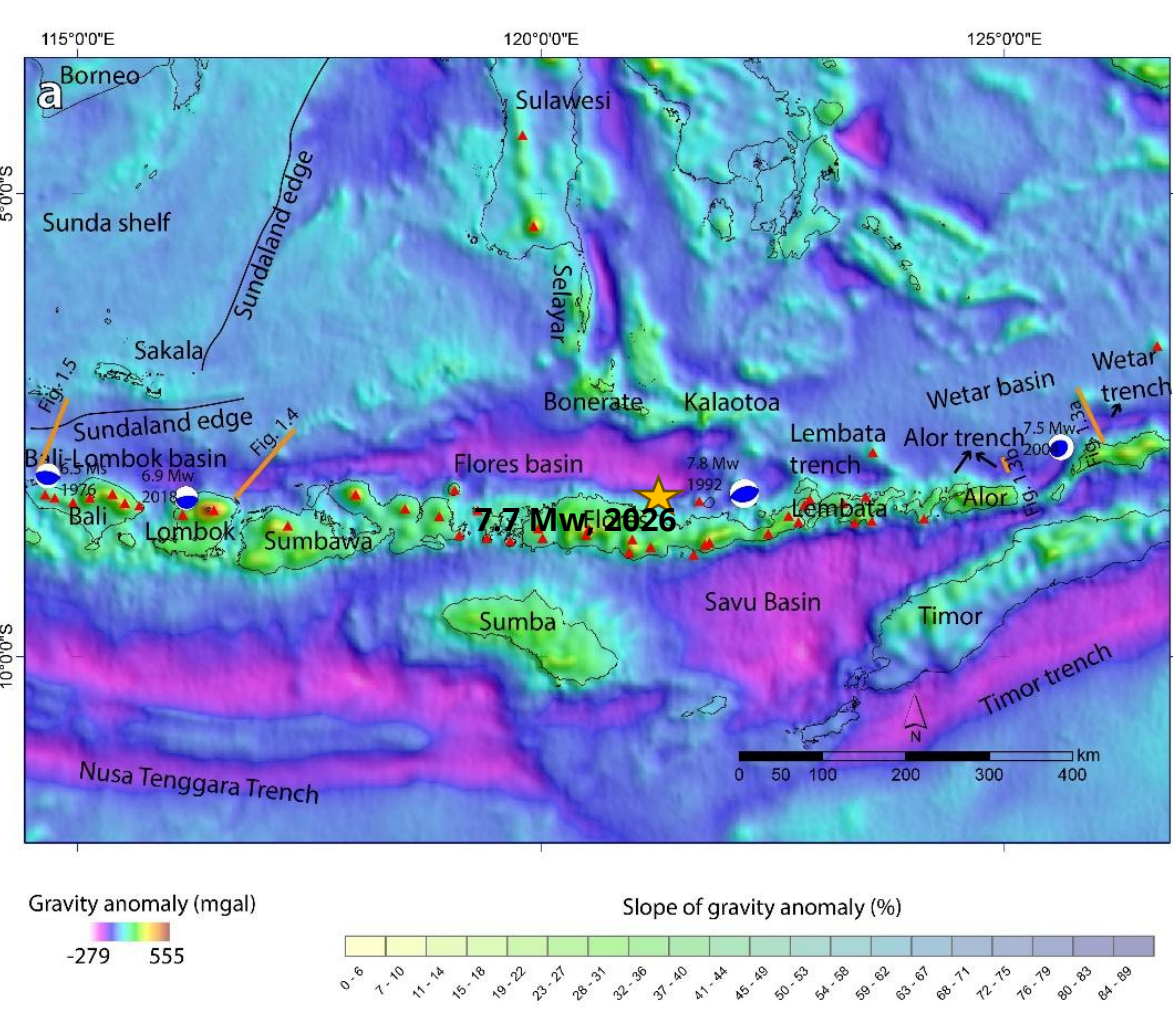
- Fitur Geologi / Geological Features
- Sesar Aktif / Active Fault (PuSGeN 2024)
 - Palung Subduksi / Subduction Trench

- Mekanisme Sesar / Fault Mechanism
- Sesar Naik / Thrust Fault
 - Sesar Turun / Normal Fault
 - Sesar Geser / Strike-slip Fault

