# M 7.5 Earthquake of Papua New Guinea on May 14, 2019

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

Earthquake Summary Map
prepared in cooperation with
the Global Seismographic Network

## Tectonic Summary

The May 14, 2019, M 7.5 earthquake in the New Ireland region of Papua New Guinea occurred as the result of shallow strike-slip faulting within the interior of the Pacific plate. Focal mechanism solutions for the earthquake indicate that rupture occurred on either a right-lateral northeast striking or a left-lateral southeast-striking fault. In this region, the Australia plate moves to the east-northeast with respect to the Pacific plate at a velocity of about 105 mm/yr. At the location of the earthquake, some researchers consider the edges of the Australia and Pacific plates to be divided into several microplates that take up the overall convergence between Australia and the Pacific, including the Solomon Sea, South Bismark, and Manus microplates near this event. In this context, the May 14th event occurred along the boundary between the South Bismark and Manus microplates. This fault structure was also the location of a M 8.0 earthquake in November 2000.

While commonly plotted as points on maps, earthquakes of this size are more appropriately described as slip over a larger fault area. Strike-slip events of the size of the May 14, 2019 M 7.5 earthquake are typically about 130x22 km (length x width).

Shallow earthquakes predominantly represent deformation along plate boundaries and associated structures, rather than within subducted slabs where intermediate-depth and deep earthquakes (70–300 and 300+ km, respectively) occur. This region hosts shallow, intermediate-and deep events, and the Australia plate in this region is known to be seismically active to depths of more than 500 km.

Within 250 km of the May 14th M 7.5 earthquake, there have been 36 other events of at least M 7 over the preceding century. Three of these events were M 8 or larger, including the November 16, 2000 M 8.0 earthquake, 45 km to the northwest of this May 14 event. The November 2000 event was also followed by two M 7.8 aftershocks on the subduction zone megathrust interface between the Australia and Pacific plates to the south of this event, respectively 3 hours and 17 hours after the M 8.0 event. The November 2000, M 8.0 earthquake resulted in at least 1 fatality, left several thousand homeless, and triggered several landslides in the nearby region.

