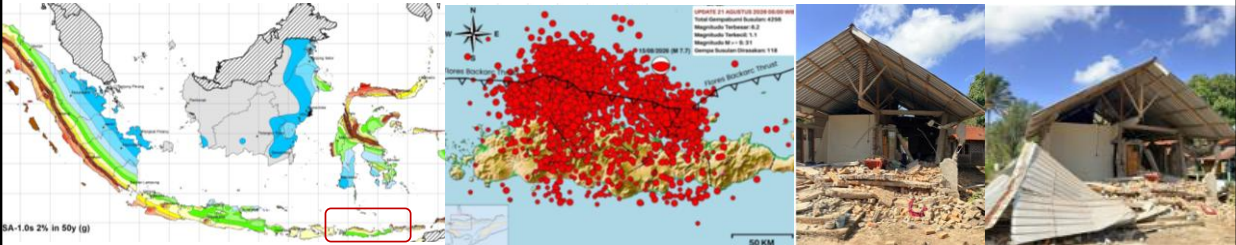


WEBINAR
GEMPA FLORES 2026:
DAMPAK SERTA PEMBELAJARAN
UNTUK PENGUATAN MITIGASI BENCANA

11 September 2026

**APLIKASI PETA BAHAYA SEISMIK
UNTUK DESAIN KETAHANAN GEMPA BANGUNAN DAN INFRASTRUKTUR
DI INDONESIA**

Masyhur Irsyam
Hendriyawan



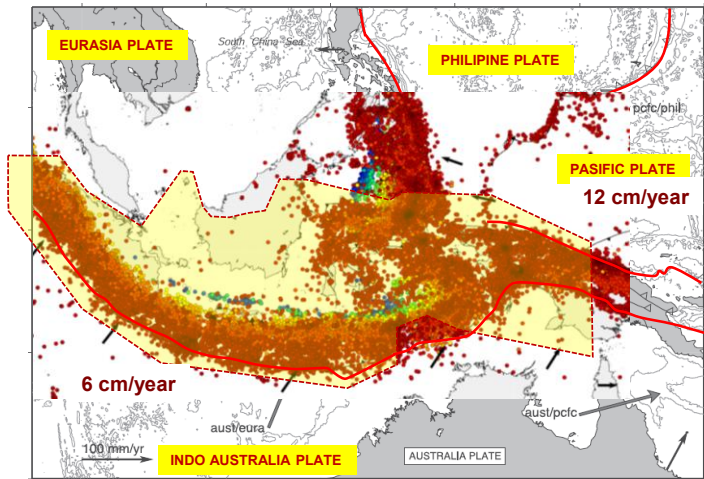
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11 September 2026

Outline:

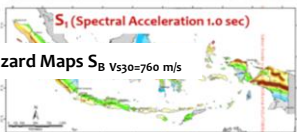
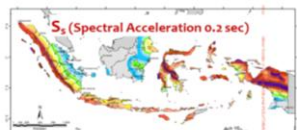
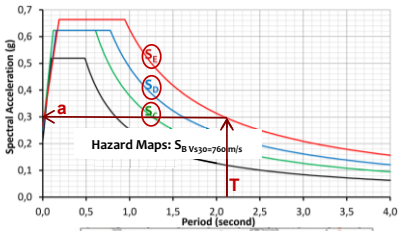
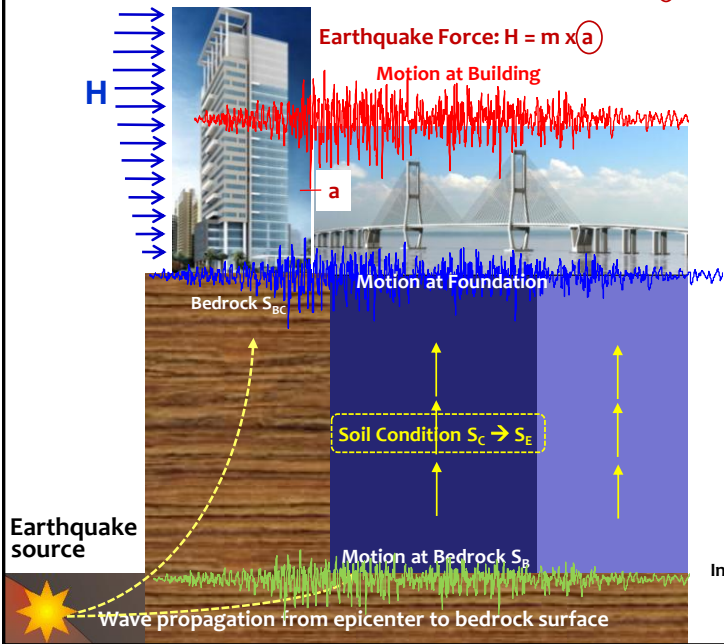
1. Latar Belakang
2. Penerapan Peta Bahaya Gempa Nasional untuk Desain Tahan Gempa di Indonesia
3. Pemilihan dan Modifikasi Ground Motion untuk Analisis Riwayat Waktu untuk Struktur Khusus
4. Penyempurnaan Peta Bahaya Gempa Nasional 2024
5. Lesson learned dari Gempa Flores 2026
6. Kesimpulan dan Saran

Major Tectonics around Indonesia (Bock et al., 2003)



