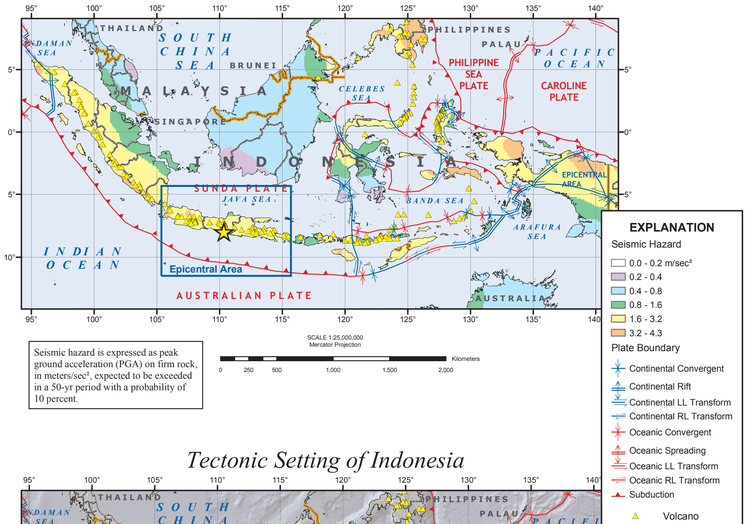
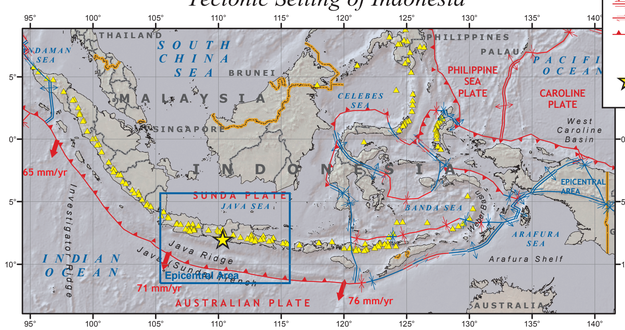
M6.3 Java Earthquake of 26 May 2006

Generalized Seismic Hazard of Indonesia



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.

Tectonic Setting of Indonesia



LARGEST EARTHQUAKES IN THE EPICENTRAL AREA
1964 - 2002

YR	MO	DY	LAT	LON	DEPTH	MAG
1964	4	23	-5.420	133.939	6.1	6.4
1968	7	29	-0.291	133.499	32.7	6.1
1970	11	8	-3.418	135.624	2.3	6.2
1971	9	16	-5.971	130.697	133.0	6.4
1972	12	4	-1.513	136.639	1.4	6.1
1975	1	14	-4.942	130.021	16.4	6.0
1976	11	18	-4.193	135.116	3.6	6.5
1977	3	15	-4.976	131.036	75.7	6.2
1978	4	3	-4.884	133.956	6.4	6.3
1978	8	3	-0.157	131.785	40.5	6.4
1979	9	12	-1.686	135.969	18.5	7.6
1979	9	13	-1.166	136.430	17.9	6.1
1979	10	17	-1.171	136.535	18.4	6.1
1979	11	16	-1.951	134.170	37.8	6.1
1985	4	8	-4.050	136.259	18.3	6.0
1985	4	21	-5.151	130.430	91.0	6.0
1985	9	15	-4.065	136.093	4.4	6.4
1985	9	15	-4.120	136.287	11.1	6.3
1985	11	17	-1.634	134.434	26.5	6.0
1985	11	17	-1.671	134.937	11.8	7.3
1985	12	6	-1.623	134.918	19.9	6.0
1986	10	17	-5.283	131.453	58.1	6.4
1987	6	17	-5.599	130.835	67.0	7.1
1987	10	3	-5.467	131.023	74.0	6.4
1989	1	10	-3.170	130.500	32.0	6.7
1989	9	4	-4.253	136.713	9.0	6.4
1989	12	12	-4.671	130.821	74.2	6.1
1990	12	5	-5.269	131.446	75.0	6.1
1991	12	29	-4.407	132.665	42.5	6.4
1992	4	7	-4.161	130.961	51.0	6.0
1993	6	12	-4.357	135.175	10.0	6.1
1994	1	19	-3.205	136.000	23.0	6.8
1994	4	13	-3.159	136.005	29.0	6.5
1994	5	25	-4.182	135.520	15.0	6.5
1994	11	20	-2.011	135.962	16.0	6.3
1995	1	27	-4.445	134.442	22.0	6.8
1995	3	19	-4.143	135.118	26.0	6.9
1995	3	19	-4.236	135.051	19.0	6.1
1996	2	17	-0.558	135.804	19.0	6.5
1996	2	17	-0.811	136.096	32.0	6.5
1996	2	17	-0.871	136.128	32.0	6.5
1996	2	17	-0.918	136.971	36.0	8.2
1996	2	18	-0.665	136.550	20.2	6.3
1996	2	18	-1.360	136.487	11.0	6.4
1998	4	27	-2.965	136.275	24.0	6.1
1998	11	18	-3.332	130.757	31.2	6.0
1999	10	10	-2.056	134.245	10.0	6.1
2001	1	29	-0.710	133.250	14.0	6.2
2001	4	4	-5.265	132.290	17.0	6.4
2001	7	22	-5.216	132.322	38.4	6.0
2001	9	11	-0.618	133.115	31.1	6.5
2002	9	20	-1.675	134.281	24.0	6.4
2002	9	20	-1.747	134.054	9.0	6.0
2002	10	10	-1.432	133.966	15.8	6.0
2002	10	10	-1.493	134.056	48.8	6.0
2002	10	10	-1.526	133.996	36.7	6.7
2002	10	10	-1.711	134.311	16.0	7.7

