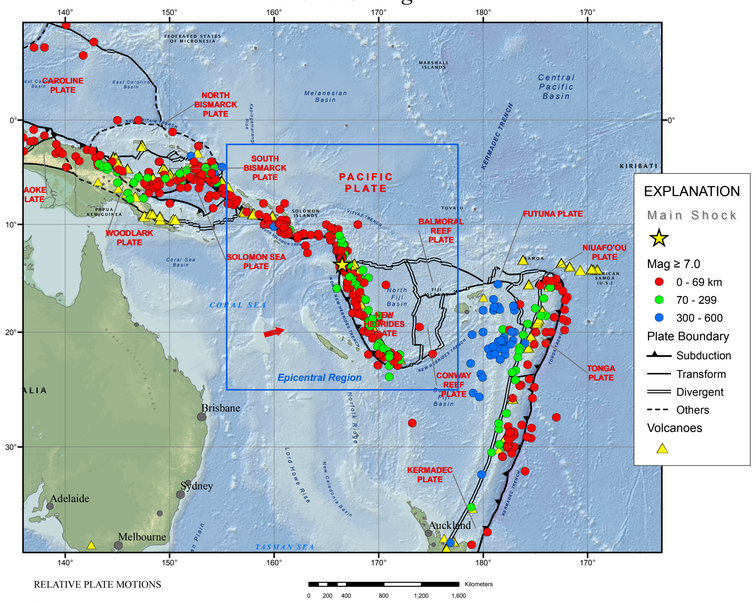
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

EARTHQUAKE SUMMARY MAP

Prepared in cooperation with the Global Seismographic Network

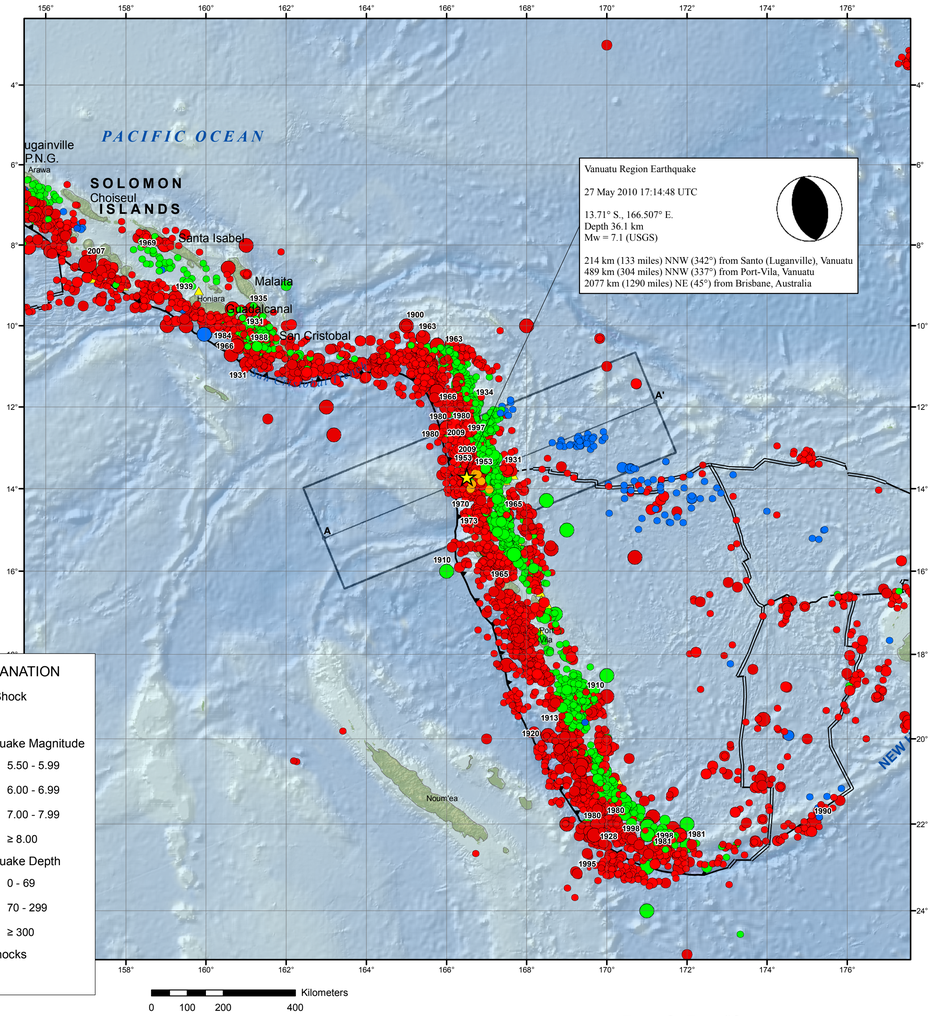
M7.1 Vanuatu Region Earthquakes of 27 May 2010