Peta Indeks / Index Map

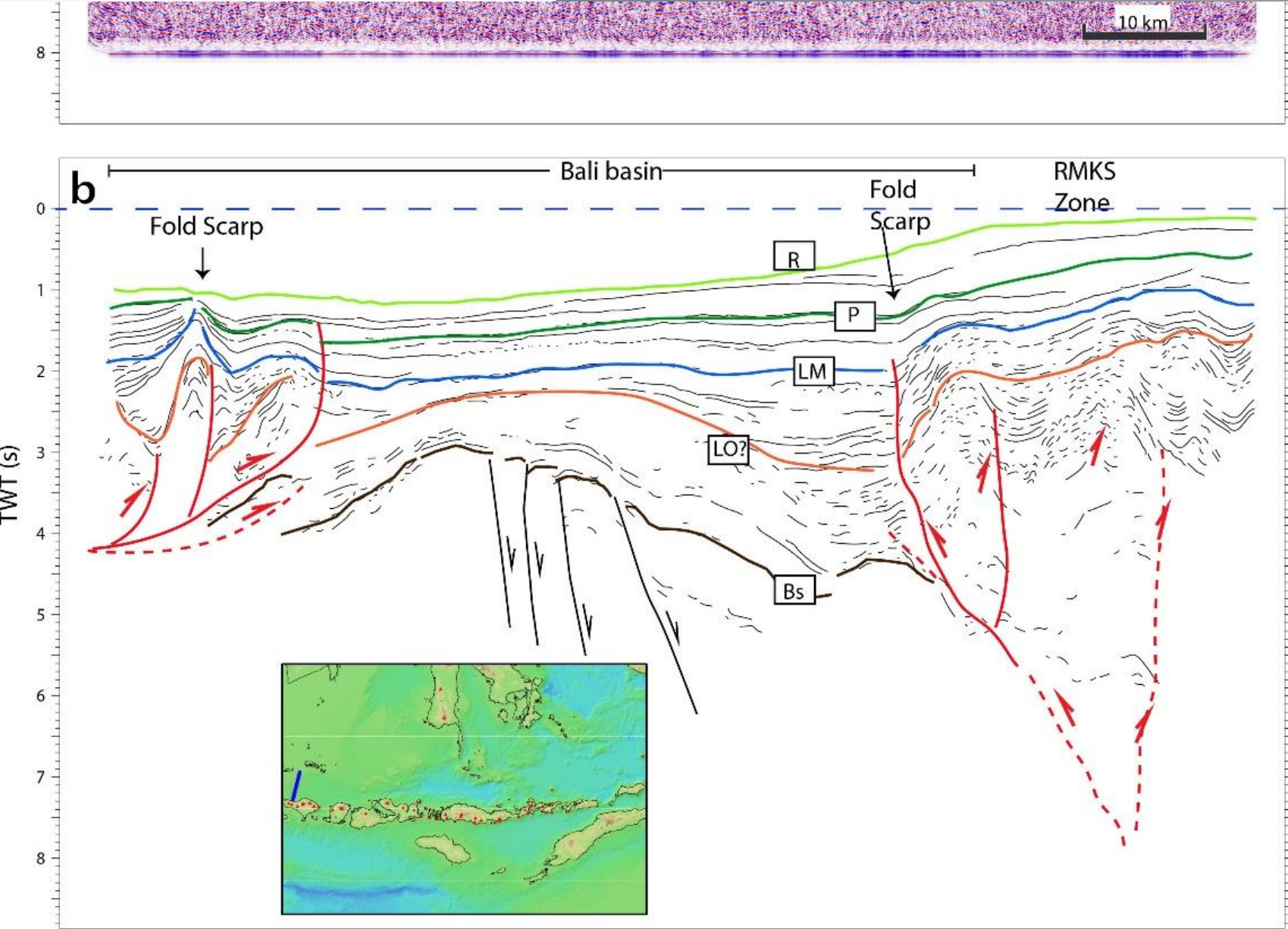


Morphological and geophysical expression of the FBT

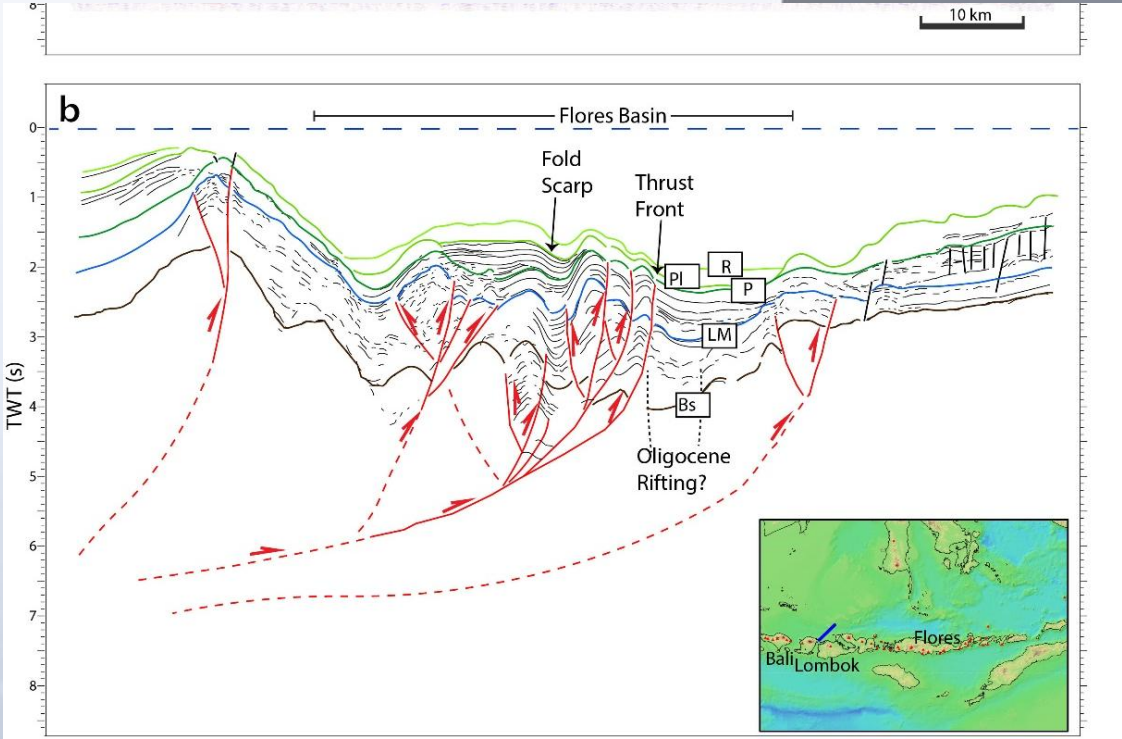


Batimetri, Gebco
Gravity, Sandwell & Smith 2014

