Potensi Sumber Gempabumi di Wilayah Jawa Timur

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Ucapan Terimakasih

PuSGeN

Isi Presentasi

Bagaimana potensi gempa di Jawa (menurut pakar)

Apa yang harus dilakukan ?

JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 92, NO. B1, PAGES 421-439, JANUARY 10, 1987

SEISMIC HISTORY AND SEISMOTECTONICS OF THE SUNDA ARC

K. R. Newcomb[1] and W. R. McCann

Lamont-Doherty Geological Observatory, Palisades, New York

Potensi gempa yang besar di Sumatra

zone. There are more frequent and larger earthquakes along Sumatra where younger, more shallowly dipping seafloor enters the trench, indicating a significant seismic slip rate; less frequent and smaller events occur along Java where subduction of older seafloor takes place relatively aseismically. The effect of variation in age is also reflected in the deeper

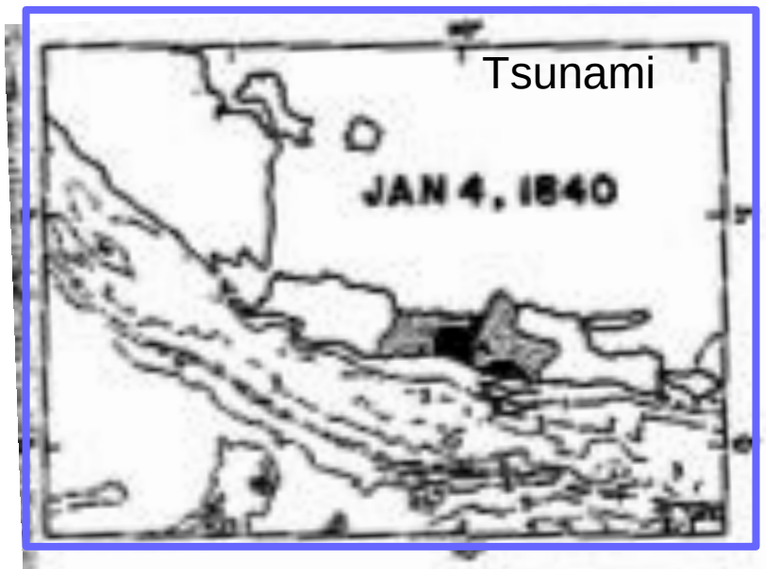
Potensi gempa yang rendah di Jawa

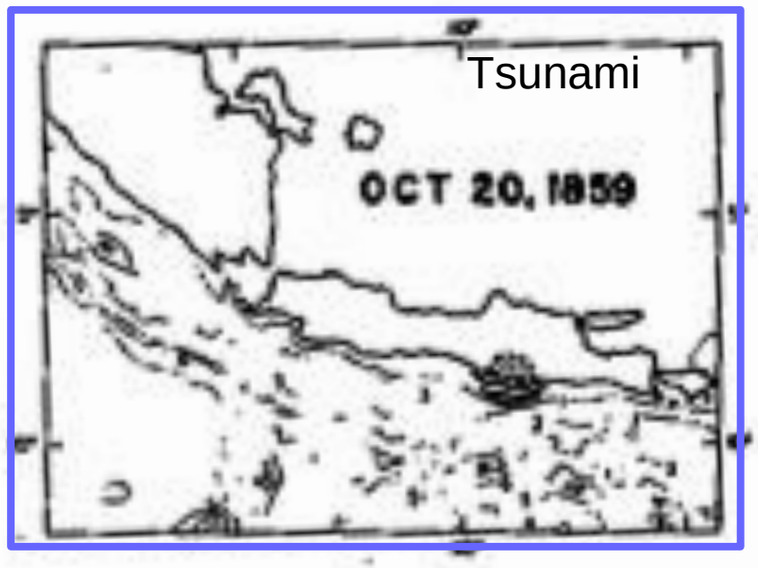
off zone where the similarly increasing dip and depth he slab are more pronounced at Java. The Sunda Arc also appears to exhibit a gross correlation of maximum magnitude of earthquakes with the nature of the upper plate (continental versus oceanic).

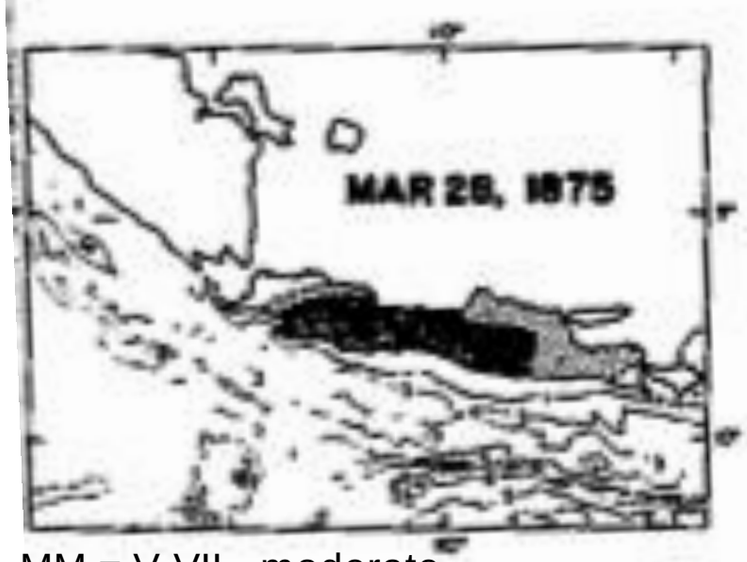
Sejarah Kegempaan

(Newcomb and McAnn, JGR, 1987)

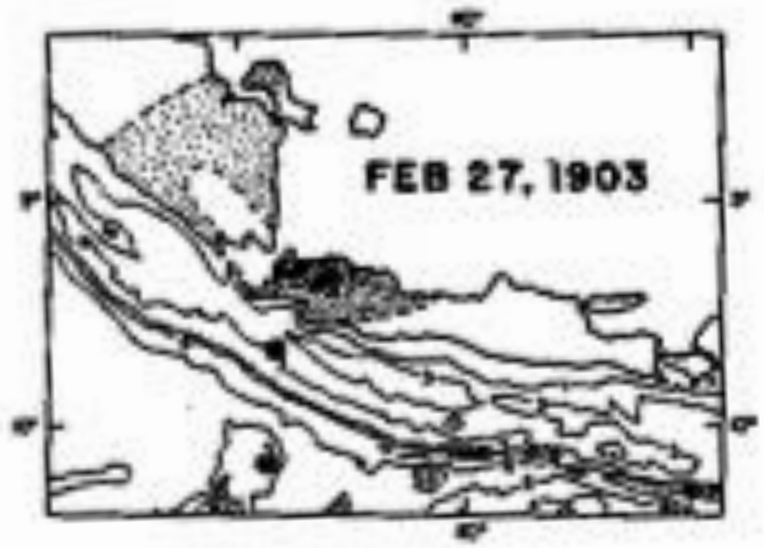
6 events of M>7 from 1840 to 1921.
NO megathrust earthquake off West Java from written historical history. We lack to historical data