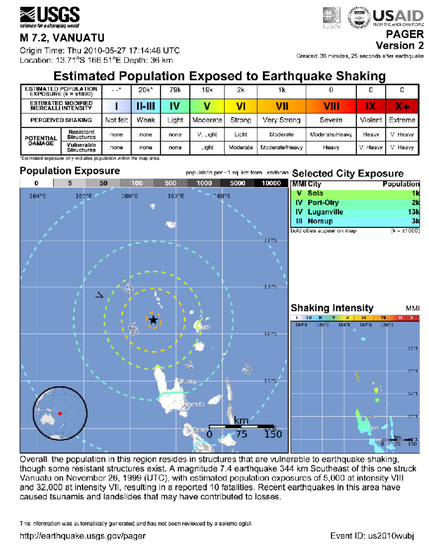
Tectonic Setting



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

Epicentral Region





USGS science for a changing world

USAID from the American people

M 7.2, VANUATU

Origin Time: Thu 2010-05-27 17:14:48 UTC
Location: 13.71°S 166.51°E Depth: 36 km

PAGER
Version 2

Created: 36 minutes, 25 seconds after earthquake

Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)	--*	20k*	20k	19k	2k	1k	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

0 5 50 100 500 1000 5000 10000

164°E 165°E 166°E 167°E 168°E

Selected City Exposure

MMI	City	Population
V	Sola	1k
IV	Port-Olry	2k
IV	Luganville	13k
III	Norsup	3k

MMI cities overlaid on shake map

Shaking Intensity

MMI

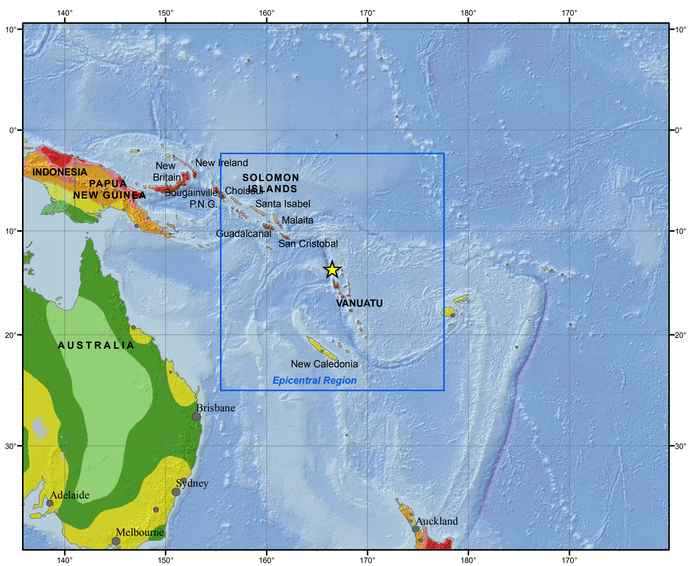
Overall, the population in this region resides in structures that are vulnerable to earthquake shaking, though some resistant structures exist. A magnitude 7.4 earthquake 344 km Southeast of this one struck Vanuatu on November 26, 1999 (UTC), with estimated population exposures of 5,000 at intensity 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: us2010wubj

Seismic Hazard

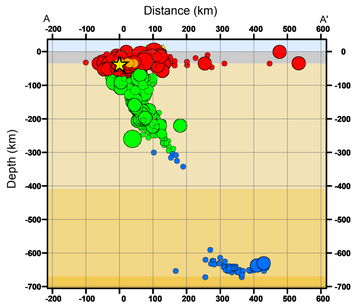


Seismic hazard is expressed as peak ground acceleration (PGA) on firm rock, in meters/sec², expected to be exceeded in a 50-yr period with a probability of 10 percent.

Peak Ground Acceleration in m/sec**2

.2 .4 .8 1.6 2.4 3.2 4.0 4.8

Depth Profile



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

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
1970	08	11	1022	-14.095	166.570	39.1	7.5
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	08	10	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
2007	04	01	2039	-8.466	157.043	24	8.1
2009	10	07	2203	-13.006	166.510	45	7.7
2009	10	07	2218	-12.517	166.382	35	7.8

DISCUSSION

The Vanuatu Region earthquakes of May 27, 2010 occurred on or near the plate boundary between the Australia and Pacific plates. In the region of the earthquake, the Australia plate moves to the east-northeast with respect to the Pacific plate at a velocity of about 91 mm/year. The Australia plate thrusts under the Pacific plate at the New Hebrides trench and dips to the east-northeast.

The Vanuatu region experiences a very high level of earthquake activity, with over a dozen events of magnitude 7 and larger having been recorded since the early decades of the twentieth century. Recent large earthquakes near the May 27 event include a M 7.2 earthquake in 2007 and a M 7.3 earthquake in 1999. The subducting Australia plate is seismically active to depths of about 350 km beneath the islands.

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 Academeic Press, 932 p.
EHB catalog (Engdahl et al., 1998)
HDF (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 signifiance.

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