

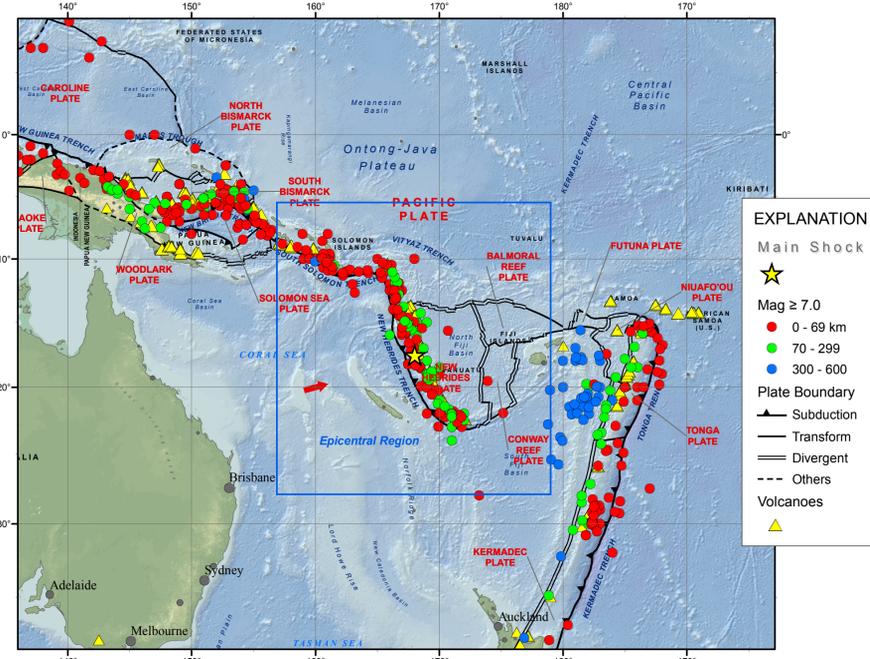


Prepared in cooperation with the
Global Seismographic Network



M7.3 Vanuatu Earthquake of 10 August 2010

Tectonic Setting



EXPLANATION

Main Shock
★

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

Plate Boundary
— Subduction
— Transform
— Divergent
- - - Others

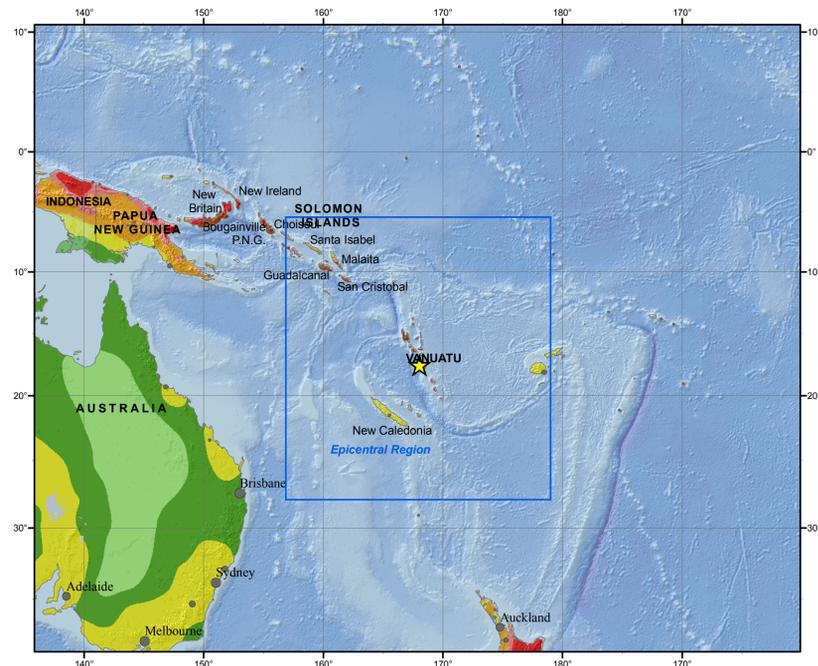
Volcanoes
▲

RELATIVE PLATE MOTIONS

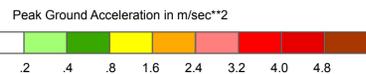
The broad red vector represents the motion of the Australia plate with respect to the Pacific plate in the epicentral region.