## PAGER Information


Landslides

Significant area affected

Little or no population exposed

Liquefaction

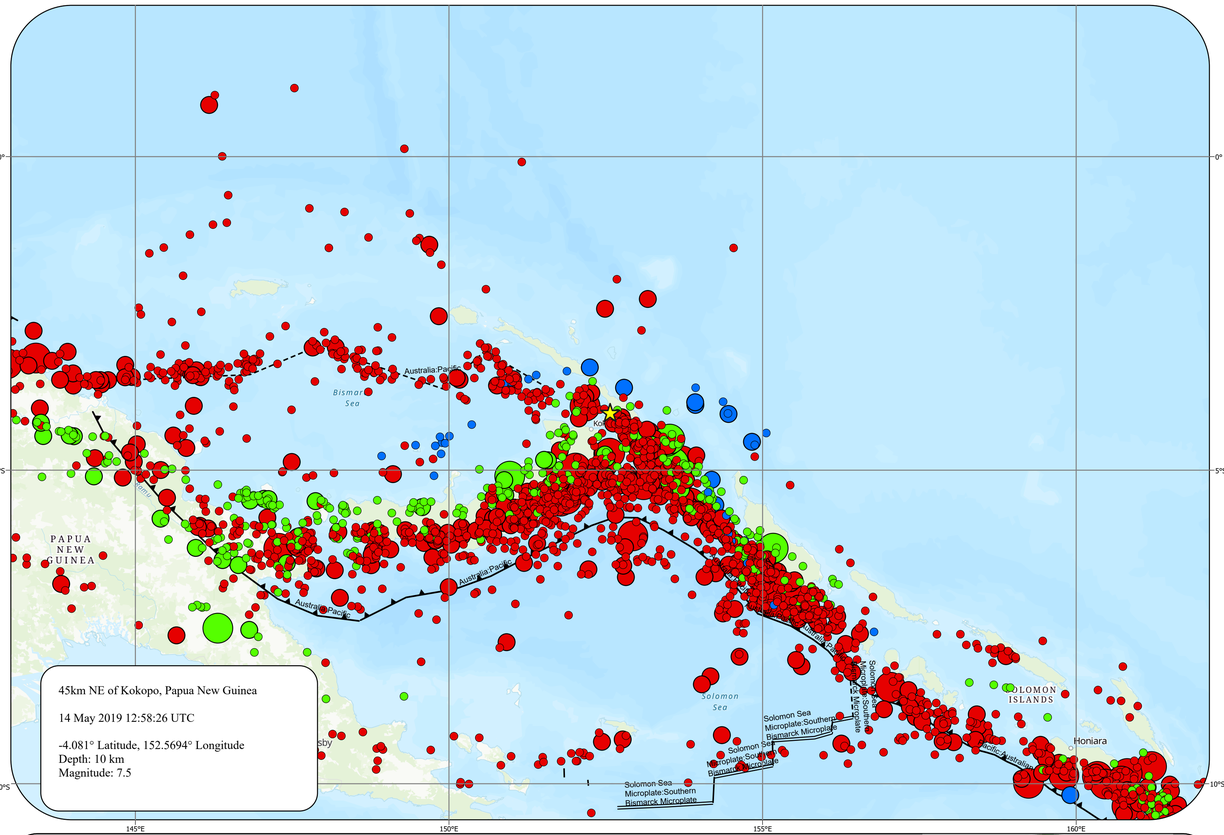
Limited area affected

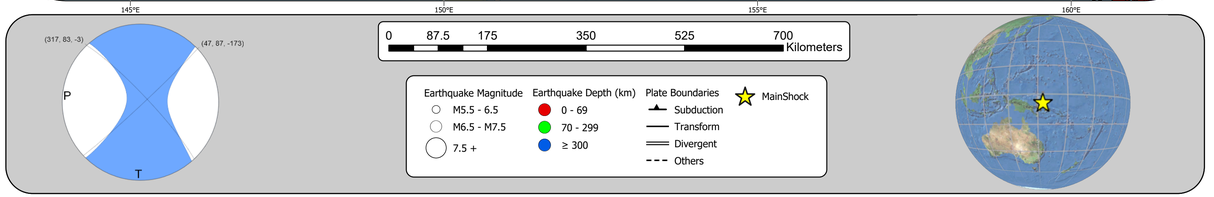
Limited population exposed

Green alert for shaking-related fatalities and economic losses. There is a low likelihood of casualties and damage.

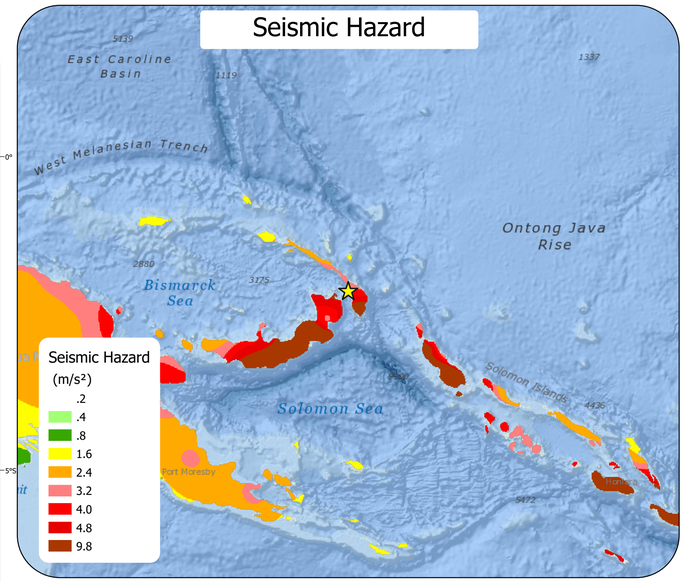
Recent earthquakes in this area have caused secondary hazards such as tsunamis and landslides that might have contributed to losses.