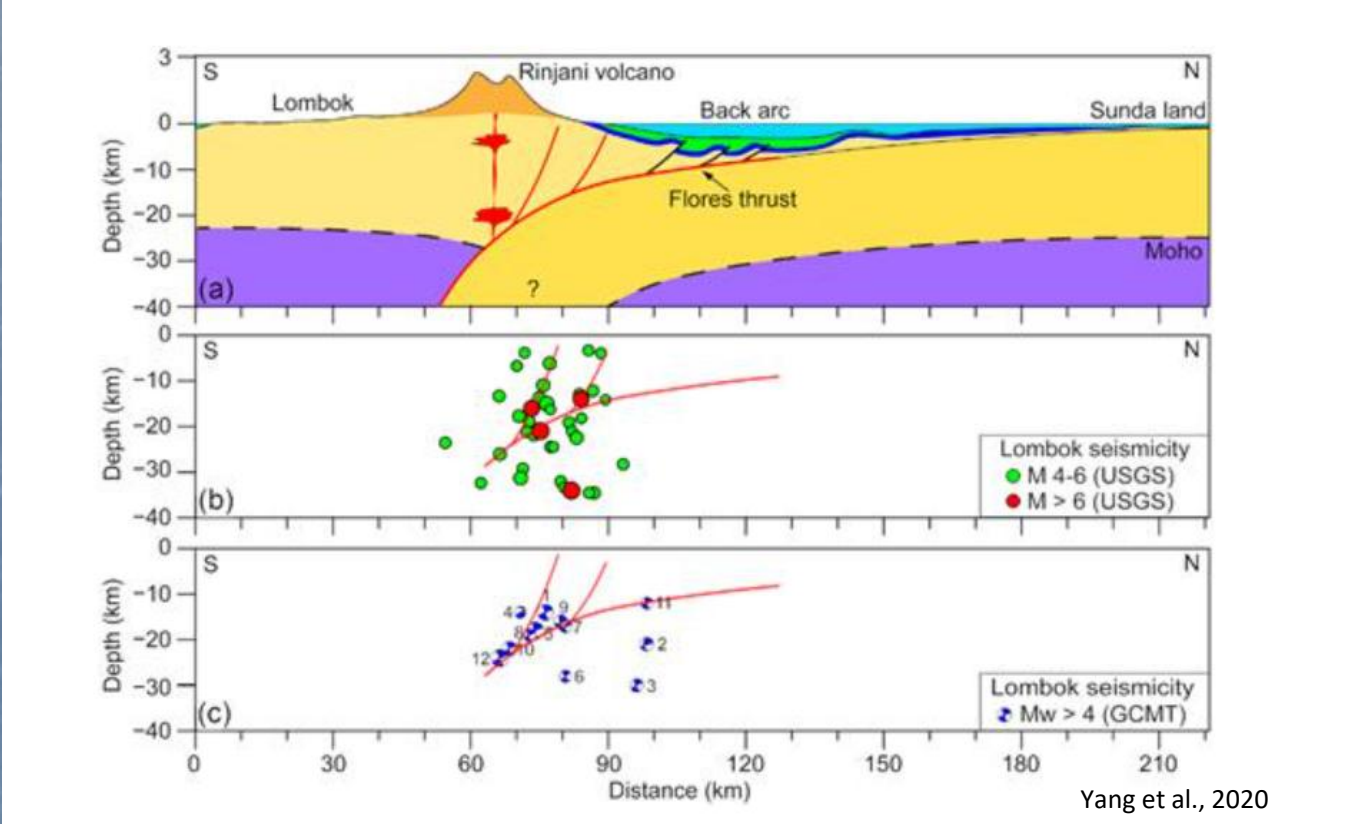
Karakteristik FBT : Bali segment



Karakteristik FBT :Lombok Segment

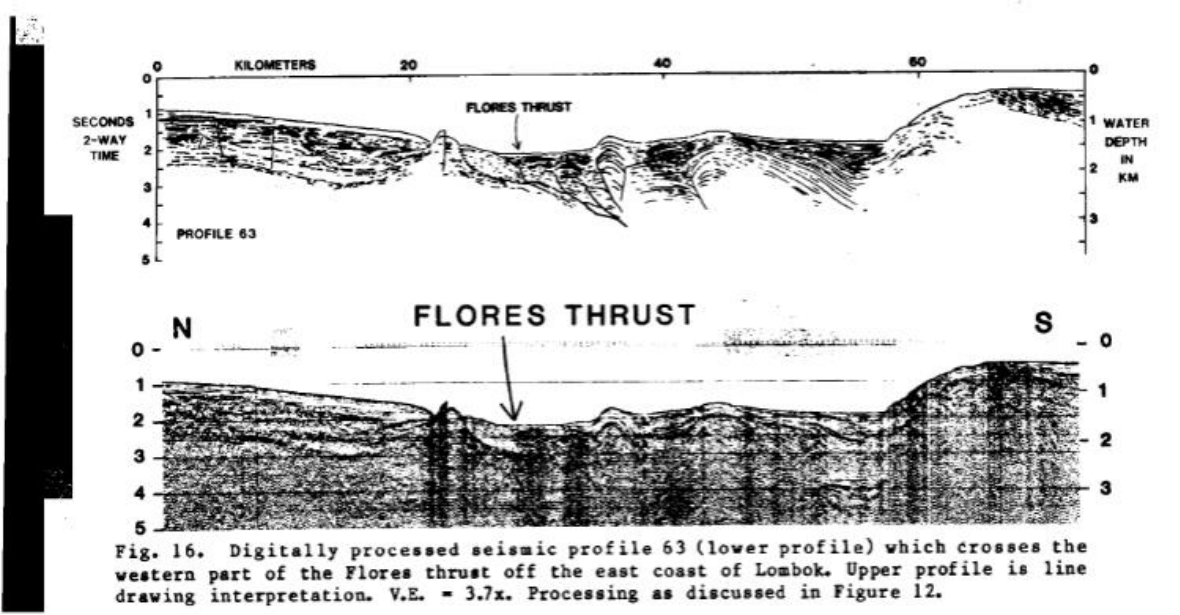
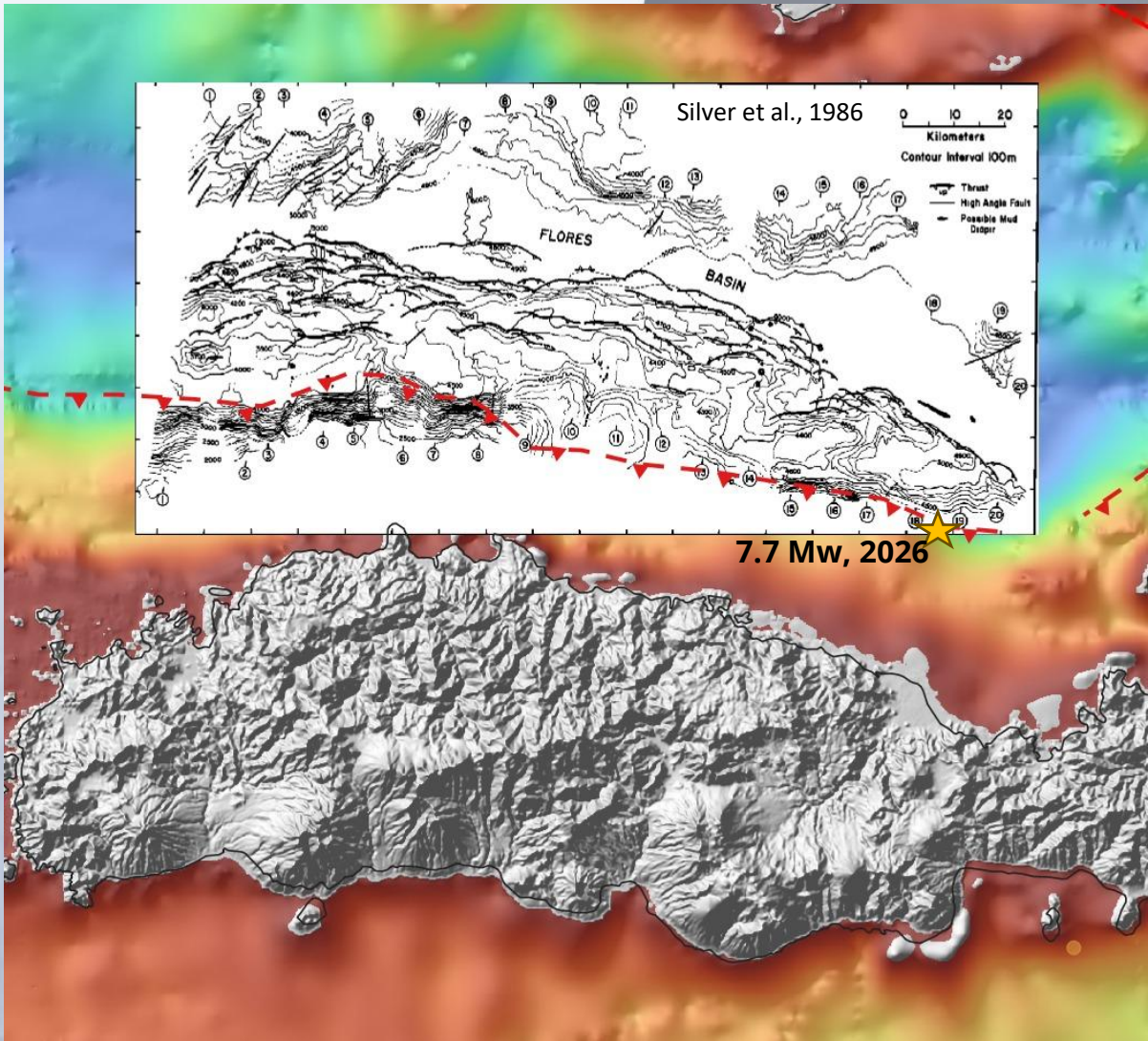