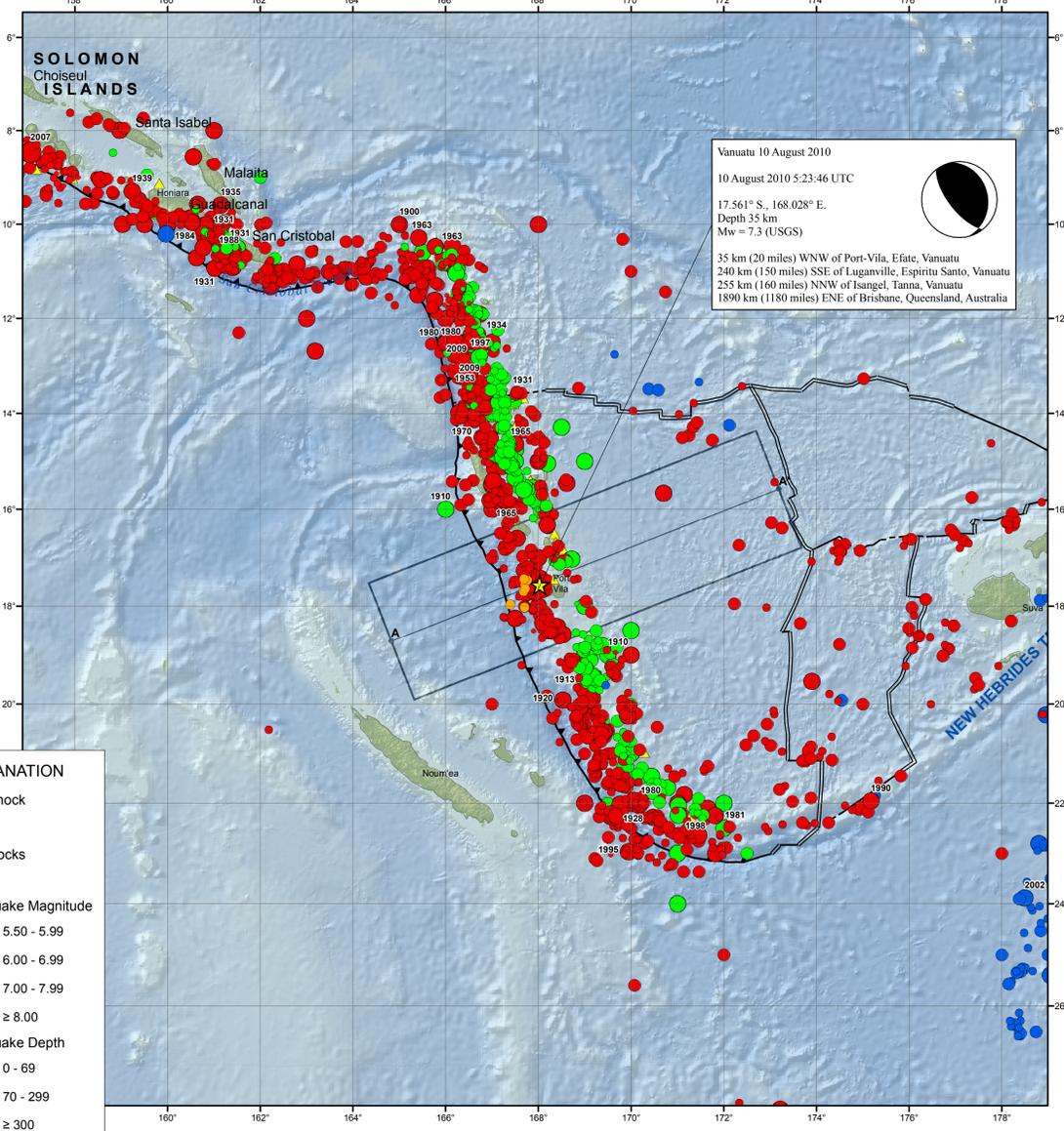
Seismic Hazard



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.