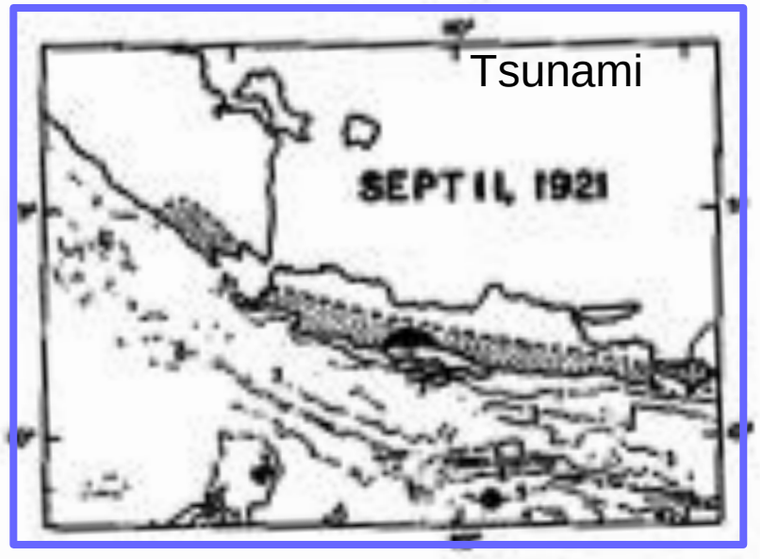




MM = V-VII - moderate
EQ inland epicenter



M. 8.1 (Richter, 1958)

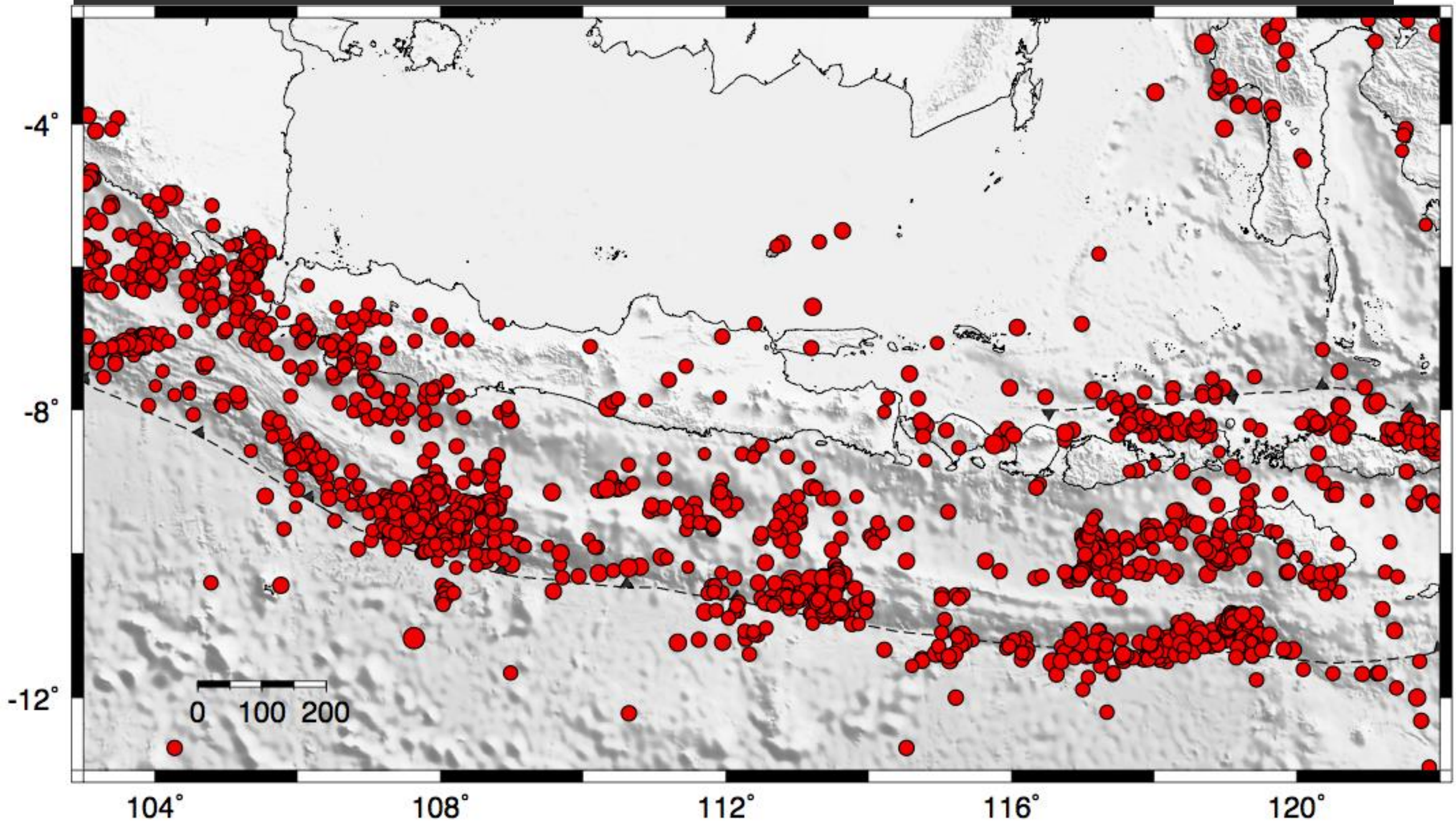


M. 7.5 (Richter, 1954), Epicenter on the Roo Rise ,Intraplate setting

Kegempaan Indonesia: 1990-1 Des 2004

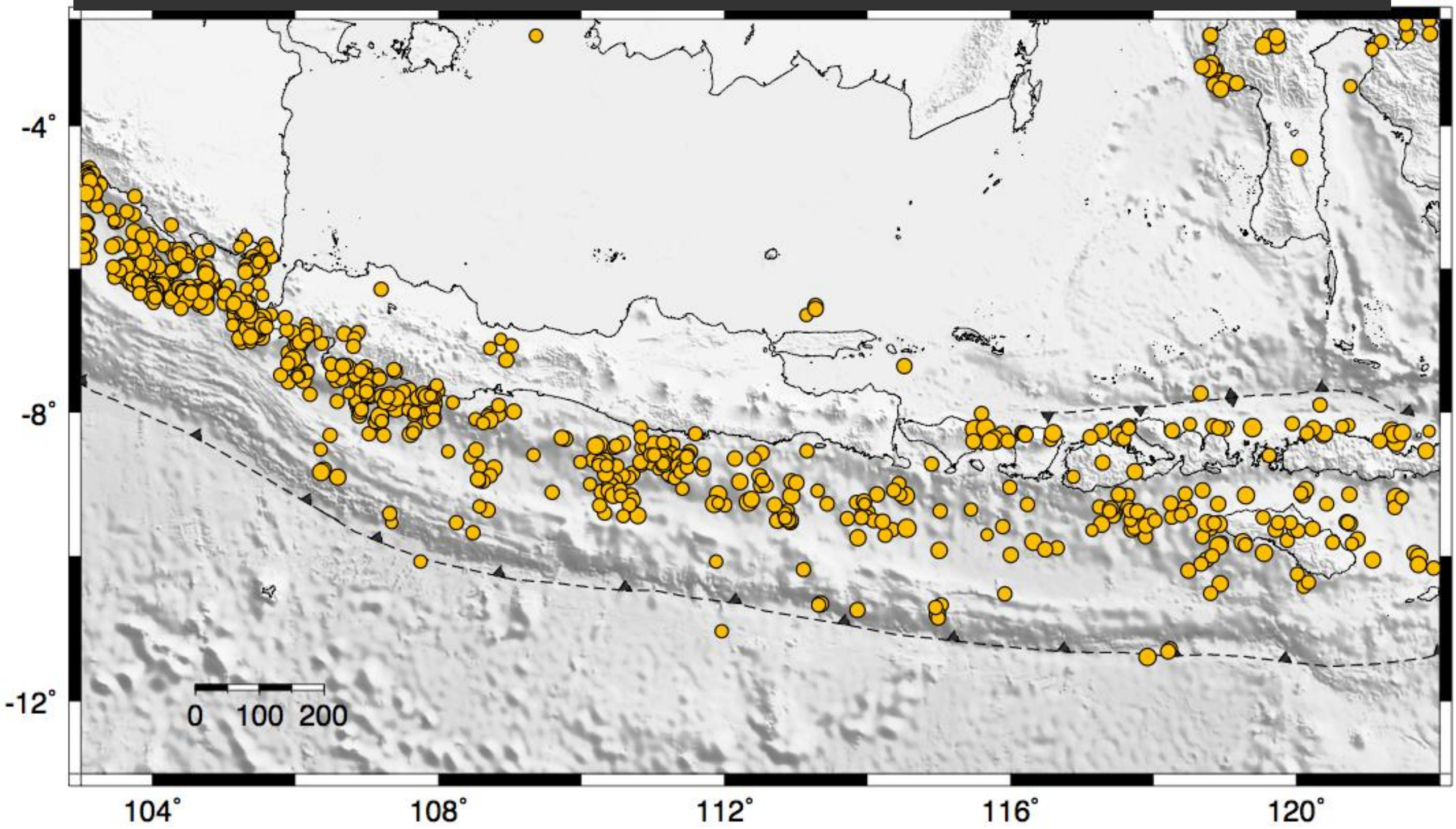
Kegempaan Indonesia: Dec 2004-Feb 2017

Earthquake in Indonesia < 35km



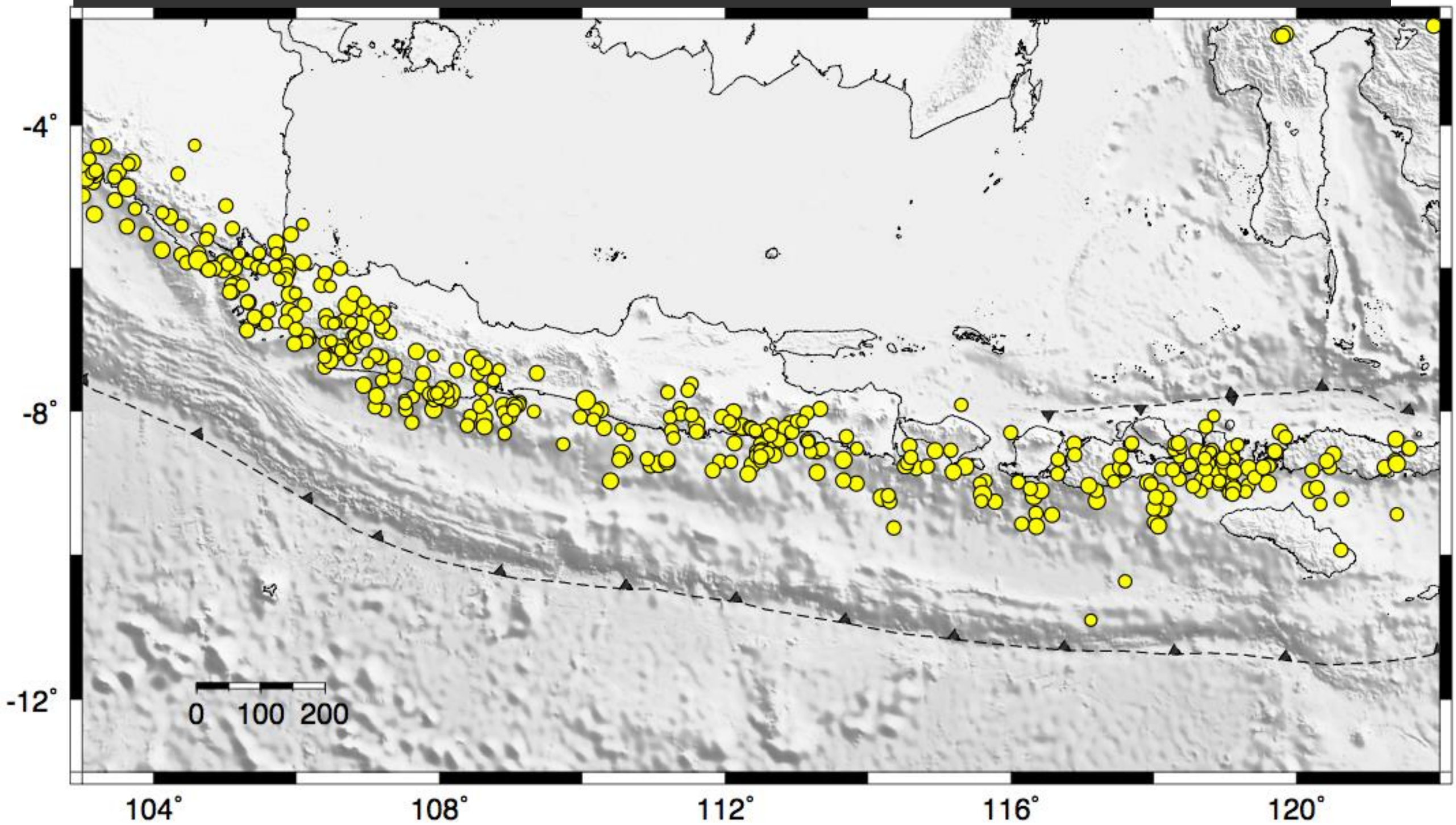
Eq data : Engdahl, 2009

Earthquake in Indonesia 35-70 km



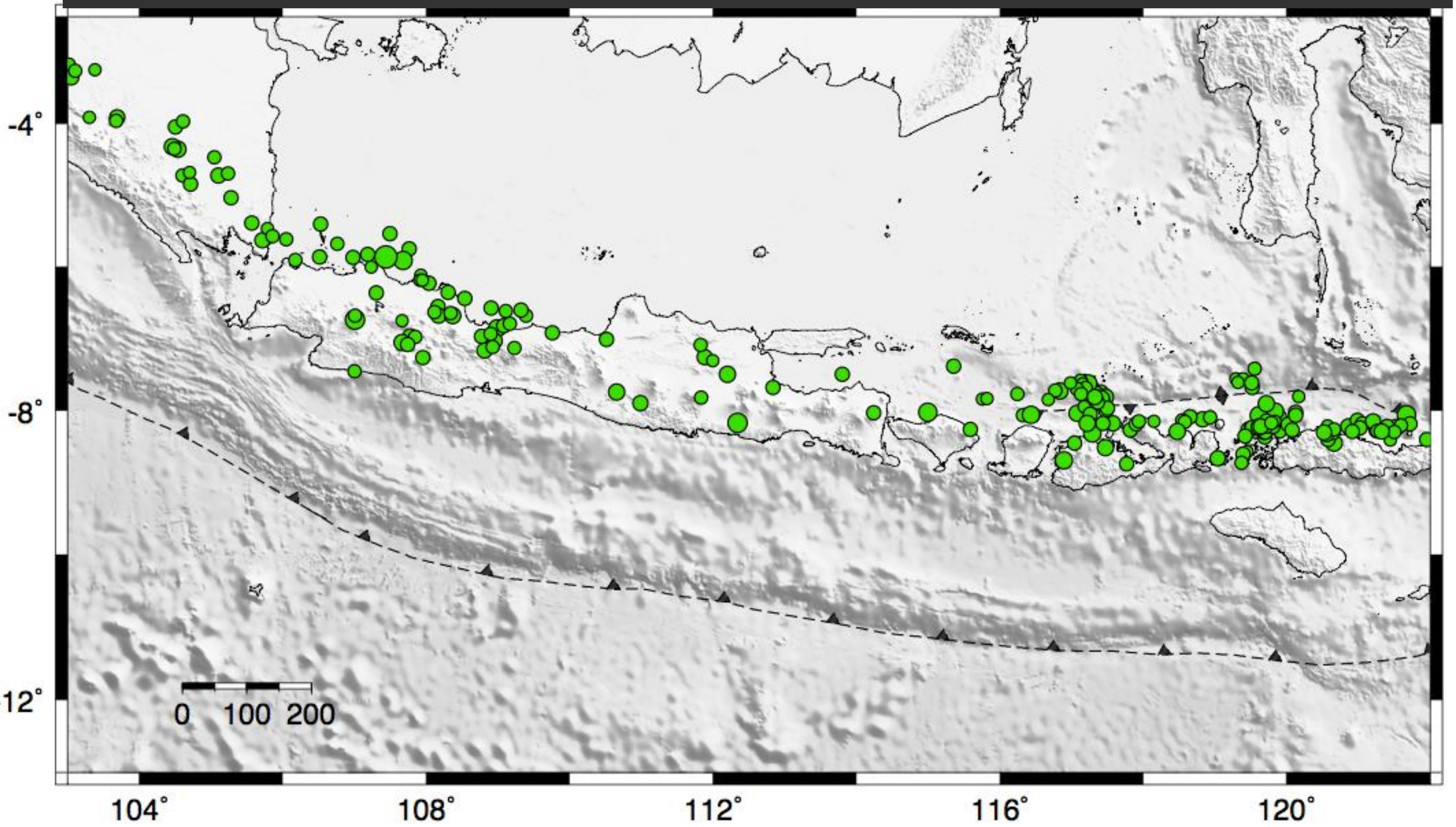
Eq data : Engdahl, 2009

Earthquake in Indonesia 70-150km