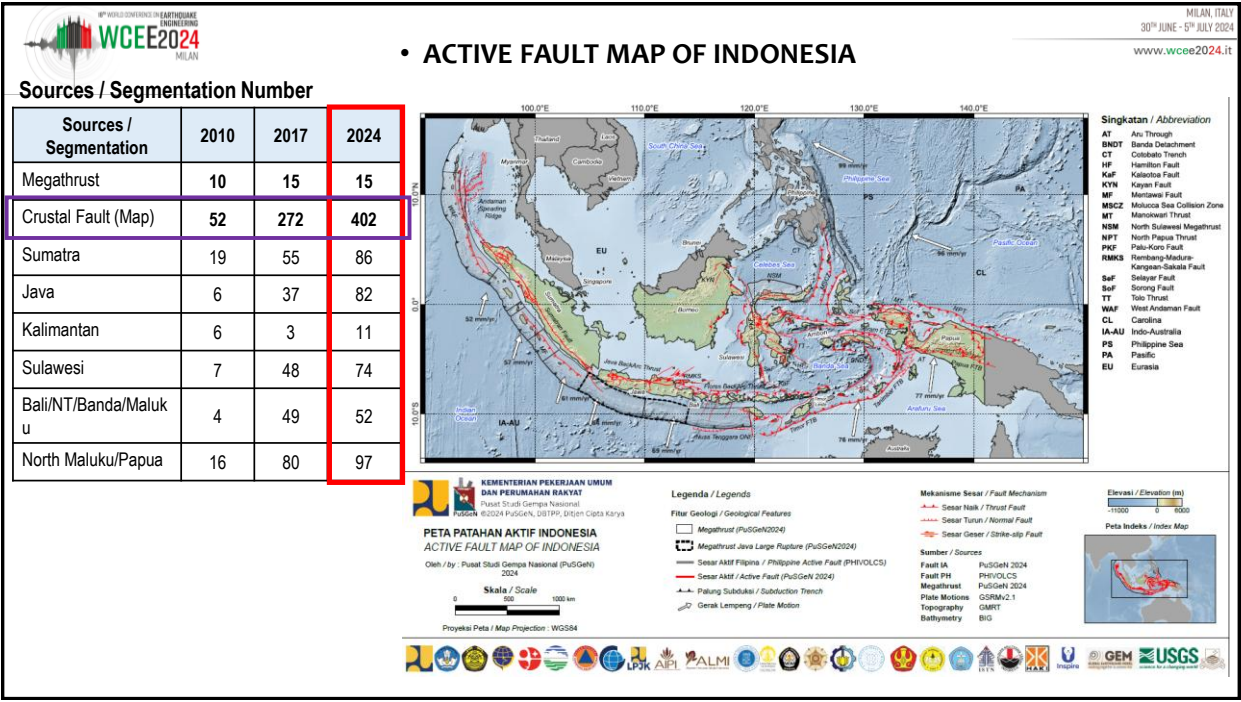
- There are 4 major tectonic plates in this region: Eurasia, Indoaustralia, Pacific and Philippine.
- Indoaustralia and Philippine/pacific plates subduct beneath the Eurasia plate with the rate of 6cm/year and 12 cm/year
- Indonesia is one of the most seismically active in the world

In the design, a is obtained from Respon spectra curves in SNI



Indonesian Hazard Maps S_B $V_{530}=760$ m/s







Implementation of the Indonesian Seismic Hazard Maps in the Earthquake Resistance Design of Buildings and Infrastructures

