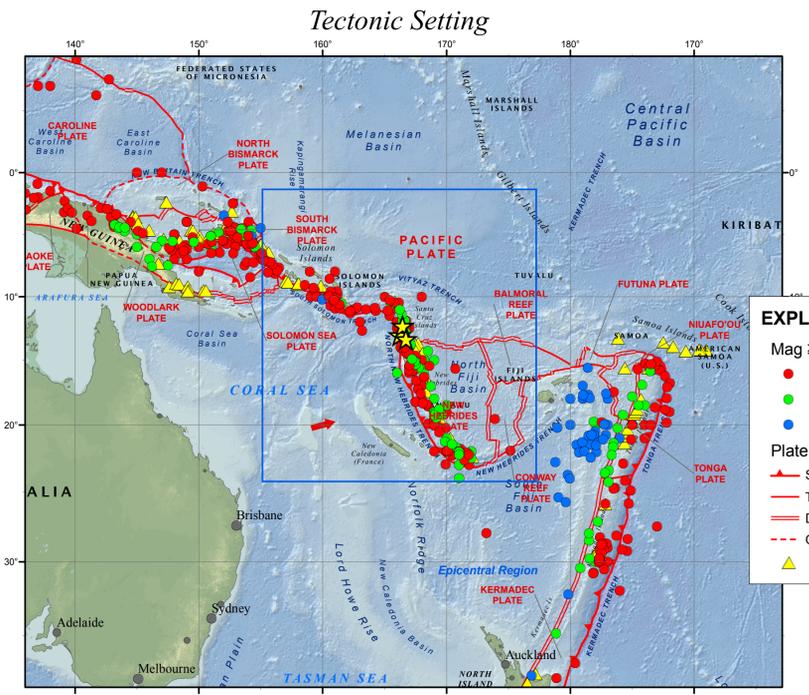
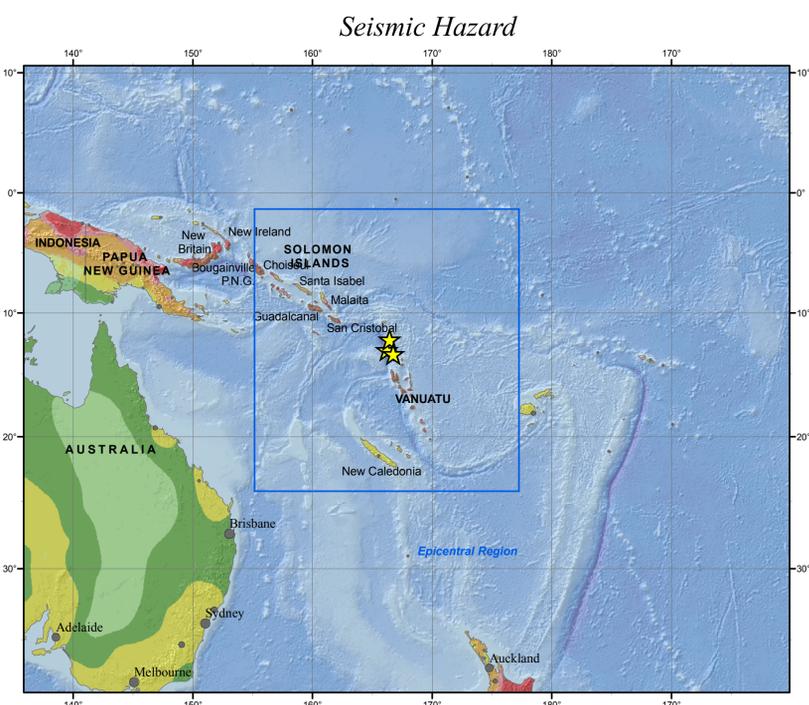