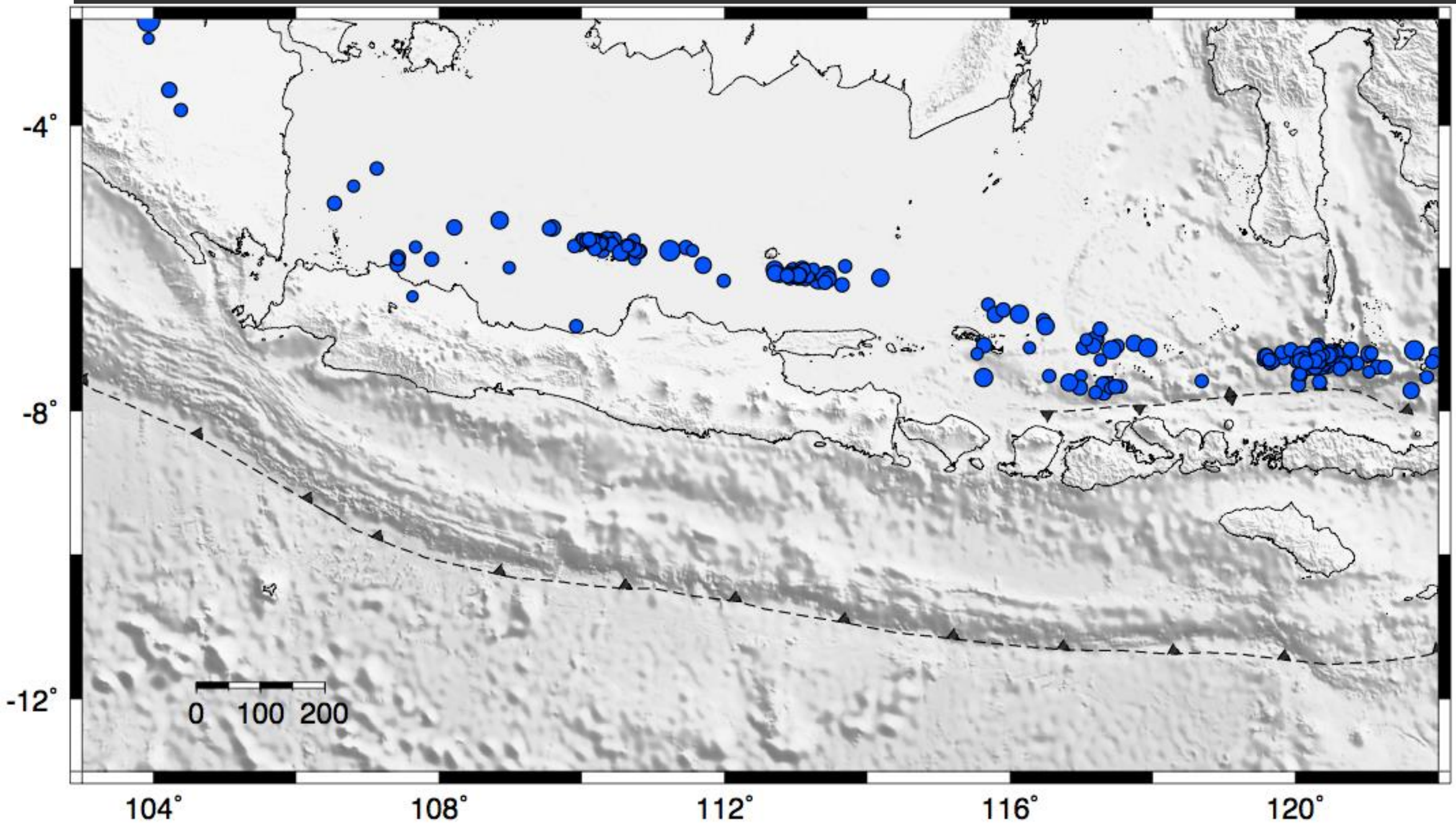
Eq data : Engdahl, 2009

Earthquake in Indonesia 150-300 km



Eq data : Engdahl, 2009

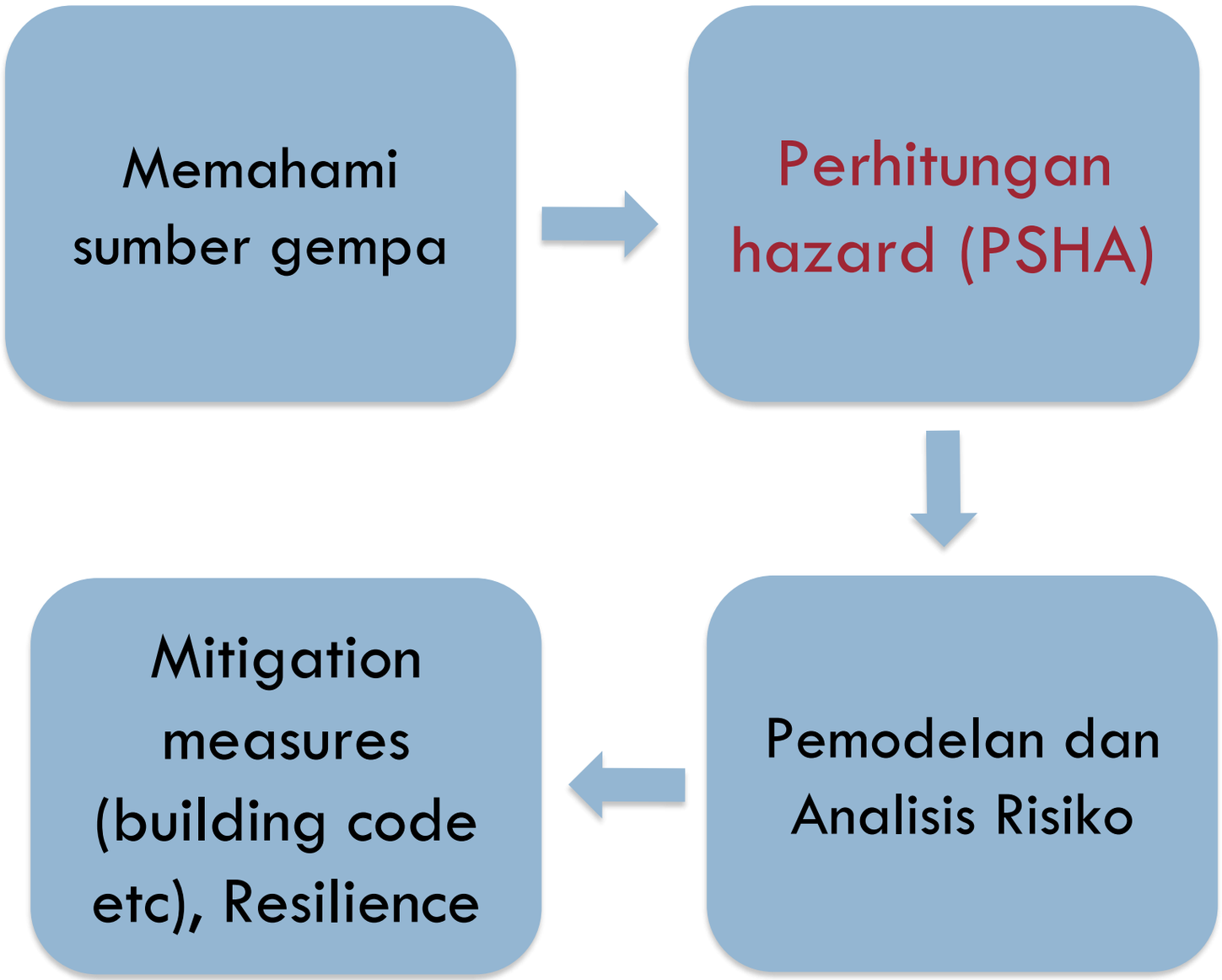
Earthquake in Indonesia >300 km



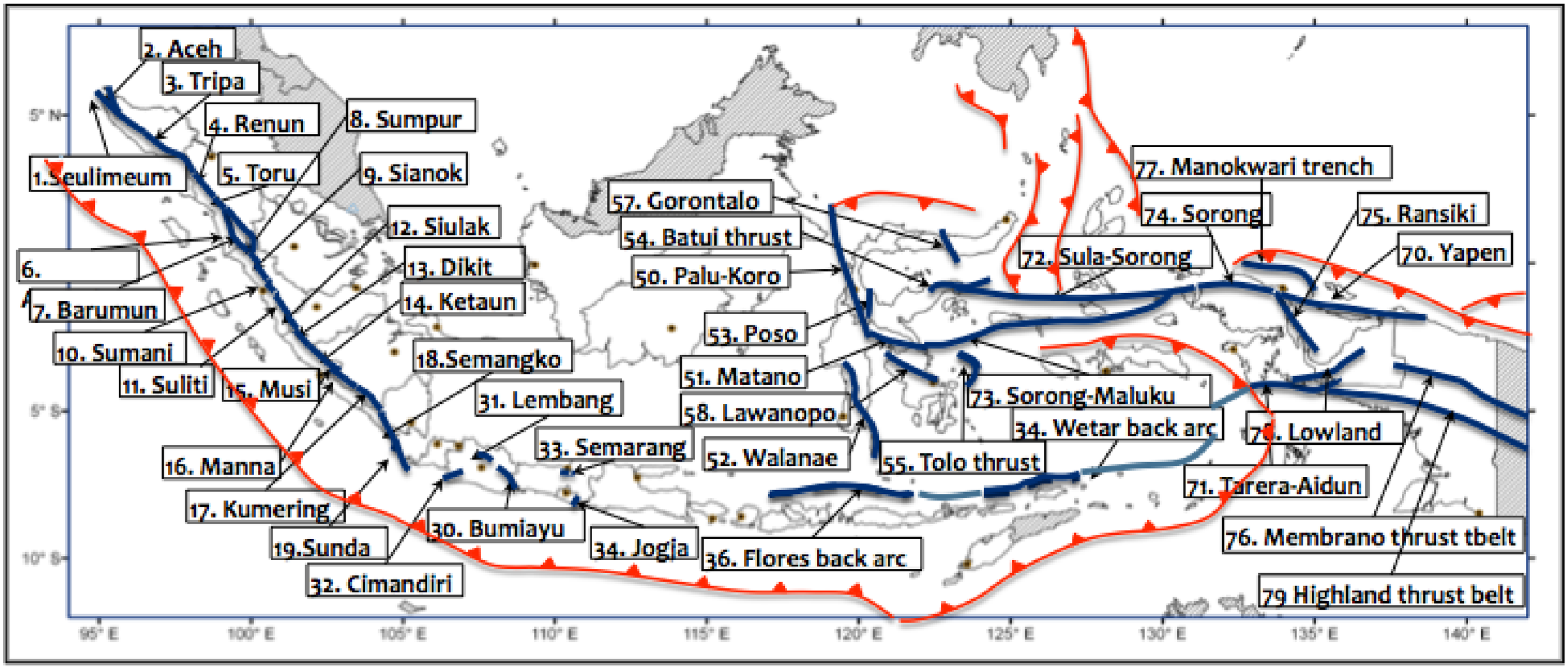
Eq data : Engdahl, 2009

Pulau Jawa memililiki potensi gempa

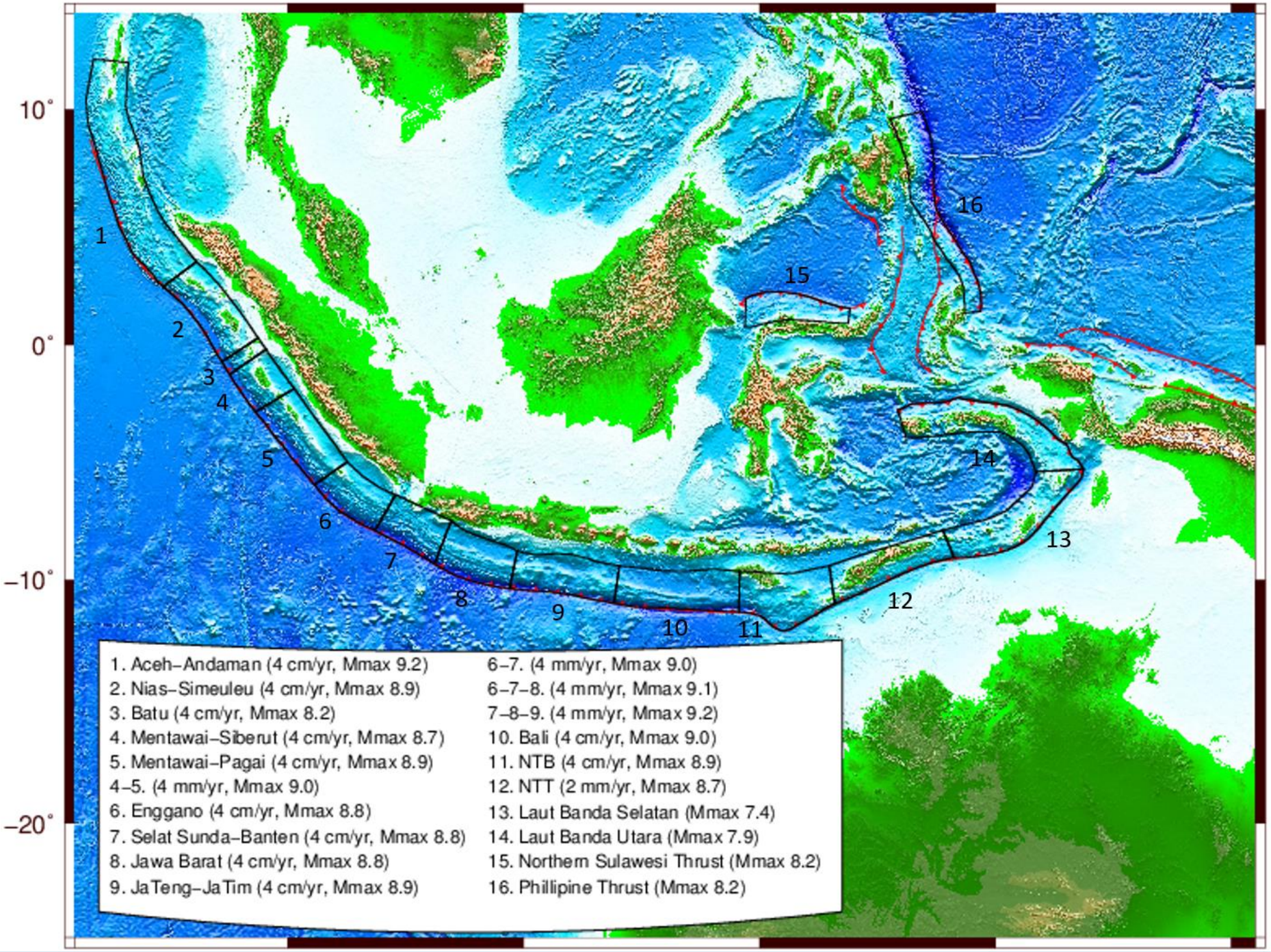
Apa yang harus dilakukan ?


Memahami sumber gempa
Perhitungan hazard (PSHA)
Pemodelan dan Analisis Risiko
Mitigation measures (building code etc), Resilience

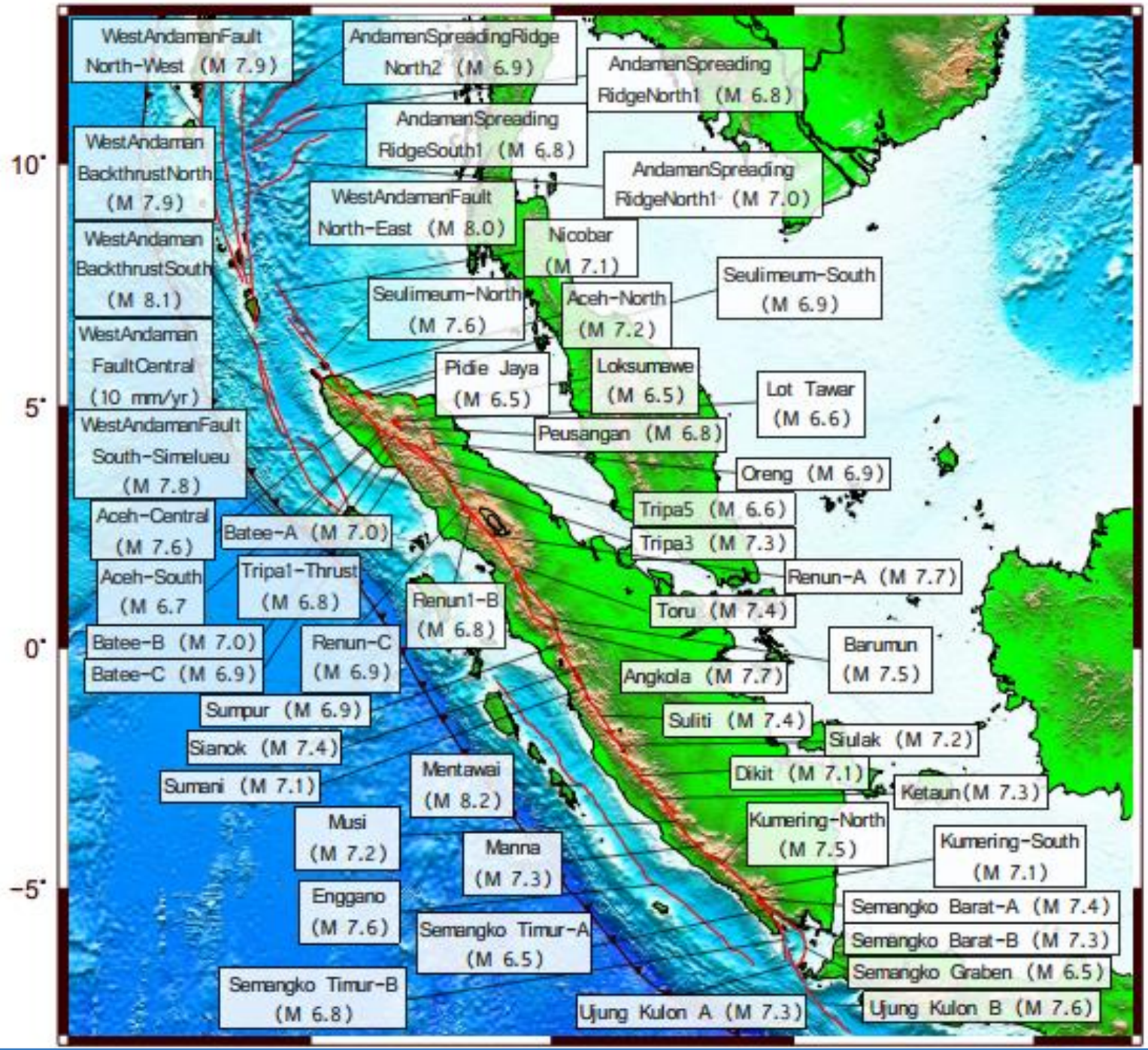
Peta Sumber Gempa Indonesia 2010 (SNI 2012)



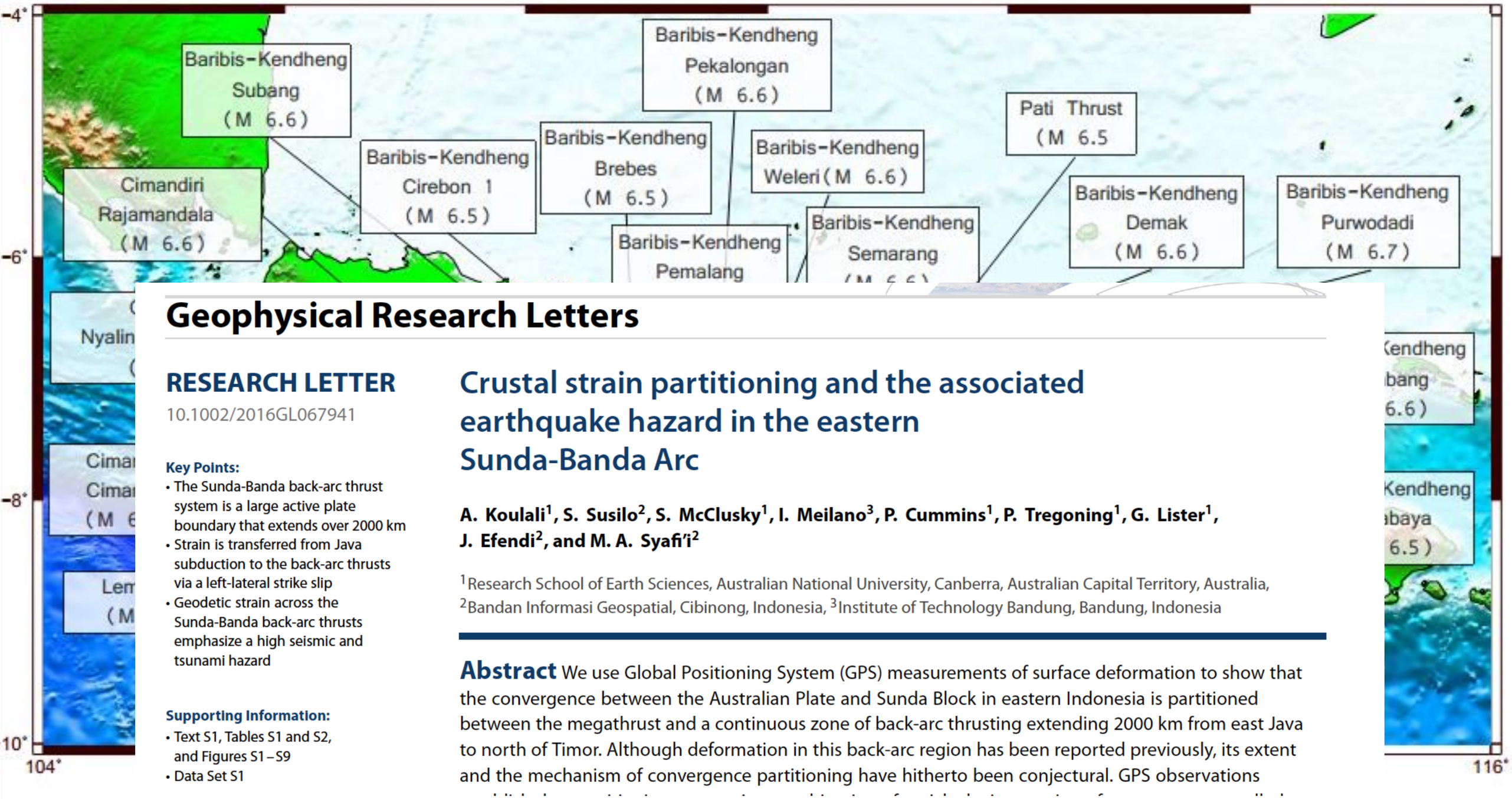
Peta Sumber Gempa Indonesia 2016 (subduction)



Peta Sumber Gempa Indonesia 2016



Peta Sumber Gempa Indonesia 2016



Geophysical Research Letters

RESEARCH LETTER

10.1002/2016GL067941

Key Points:
- The Sunda-Banda back-arc thrust system is a large active plate boundary that extends over 2000 km
- Strain is transferred from Java subduction to the back-arc thrusts via a left-lateral strike slip
- Geodetic strain across the Sunda-Banda back-arc thrusts emphasize a high seismic and tsunami hazard

Supporting Information:
- Text S1, Tables S1 and S2, and Figures S1–S9
- Data Set S1