MILAN, ITALY
30th JUNE - 5th JULY 2024
www.wcee2024.it

New Buildings



Evaluation and Retrofit of Existing Buildings



Highway Bridges



Metro Tunnels



Railway Bridges



Liquefaction for Runway Airport

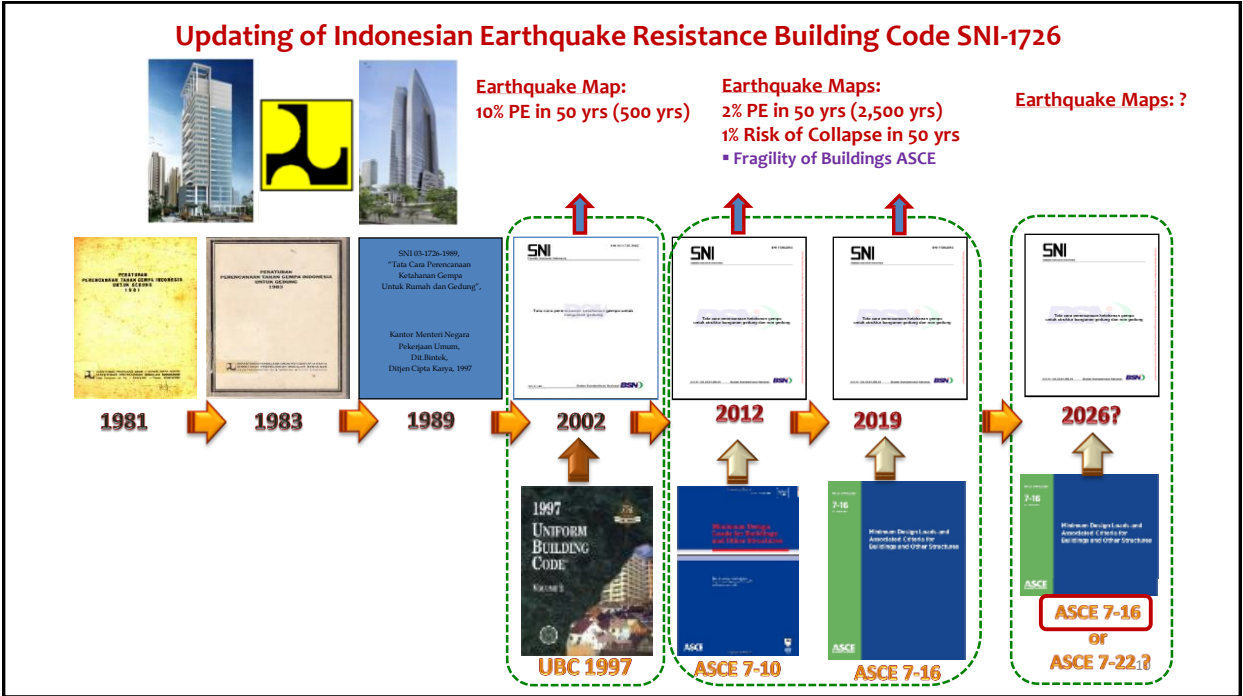


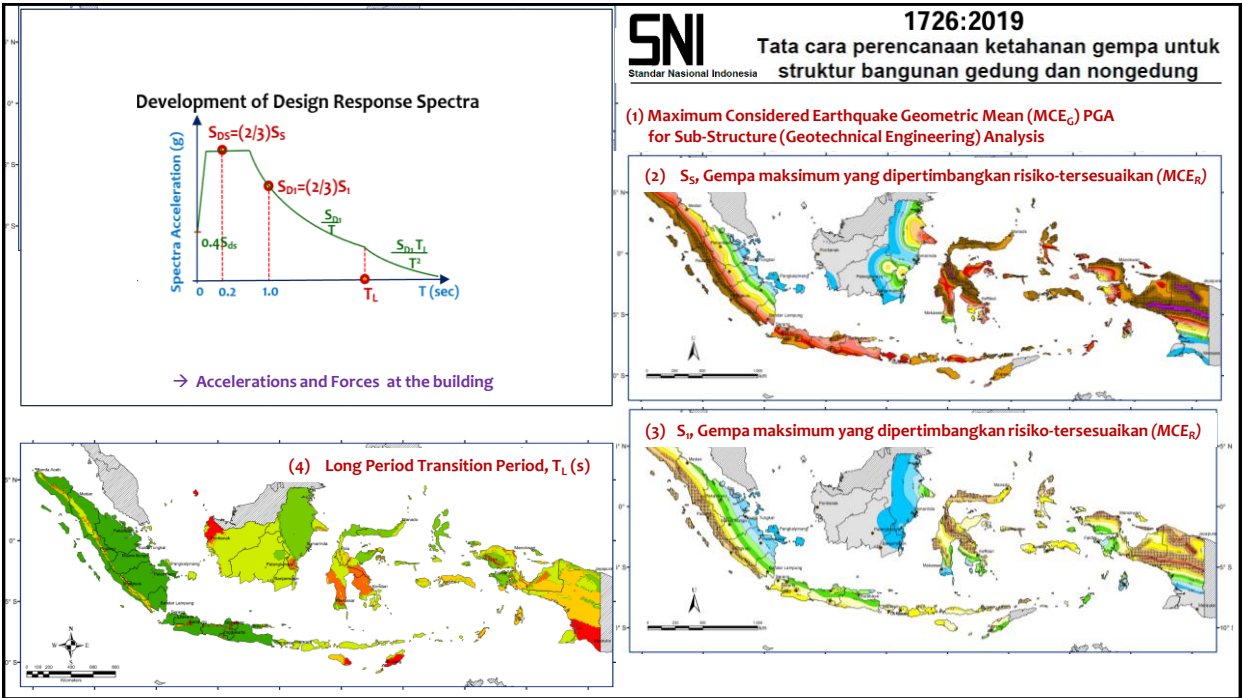
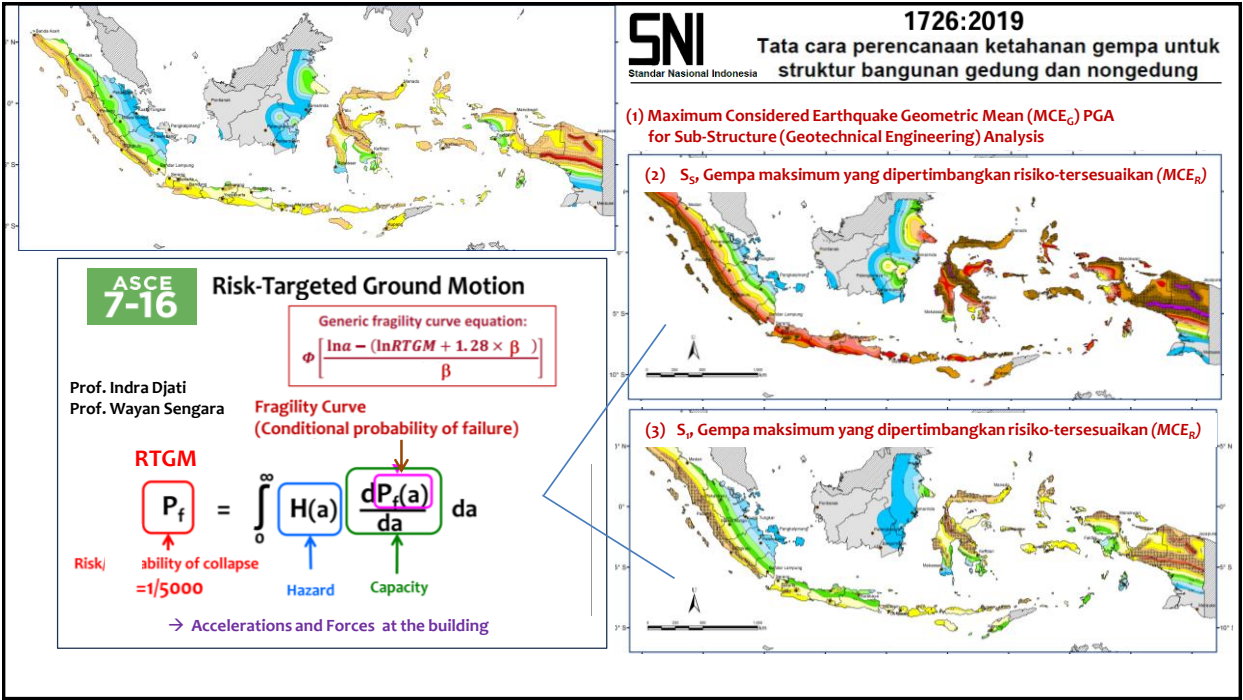
Offshore Platforms

