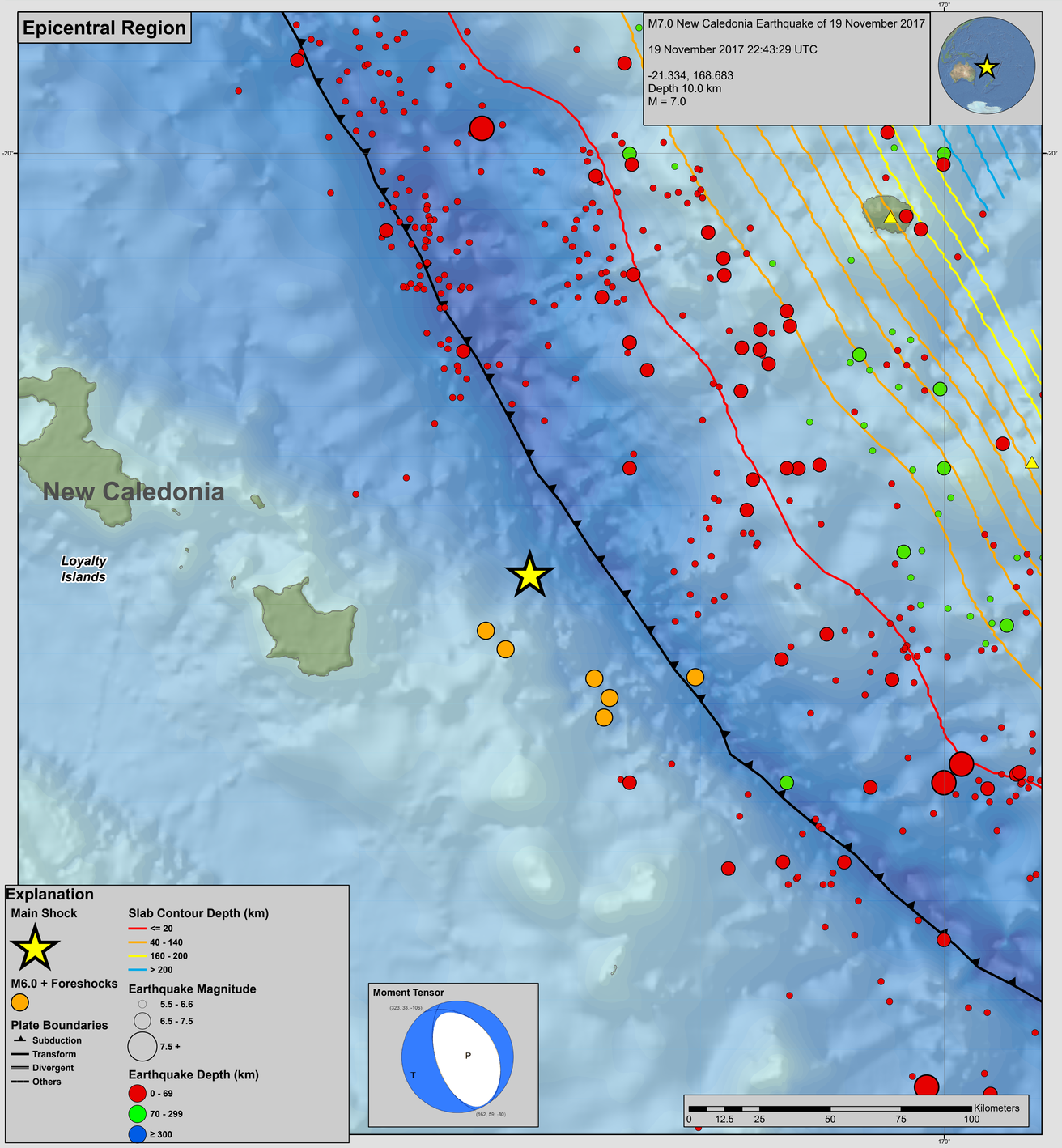
U.S. Department of the Interior
U.S. Geological Survey

# M7.0 New Caledonia Earthquake of November 19, 2017

Earthquake Summary Map
prepared in cooperation with
the Global Seismographic Network