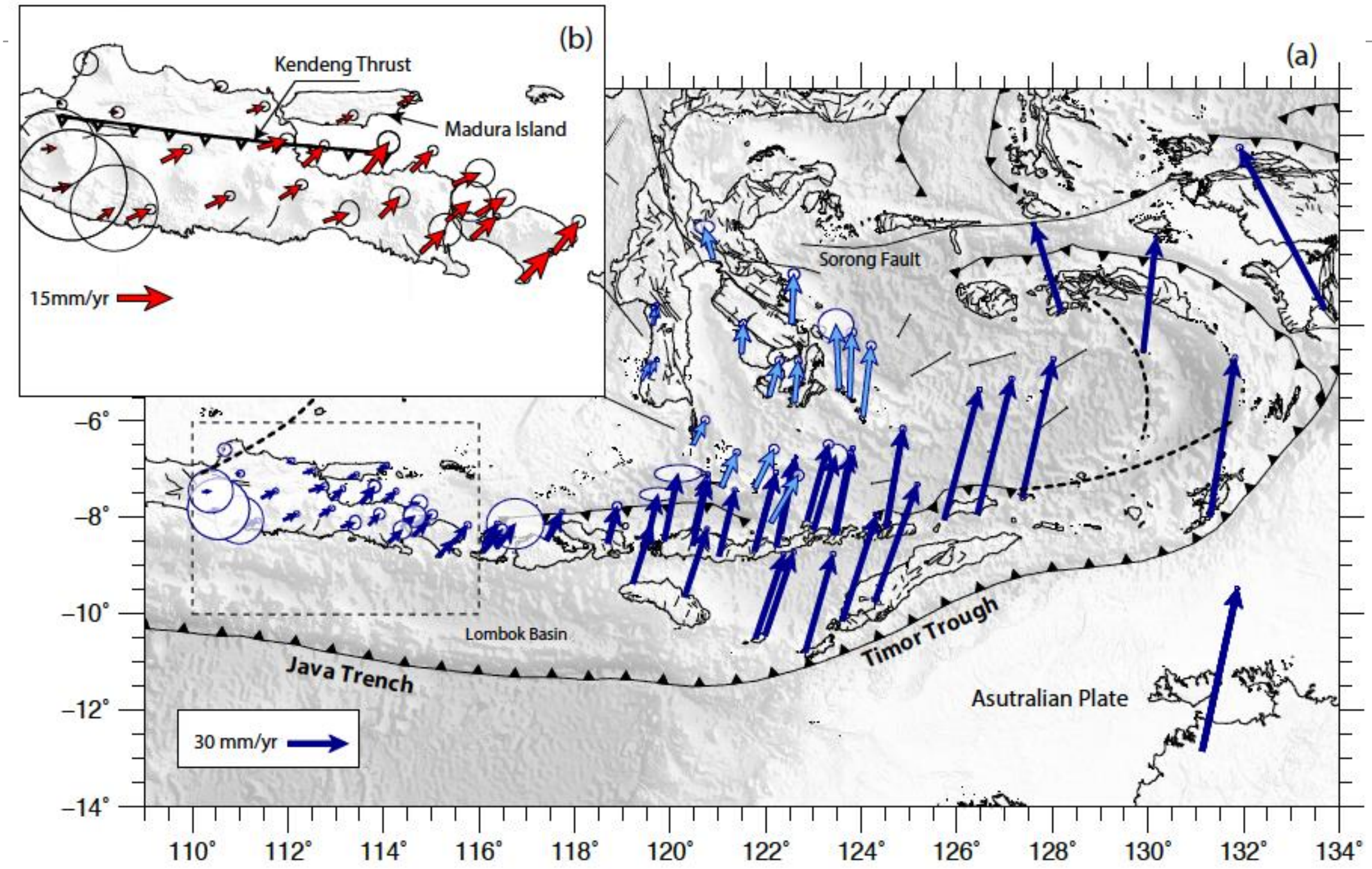
Crustal strain partitioning and the associated earthquake hazard in the eastern Sunda-Banda Arc

A. Koulali[1], S. Susilo[2], S. McClusky[1], I. Meilano[3], P. Cummins[1], P. Tregoning[1], G. Lister[1], J. Efendi[2], and M. A. Syafi'i[2]

[1]Research School of Earth Sciences, Australian National University, Canberra, Australian Capital Territory, Australia, [2]Bandan Informasi Geospatial, Cibinong, Indonesia, [3]Institute of Technology Bandung, Bandung, Indonesia

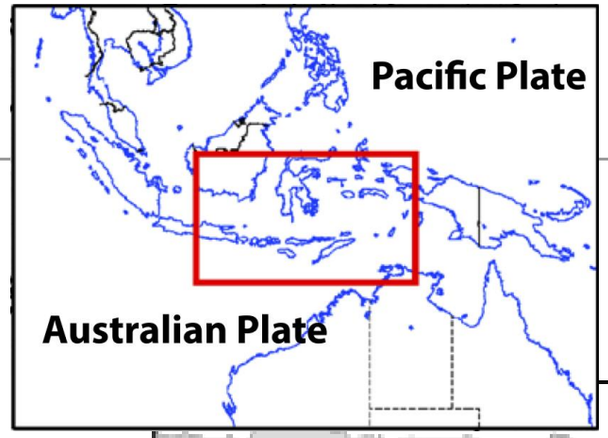
Abstract We use Global Positioning System (GPS) measurements of surface deformation to show that the convergence between the Australian Plate and Sunda Block in eastern Indonesia is partitioned between the megathrust and a continuous zone of back-arc thrusting extending 2000 km from east Java to north of Timor. Although deformation in this back-arc region has been reported previously, its extent and the mechanism of convergence partitioning have hitherto been conjectural. GPS observations

Sumber Gempa di Jawa Timur: Sesar Naik Kendeng

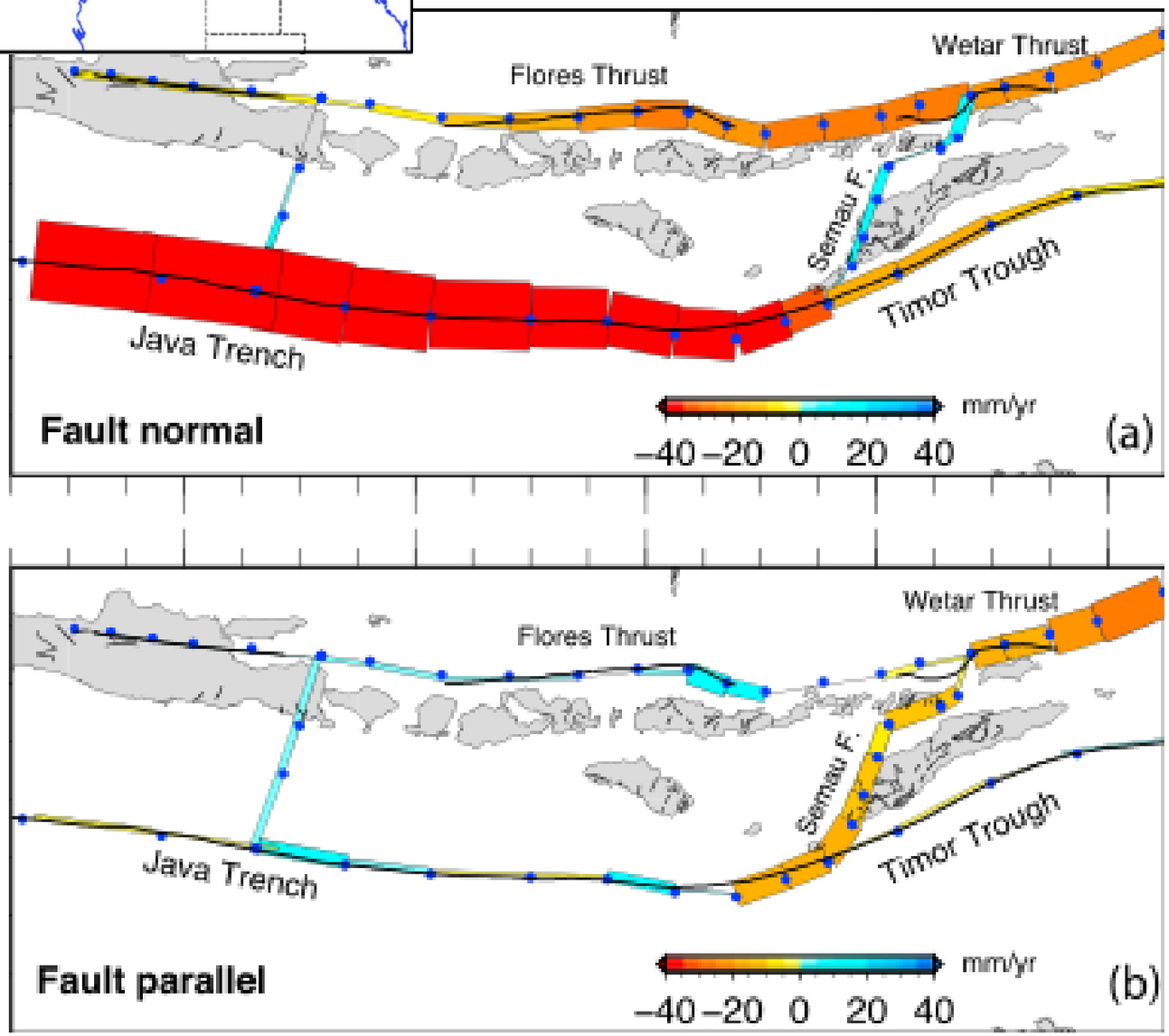


Sumber Gempa : Jatim

- Almost all convergence accommodated by Java Trench offshore Java and Bali, gradually decreasing to almost none east of Timor
- Small but significant (6mm/yr) convergence on Kendeng Thrust, increasing to accommodate all convergence along the Flores-Wetar Backarc Thrust
- Transfer of convergence facilitated by strike-slip motion along Semau Fault

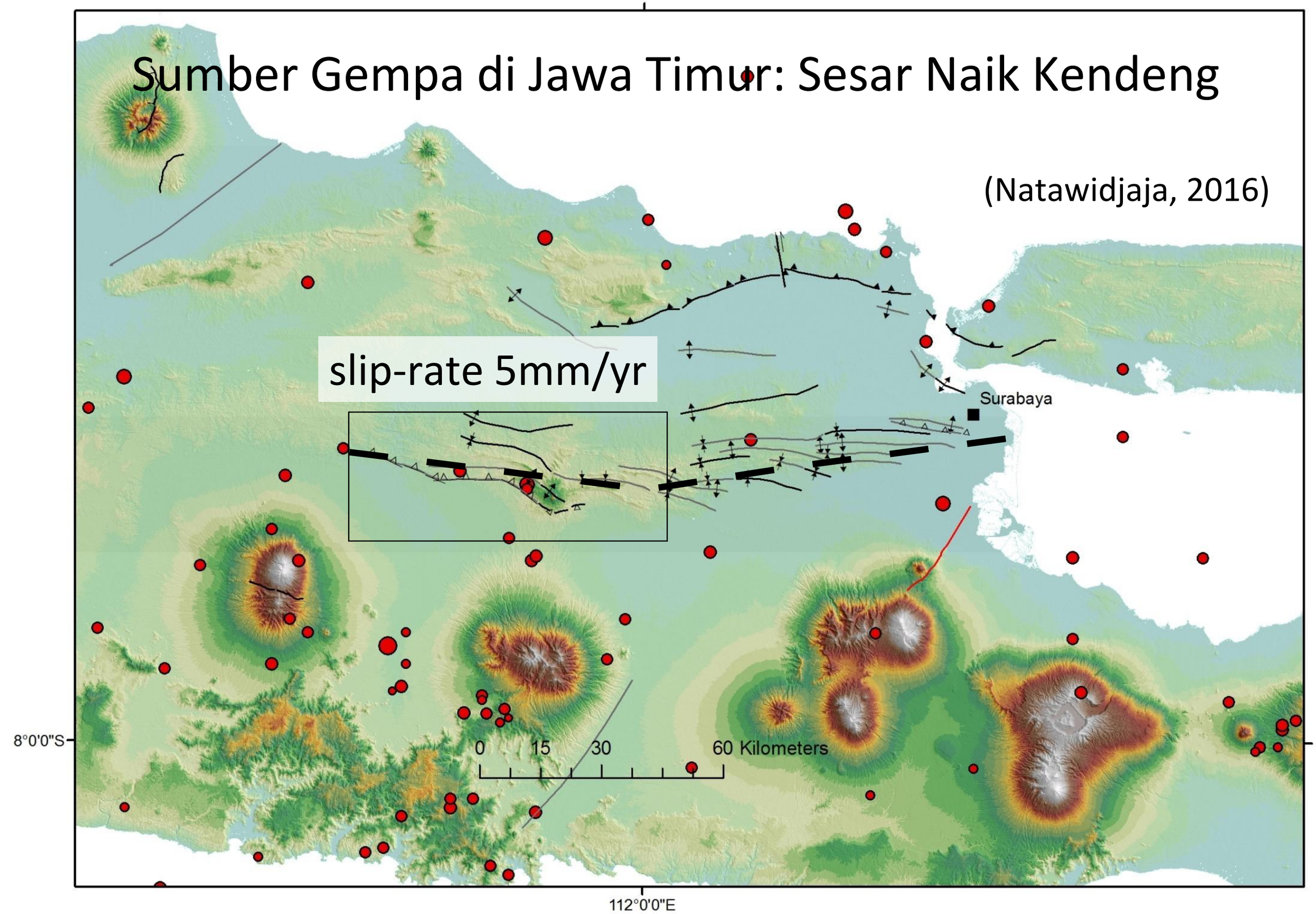


(Koulali et al., 2016)