Epicentral Region



Vanuatu 10 August 2010
10 August 2010 5:23:46 UTC
17.561° S., 168.028° E.
Depth 35 km
Mw = 7.3 (USGS)

35 km (20 miles) WNW of Port-Vila, Efate, Vanuatu
240 km (150 miles) SSE of Luganville, Espiritu Santo, Vanuatu
255 km (160 miles) NNW of Isangel, Tanna, Vanuatu
1890 km (1180 miles) ENE of Brisbane, Queensland, Australia

EXPLANATION

Main Shock
★

Aftershocks
●

Earthquake Magnitude
○ 5.50 - 5.99
○ 6.00 - 6.99
○ 7.00 - 7.99
○ ≥ 8.00

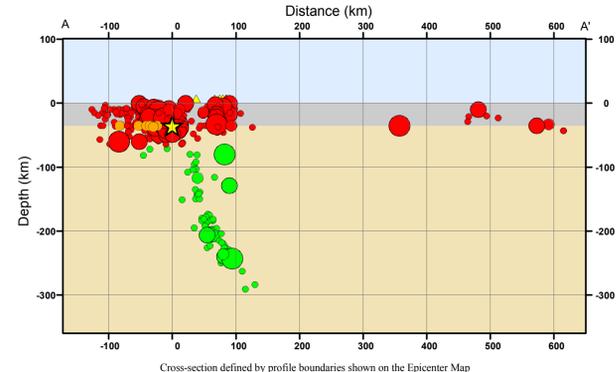
Earthquake Depth
● 0 - 69
● 70 - 299
● ≥ 300

DISCUSSION

The Vanuatu earthquake of August 10, 2010 occurred on or near the plate boundary between the Australia and Pacific plates in the Coral Sea region of the southwest Pacific. In the region of the earthquake, the Australia plate moves to the east-northeast with respect to the Pacific plate at a velocity of approximately 85 mm/year. The Australia plate thrusts underneath the Pacific plate at the Vanuatu trench and dips to the east-northeast. The August 10 earthquake's location, depth, and focal mechanism are consistent with the earthquake having occurred as thrust faulting associated with subduction along the Australia-Pacific plate boundary.

This earthquake is located approximately 500 km to the south of a sequence of large subduction thrust earthquakes that occurred in October of 2009. On October 7th, 2009, two earthquakes of M 7.7 and M 7.8 occurred 15 minutes apart. After these events, an M 7.4 aftershock struck approximately one hour later, and two M 6.6 and M 6.8 aftershocks occurred on the following day. On May 27th, 2010, a M 7.1 earthquake occurred a further 100 km to the north of the

Depth Profile



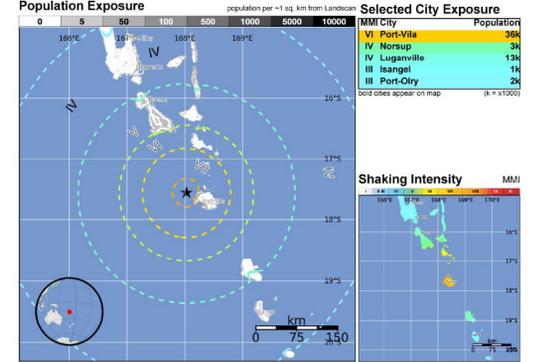
Cross-section defined by profile boundaries shown on the Epicenter Map

