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

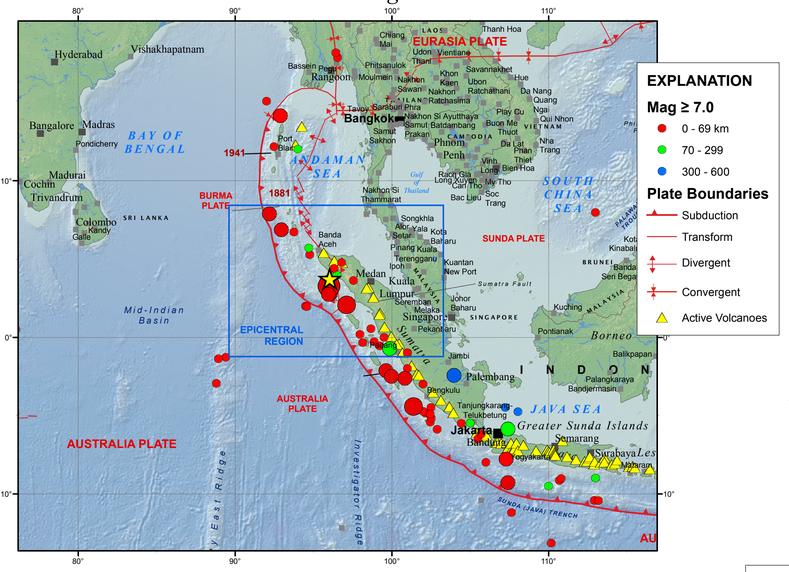
EARTHQUAKE SUMMARY MAP

M7.2 Northern Sumatra, Indonesia, Earthquake of 9 May 2010

Prepared in cooperation with the Global Seismographic Network

GSN

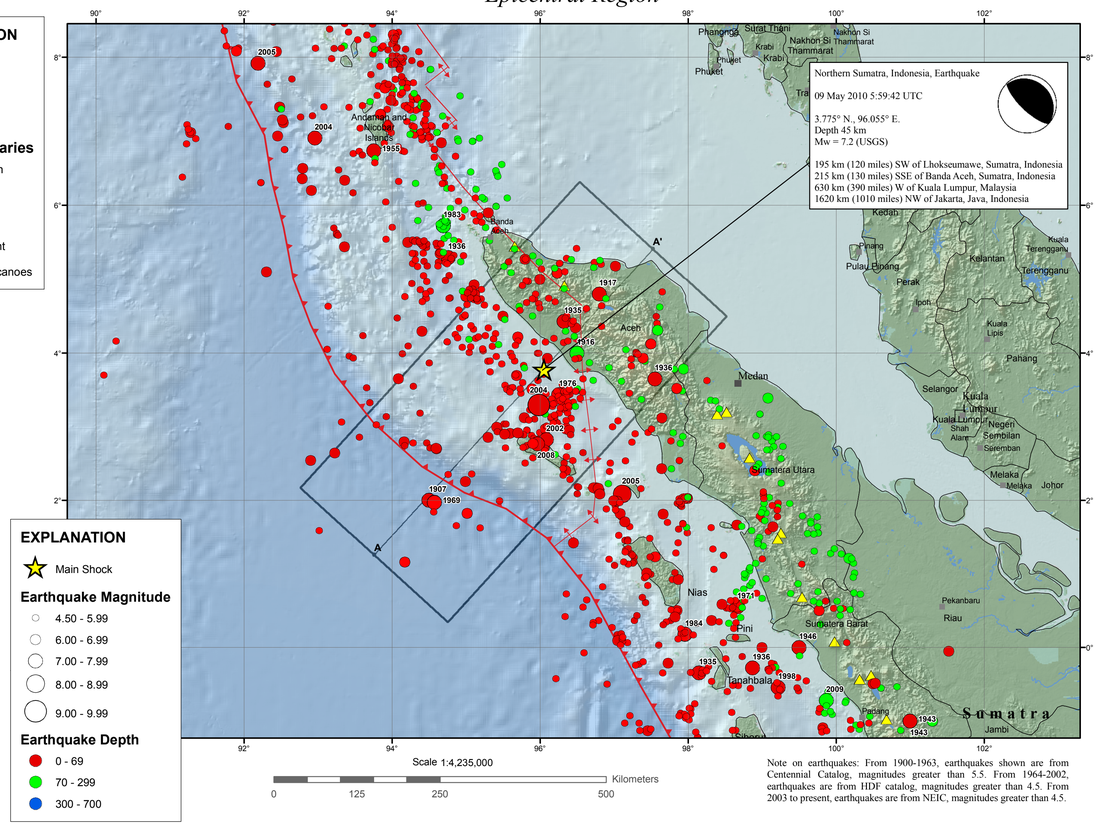
Tectonic Setting



RELATIVE PLATE MOTIONS

In the region of this earthquake, the Australia Plate moves northeast with respect to the Sunda Plate at about 60-65 mm/yr.

Epicentral Region



Note on earthquakes: From 1900-1963, earthquakes shown are from Centennial Catalog, magnitudes greater than 5.5. From 1964-2002, earthquakes are from HDF catalog, magnitudes greater than 4.5. From 2003 to present, earthquakes are from NEIC, magnitudes greater than 4.5.

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M 7.2, NORTHERN SUMATRA, INDONESIA

Origin Time: Sun 2010-05-09 05:59:42 UTC
Location: 3.78°N 96.06°E Depth: 45 km

PAGER
Version 2

Created: 2 hours, 10 minutes after earthquake

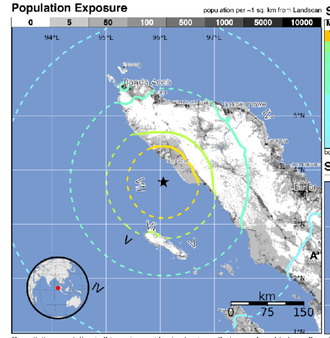
Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)	- *	1,080k*	8,503k	1,937k	266k	494k	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