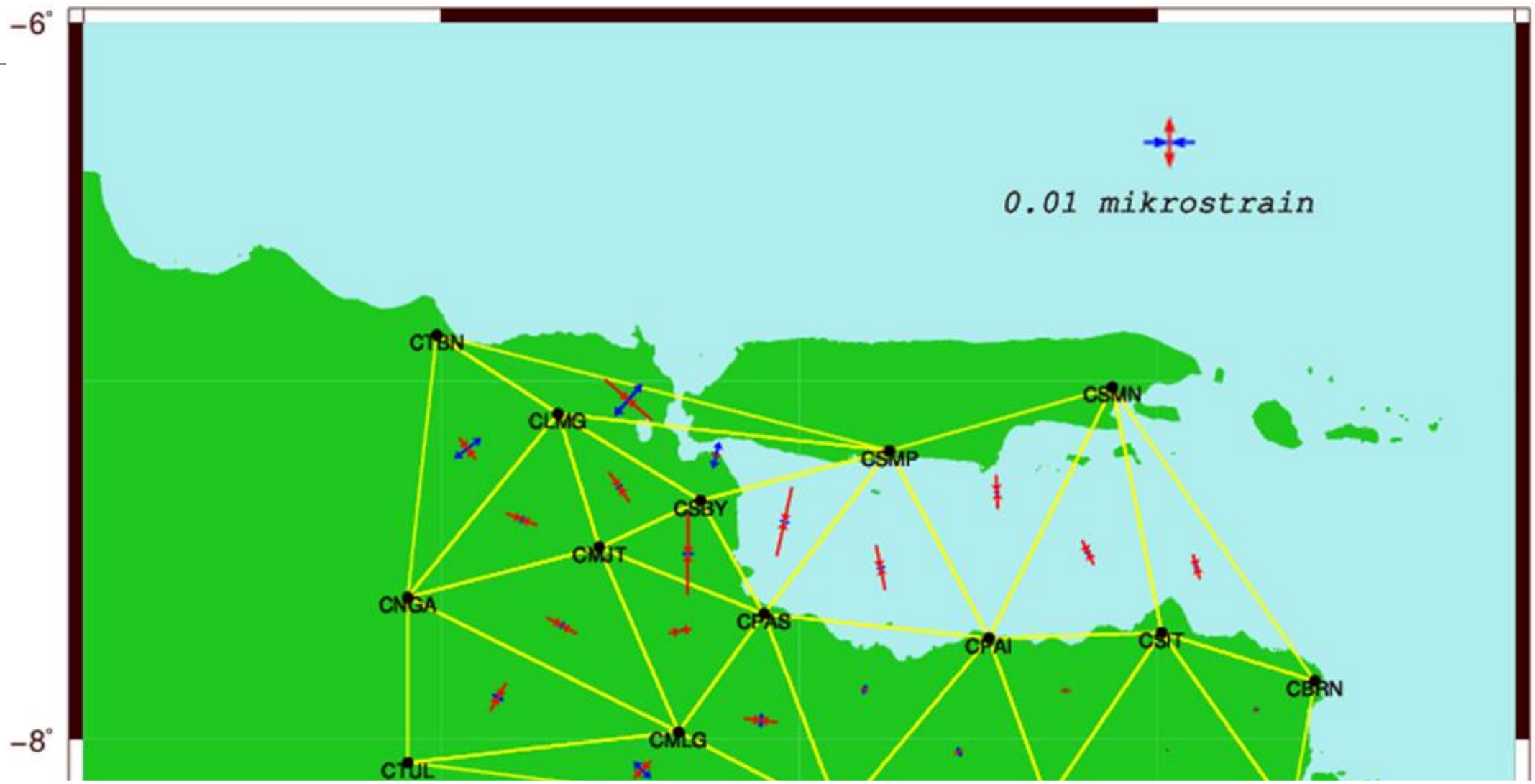


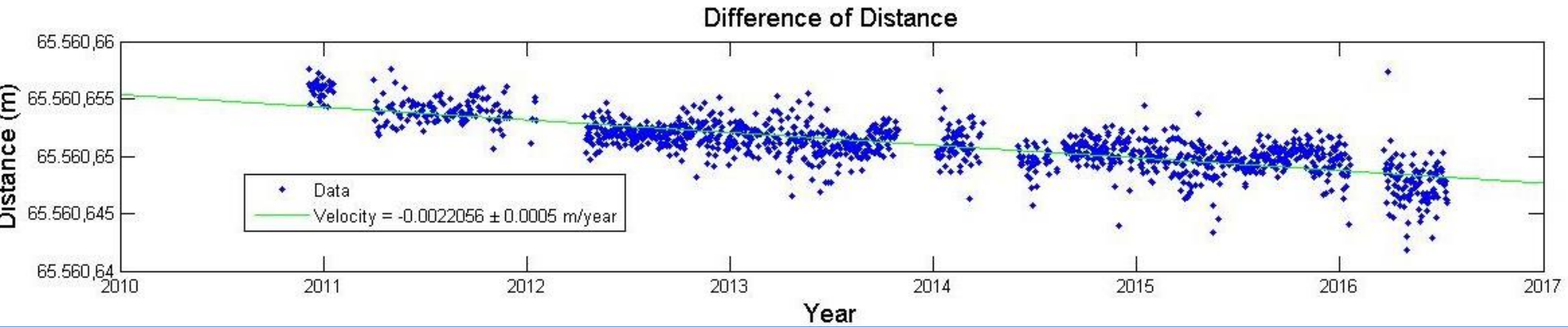
Sumber Gempa di Jawa Timur: Sesar Naik Kendeng

(Natawidjaja, 2016)



Sumber Gempa di Jawa Timur: Sesar Naik Kendeng



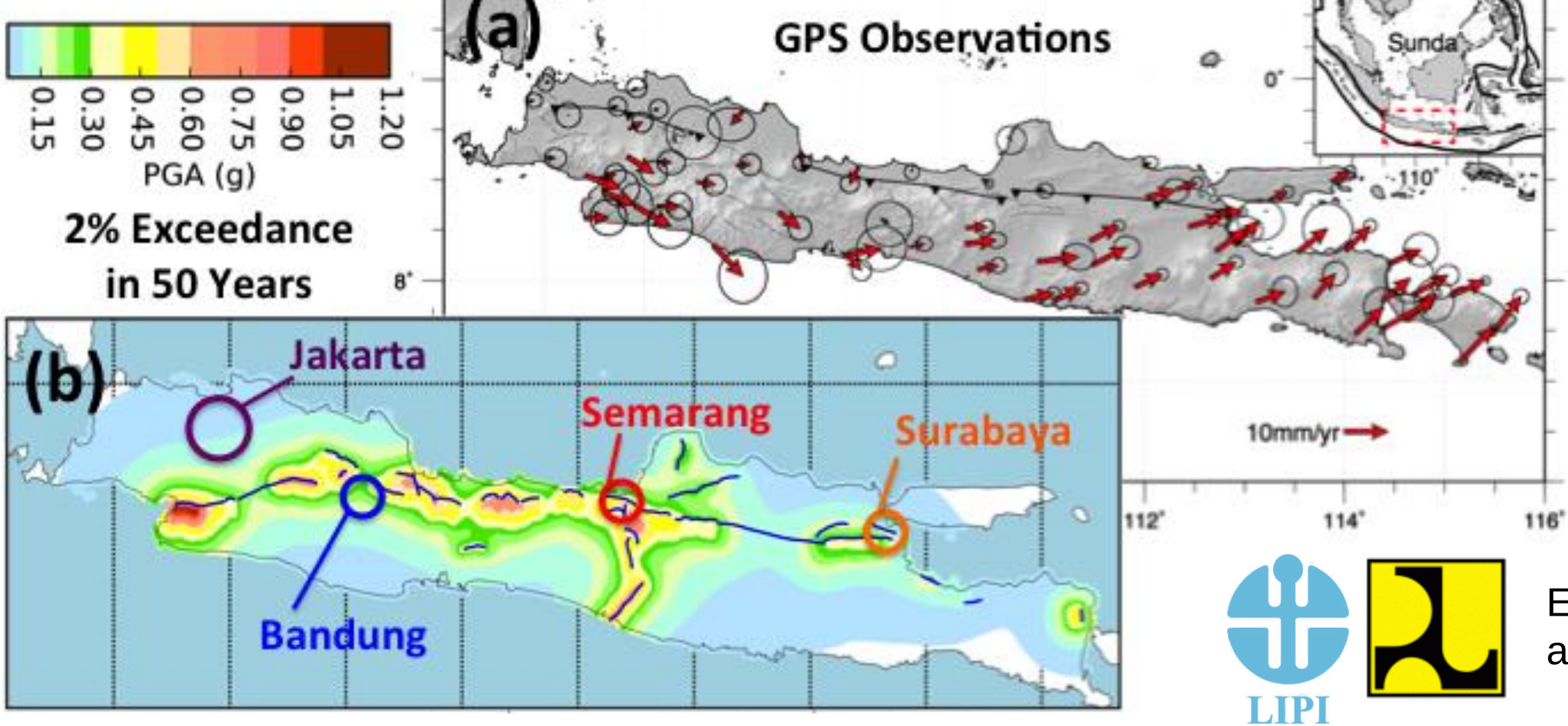


Sumber Gempa di Jawa Timur: Sesar Naik Kendeng

BADAN INFORMASI GEOSPASIAL

Australian National University

Australian Aid



Et al.

Pulau Jawa memililiki potensi gempa?

Saya sudah lama tinggal disini tidak pernah mengalami gempa !

