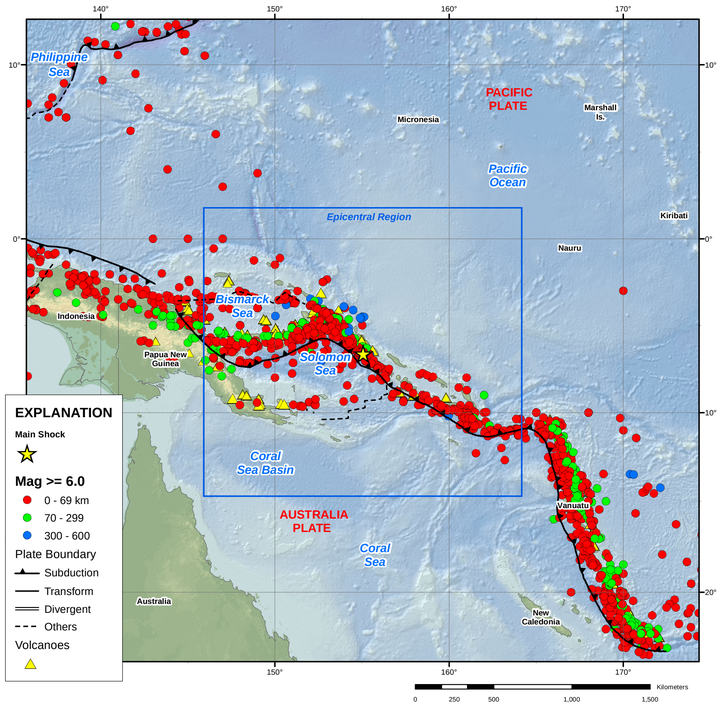
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

EARTHQUAKE SUMMARY MAP

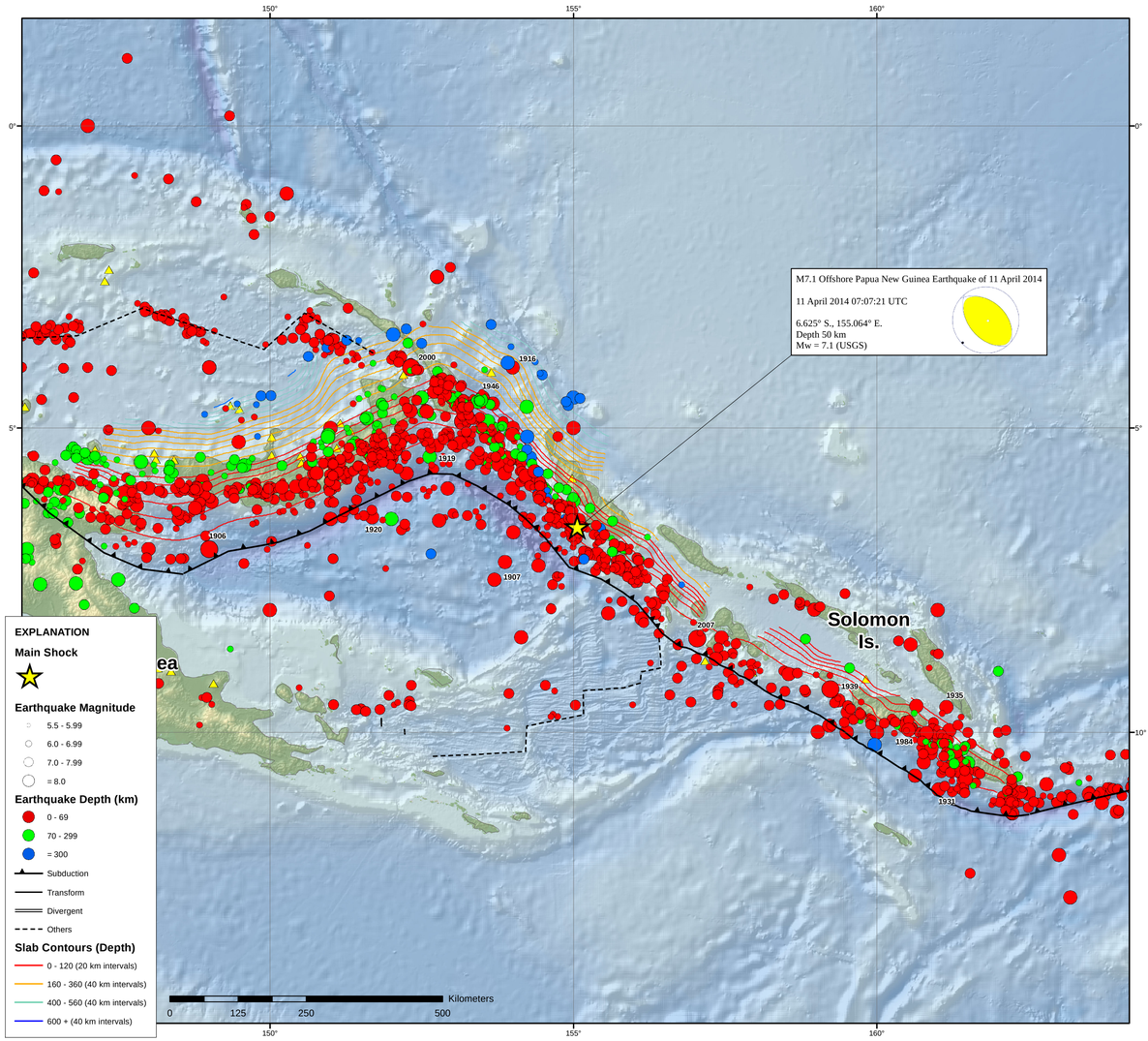
Prepared in cooperation with the Global Seismographic Network