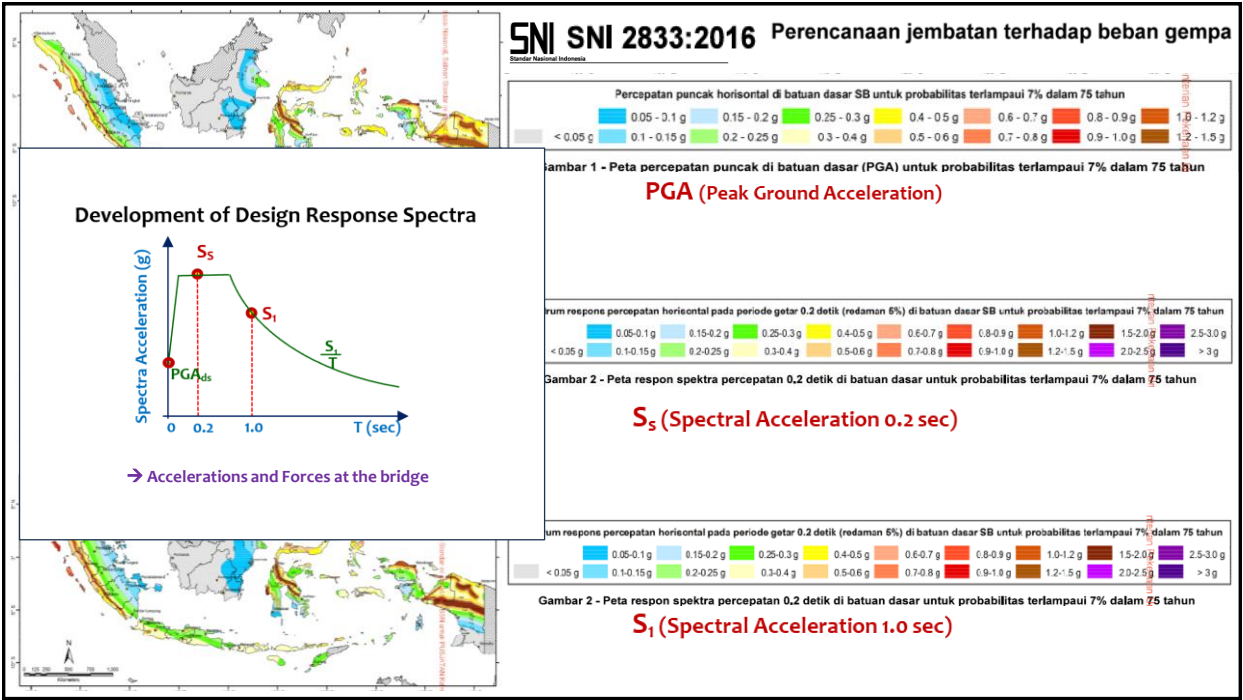


Dams









SNI

Earthquake Return Period

INF

PGA

Peta percepatan puncak di batuan dasar (SB) untuk perioda ulang 1,000 thn

1,000 thn

1,000 years



SNI

Standar Nasional Indonesia

PGA

$Sa_{0.2 \text{ sec}}$

Sa_{1.0 sec}

PGA

Sa_{0.2 sec}

Sa_{1.0 sec}



EXISTING BUILDINGS

EDUCATIONAL FACILITIES



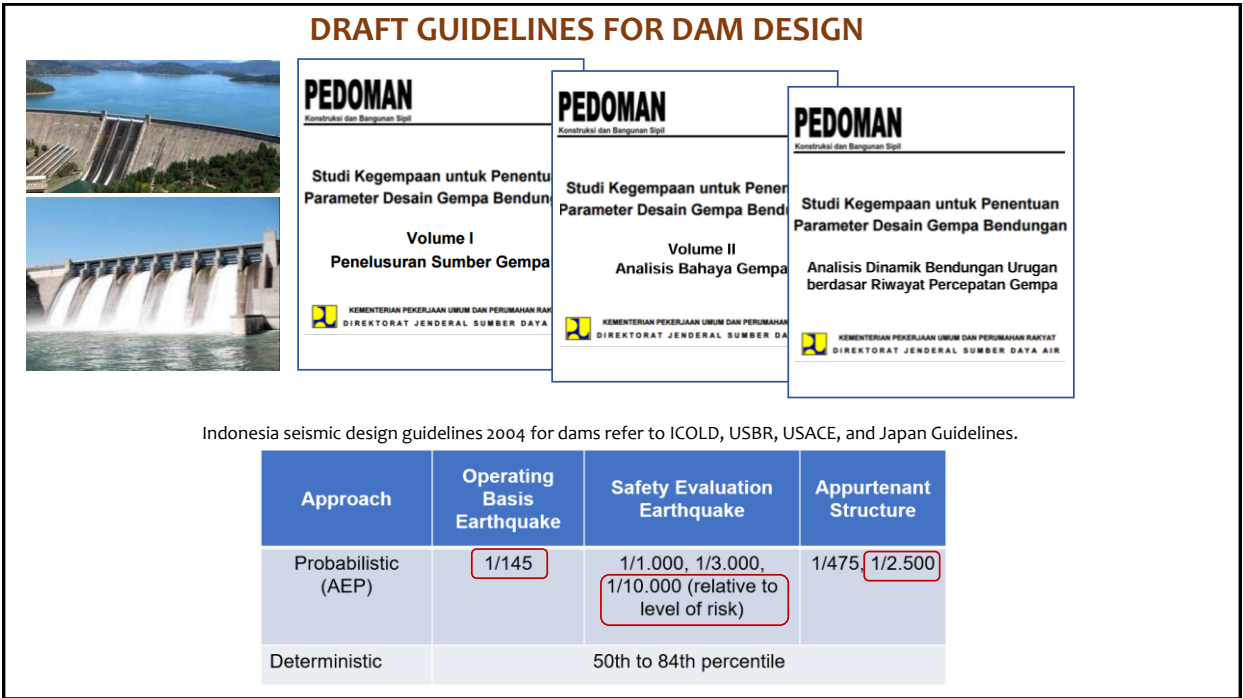
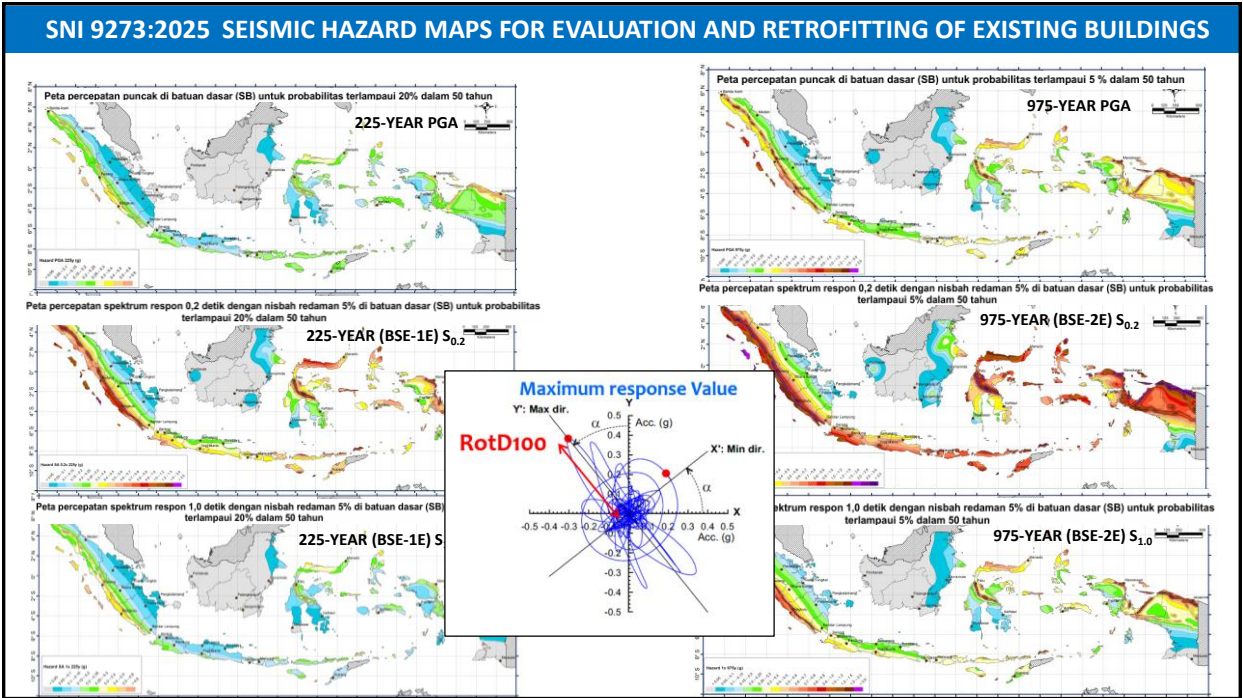
PUBLIC HOUSING



HEALTH CARE FACILITIES



GOVERNMENT BUILDINGS



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 UNTUK PENGUATAN MITIGASI BENCANA



11 September 2026
 dibekuk oleh:

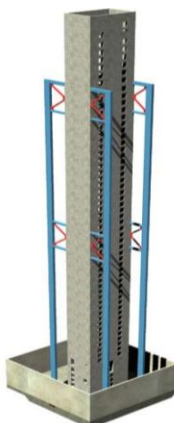


Outline:

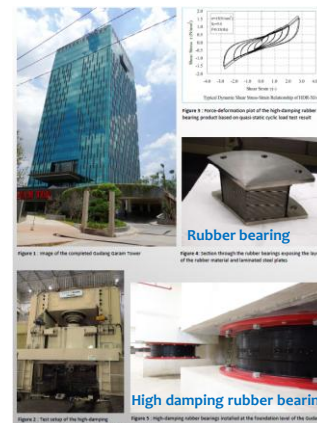
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6. Kesimpulan dan Saran