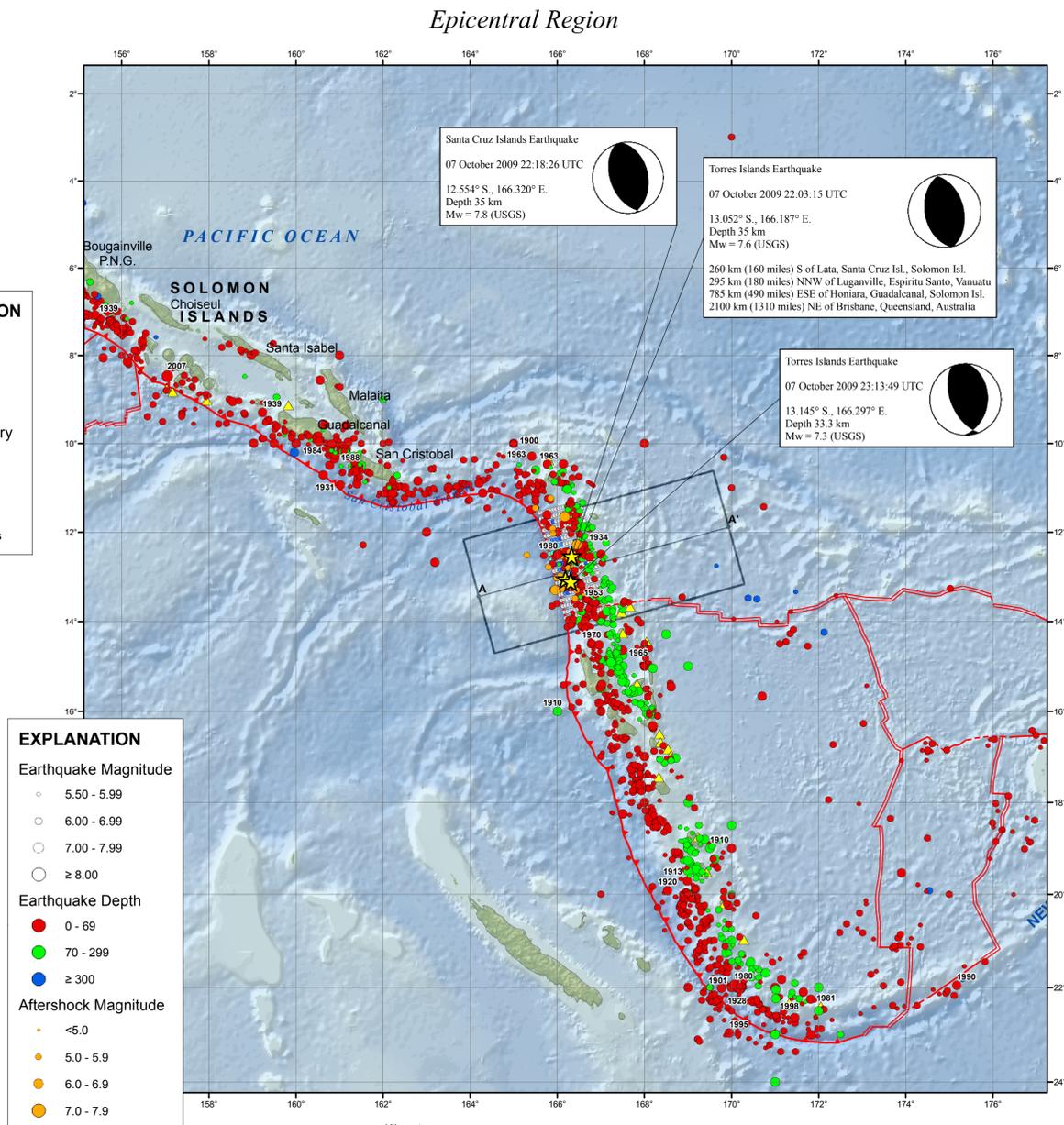
M7.6, 7.8, and 7.3 Vanuatu Region Earthquakes of 7 October 2009



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 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.