## Epicentral Region




### Explanation

**Main Shock**

**M6.0 + Foreshocks**

**Plate Boundaries**
- Subduction
- Transform
- Divergent
- Others

**Slab Contour Depth (km)**
- <= 20
- 40 - 140
- 160 - 200
- > 200

**Earthquake Magnitude**
- 5.5 - 6.6
- 6.5 - 7.5
- 7.5 +

**Earthquake Depth (km)**
- 0 - 69
- 70 - 299
- ≥ 300

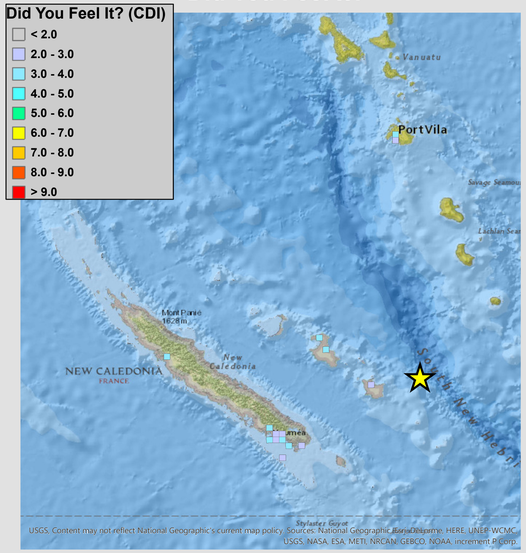
## Tectonic Summary

The November 19, 2017, M 7.0 earthquake east of New Caledonia in the southwest Pacific Ocean occurred as the result shallow of normal faulting within the oceanic crust of the Australia plate, just west of the South New Hebrides Trench which marks the plate boundary between the Australia and Pacific plates in this region. Focal mechanism solutions indicate faulting occurred on a moderately dipping fault striking either to the northwest or to the south-southeast. At the location of this earthquake, the Australia plate moves towards the east-northeast with respect to the Pacific at a rate of approximately 78 mm/yr. At the South New Hebrides Trench, Australia lithosphere converges with and sinks beneath the Pacific plate, descending into the mantle and forming the New Hebrides/Vanuatu subduction zone, stretching from New Caledonia in the south to the Santa Cruz Islands in the north, a distance of about 1,600 km. The November 19, 2017, earthquake occurred approximately 20 km to the west of this trench, in the tectonic region sometimes known as the "outer rise", where the subducting plate begins flexing (extending) before sinking into the mantle. The location, depth, and focal mechanism solution of this earthquake are all consistent with the event occurring as a result of intraplate faulting in this outer rise region.

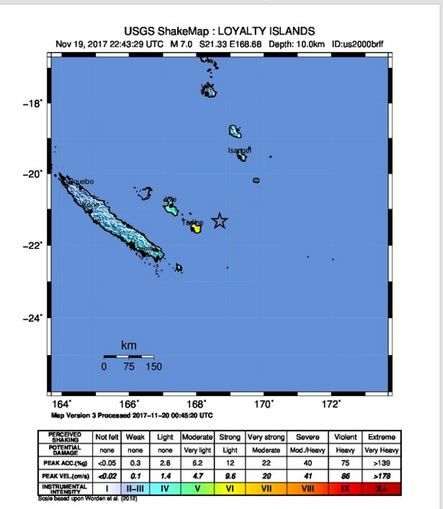
The November 19, 2017 earthquake is seventh M 6+ earthquake to occur in this region over the past three weeks, and is part of an intense sequence of events that began on October 31st, 2017 with a M 6.8 interplate thrust faulting earthquake just to the east of the South New Hebrides Trench and about 70 km to the southeast of the November 19, 2017 earthquake. Over this time period, about 135 M 4+ earthquakes have been recorded in this region by the USGS, most to the west of the plate boundary, in the outer rise.

The Loyalty Islands region is very active seismically, and the region within 250 km of the November 19, 2017 earthquake has hosted 21 other M 7+ earthquakes over the preceding century. The largest was a M 8.1 earthquake in September 1920, which was located about 140 km to the north of today's event, just to the east of the oceanic trench. 4 of these M 7+ earthquakes have occurred to the west of the oceanic trench, including a M 7.7 earthquake in May 1995, 225 km to the southeast, and a M 7.1 earthquake in January 2004, 145 km to the southeast. Neither are known to have caused any damage or fatalities. The January 2004 M 7.1 earthquake was also part of an active sequence of about 270 events, beginning in December 2003. That sequence included both interplate thrust faulting earthquakes (the largest event in the sequence was a M 7.3 thrust faulting earthquake on December 27, 2003) and normal faulting earthquakes to the west of the oceanic trench. Between December 25, 2003, and January 3, 2004, 12 earthquakes of M 6+ occurred. The 2003-2004 sequence eventually died down in early-mid February of 2004.