For Special Cases, spectra acceleration alone are not sufficient for the seismic design of certain structures.
Ground motion records (acceleration time history) are also required for Time History Analysis (THA), particularly for special structural systems:

- Non-conventional buildings, for example, structures equipped with base isolation systems

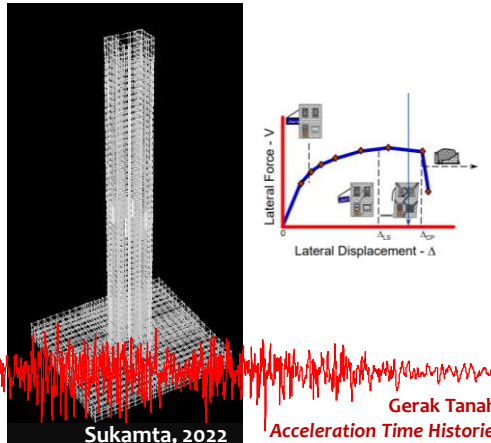


Corewall dng outrigger



Rubber bearing

High damping rubber bearing

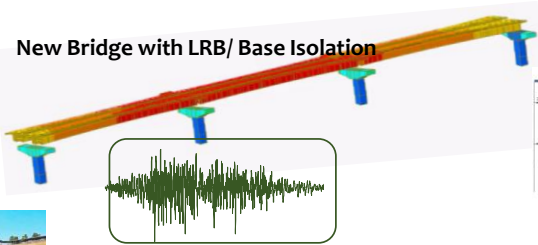


Sukamta, 2022

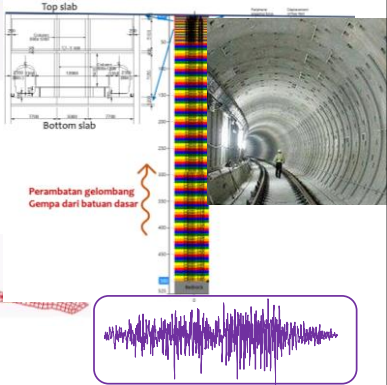
**Gerak Tanah/
Acceleration Time Histories**

For Special Cases, spectra acceleration alone are not sufficient for the seismic design of certain structures. **Ground motion records (acceleration time history)** are also required for Time History Analysis (THA), particularly for special structural systems:

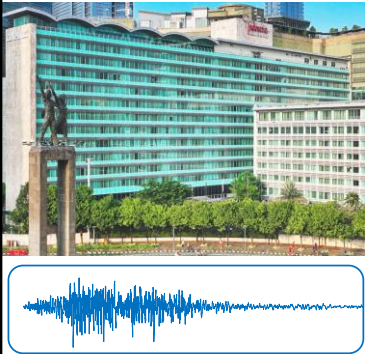
New Bridge with LRB/ Base Isolation



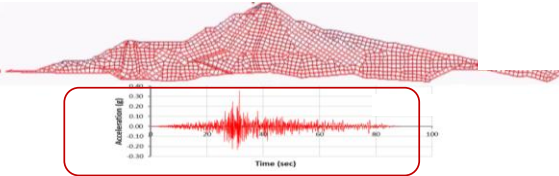
Tunnel dan Station MRT



Evaluation and Retrofitting of Existing Building



Dam



PUSGEN: WEBSITE UNTUK SELEKSI DAN MODIFIKASI GROUND MOTION
CONTOH HASIL APLIKASI UNTUK SITUS JAKARTA UNTUK BANGUNAN EKSISTING

Dr. Nick Alexander

PETA DEAGREGASI BAHAYA GEMPA INDONESIA UNTUK PERENCANAAN DAN EVALUASI INFRASTRUKTUR TAHAN GEMPA



SHALLOW CRUSTAL: PEER NGA-West2

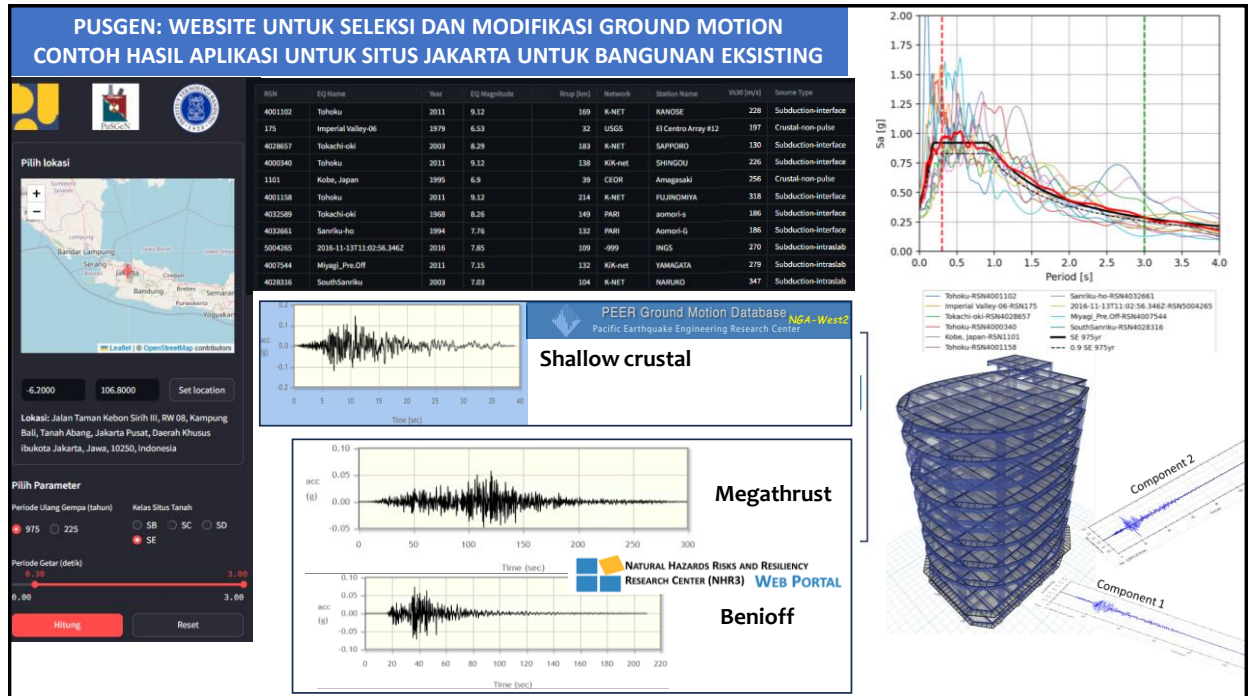
PEER Ground Motion Database
Pacific Earthquake Engineering Research Center

Record ground motion > 20,000 records

SUBDUKSI: PEER NGA-SUB

NGA-Subduction Web Portal:
Ground-Motion Record Selection and Download

Record ground motion > 70,000 records



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GEMPA FLORES 2026:
DAMPAK SERTA PEMBELAJARAN
UNTUK Penguatan Mitigasi Bencana