M7.1 Offshore Papua New Guinea Earthquake of 11 April 2014

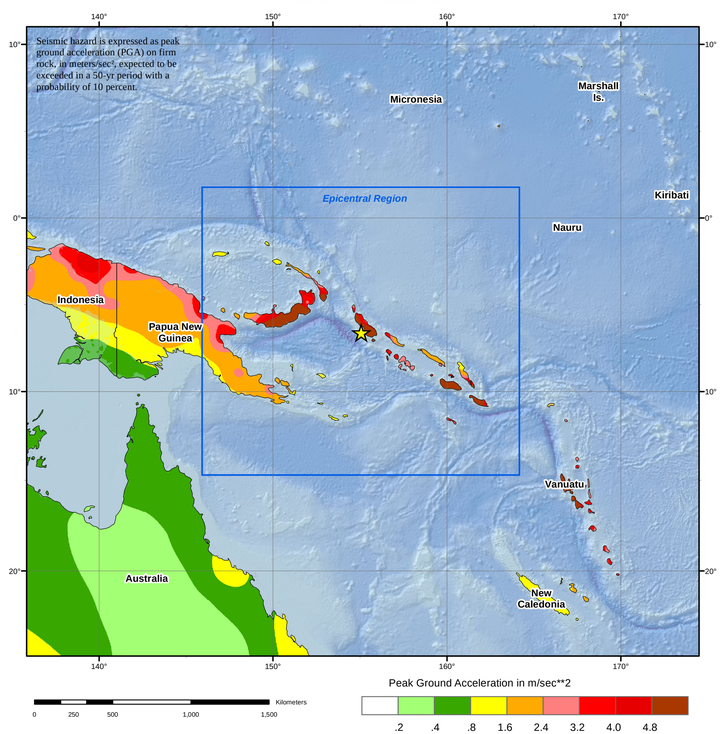
Tectonic Setting



Epicentral Region



Seismic Hazard



PAGER

USGS science for a changing world — Earthquake Shaking: Green Alert

M 7.1, BOUGAINVILLE REGION, PAPUA NEW GUINEA

Origin Time: Fri 2014-04-11 07:07:21 UTC (18:07:21 local)
Location: 6.62°S 155.06°E Depth: 50 km

PAGER Version 2

Created: 51 minutes, 53 seconds 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

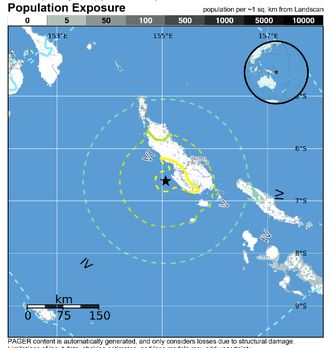
Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)		- -*	63k*	260k	99k	103k	25k	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



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 unreinforced brick masonry and informal (metal, timber, GI etc.) construction.

Historical Earthquakes (with MMI levels):

Date (UTC)	Dist. (km)	Mag.	Max MMI(#)	Shaking Deaths
2005-10-29	193	6.9	VII(39k)	0
1996-04-29	14	7.2	VIII(601)	1
1983-12-21	373	6.2	VIII(5k)	10

Recent earthquakes in this area have caused secondary hazards such as tsunamis and landslides that might have contributed to losses.

Selected City Exposure

from GeoNames.org

MMI	City	Population
VI	Kieta	4k
VI	**Arawa**	**40k**
VI	**Panguna**	**3k**
IV	**Gizo**	**6k**
IV	Kokopo	26k
IV	Rabaul	8k
III	Namatanai	1k

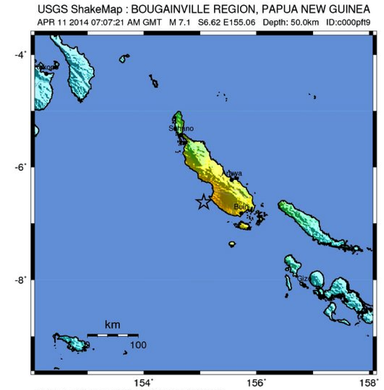
bold cities appear on map (k = x1000)