Gempabumi di Pulau Jawa di Masa Lalu

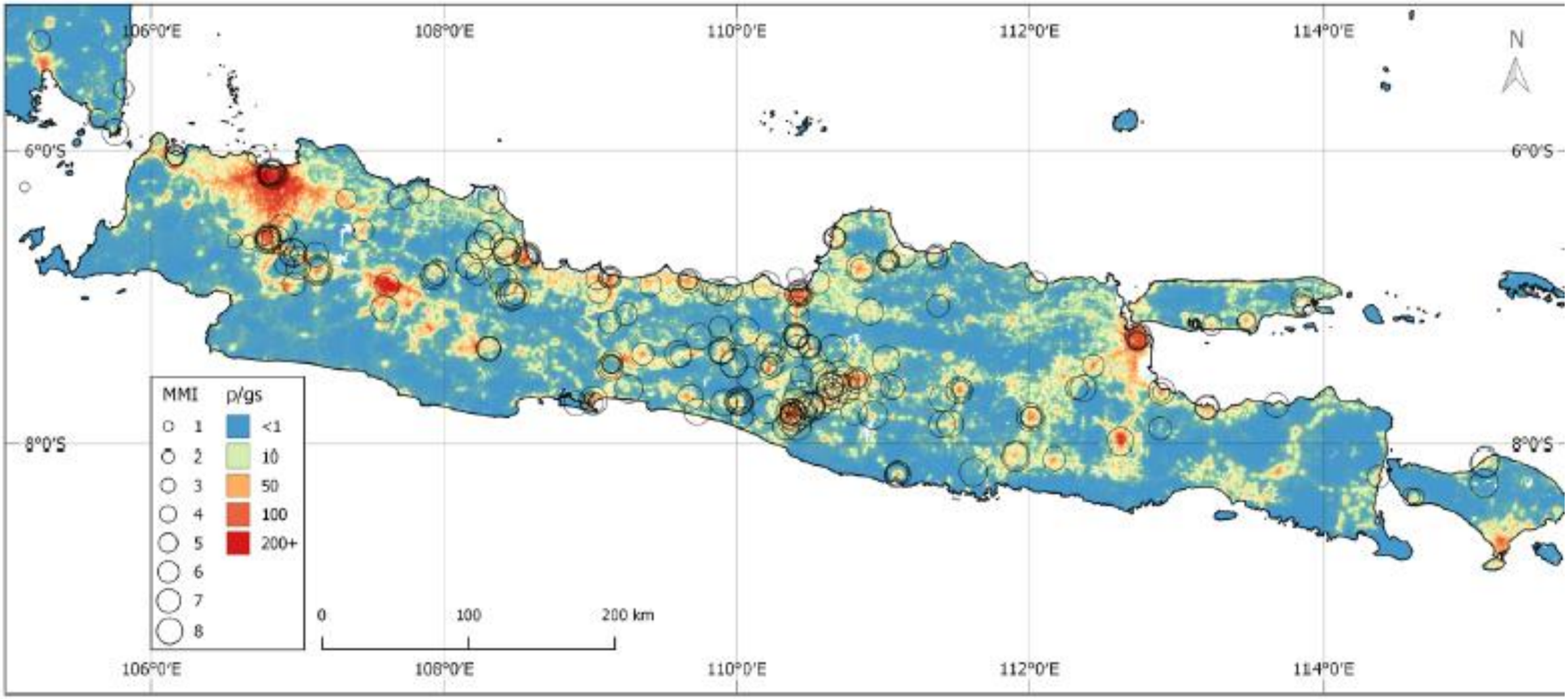
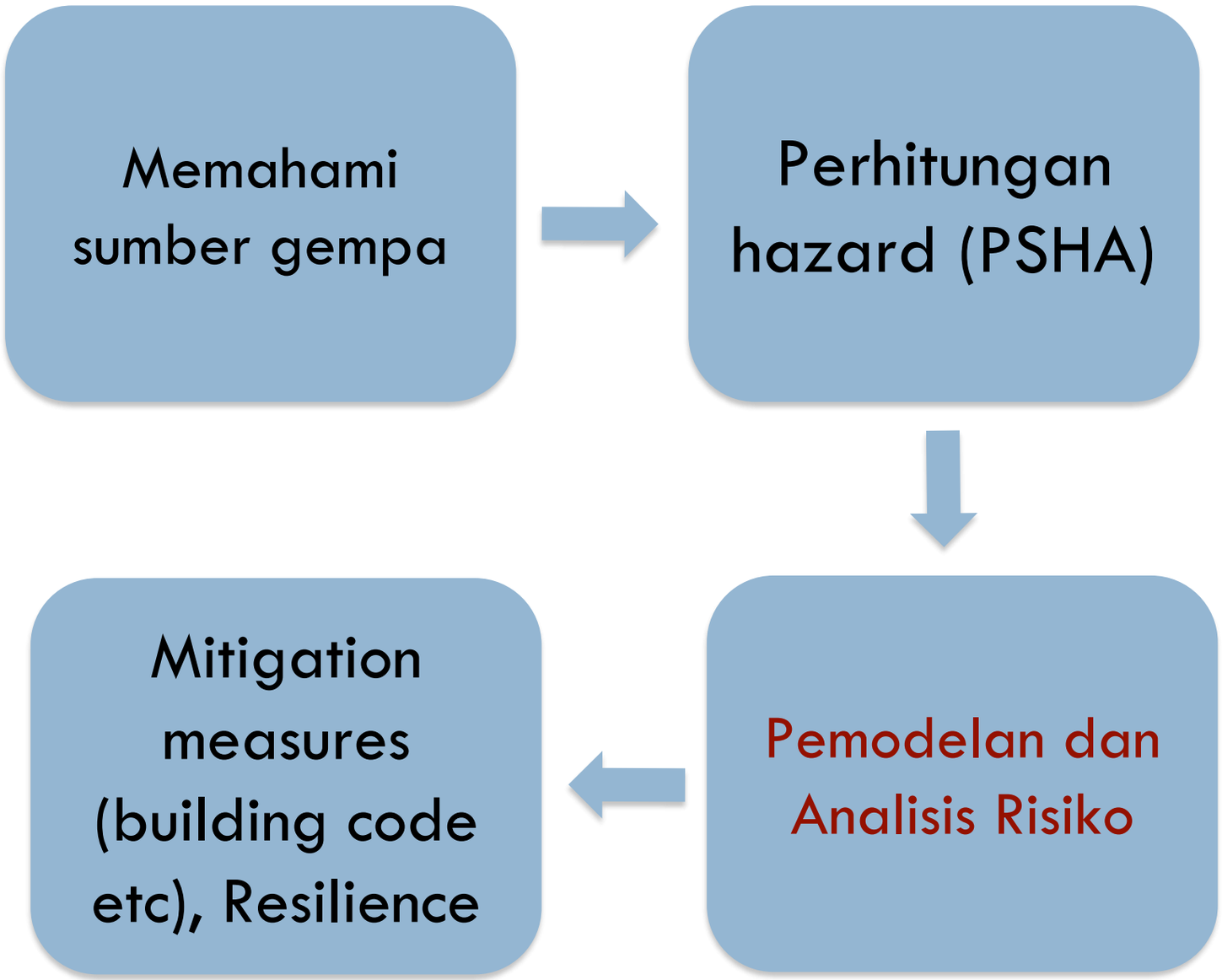
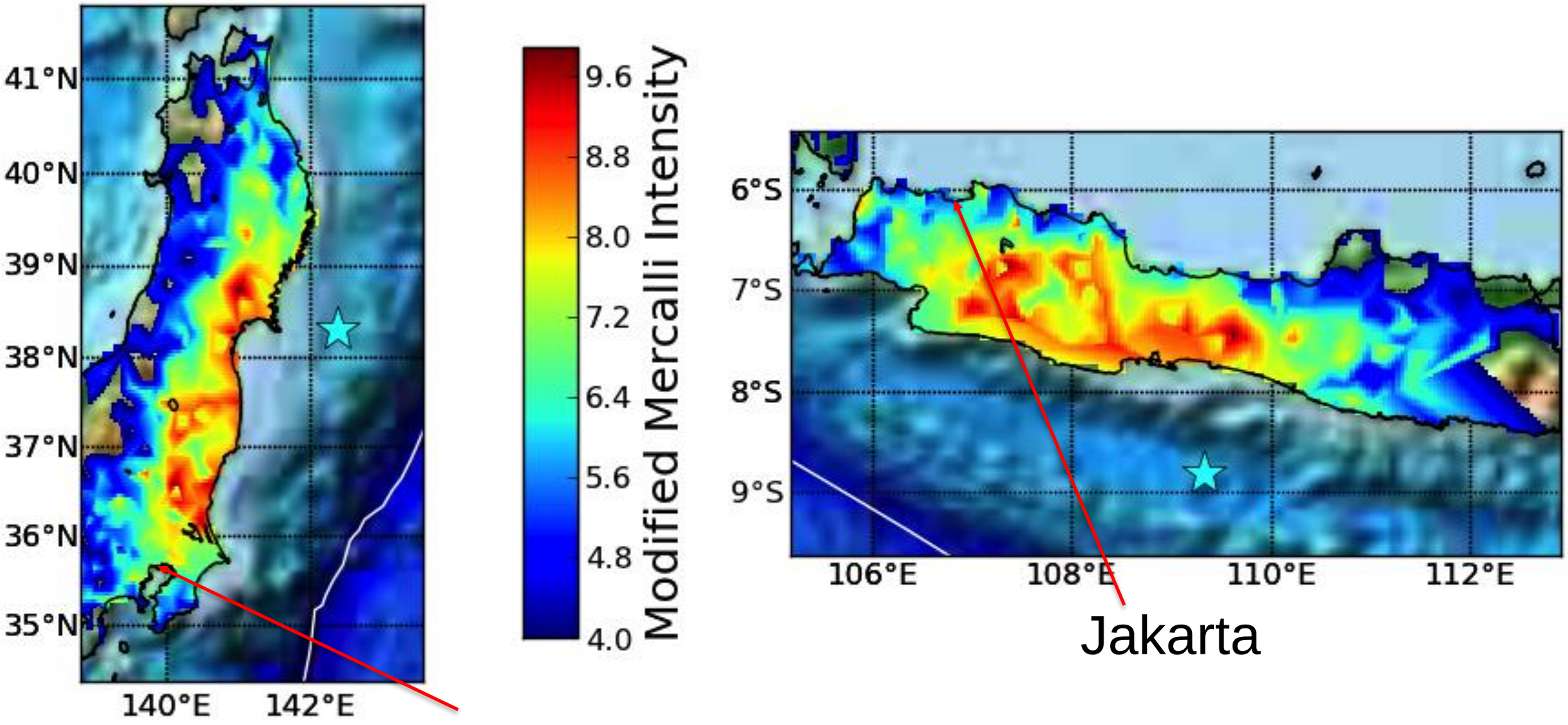


Figure 1.1 Estimates of persons per grid square (p/gs) (~100 m at the equator) in for Java for 2015 (adjusted to match United Nations' projections by Gaughan et al., 2013)*, with observed MMI from all events modelled. Data from WorldPop* (2015).

Cummins, 2017


Memahami sumber gempa
Perhitungan hazard (PSHA)
Pemodelan dan Analisis Risiko
Mitigation measures (building code etc), Resilience

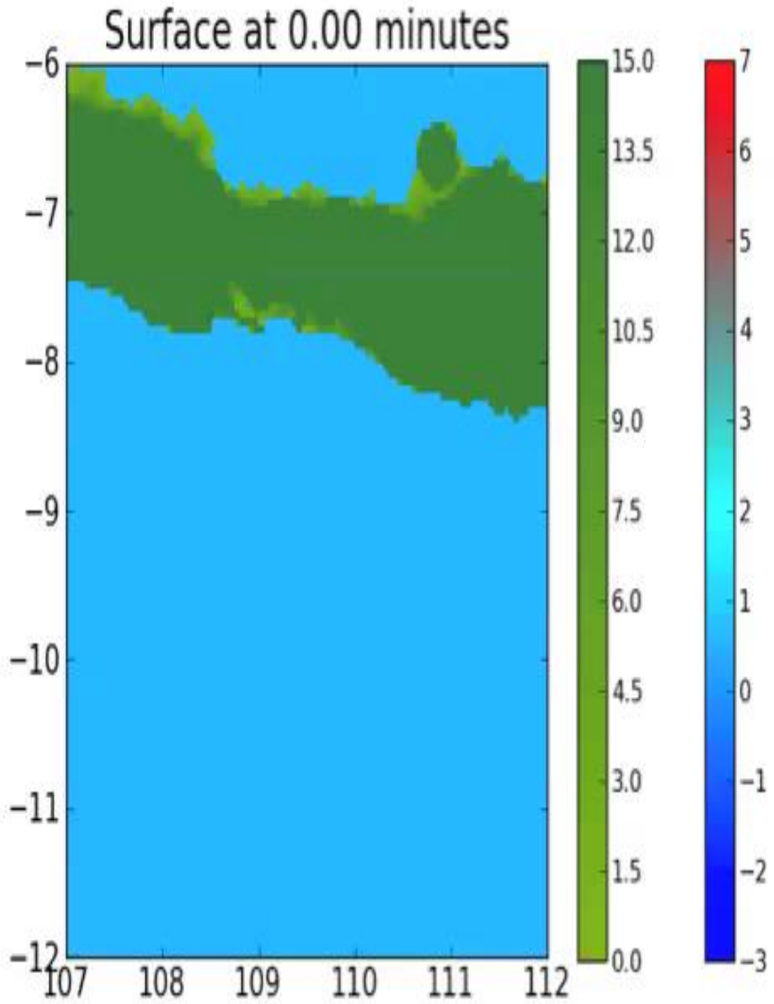
Dampak kerusakan gempabumi jika gempa M9