11 September
2026



Outline:

- Latar Belakang
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- Pemilihan Ground Motion untuk Analisis Time History pada Struktur Khusus
- Penyempurnaan Peta Bahaya Gempa Nasional 2024**
- Lesson learned dari Gempa Flores 2026
- Kesimpulan dan Saran

Penyempurnaan Peta Bahaya Gempa Nasional 2024

PETA HAZARD GEMPA INDONESIA 2010
SEBAGAI ACUAN DASAR
PERENCANAAN DAN PERANCANGAN INFRASTRUKTUR TAHAN GEMPA



Jakarta, Juli 2010

The Team
11 members
5 institutions

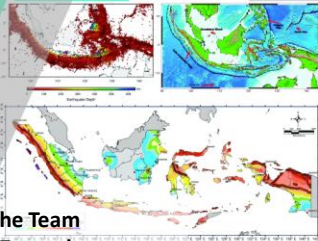
KEMENTERIAN PEKERJAAN UMUM

Didukung oleh:



ISBN 978-602-5489-01-3

PETA SUMBER DAN BAHAYA GEMPA INDONESIA TAHUN 2017



The Team
77 members
17 institutions

Ditusun oleh:
Pusat Studi Gempa Nasional
Pusat Litbang Pemahaman dan Perilaku
Badan Penelitian dan Pengembangan
Kementerian Pekerjaan Umum dan Perumahan Rakyat
Kerjasama:



AKEMENPU
KEMENTERIAN PEKERJAAN UMUM

PETA SUMBER DAN BAHAYA GEMPA INDONESIA TAHUN 2024



The Team
181 members
40+ institutions



Pembaharuan Model Sumber Gempa

Enhancement of earthquake source parameters

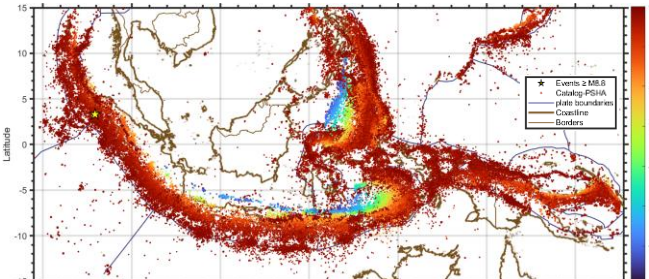
Engineering Seismology

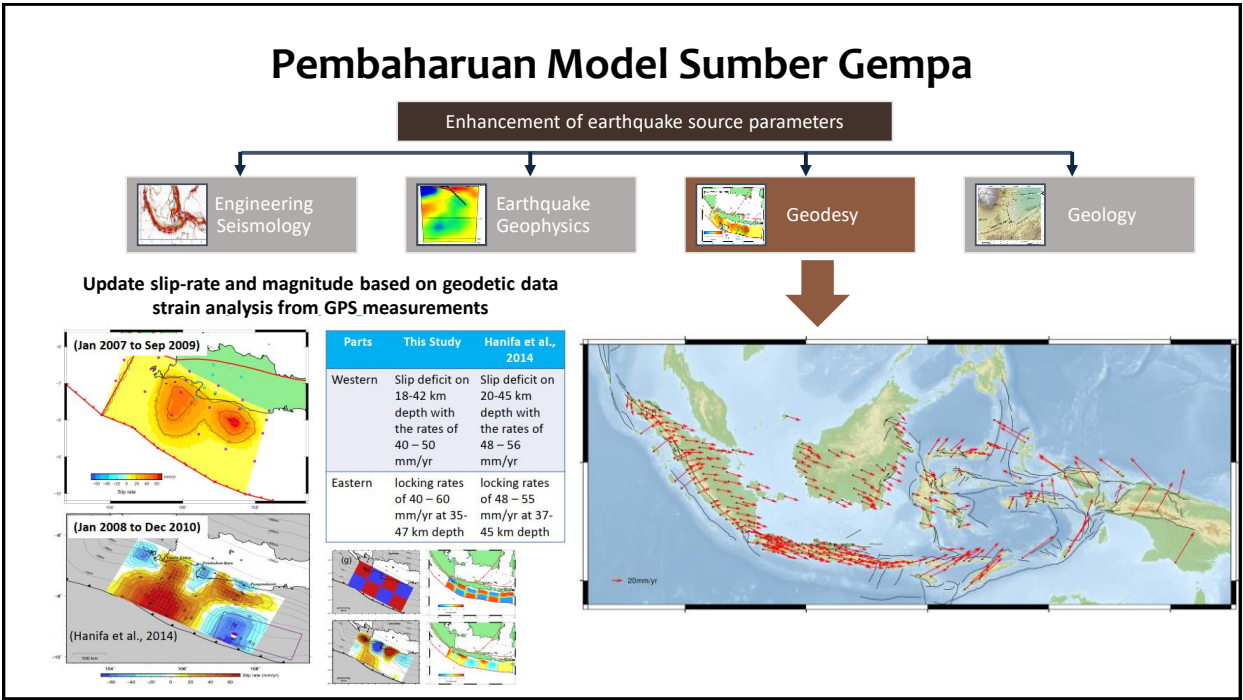
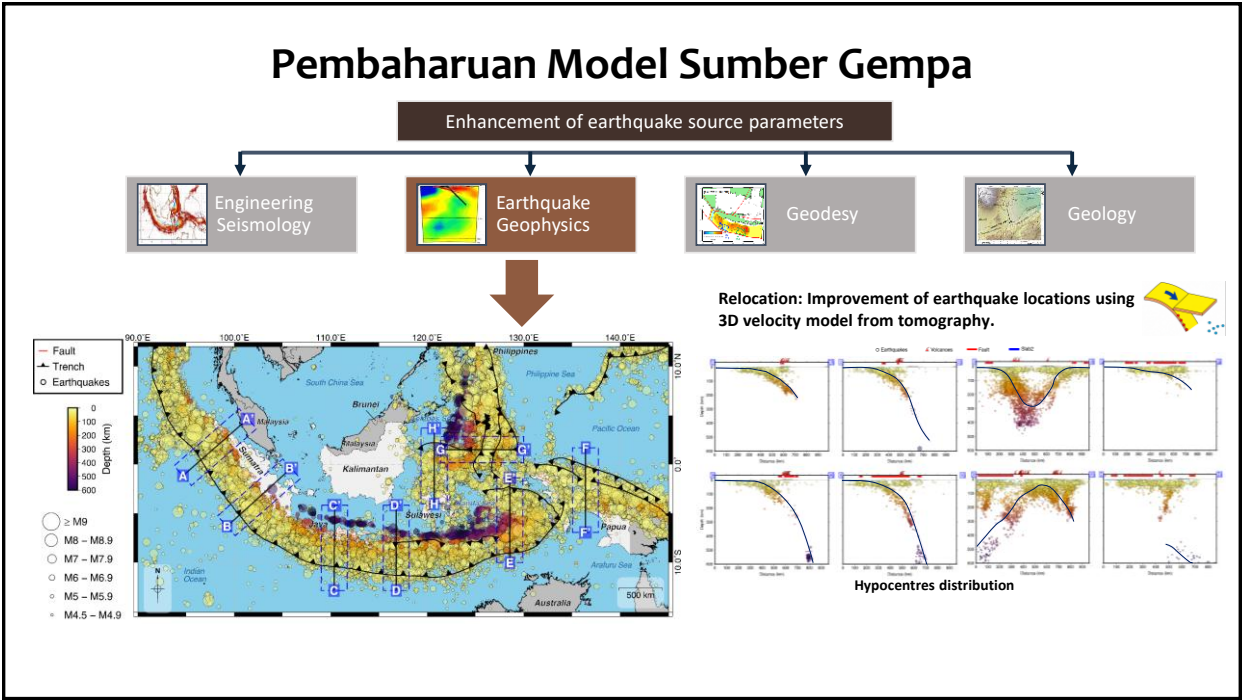
Earthquake Geophysics

