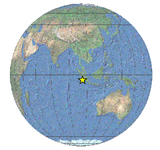
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

EARTHQUAKE SUMMARY MAP XXX

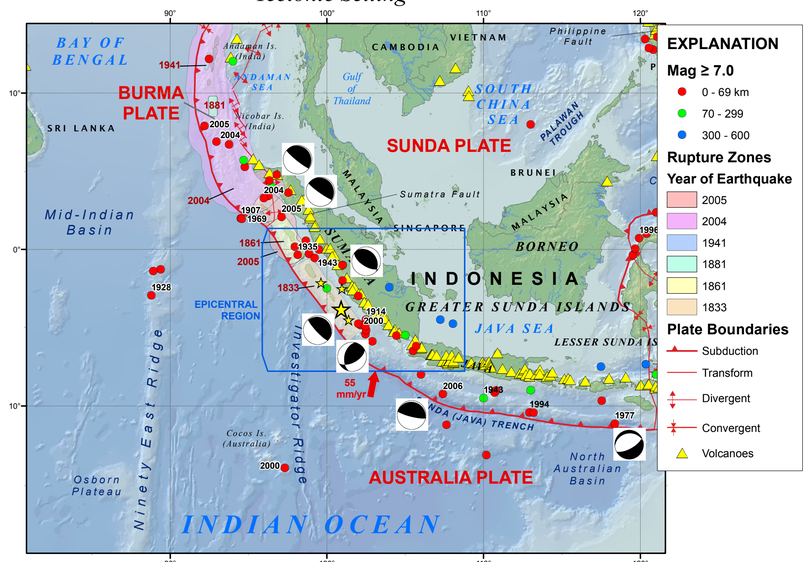
M6.8 Southwest of Sumatra, Indonesia Earthquake of 24 October 2007



Prepared in cooperation with the Global Seismographic Network

GSN

Tectonic Setting



EXPLANATION

Mag ≥ 7.0
- 0 - 69 km
- 70 - 299
- 300 - 600

Rupture Zones
Year of Earthquake
- 2005
- 2004
- 1941
- 1881
- 1861
- 1833

Plate Boundaries
- Subduction
- Transform
- Divergent
- Convergent
- Volcanoes

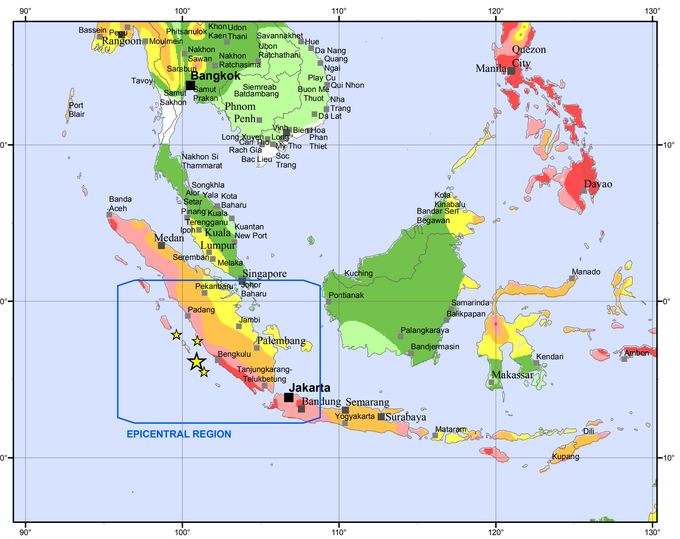
RELATIVE PLATE MOTIONS

The broad red vector represents the motion of the Australia Plate relative to the Sunda Plate in the region. The motion of the Australia Plate is generally 50 - 60 mm/yr north and slightly eastward with respect to the Sunda Plate.

SCALE 1:20,000,000 at the Equator

0 200 400 800 1,200 1,600 Kilometers

Seismic Hazard



Seismic hazard is expressed as peak ground acceleration (PGA) on firm rock, in meters/sec², expected to be exceeded in a 50-yr period with a probability of 10 percent.