POTENTIAL DAMAGE: 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

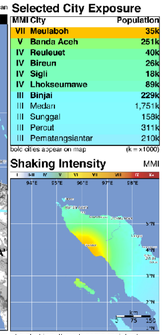


Selected City Exposure

MMI	City	Population
VII	Meulaboh	35k
V	Banda Aceh	251k
IV	Reuleuet	40k
IV	Bireun	26k
IV	Sigli	18k
IV	Lhokseumawe	89k
III	Binjai	229k
III	Medan	1,75k
III	Sunggal	158k
III	Perout	311k
III	Pematangsiantar	210k

50K cities active on map (k = x1000)

Shaking Intensity



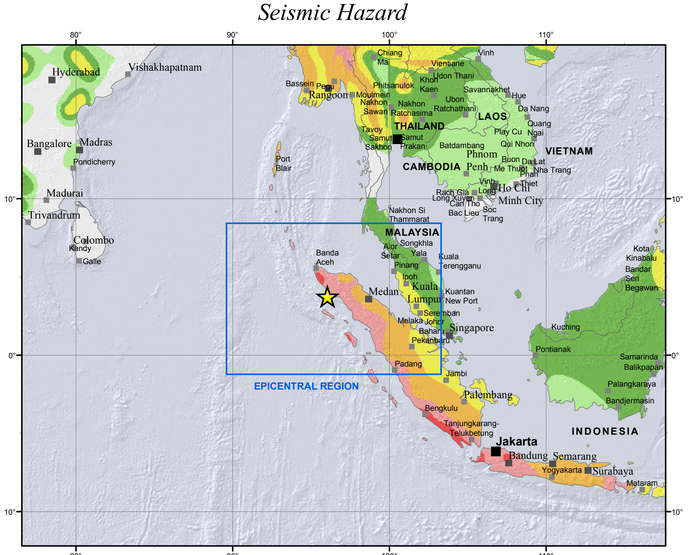
Overall, the population in this region resides in structures that are vulnerable to earthquake shaking, though some resistant structures exist. A magnitude 7.2 earthquake 96 km South of this one struck Indonesia on November 2, 2002 (UTC), with estimated population exposures of 1,000 at intensity VIII and 79,000 at intensity VII, resulting in a reported 3 fatalities. On December 26, 2004 (UTC), a magnitude 9.0 earthquake 5.1 km South of this one struck Sumatra - Andaman Islands, Indonesia, with estimated population exposures of 232,000 at intensity IX or greater and 1,449,000 at intensity VIII, resulting in a reported 227,898 fatalities. Recent earthquakes in this area have caused tsunamis and landslides that may have contributed to losses.

