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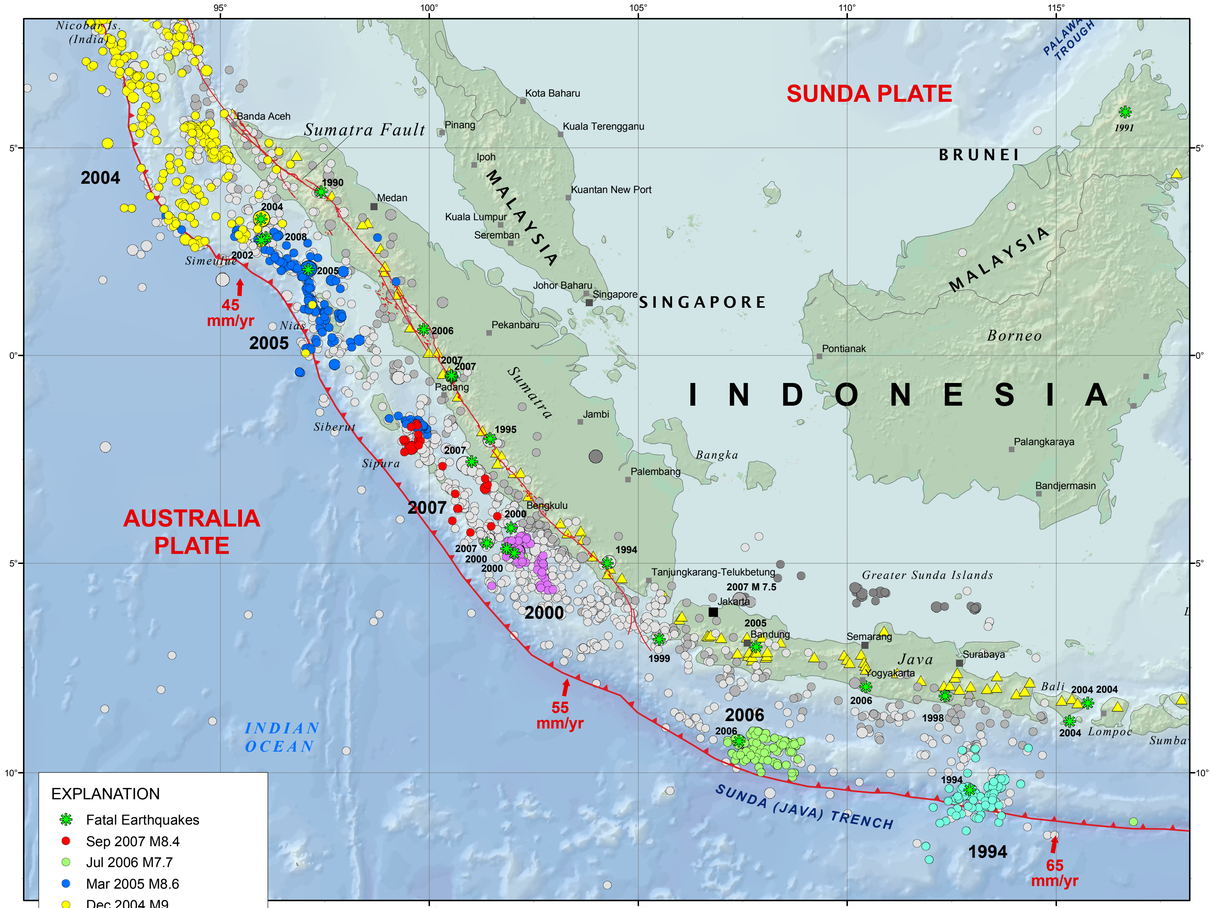
Seismic Hazard of Western Indonesia

Map prepared by U.S. Geological Survey
National Earthquake Information Center
April 2008
Map not approved for release by Director USGS
URL http://earthquake.usgs.gov/research/hazmaps/products_data/

Western Indonesia Earthquakes, 1988 - February 2008



EXPLANATION

- Fatal Earthquakes
- Sep 2007 M8.4
- Jul 2006 M7.7
- Mar 2005 M8.6
- Dec 2004 M9
- Jun 2000 M7.9
- Jun 1994 M7.8
- 1988- Feb 2008 M ≥ 5

Magnitude
- 5 - 5.9
- 6 - 6.9
- 7 - 7.9
- 8 - 9

Depth for 1988- Feb 2008 events
- 1 - 64 km
- 65 - 299
- ≥ 300

Faults
- Subduction
- Transform
- Volcanoes

Scale 1:7,500,000
0 200 400 800 1,200 Kilometers

RELATIVE PLATE MOTIONS

The broad red vectors 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 northward with respect to the Sunda Plate in the southern region, but diminishes to 40-50 mm/yr towards the north.