Aribowo, 2023



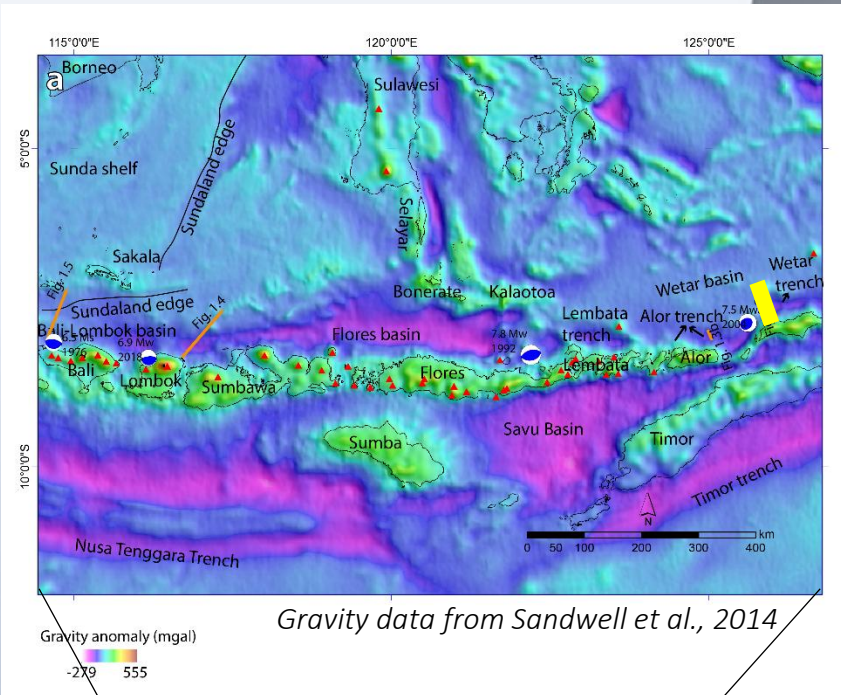
Yang et al., 2020

Karakteristik FBT : Nusa Tenggara Segment

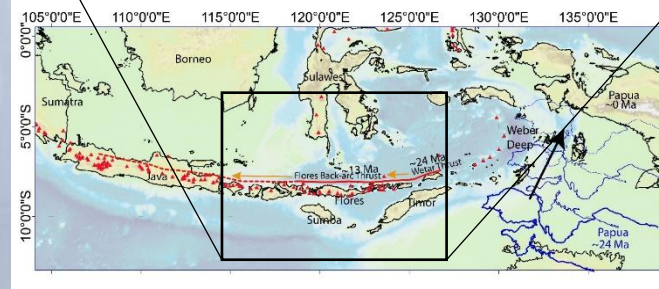


Silver et al., 1983

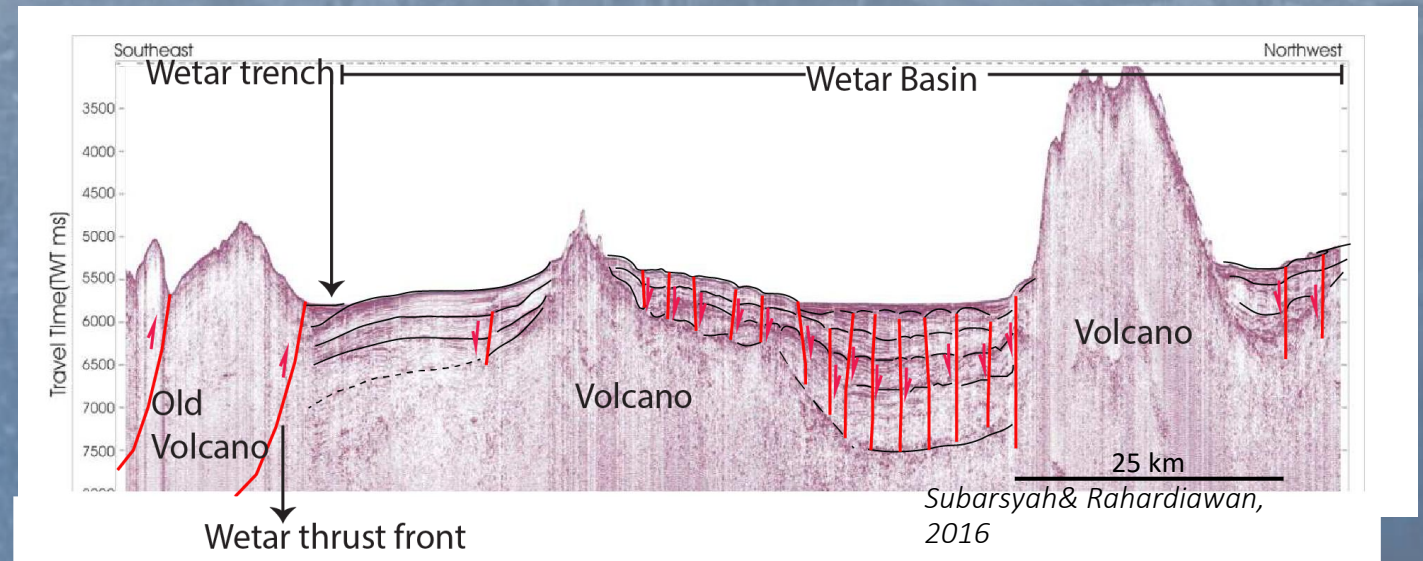
Karakteristik FBT : Nusa Tenggara Segment