Cummins, 2017

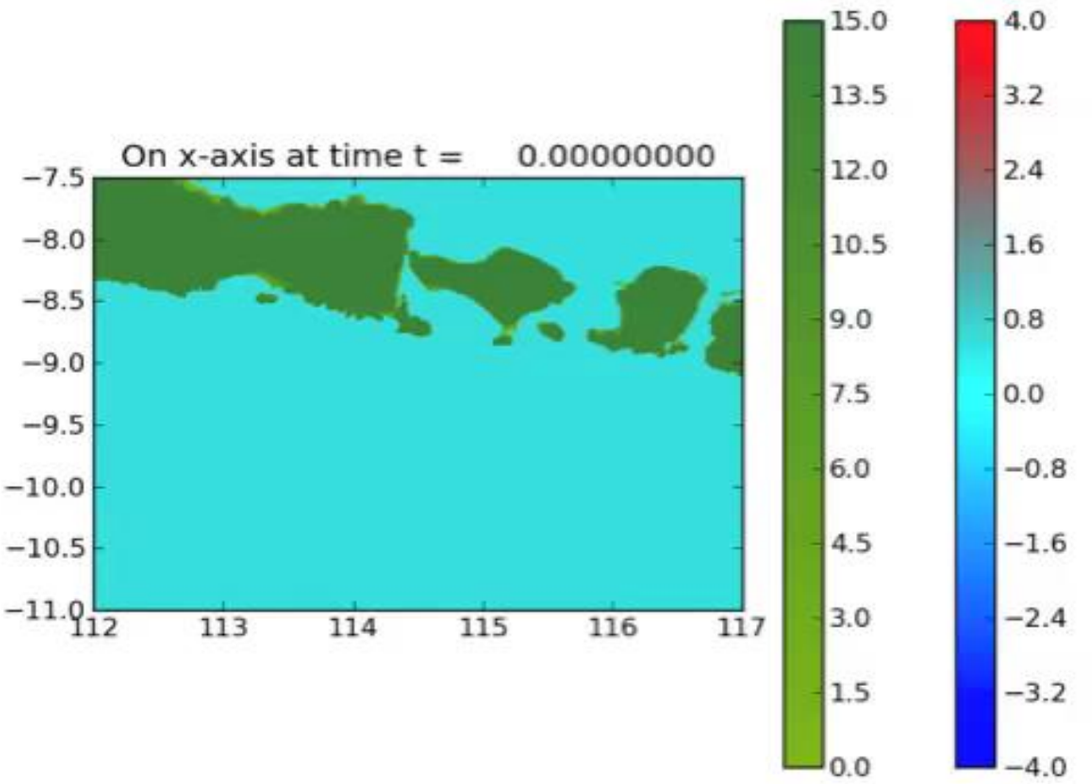
Dampak kerusakan gempabumi jika gempa M9

Offshore Cilacap



A tsunami of 7-10 m height impacting a 300 km section of south Java coast, e.g. completely inundating Cilacap

Offshore Bali



A tsunami of 7-10 m height impacts the coasts of East Java, Bali and Lombok, completely overwashing the Kuta Isthmus

Cummins, 2017

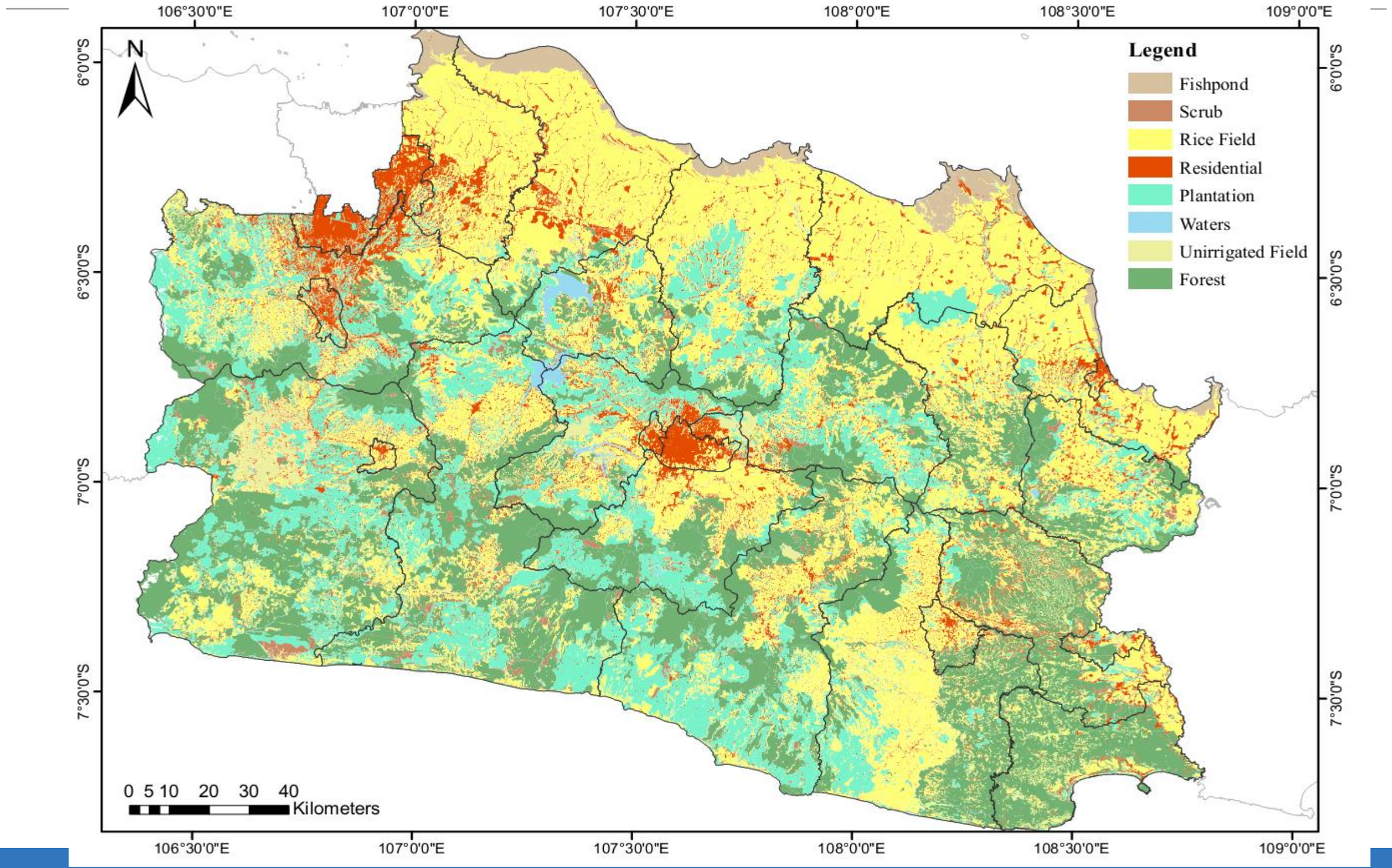
Dampak kerusakan gempabumi jika gempa M9

	Event		MMI VII	MMI VIII	MMI IX	MMI X
	Damage	Resilient	Moderate	Mod/heavy	Heavy	V. Heavy
		Vulnerable	Mod/heavy	Heavy	V. Heavy	V. Heavy
USGS Pager	2010 Haiti	(M 7.0)	598k	2,030k	908k	118k
	2011 Tohoku	(M 9.0)	34,740k	5,816k	257k	0
	2010 Wenchuan	(M7.9)	4,006k	1,245k	528k	2k
This study	???? Java	(M9.0)	29,747k	25,642k	6,313k	121k
	???? Bali	(M9.0)	10,676k	10,055k	3,293k	58k

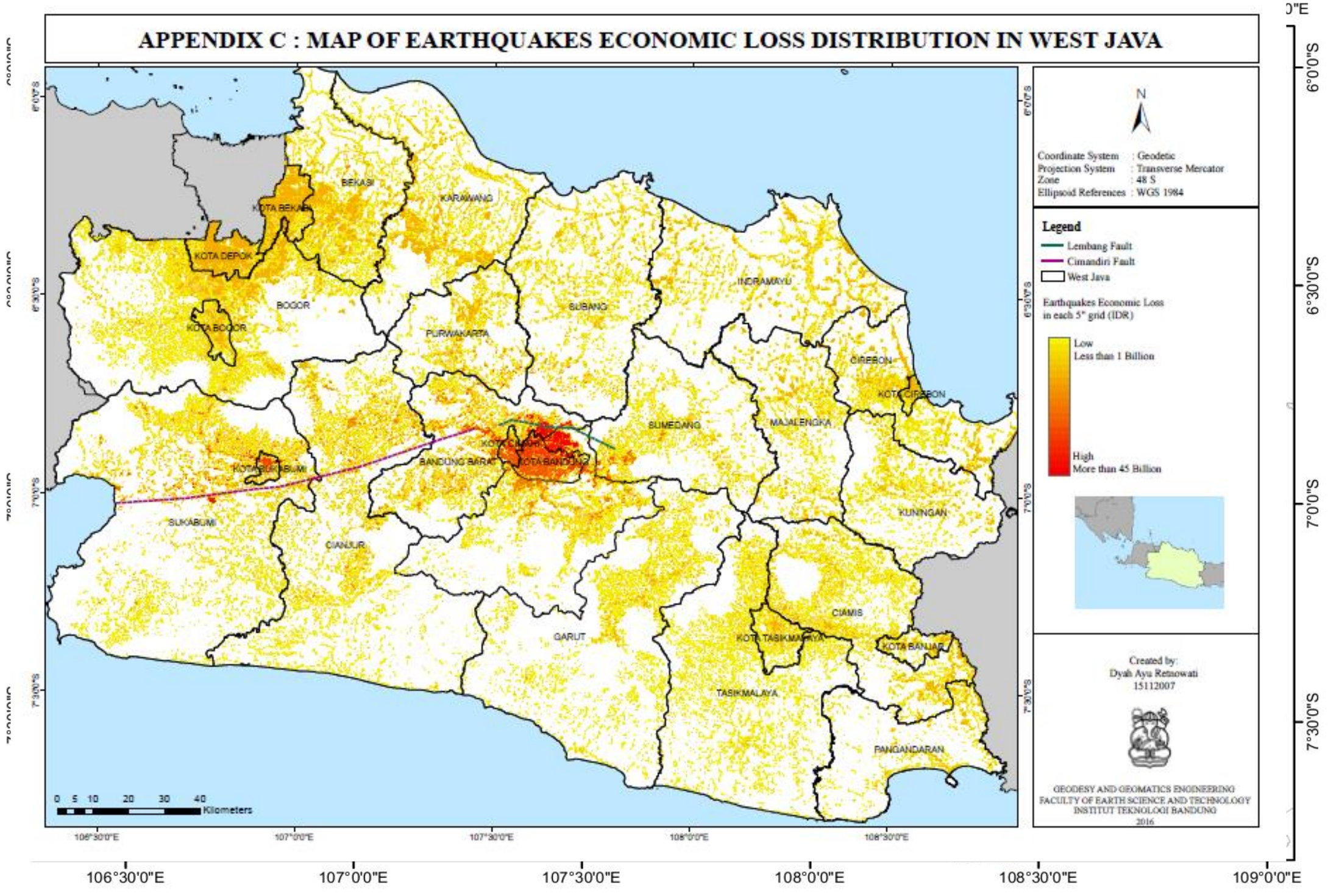
- Exposure to MMI 9 and above similar to Haiti EQ
- Ground motions at MMI 8 and 9 have much higher exposure than any recent earthquake

Cummins, 2017

Perhitungan Risiko Bencana di Jawa Barat



Perhitungan Risiko Bencana di Jawa Barat



Pulau Jawa memililiki potensi gempa

Apa yang harus dilakukan ?

Penutup (1)

Pulau Jawa memiliki risiko gempa yang lebih tinggi dari apa yang diyakini masyarakat saat ini

Pertanyaannya lebih pada “apa yang yang harus kita perbuat” dan bukan “kapan”

Penutup (2)

Risiko yang tinggi menjadi bahan renungan:
Karena tidak ada seorang pun dari kita pernah merasakan gempa besar disini.

Apabila kita dengan serius melakukan tindakan pengurangan risiko, maka potensi gempa tidak akan menjadi bencana.