DISCUSSION

The tectonics of the poster region are dominated by the subduction of the Australia plate beneath the Sunda plate. The rate of relative plate motion varies from east to west across the map region, as indicated in the large map. Interplate earthquakes occur as the result of seismic slip on the thrust boundary between the overriding Sunda plate and the subducting Australia plate. The Sumatran fault accommodates a large component of trench parallel motion of the western Australia/Sunda plate boundary that is not be accommodated by slip on the thrust-fault interface between the two plates. Intraplate shocks within the Australia or Sunda plate reflect stresses generated in those two plates by the overall subduction process.

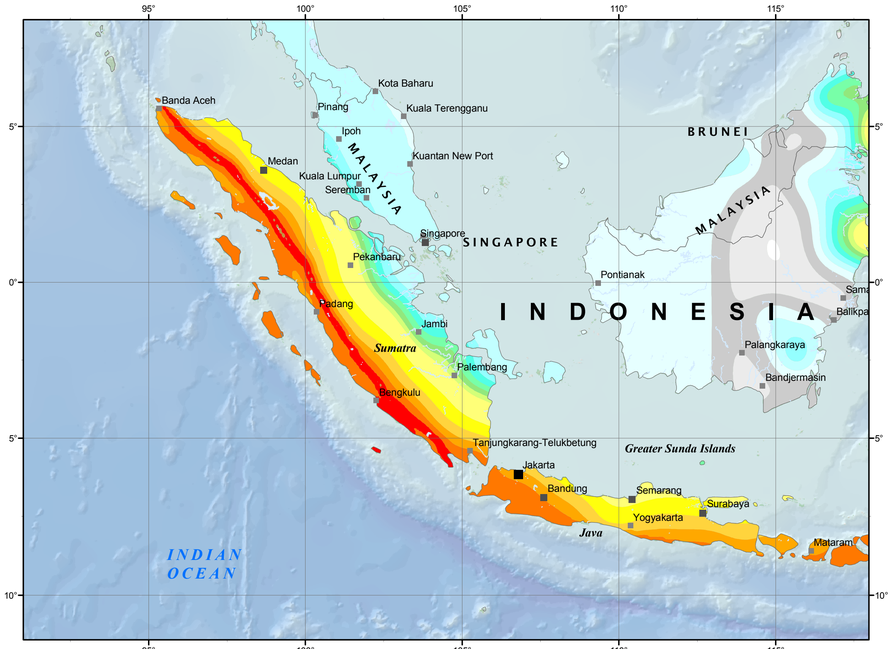
The large map shows epicenters of magnitude 5 and larger earthquakes occurring in the region from the beginning of 1988 through February 2008. Main shocks of magnitude 7.7 and larger and aftershocks occurring within 31 days of the main shocks are represented by differently colored symbols.

The large map also shows earthquakes for which fatalities are listed in the Preliminary Determination of Epicenters publication of the U. S. Geological Survey. For some earthquakes, casualties were the result of building damage due to shaking. For other earthquakes, casualties were the result of inundation by tsunami generated by the earthquakes. Several earthquakes produced casualties from both building damage and tsunami inundation. In a few cases, fatalities resulted from fright at the occurrence of relatively minor shaking. The magnitude 7.5 earthquake of August 8, 2007, with an epicenter close to Jakarta and a focal depth of 290 km, did not produce fatalities, but it is labeled because it was widely felt.

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.

Seismic Hazard



Seismic Hazard expressed as Peak Ground Acceleration (%g)
with a 10% probability of exceedance in 50 years.
Reference site condition is firm rock. From USGS/AID Administrative Report.