Gravity data from Sandwell et al., 2014



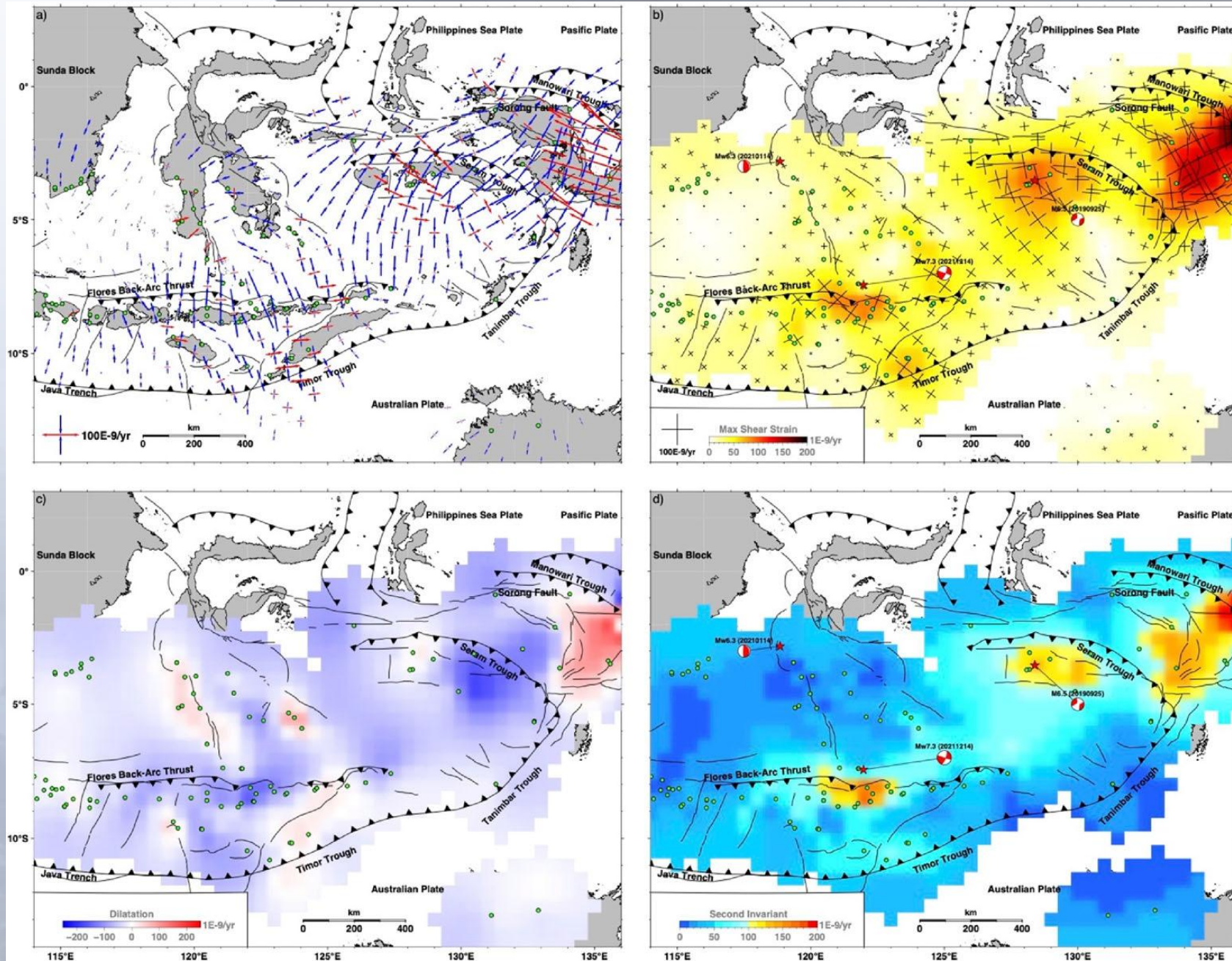
Aribowo, 2023



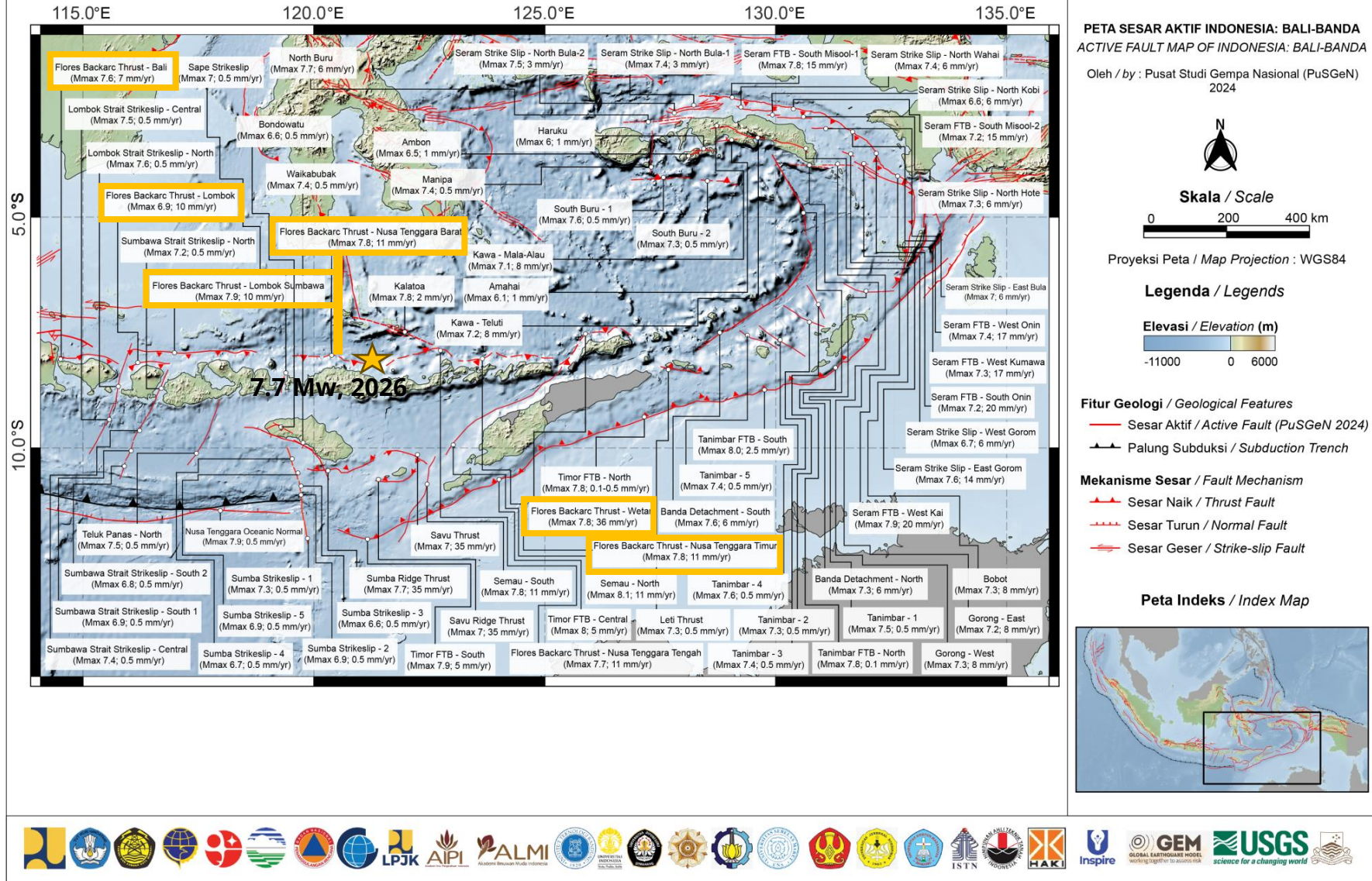
Wetar

Seismic from Subarsyah and Rahadiawan, 2016

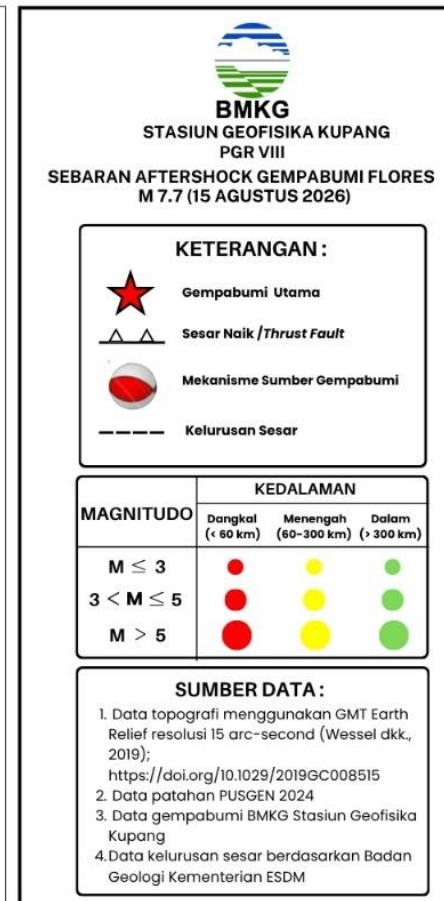
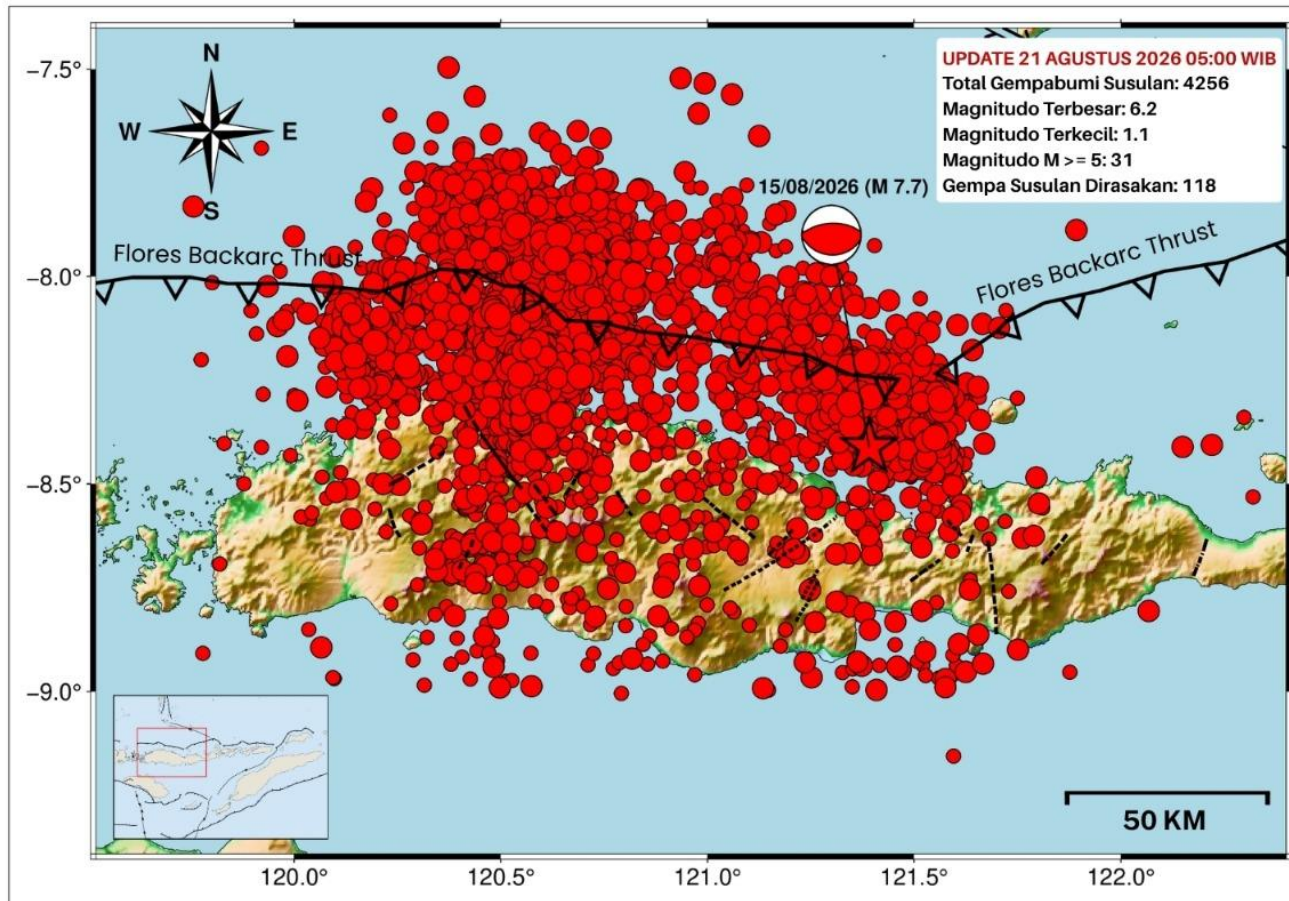
Stress budget and strain accumulation



