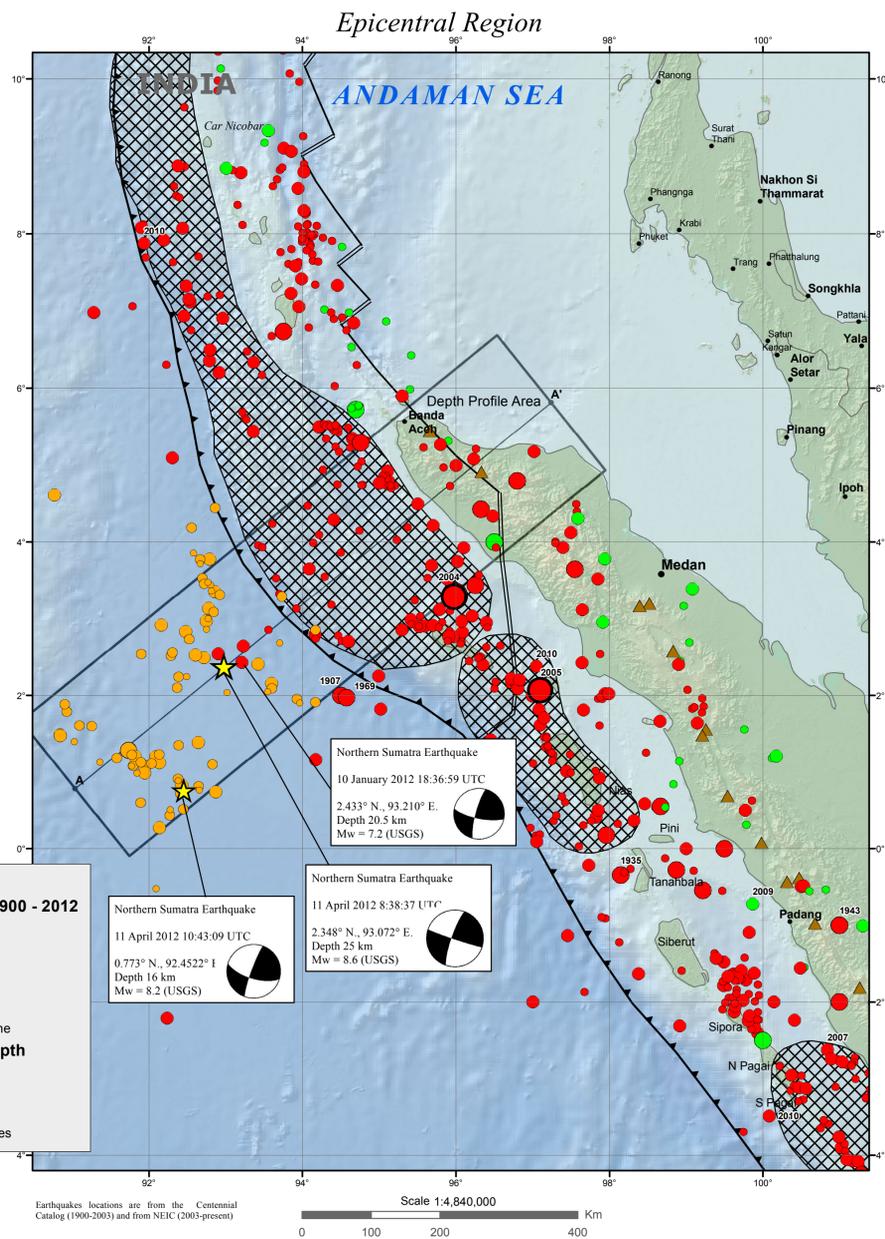
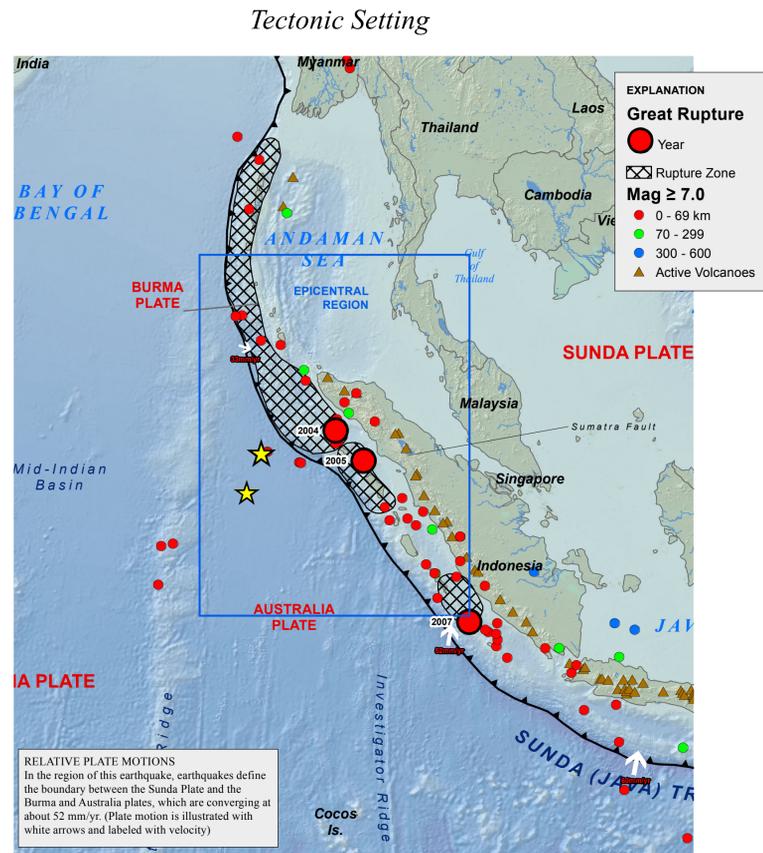