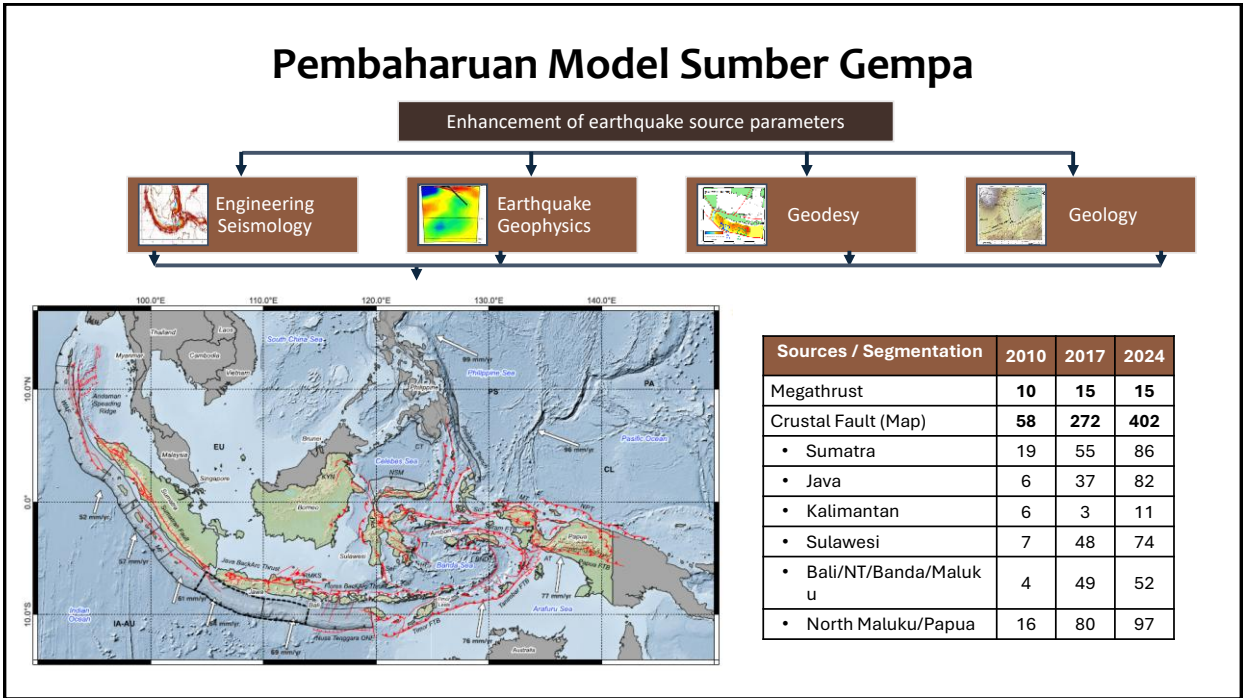
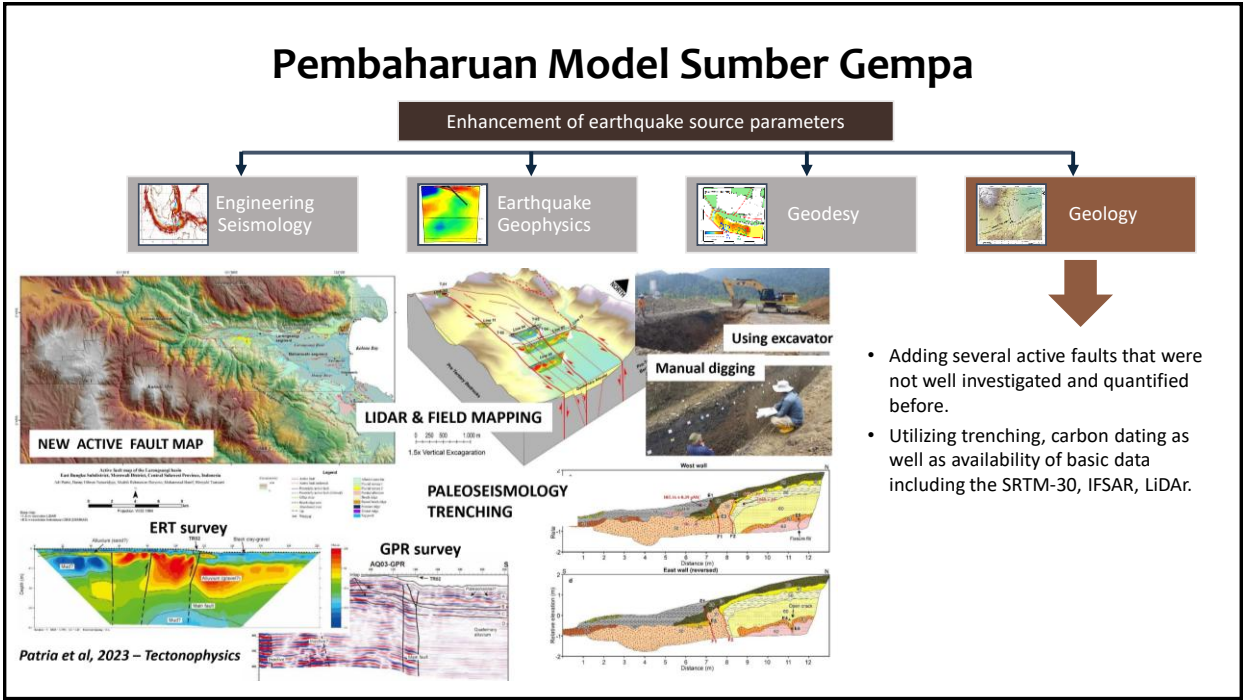
Geodesy

