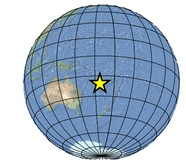
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

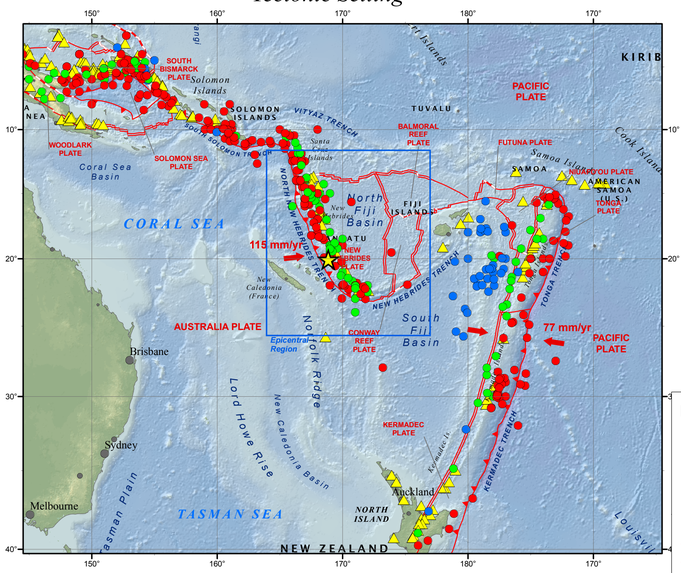
EARTHQUAKE SUMMARY MAP XXX

Prepared in cooperation with the Global Seismographic Network
GSN

M7.3 Loyalty Islands Earthquake of 9 April 2008



Tectonic Setting



RELATIVE PLATE MOTIONS

The broad red vectors represent the motion of tectonic plates relative to the adjacent plate. In the vicinity of this earthquake, the Australia Plate is subducting eastward beneath the New Hebrides Plate at about 115 mm/yr. To the east, the Australia Plate and Pacific Plate are converging at about 77 mm/yr. Many microplates are caught in this convergence.

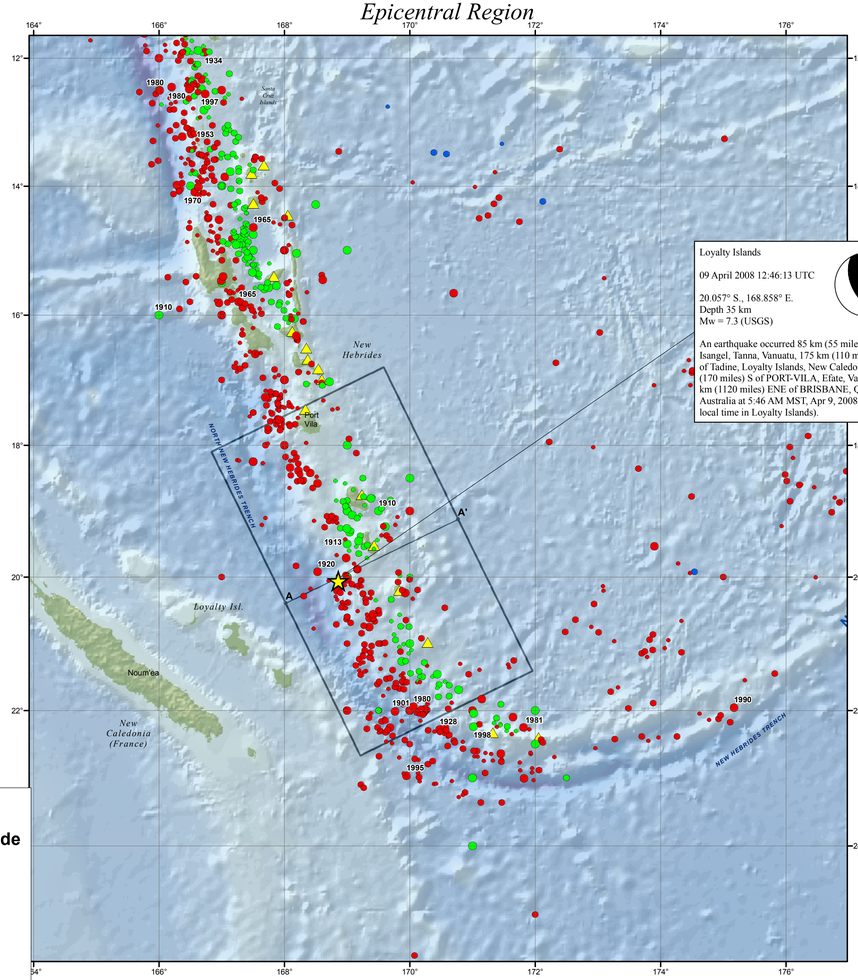
SCALE 1:25,000,000
Kilometers

EXPLANATION

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

Plate Boundary
- Subduction
- Transform
- Divergent
- Convergent
- Volcanoes

Epicentral Region



Loyalty Islands

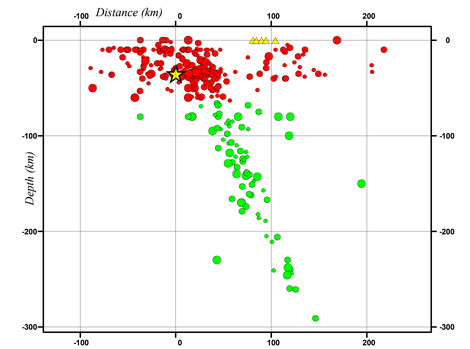
09 April 2008 12:46:13 UTC

20.057° S., 168.858° E.
Depth 35 km
Mw = 7.3 (USGS)

An earthquake occurred 85 km (55 miles) SSW of Isangel, Tanna, Vanuatu, 175 km (110 miles) NE of Tadine, Loyalty Islands, New Caledonia, 275 km (170 miles) S of PORT-VILA, Efate, Vanuatu, 1800 km (1120 miles) ENE of BRISBANE, Queensland, Australia at 5:46 AM MST, Apr 9, 2008 (11:46 PM local time in Loyalty Islands).