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
1934	07	18	1940	-11.907	166.731	35	7.8
1939	01	30	0218	-7.080	155.386	35	7.7
1939	04	30	0255	-9.295	159.234	35	7.9
1953	11	04	0349	-13.189	166.516	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
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	-13.052	166.187	35	7.6
2009	10	07	2218	-12.554	166.320	35	7.8

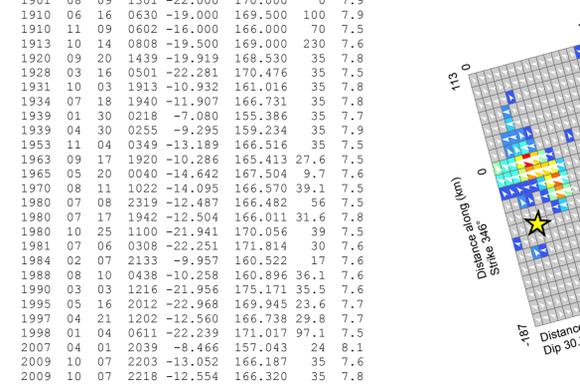
DISCUSSION

The Vanuatu Region earthquakes of October 7, 2009: M7.6, Torres Islands, 22:03:15; M7.8 Santa Cruz Islands, 22:18:26 UTC; and M7.3, Torres Islands, 23:13:49 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 October 7 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.

The earthquake of October 7, 2009, 23:13 UTC occurred about 15 km southeast of, and 1 hour after, a larger earthquake of the same date, 22:03 UTC. A second event of a similar size to the first occurred at 22:18 UTC, 60 km to the north of the first event. All three events are likely related; while the first two similarly sized events may be considered a earthquake doublet, preliminary analysis suggests the October 7, 2009, 23:13 UTC is likely a large aftershock of the previous events.

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 October 7 events include a M7.2 earthquake in 2007 and a M7.3 earthquake in 1999. The subducting Australia plate is seismically active to depths of about 350 km beneath the islands.

Finite Fault Model for M7.6 Earthquake



USGS
M 7.6, VANUATU
Origin Time: Wed 2009-10-07 22:03:15 UTC
Location: 13.05°S 166.18°E Depth: 35 km

Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (N = 21,000)	I	II-III	IV	V	VI	VII	VIII	IX	X+
ESTIMATED WEAKENED STRUCTURAL INTEGRITY	Not felt	Weak	Light	Moderate	Strong	Very strong	Sovereign	Violent	Extreme
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Sovereign	Violent	Extreme
POTENTIAL DAMAGE	None	None	None	Light	Moderate	Severe	Heavy	Very Heavy	Very Heavy

Population Exposure

Intensity	Population
IV	19,000
V	1,000
VI	100
VII	10
VIII	1
IX	0
X+	0

Selected City Exposure

City	Intensity	Population
Luganville	IV	13k
Port-Olry	IV	1k

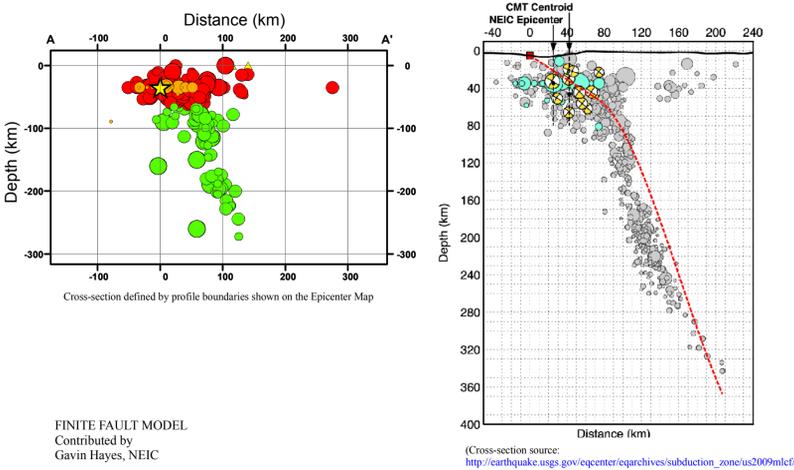
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Shaking Intensity MMI

Overall, the population in this region resides in structures that are vulnerable to earthquake shaking, though some resistant structures exist. On November 27, 2002 (UTC), a magnitude 5.8 earthquake occurred in the Vanuatu region 246 km southeast of the location of this earthquake, with estimated population exposures of 19,000 at intensity V and 70,000 at intensity IV, with no reported fatalities. Recent earthquakes in this area have caused 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: us2009m1c1



DATA SOURCES AND REFERENCES

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IASPEI, Centennial Catalog (1900 - 1999) and extensions Engdahl, E.R. and Villaseñor, A., 2002, Global Seismology: 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.

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BASE MAP
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