Geology

Catalog Type	2017 Catalog	Updated 2024 Catalog
ISC-EHB	15,463	43,734
ISC-GEM	484	1,029
BMKG Relocation	4,468	10,491
ISC Reviewed (GCMT)	N/A	224
Katalog 2010	20,003	Not included
NEIC-USGS	24,267	49,028
Total	64,685	104,506









Sesar Aktif: Bali-Banda

Legenda / Legends

Fitur Geologi / Geological Features

- Megathrust (PuSGeN2024)
- Megathrust Java Large Rupture (PuSGeN2024)
- Sesar Aktif Filipina / Philippine Active Fault (PHIVOLCS)
- Sesar Aktif / Active Fault (PuSGeN 2017)
- Sesar Aktif / Active Fault (PuSGeN 2024)
- Paling Subduksi / Subduction Trench
- Gerak Lempeng / Plate Motion

5 Gempabumi Signifikan di Flores

Gempabumi Utama 2026

M = 7.7

15 Agustus 2026 04.58 WIB
8,41 LS 121,39 BT
Kedalaman : 15 km

Laut Flores 2021

M = 7.3

14 Desember 2021
7,60 LS 122,23 BT
Kedalaman : 14,27 km

Gempa Flores 1992

M = 7.8

12 Desember 1992
8,48 LS 121,90 BT
Kedalaman : 27,7 km

Gempabumi 1968

M = 6.8

26 Januari 1968
8,87 LS 120,27 BT
Kedalaman : 25 km

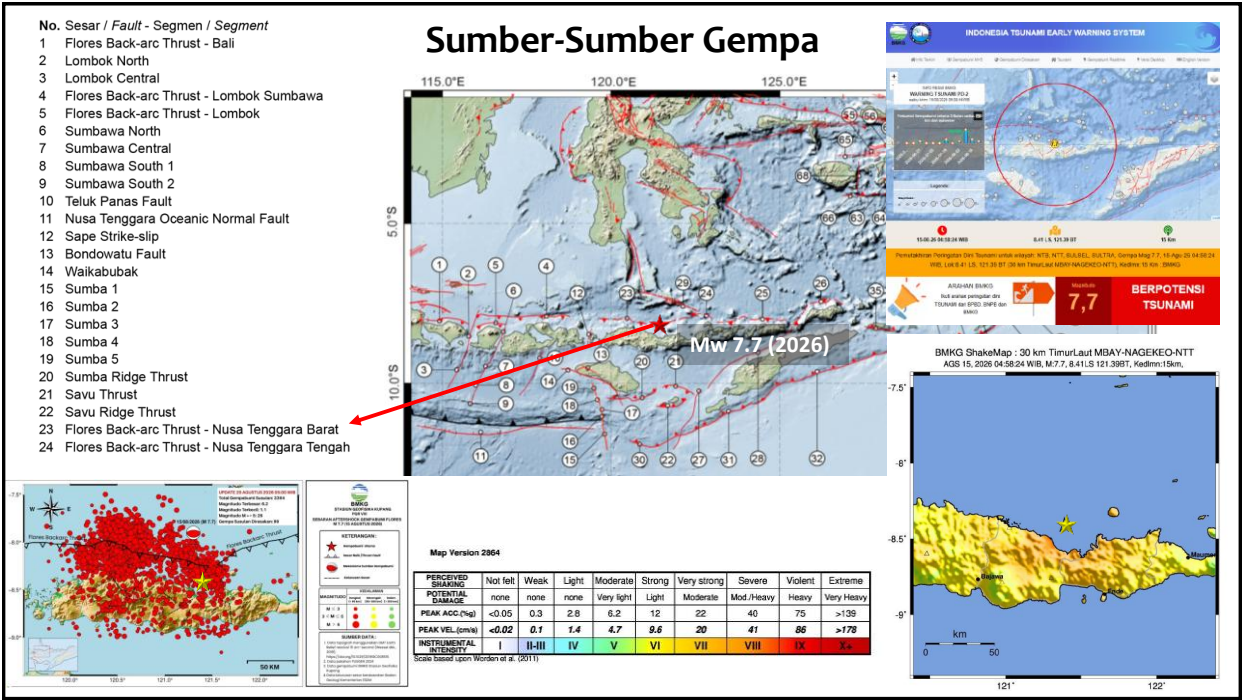
Gempabumi 1938

M = 7.2

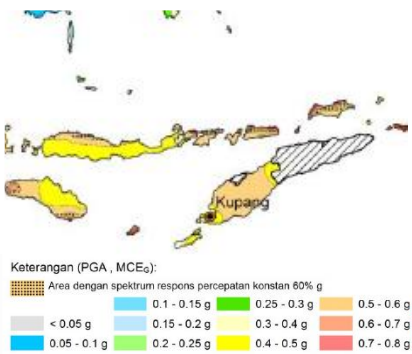
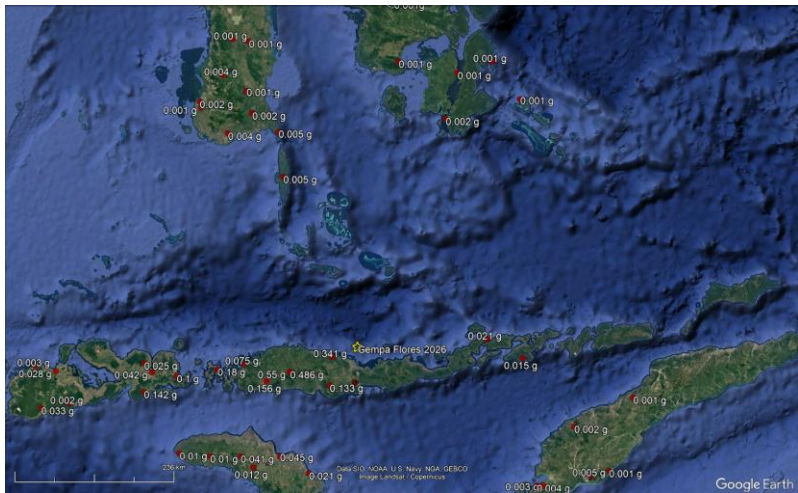
20 Oktober 1938
9,00 LS 122,73 BT
Kedalaman : 66 km

Katalog M > 6.0
Lingkaran kuning: 5 kejadian utama
Lingkaran oranye: kejadian lain

M6.8 1968, M7.7 2026, M7.3 2021, M7.8 1992, M7.2 1938



Nilai Percepatan PGA di Beberapa Stasion BMKG



- Variasi PGA tercatat sebagai pembanding empiris terhadap peta hazard
- Bukan ukuran langsung terlampauinya MCE₀.

Nilai Percepatan PGA di Beberapa Stasion BMKG