From: Engdahl (2003, unpublished catalog)

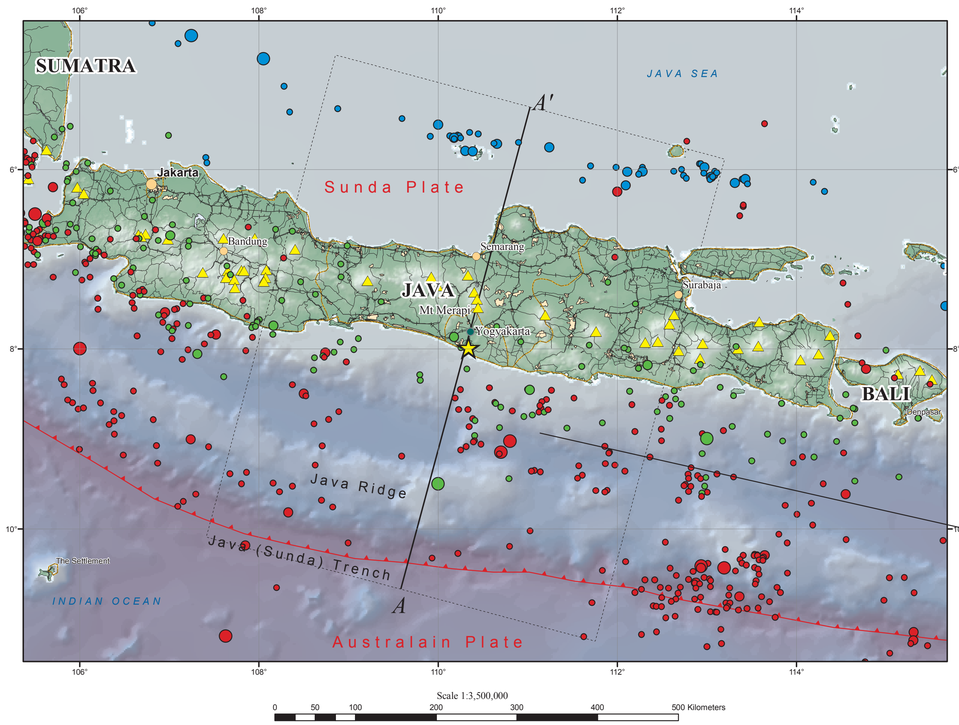
RELATIVE PLATE MOTIONS

The relative motion of adjacent tectonic plates is depicted on the map by short vectors shown at selected locations on the plate boundary. In this presentation, the Australian plate is defined as the reference plate. The vector therefore represents the direction of motion of the adjacent plate relative to the Australian plate. The rate of relative motion is labeled next to the vector.

The components of the vector perpendicular and parallel to the plate margin approximate convergent/divergent and transverse direction of motion between the plates, respectively. As viewed from the Australian plate, an inward directed component suggests convergence at and near the plate boundary that may be expressed as crustal folding, uplift, thrust faulting, or plate subduction. Similarly, an outward directed component suggests plate divergence such as would be expected at a zone of crustal spreading. Transcurrent or transform faulting would be expected when the dominant vector component is parallel to the plate margin.

In the Tectonic Setting map, the reference plate is the Australian plate and the adjacent plate is the Sunda plate. The vectors indicate that the Sunda plate is moving roughly south-southwest relative to the Australian plate at a rate that varies from about 65 mm/yr to 76 mm/yr. The Java (Sunda) Trench, deep earthquake foci, and line of volcanoes parallel to the plate boundary are characteristic of typical subduction zones.