USGS
M 7.3, VANUATU
Origin Time: Tue 2010-08-10 05:23:46 UTC
Location: 17.56°S 168.03°E Depth: 35 km

USAID
PAGER
Version 2
Created: 3 hours, 10 minutes after earthquake

Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (x 1000)	I	II-III	IV	V	VI	VII	VIII	IX	X+
ESTIMATED MODIFIED MEDICAL INTENSITY	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
PERCEIVED SHAKING	none	none	none	V. Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
POTENTIAL DAMAGE	Resistant Structures: none	Vulnerable Structures: none	Resistant Structures: none						



Overall, the population in this region resides in structures that are vulnerable to earthquake shaking, though some resistant structures exist. A magnitude 7.4 earthquake 144 km North of this one struck Vanuatu on November 26, 1999 (UTC), with estimated population exposures of 5,000 at intensity VIII and 32,000 at intensity VII, resulting in a reported 10 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: us2010zuaq

Significant Earthquakes Mag >= 7.5

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1900	07	29	0659	-10.000	165.000	0	7.6
1901	08	09	1301	-22.000	170.000	0	7.9
1910	06	16	0630	-19.000	169.500	100	7.9
1910	11	09	0602	-16.000	166.000	70	7.5
1913	10	14	0808	-19.500	169.000	230	7.6
1920	09	20	1439	-19.919	168.530	35	7.8
1928	03	16	0501	-22.281	170.476	35	7.5
1931	10	03	1913	-10.932	161.016	35	7.8
1931	10	10	0020	-9.968	161.194	50.2	7.7
1934	07	18	1940	-11.907	166.731	35	7.8
1935	12	15	0707	-9.590	161.145	35	7.5
1939	04	30	0255	-9.295	159.234	35	7.9
1953	11	04	0349	-13.189	166.516	35	7.5
1963	09	15	0046	-10.472	165.770	35	7.5
1963	09	17	1920	-10.286	165.413	27.6	7.5
1965	05	20	0040	-14.642	167.504	9.7	7.6
1965	08	11	2231	-15.797	167.268	45.8	7.6
1966	06	15	0059	-10.344	160.887	3.3	7.5
1966	12	31	1823	-11.893	166.445	82.9	7.5
1969	01	05	1326	-7.991	158.968	63	7.5
1970	08	11	1022	-14.093	166.571	38.3	7.5
1973	12	28	1341	-14.500	166.784	23.3	7.8
1980	07	08	2319	-12.487	166.482	56	7.5
1980	07	17	1942	-12.504	166.011	31.6	7.8
1980	10	25	1100	-21.941	170.056	39	7.5
1981	07	06	0308	-22.251	171.814	30	7.6
1984	02	07	2133	-9.957	160.522	17	7.6
1988	10	04	0438	-10.258	160.896	36.1	7.6
1990	03	03	1216	-21.956	175.171	35.5	7.6
1995	05	16	2012	-22.968	169.945	23.6	7.7
1997	04	21	1202	-12.560	166.738	29.8	7.7
1998	01	04	0611	-22.239	171.017	97.1	7.5
2002	08	19	1108	-23.884	178.495	675	7.7
2007	04	01	2039	-8.466	157.043	24	8.1
2009	10	07	2203	-13.006	166.510	45	7.7

DATA SOURCES AND REFERENCES

EARTHQUAKES AND SEISMIC HAZARD
USGS, National Earthquake Information Center
NOAA, National Geophysical Data 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 Academic Press, 932 p.
EHB catalog (Engdahl et al., 1998)
IHF (unpublished earthquake catalog, Engdahl, 2003)
Global Seismic Hazard Assessment Program
<http://www.seismo.ethz.ch/GSHAP/>

PLATE TECTONICS

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

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

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.

Map prepared by U.S. Geological Survey National Earthquake Information Center
10 August 2010
<http://earthquake.usgs.gov/>
Map not approved for release by Director USGS