Scale 1:5,000,000
Mercator Projection
Kilometers

Cross Section A-A'



USGS
science for a changing world

M 7.3, LOYALTY ISLANDS
Origin Time: Wed 2008-04-09 12:46:13 UTC
Location: 20.06°S 168.86°E Depth: 35 km

USAID
FROM THE AMERICAN PEOPLE

PAGER
Version 2
Created: 1 hrs, 18 mins after earthquake

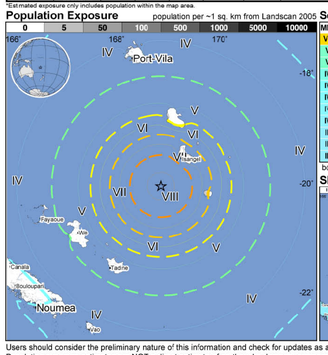
Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)		- -*	103k*	74k	25k	13k	13k	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
	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 2005



Selected City Exposure

MMI	City	Population
VII	Isangel	1k
V	Tadine	7k
V	We	10k
IV	Fayaoue	4k
IV	Port-Vila	35k
IV	Vao	1k
IV	Mont-Dore	24k
IV	Noumea	93k
III	Paita	12k
III	Dumbea	19k
III	Canala	3k

bold cities appear on map (k = x1000)

Shaking Intensity

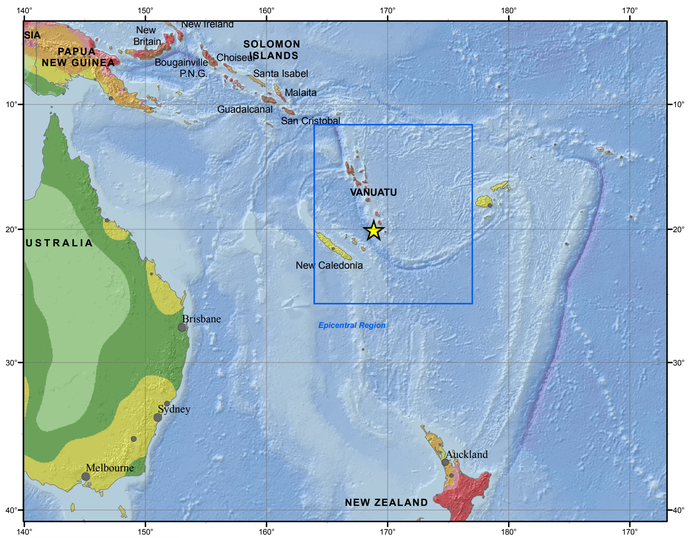
Users should consider the preliminary nature of this information and check for updates as additional data becomes available. Population exposure estimates are NOT a direct estimate of earthquake damage; comparable shaking will result in significantly lower losses in regions with well built structures than in regions with vulnerable structures. Overall, structures in this region are vulnerable to earthquake shaking, though some resistant structures exist. A magnitude 7.4 earthquake struck the Vanuatu region on November 26, 1999 (UTC), with estimated population exposures of 11,000 at intensity VIII and 36,000 at intensity VII, resulting in 10 deaths. Recent earthquakes in this area have also triggered landslide hazards that have contributed to losses.

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

http://earthquake.usgs.gov/pager

Event ID: us2008qqa2

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.

SCALE 1:25,000,000
Kilometers

Peak Ground Acceleration in m/sec**2

.2 .4 .8 1.6 2.4 3.2 4.0 4.8

EXPLANATION

Earthquake Magnitude
- 4.00 - 5.99
- 6.00 - 6.99
- 7.00 - 7.99
- 8.00 - 8.99
- 9.00 - 9.99

Earthquake Depth
- 0 - 69
- 70 - 299
- 300 - 700

DISCUSSION

The Loyalty Islands (New Hebrides arc) earthquake of April 9, 2008, occurred as the result of thrust-faulting on the boundary between the Australia plate and the New Hebrides plate. In the epicentral region of the earthquakes, the Australia plate moves east-northeast relative to the New Hebrides plate with a velocity of about 11 cm/yr. The Australia plate subducts beneath the New Hebrides plate and is seismically active to a depth of about 300 km northeast of the epicenter of the April 9 earthquake.

The New Hebrides arc region of the Australia/New Hebrides plate- boundary experiences numerous strong earthquakes. In the past quarter century, the thousand kilometer section of the arc centered on the epicenter of the April 9 earthquake has produced over 20 earthquakes of magnitude 7 or greater, the largest having magnitude 7.7.

Significant Earthquakes Mag >= 7.5

Year	Mon	Day	Time	Lat	Long	Dep	Mag
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
1934	07	18	1940	-11.907	166.731	35	7.8
1953	11	04	0349	-13.189	166.516	35	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
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

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.
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 significance.

Map prepared by U.S. Geological Survey
National Earthquake Information Center
2008
Map not approved for release by Director