How is Flores represented in the Pusgen 2024 model

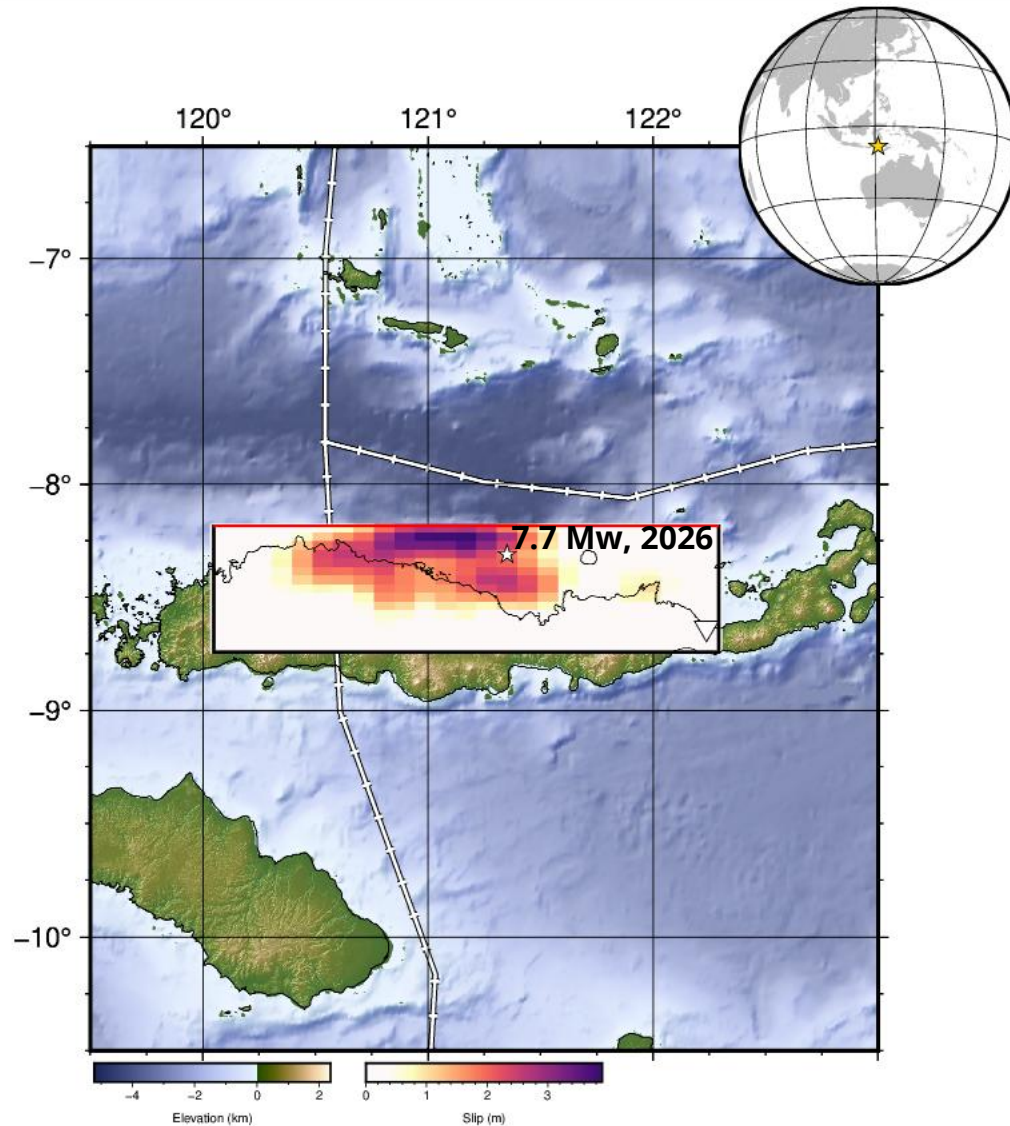


What needs to be updated, what remains uncertain



- Geometry? → Bathymetry/geophysics
- Segmentation? → Seismicity
- Slip rate? → Geodesy, geology
- Mmax → Historical + finite fault
- Reccurence → Paleoseimology