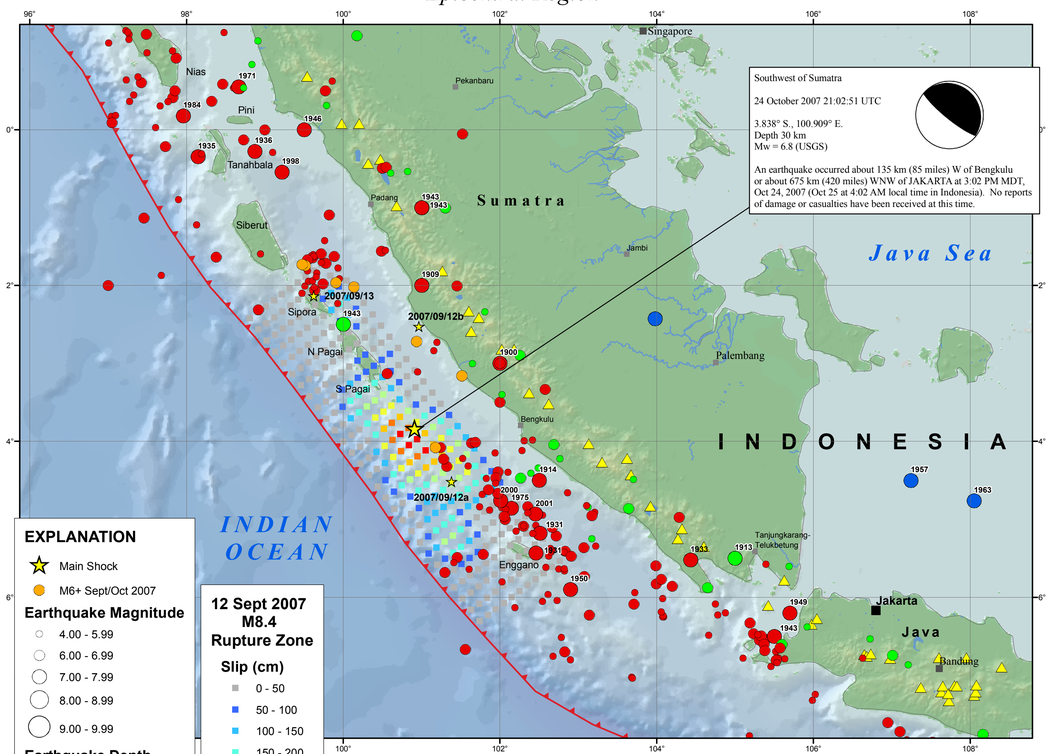
SCALE 1:20,000,000 at the Equator

0 200 400 800 1,200 1,600 Kilometers

Peak Ground Acceleration in m/sec**2

.2 .4 .8 1.6 2.4 3.2 4.0 4.8

Epicentral Region



EXPLANATION
- Main Shock
- M6+ Sept/Oct 2007

Earthquake Magnitude
- 4.00 - 5.99
- 6.00 - 6.99
- 7.00 - 7.99
- 8.00 - 8.99
- 9.00 - 9.99

Earthquake Depth
- 0 - 69
- 70 - 299
- 300 - 700

12 Sept 2007 M8.4 Rupture Zone
Slip (cm)
- 0 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- 200 - 250
- 250 - 300
- 300 - 350
- 350 - 400
- 400 - 450

Scale at the Equator 1:4,000,000
Mercator Projection

0 100 200 400 Kilometers

Significant Earthquakes Mag ≥ 7.5

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1914	06	25	1907	-4.500	102.500	0	7.6
1935	12	28	0235	-0.345	98.147	35	7.8
1943	06	09	0306	-1.000	101.000	50	7.5
2000	06	04	1628	-4.762	102.007	35	7.9
2002	11	02	0126	2.82	96.08	30	7.6
2004	12	26	0058	3.30	95.98	30	9.1
2005	03	28	1609	2.09	97.11	30	8.6
2006	07	17	0819	-9.25	107.41	34	7.7
2007	08	08	1704	-5.91	107.67	280	7.5
2007	09	12	1110	-4.514	101.382	30	8.4
2007	09	12	2349	-2.526	100.964	10	7.9

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GSN USAID FROM THE AMERICAN PEOPLE

M 6.8, KEPULAUAN MENTAWAI REGION, INDONESIA

PAGER Version 3

Origin Time: Wed 2007-10-24 21:02:52 UTC
Location: 3.84°S 100.91°E Depth: 30 km

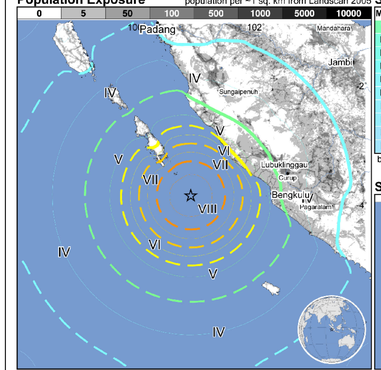
Created: 17 hrs, 38 mins after earthquake

Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)		-.-*	2.553k*	3,833k	1,090k	58k	1k	0	0	0
ESTIMATED MODIFIED MERCALLI INTENSITY		I	II-III	IV	V	VI	VII	VIII	IX	X+
PERCEIVED SHAKING		Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	Resistant Structures	none	none	none	V. Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
	Vulnerable Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy

*Estimated exposure only includes population within the map area.