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

http://earthquake.usgs.gov/pager

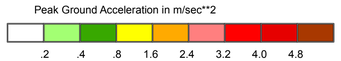
Event ID: us2010wbaq

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.

Peak Ground Acceleration in m/sec**2



TECTONIC SUMMARY

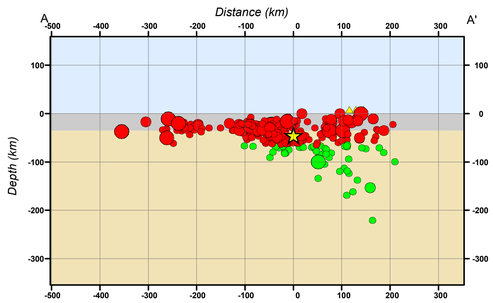
The northern Sumatra earthquake of May 9, 2010 occurred as a result of thrust faulting on or near the subduction interface plate boundary between the Australia-India and Sunda plates. At the location of this earthquake, the Australia and India Plates move north-northeast with respect to the Sunda plate at a velocity of approximately 60-65 mm/yr. On the basis of the currently available fault mechanism information and earthquake depth, it is likely that this earthquake occurred along the plate interface.

The subduction zone surrounding the immediate region of this event slipped during the devastating Mw 9.1 earthquake of December 2004, and today's event appears to have occurred within the rupture zone of that earthquake. Today's earthquake is the latest in a sequence of large ruptures along the Sunda megathrust, including a M 7.8 in April of this year, approximately 200 km to the south of today's event; two M 7.4 earthquakes beneath Simeulue approximately 100 km to the south in 2002 and 2008; a M 8.6 210 km to the south in 2005; a M 7.5 650 km to the south near Padang in 2009; and two events of M8.5 and M7.9 approximately 1000 km to the south in 2007.

Significant Earthquakes Mag >= 7.0

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1907	01	04	0519	2.000	94.500	50	7.5
1916	07	27	1152	4.000	96.500	100	7.0
1917	11	04	1203	4.800	96.800	0	7.1
1935	08	03	0110	4.430	96.326	35	7.0
1935	12	28	0235	-0.345	98.147	35	7.8
1936	01	02	2234	-0.279	98.872	35	7.0
1936	08	23	2112	5.296	94.759	35	7.1
1936	09	19	0101	3.648	97.551	35	7.1
1943	06	08	2042	-1.000	101.000	50	7.2
1943	06	09	0306	-1.000	101.000	50	7.5
1946	05	08	0520	0.000	99.500	0	7.1
1955	05	17	1449	6.738	93.754	29.1	7.2
1969	11	21	0205	1.971	94.572	10.6	7.5
1969	11	21	0205	1.973	94.574	11	7.6
1971	02	04	1533	0.552	98.665	60	7.1
1976	06	20	2053	3.437	96.253	15.7	7.0
1976	06	20	2053	3.437	96.254	16.2	7.0
1983	04	04	0251	5.724	94.693	94.7	7.0
1983	04	04	0251	5.724	94.694	94.5	7.0
1984	11	17	0649	0.179	97.959	28.7	7.1
1984	11	17	0649	0.180	97.959	28.9	7.3
1998	04	01	1756	-0.544	99.217	32	7.0
2002	11	02	0126	2.824	96.085	30	7.4
2004	12	26	0058	3.295	95.982	30	9.0
2004	12	26	0421	6.910	92.958	39	7.2
2005	03	28	1609	2.085	97.108	30	8.6
2005	07	24	1542	7.920	92.190	16	7.2
2008	02	20	0808	2.768	95.964	26	7.4
2009	09	30	1016	-0.720	99.867	81	7.5
2010	05	09	0559	3.775	96.055	45	7.2

Depth Profile



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
ESRI Online

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
10 May 2010
Map not approved for release by Director USGS