PAGER content is automatically generated, and only considers losses due to structural damage. Limitations of input data, shaking estimates, and loss models may add uncertainty.
http://earthquake.usgs.gov/pager

Event ID: usc000pft9

ShakeMap

USGS ShakeMap : BOUGAINVILLE REGION, PAPUA NEW GUINEA
APR 11 2014 07:07:21 AM GMT M 7.1 S6.62 E155.06 Depth: 50.0km ID:c000pft9



Map Version 2 Processed Fri Apr 11, 2014 01:56:50 AM MDT

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Worden et al. [2011]

TECTONIC SUMMARY

The M 7.1 April 11, 2014 earthquake (07:07 UTC) southwest of Panguna, Papua New Guinea, occurred as the result of thrust faulting on or near the subduction zone interface between the subducting Australia plate and overriding Pacific plate. At the location of the earthquake, the Australia plate moves towards the east northeast at a velocity of 102 mm/yr with respect to the Pacific, and begins its subduction into the mantle beneath Bougainville Island at the New Britain Trench south of the earthquake. The moment tensor and depth of the earthquake are consistent with thrust-type motion on the interface between these two plates. Note that at the location of the earthquake, some researchers divide the edge of the Australia plate into several microplates that take up the overall convergence between Australia and the Pacific. Here the Solomon Sea plate moves slightly faster and more northeasterly with respect to the Pacific plate than does Australia due to sea-floor spreading in the Woodlark Basin several hundred kilometers to the south of the April 11 earthquake.

In the Papua New Guinea region, the boundary between Australia and Pacific plates is very active seismically; 35 M 7+ events have occurred within 250 km of the April 11, 2014 earthquake over the past century. None are known to have caused any shaking-related fatalities. The largest was an M 8.0 175 km to the northwest of the April 11, 2014 earthquake, one of two M8+ earthquakes 140 km apart in July 1971. The M 8.1 Solomon Islands earthquake in April 2007, which caused a devastating tsunami, was 300 km southeast of the April 11, 2014 event.

A magnitude 6.5 aftershock occurred at 08:16 UTC approximately 25 km to the southeast of the M 7.1 mainshock. Like the mainshock, the moment tensor and depth of the aftershock are consistent with thrust faulting on the Australia:Pacific plate boundary interface.

Significant Earthquakes Mag >= 7.5

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1906	09	14	1604	-7.000	149.000	0	8.0
1907	05	04	0651	-7.500	153.700	60	7.7
1913	05	30	1146	-5.000	154.000	0	7.7
1916	01	01	1320	-4.000	154.000	0	7.7
1919	05	06	1940	-5.477	152.629	232	7.6
1920	02	02	1122	-6.474	151.685	35	7.6
1931	10	03	1913	-10.932	161.016	35	7.8
1931	10	10	0020	-9.968	161.194	50.2	7.7
1935	12	15	0707	-9.590	161.145	35	7.5
1939	01	30	0218	-7.080	155.386	35	7.7
1939	04	30	0255	-9.295	159.234	35	7.9
1945	12	28	1748	-6.000	150.000	0	7.6
1946	09	29	0301	-4.500	153.500	0	7.6
1949	10	19	2100	-5.500	154.000	60	7.5
1953	04	23	1624	-4.402	152.708	35	7.6
1971	07	14	0611	-5.519	153.906	44.5	8.0
1971	07	26	0123	-4.889	153.183	37.1	8.1
1975	07	20	1437	-6.612	155.097	59.7	7.7
1983	03	18	0905	-4.887	153.589	88.7	7.7
1984	02	07	2133	-9.957	160.522	17	7.6
1988	08	10	0438	-10.258	160.896	36.1	7.6
1990	12	30	1914	-5.118	150.962	177	7.5
1995	08	16	1027	-5.788	154.213	30	7.7
2000	11	16	0454	-4.001	152.327	16.8	8.0
2000	11	16	0742	-5.243	153.127	32.6	7.8
2000	11	17	2101	-5.491	151.936	25.7	7.8
2005	09	09	0726	-4.539	153.474	90	7.6
2007	04	01	2039	-8.466	157.043	24	8.1

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 Villaseñor, 2002)
EHB catalog (Engdahl et al., 1998)
HDF (unpublished earthquake catalog, Engdahl, 2003)
Global Seismic Hazard Assessment Program

PLATE TECTONICS AND FAULT MODEL
PB2002 (Bird, 2003)
Hayes, G. P., Wald, D. J., and Johnson R. L., 2012, A three-dimensional model of globalsubduction zone geometries: Journal of Geophysical Research, v. 117, B01302, doi:10.1029/2011JB008524.
DeMets, C., Gordon, R.G., Argus, D.F., 2010. Geologically current plate motions, Geophys. J. Int. 181, 1-80.

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.

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 updated by U.S. Geological Survey National Earthquake Information Center
14 April 2014
http://earthquake.usgs.gov/
Map not approved for release by Director USGS