## Did You Feel It?



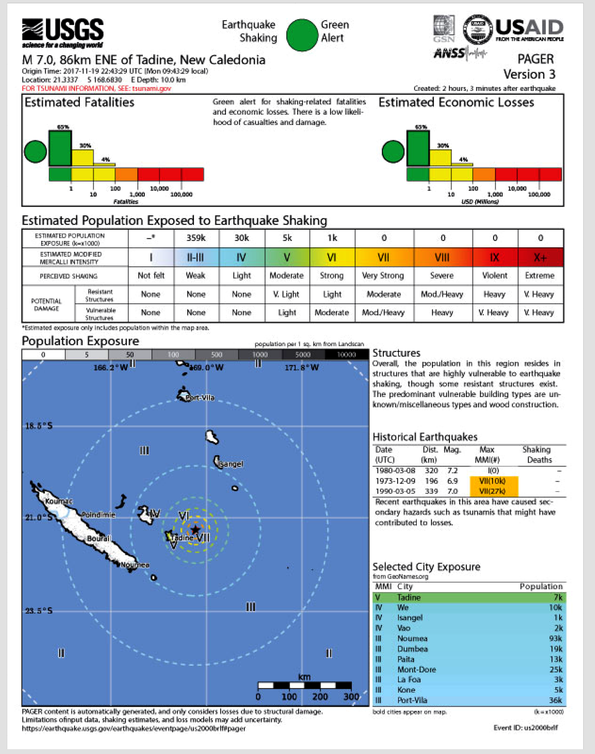

## ShakeMap



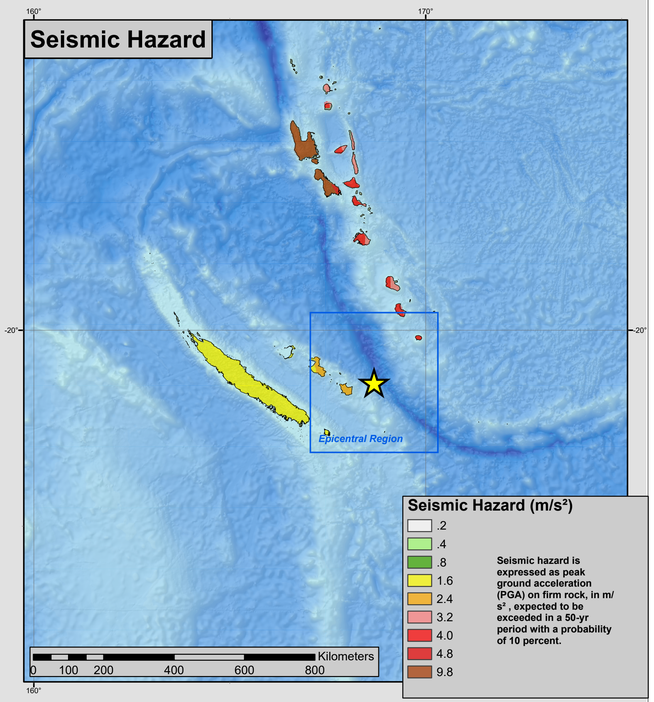

| PERCEIVED SHAKING | Not felt | Weak | Light | Moderate | Strong | Very strong | Severe | Violent | Extreme |
|---|---|---|---|---|---|---|---|---|---|
| POTENTIAL DAMAGE | none | none | none | Very light | Light | Moderate | Mod./Heavy | Heavy | Very Heavy |
| PEAK ACC.(%g) | <0.05 | 0.3 | 2.8 | 6.2 | 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. (2012)

## PAGER




## Seismic Hazard




**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
Volcanoes of the World (Siebert and Simkin, 2002)

PLATE TECTONICS AND FAULT MODEL
PB2002 (Bird, 2003)
Ji, C., D.J. Wald, and D.V. Helmberger, Source description of the 1999 Hector Mine, California earthquake; Part I: Wavelet domain inversion theory and resolution analysis, Bull. Seism. Soc. Am., Vol 92, No. 4. pp. 1192-1207, 2002.
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 signifiance.

Map updated by U.S. Geological Survey National Earthquake Information Center
20 November 2017
http://earthquake.usgs.gov/
Map not approved for release by Director USGS