What needs to be updated, what remains uncertain

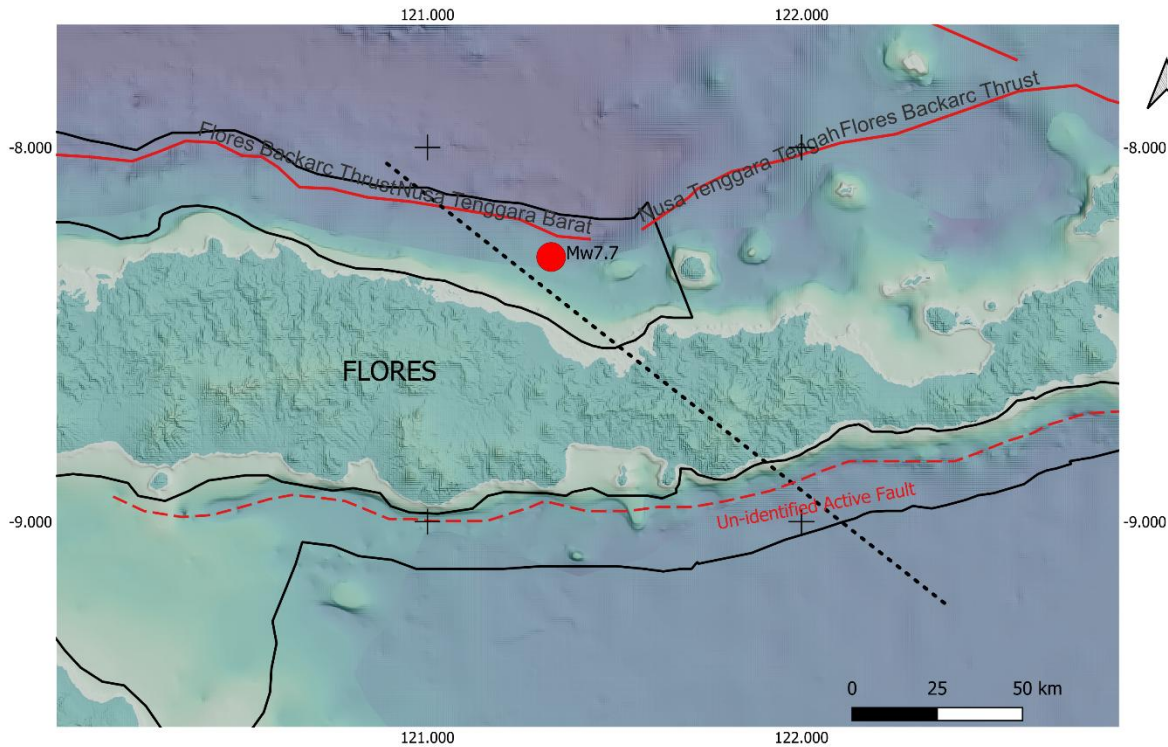


- Geometry? → Bathymetry/geophysics
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Where did the rupture occur relative to the mapped FBT?

USGS

What needs to be updated, what remains uncertain



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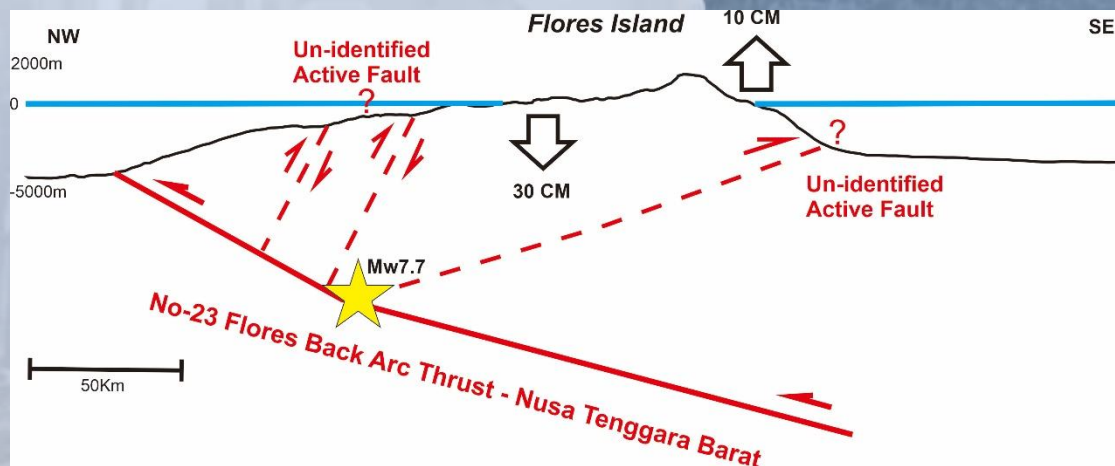
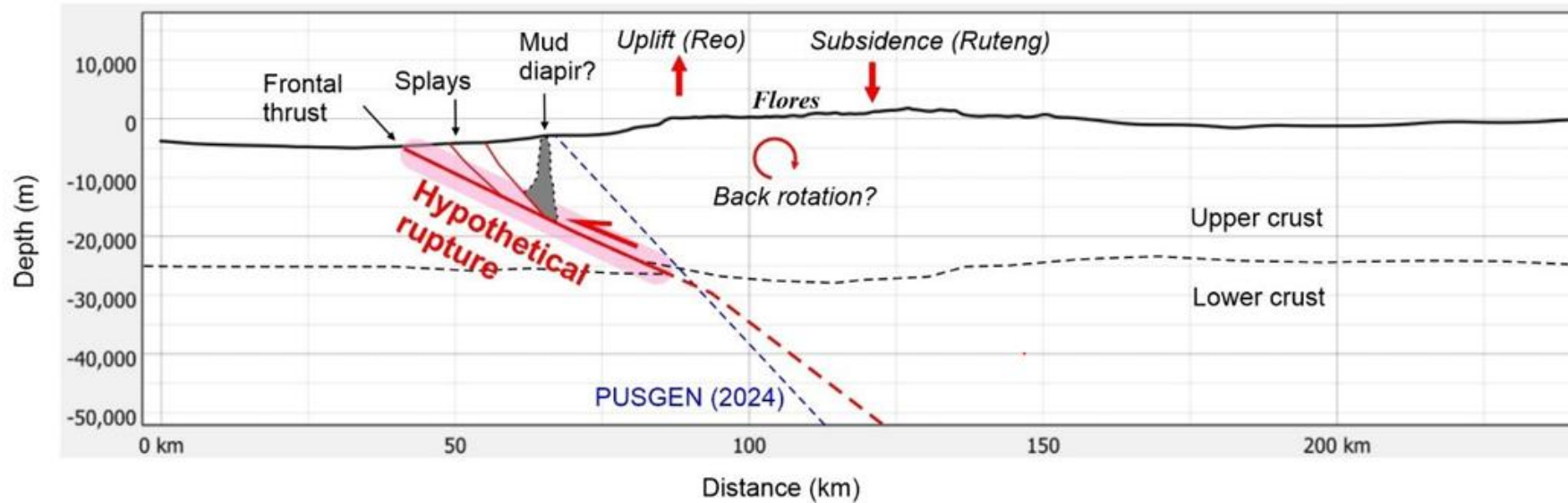