# M8.6 and M8.2 Northern Sumatra, Indonesia Earthquakes of 11 April 2012



### PAGER

**USGS Earthquake Shaking Green Alert**

**M 8.6, OFF THE WEST COAST OF NORTHERN SUMATRA**  
 Origin Time: Wed 2012-04-11 08:38:37 UTC (14:38:37 local)  
 Location: 2.31°N 93.06°E Depth: 22 km  
 FOR TSUNAMI INFORMATION, SEE: [tsunami.noaa.gov](http://tsunami.noaa.gov)

Created: 2 hours, 14 minutes after earthquake

**Estimated Fatalities**  
 Green alert for shaking-related fatalities and economic losses. There is a low likelihood of casualties and damage.

**Estimated Economic Losses**

**Estimated Population Exposed to Earthquake Shaking**

ESTIMATED POPULATION EXPOSURE (N = 10000)	I	II-III	IV	V	VI	VII	VIII	IX	X+
ESTIMATED MODIFIED MERCALLI INTENSITY	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
PERCEIVED SHAKING	none	none	none	Light	Light	Moderate	Moderate/heavy	Heavy	V. Heavy
POTENTIAL DAMAGE	Resistant Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
Vulnerable Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy

**Population Exposure**  
 Structures: Overall, the population in this region resides in structures that are vulnerable to earthquake shaking, though some resistant structures exist. The predominant vulnerable building types are nonductile reinforced concrete frame and concrete/cinder block masonry construction.

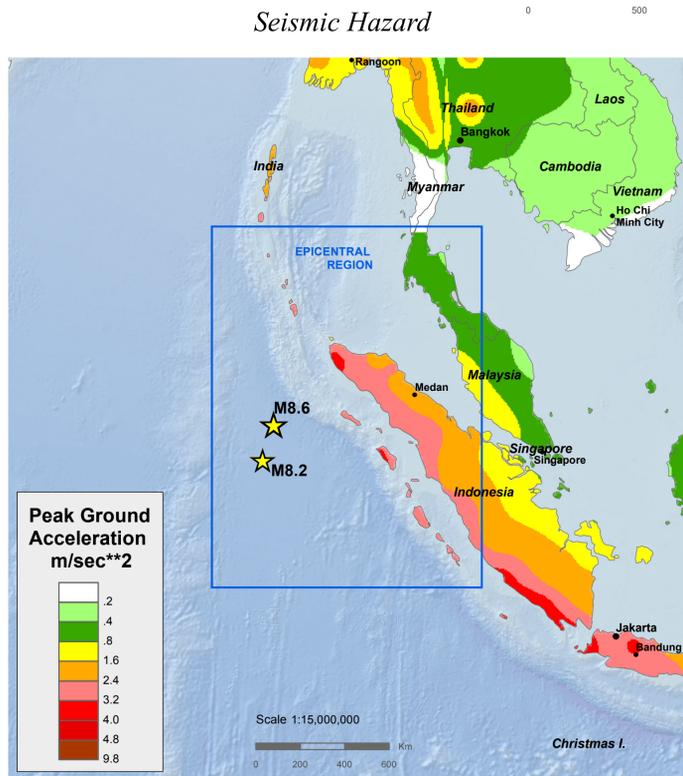
**Historical Earthquakes (with MMI levels)**