Population Exposure population per ~1 sq. km from Landscan 2005

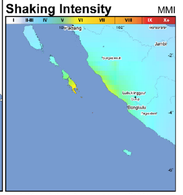


Selected City Exposure

MMI	City	Population
V	Bengkulu	309k
IV	Curup	46k
IV	Sungaipenuh	95k
IV	Lubuklinggau	148k
IV	Pagaralam	70k
IV	Lahat	65k
III	Padang	840k
III	Tanjungagung	53k
III	Jambi	420k
III	Mandahara	56k

bold cities appear on map (k = x1000)

Shaking Intensity MMI



Users should consider the preliminary nature of this information and check for updates as additional data becomes available. Population exposure estimates are NOT a direct estimate of earthquake damage; comparable shaking will result in significantly lower losses in regions with well built structures than in regions with vulnerable structures. Overall, structures in this region are vulnerable to earthquake shaking, though some resistant structures exist. A magnitude 9.0 earthquake struck the Sumatra - Andaman Islands, Indonesia region on December 26, 2004 (UTC), with estimated population exposures of 62,000 at intensity IX or greater and 1.6 million at intensity VIII, resulting in an estimated 297,200 deaths. Recent earthquakes in this area have also triggered landslide and liquefaction hazards that have contributed to losses.

This information was automatically generated and has not been reviewed by a seismologist.

http://earthquake.usgs.gov/pager Event ID: us2007iwca

TECTONIC SUMMARY

This earthquake, like the magnitude 8.4, 7.9 and 7.1 southern Sumatra earthquakes of September 12 and 13, 2007, occurred as the result of thrust faulting on the boundary between the Australia and Sunda plates. Since the September 12th earthquake, this section of the subduction zone has remained very active, producing more than 8 events greater than magnitude 6.0.

At the location of these earthquakes, the Australia plate moves northeast with respect to the Sunda plate at a velocity of about 60 mm/year. The direction of relative plate motion is oblique to the orientation of the plate boundary offshore of the west coast of Sumatra. The component of plate-motion perpendicular to the boundary is accommodated by thrust faulting on the offshore plate-boundary. Much of the component of plate motion parallel to the plate boundary is accommodated by strike-skip faulting on the Sumatra fault, which is inland on Sumatra proper.

The magnitude 8.4 earthquake of September 12, 2007 is the fourth earthquake of magnitude greater than 7.9 to have occurred in the past decade on or near the plate boundaries offshore of western Sumatra. This earthquake occurred just north of the source region of the magnitude 7.9 earthquake on June 4, 2000. The September 12, 2007 magnitude 7.8 earthquake occurred about 225 km northwest of the magnitude 8.4 earthquake at the northern end of the aftershock zone. These two earthquakes and their aftershocks overlay the southern portion of the estimated 1833 rupture zone, which extends from approximately Eggano Island to the northern portion of Siberut Island. The great magnitude 9.1 earthquake of December 26, 2004, which produced the devastating Indian Ocean tsunami of that date, ruptured much of the boundary separating the India plate and the Burma plate. Immediately to the south of the great 2004 earthquake, the magnitude 8.6 Nias Island earthquake of March 28, 2005, ruptured a segment of the plate boundary separating the Australia and Sunda plates. Since the December 26, 2004 earthquake, much of the Sunda trench between the northern Andaman Islands to Eggano Island, a distance of more than 2,000 km, has ruptured in a series of large subduction zone earthquakes.

DISCLAIMER

Base map data, such as place names and political boundaries, are the best available but may not be current or may contain inaccuracies and therefore should not be regarded as having official significance.

DATA SOURCES

EARTHQUAKES AND SEISMIC HAZARD
USGS, National Earthquake Information Center
NOAA, National Geophysical Data Center
IASPEI, Centennial Catalog (1900 - 1999) and extensions (Engdahl and Villaseñor, 2002)
HDF (unpublished earthquake catalog) (Engdahl, 2003)
Global Seismic Hazard Assessment Program

PLATE TECTONICS AND FAULT MODEL
PB2002 (Bird, 2003)
Finite Fault Model, Chen Ji, UC Santa Barbara (2007)

BASE MAP
NIMA and ESRI, Digital Chart of the World
USGS, EROS Data Center
NOAA GEBCO and GLOBE Elevation Models

REFERENCES

Bird, P., 2003, An updated digital model of plate boundaries: Geochem. Geophys. Geosyst., v. 4, no. 3, pp. 1027- 80.

Engdahl, E.R. and Villaseñor, A., 2002, Global Seismicity: 1900 - 1999, chap. 41 of Lee, W.H.K., and others,eds., International Earthquake and Engineering Seismology, Part A: New York, N.Y., Elsevier Academeic Press, 932 p.

Engdahl, E.R., Van der Hilst, R.D., and Buland, R.P., 1998, Global teleseismic earthquake relocation with improved travel times and procedures for depth determination: Bull. Seism. Soc. Amer., v. 88, p. 722-743.

Map prepared by U.S. Geological Survey
National Earthquake Information Center
25 October 2007
Map not approved for release by Director USGS