Illustration by Mudrik R. Daryono

What needs to be updated, what remains uncertain

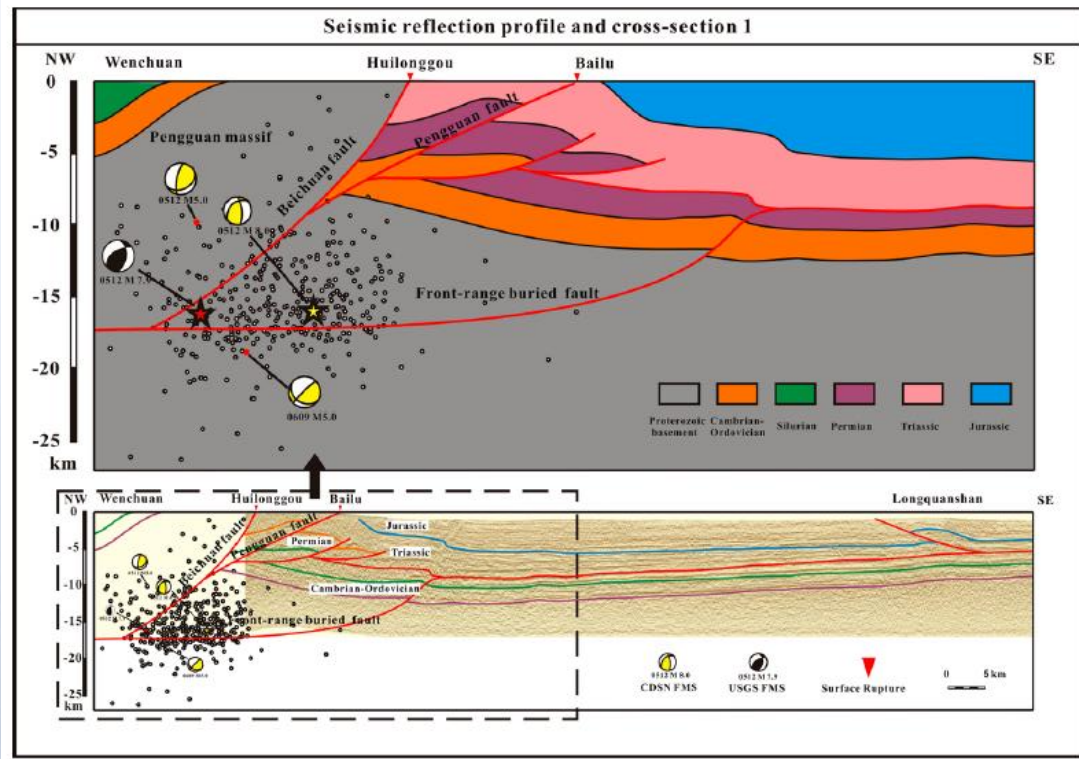


Gambar 3. Hipotesis pergerakan dan deformasi yang terjadi akibat Gempa Flores 2026 berdasarkan Setiawan et al. (2026), Supendi et al. (2026), dan Silver et al. (1983, 1986).

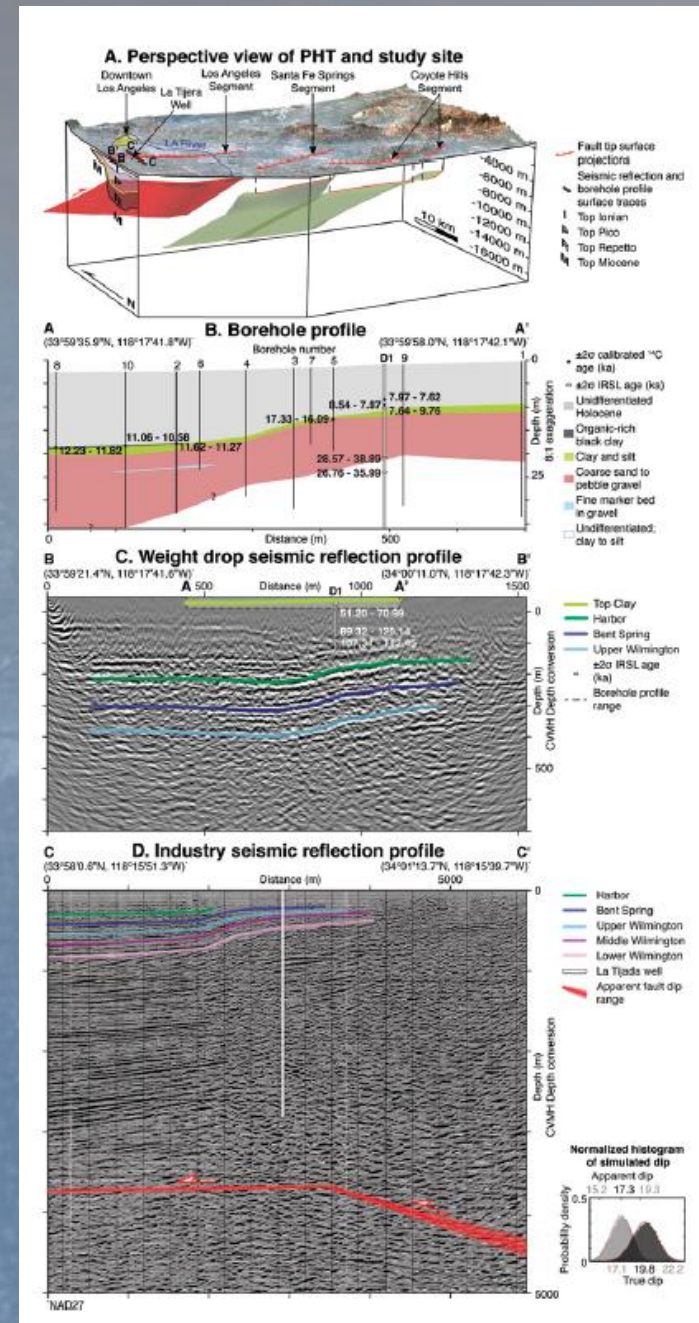
Illustration by Adi Patria

- Geometry? → Bathymetry/geophysics
- Segmentation? → Seismicity
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What needs to be updated, what remains uncertain



Li et al., 2010



Bergen et al., 2010

- Geometry? → Bathymetry/geophysics
- Segmentation? → Seismicity
- Slip rate? → Geodesy, geology
- Mmax → Historical + finite fault
- Recurrence → Paleoseimology
- PSHA for fault-related folding

Conclusion

1. Flores back-arc thrust is a complex earthquake-source region within the Sunda-Banda system
2. Flores back-arc thrust is a major active earthquake source, but its geometry and segmentation vary along strike
3. New seismic, geophysical, geological and geodetic constraints provide opportunities to refine the existing earthquake-source model
4. The 2026 Flores earthquake provides an important test of the existing FBT source characterization and an opportunity for further model updating
5. We hope Less bureaucracy for disaster or hazard research

A blue-tinted photograph of a mountainous landscape. In the foreground, a large white silhouette of a person's head is visible on the left side, facing right. The background shows a village with several houses and a large mountain range in the distance.

Terimakasih