0 - 1 | 1 - 2 | 2 - 3 | 3 - 4 | 4 - 5 | 5 - 6 | 6 - 7 | 7 - 8 | 8 - 9 | 9 - 10 | 10 - 15 | 15 - 20 | 20 - 25 | 25 - 30 | 30 - 40 | 40 - 60 | > 60

Scale 1:10,000,000
0 250 500 Kilometers

Lethal Earthquakes 1988 - 2008

Year	Mo	Dy	Hr	Mn	Lat	Lon	Dep	Mag	Deaths
1990	11	15	2	34	3.939	97.405	30	6.7	7
1991	5	26	10	59	5.858	116.652	49	5.1	1
1994	2	15	17	7	-4.999	104.255	23	6.8	207
1994	6	2	18	17	-10.409	112.934	35	7.8	277*
1995	10	6	18	9	-2.007	101.45	37	6.7	84
1998	9	28	13	34	-8.177	112.34	152	6.5	1
1999	12	21	14	14	-6.823	105.498	42	6.4	5
2000	6	4	16	28	-4.76	102.031	34	7.9	103
2000	6	5	23	55	-4.151	101.953	47	5.5	1
2000	6	7	23	45	-4.651	101.848	32	6.7	1
2002	11	2	1	26	2.837	96.088	30	7.2	3
2004	1	1	20	59	-8.349	115.758	45	5.8	1
2004	2	16	14	44	-0.516	100.548	13	5	5
2004	9	15	8	35	-8.784	115.325	97	5.3	1
2004	12	26	0	58	3.287	95.972	30	9	227898*
2005	2	2	5	55	-7.004	107.816	57	4.8	1
2005	3	28	16	9	2.069	97.097	22	8.6	1303
2006	5	26	22	53	-7.961	110.446	12	6.4	5749
2006	7	17	8	19	-9.254	107.411	34	7.7	665*
2006	12	17	21	39	0.626	99.859	30	5.8	7
2007	3	6	3	49	-0.512	100.524	19	6.4	67
2007	3	6	5	49	-0.488	100.53	11	6.3	**
2007	9	12	11	10	-4.52	101.374	34	8.4	25
2007	9	12	23	49	-2.506	100.906	30	7.9	**
2008	2	20	8	8	2.778	95.978	35	7.4	3

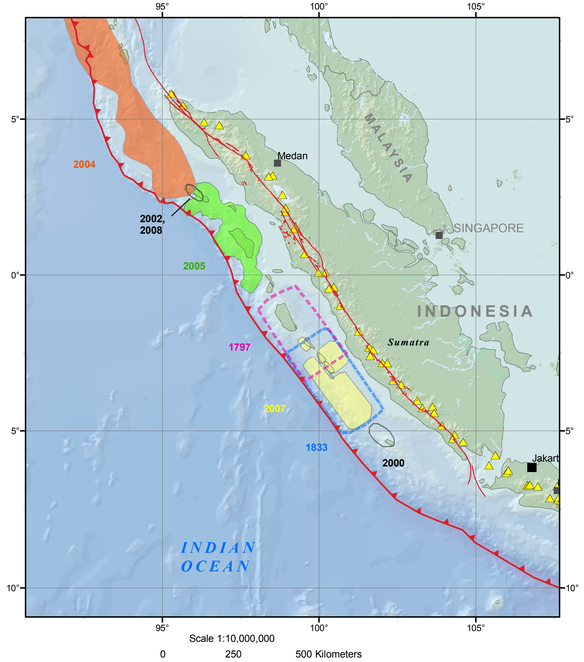
* most deaths are from tsunamis
** casualties for earthquakes on same day are listed with the first

DATA SOURCES
USGS, National Earthquake Information Center
IASPEI, Centennial Catalog (1900 - 1999) and extensions
(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.)
HDF (unpublished earthquake catalog) (Engdahl, 2003)

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

NIMA and ESRI, Digital Chart of the World
NOAA GEBCO and GLOBE Elevation Models

Rupture zones offshore western Sumatra: 1797, 1833, and 2000 - 2008



Scale 1:10,000,000
0 250 500 Kilometers

Discussion of Rupture Zones

Much of the thrust-fault plate boundary offshore of Sumatra has ruptured in a sequence of great earthquakes since 2000. Although the effect of these earthquakes is to reduce stress on much of the thrust-fault boundary, continuing readjustments of stress and associated aftershocks are expected around the edges of the rupture zones (solid colors on map). In addition, some sections of the thrust-fault boundary offshore of central and southern Sumatra have not ruptured in the recent sequence of great earthquakes and retain the potential to produce one or more earthquakes of magnitude 8 or greater in upcoming years or decades. This section of the Australia/Sunda plate boundary produced earthquakes of magnitude larger than 8.5 in 1797 and 1833 (rupture zones dashed on map), and geodetic and geologic observations imply that much of the elastic strain that accumulated on the plate boundary since the early 19th century has not yet been released in the shocks that have occurred in the region since 2000. The exact timing of future earthquakes cannot be specified.

Rupture Zones from Rich Briggs, "2007 Sumatra, Indonesia, Earthquakes, " EERI Newsletter, Oct 2007, V 41, N 10.