Overall, the population in this region resides in structures that are a mix of vulnerable and earthquake resistant construction. The predominant vulnerable building types are informal (metal, timber, GI etc.) and wood construction.

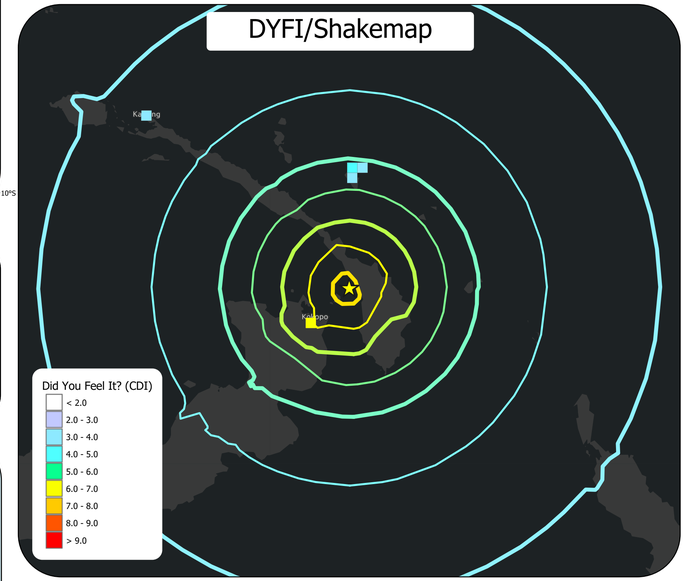


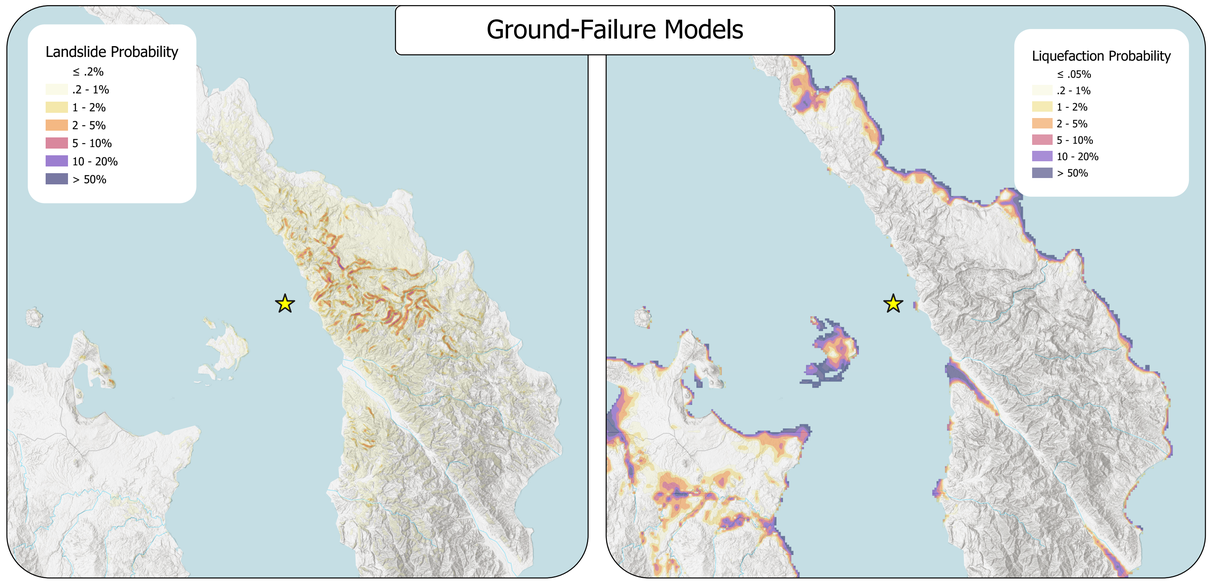

## Seismic Hazard




## DYFI/Shakemap




## Ground-Failure Models




**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 significance.

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