Epicentral Area



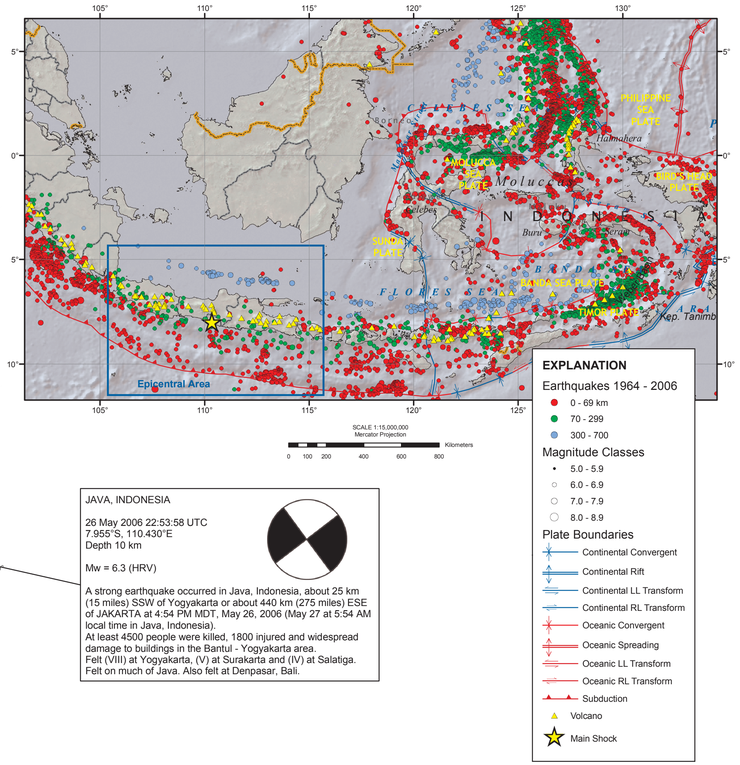
JAVA, INDONESIA

26 May 2006 22:53:58 UTC
7.955°S, 110.430°E
Depth 10 km

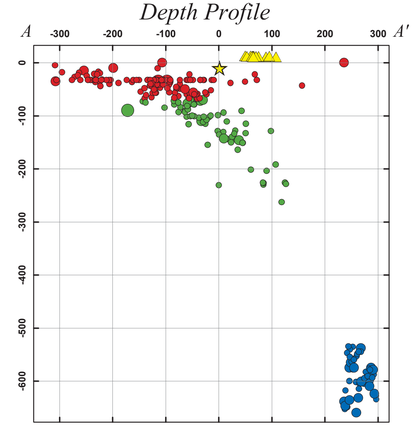
Mw = 6.3 (HRV)

A strong earthquake occurred in Java, Indonesia, about 25 km (15 miles) SSW of Yogyakarta or about 440 km (275 miles) ESE of JAKARTA at 4:54 PM MDT, May 26, 2006 (May 27 at 5:54 AM local time in Java, Indonesia).
At least 4500 people were killed, 1800 injured and widespread damage to buildings in the Bantul - Yogyakarta area.
Felt (VIII) at Yogyakarta, (V) at Surakarta and (IV) at Salatiga.
Felt on much of Java. Also felt at Denpasar, Bali.

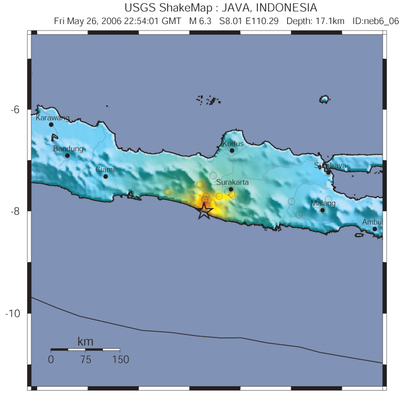
Seismicity of central Indonesia



Depth Profile



USGS ShakeMap : JAVA, INDONESIA
Fri May 26, 2006 22:54:01 GMT M 6.3 S8.01 E110.29 Depth: 17.1km ID:neb6_06



Map Version 3 Processed Sun May 28, 2006 09:40:00 PM MDT -- NOT REVIEWED BY HUMAN

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-39	3.9-92	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-34	3.4-83	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

DISCUSSION

The tectonics of Java are dominated by the subduction of the Australia plate north-northeastward beneath the Sunda plate with a relative velocity of about 6 cm/year. The Australia plate dips north-northeastward from the Java trench, attaining depths of 100-200 km beneath the island of Java, and depths of 600 km north of the island. The earthquake of 26 May 2006 occurred at shallow depth in the overriding Sunda plate well above the dipping Australia plate.

From presently available data, we do not know if there is a direct link between the May 26 earthquake and the ongoing eruption of the volcano Merapi which is several tens of kilometers to the north. The occurrence of shallow-focus earthquakes near volcanoes is not unusual worldwide. Sometimes the association of earthquakes and volcanic eruptions is so close in space and time that it is clear that the earthquakes are triggered by the magmatic processes that are causing the eruption. In the cases of many earthquakes that occur in the general vicinity of volcanoes, however, there are not obvious links to volcanic eruptions. In these cases, the general spatial association of volcanoes and earthquakes is probably due to both seismic and magmatic phenomena being localized by a broader tectonic process.

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.

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.

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
PB2003 (Bird, 2003)

VOLCANOES
Smithsonian Institution, Global Volcano Program

BASE MAP
NIMA and ESRI, Digital Chart of the World
USGS, EROS Data Center

Map prepared by U.S. Geological Survey
National Earthquake Information Center
30 May 2006
Map not approved for release by Director USGS