Date (UTC)	Dist. (km)	Mag.	Max. Shaking (MMI)	Deaths
1953-09-01	340	6.3	VI (MMI)	0
2004-12-26	326	9.0	X (MMI)	0
2002-11-02	339	7.2	VIII (MMI)	3

**Selected City Exposure**

MMI City	Population
VI Banda Aceh	251k
V Meulaboh	39k
V Sigi	18k
V Sabang	23k
IV Bireun	26k
IV Reuleut	40k
IV Binjai	229k
IV Medan	1,751k
IV Pekanbaru	311k
IV Sunggal	158k
IV Pematangsiantar	210k

Event ID: usc000905e



### TECTONIC SUMMARY

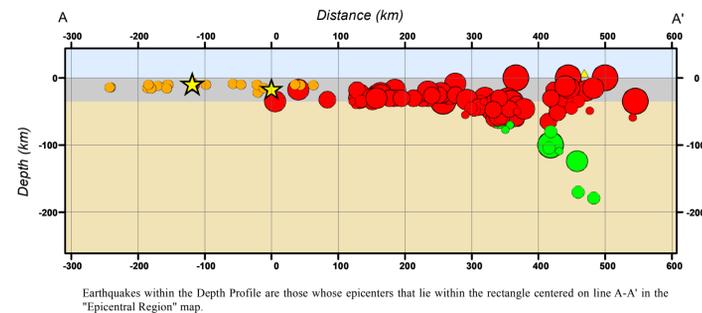
The April 11, 2012, M8.6 and M8.2 earthquakes off the west coast of northern Sumatra, Indonesia, occurred as a result of strike-slip faulting within the oceanic lithosphere of the Indo-Australia plate. The quakes were located respectively 100 km and 200 km to the southwest of the major subduction zone that defines the plate boundary between the India/Australia and Sunda plates offshore Sumatra. At this location, the India/Australia plates move north-northeast with respect to the Sunda plate at a velocity of approximately 52 mm/yr.

Large strike-slip earthquakes are not unprecedented in the diffuse boundary region separating the India and Australia plates, southwest of the Sumatra subduction zone. Since the massive M 9.1 earthquake that ruptured a 1300 km long segment of the Sumatran megathrust plate boundary in December of 2004, three earlier large strike-slip events had occurred within 50 km of the first large April 11, 2012 event. These earthquakes occurred on April 19 2006 (Mw6.2), October 4 2007 (Mw6.2) and January 10, 2012 (Mw7.2). The focal-mechanisms of the three earlier earthquakes and the two great earthquakes of April 11, 2012, are consistent in implying that each earthquake could have occurred as the result of left-lateral slip on a north-northeast striking fault or right-lateral slip on a west-northwest striking fault. The two different orientations of strike-slip faulting are both possible under the same tectonic stress field; perpendicular strike-slip faults that are both compatible with the same stress field are called "conjugate faults." Possibly faults of both orientation have been involved in the recent earthquake activity.

### Significant Earthquakes Mag ≥ 7.5

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1907	01	04	05:19	2.000	94.500	50	7.5
1935	12	28	02:35	-0.345	98.147	35	7.8
1943	06	09	03:06	-1.000	101.000	50	7.5
1969	11	21	02:05	1.973	94.574	11	7.6
2004	12	26	00:58	3.295	95.982	30	9.0
2005	03	28	16:09	2.095	97.108	30	8.6
2007	09	12	11:10	-4.438	101.367	34	8.5
2007	09	12	23:49	-2.625	100.841	35	7.9
2009	09	30	10:16	-0.720	99.867	81	7.5
2010	04	06	22:15	2.383	97.048	31	7.8
2010	06	12	19:26	7.881	91.936	35	7.5
2010	10	25	14:42	-3.487	100.082	20	7.8
2012	04	11	10:43	0.773	92.452	16	8.2

### Depth Profile



### 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 Villasenor, 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)  
 World Slab (Hayes and Wald, 2010)
- 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 Villasenor, 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 Academic 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.
- The GEBCO\_08 Grid, version 20090202, <http://www.gebco.net>
- Hayes, Gavin, and Wald, David, 2010, Slab models for subduction zones: USGS, <http://earthquakes.usgs.gov/research/data/slab>

### 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.