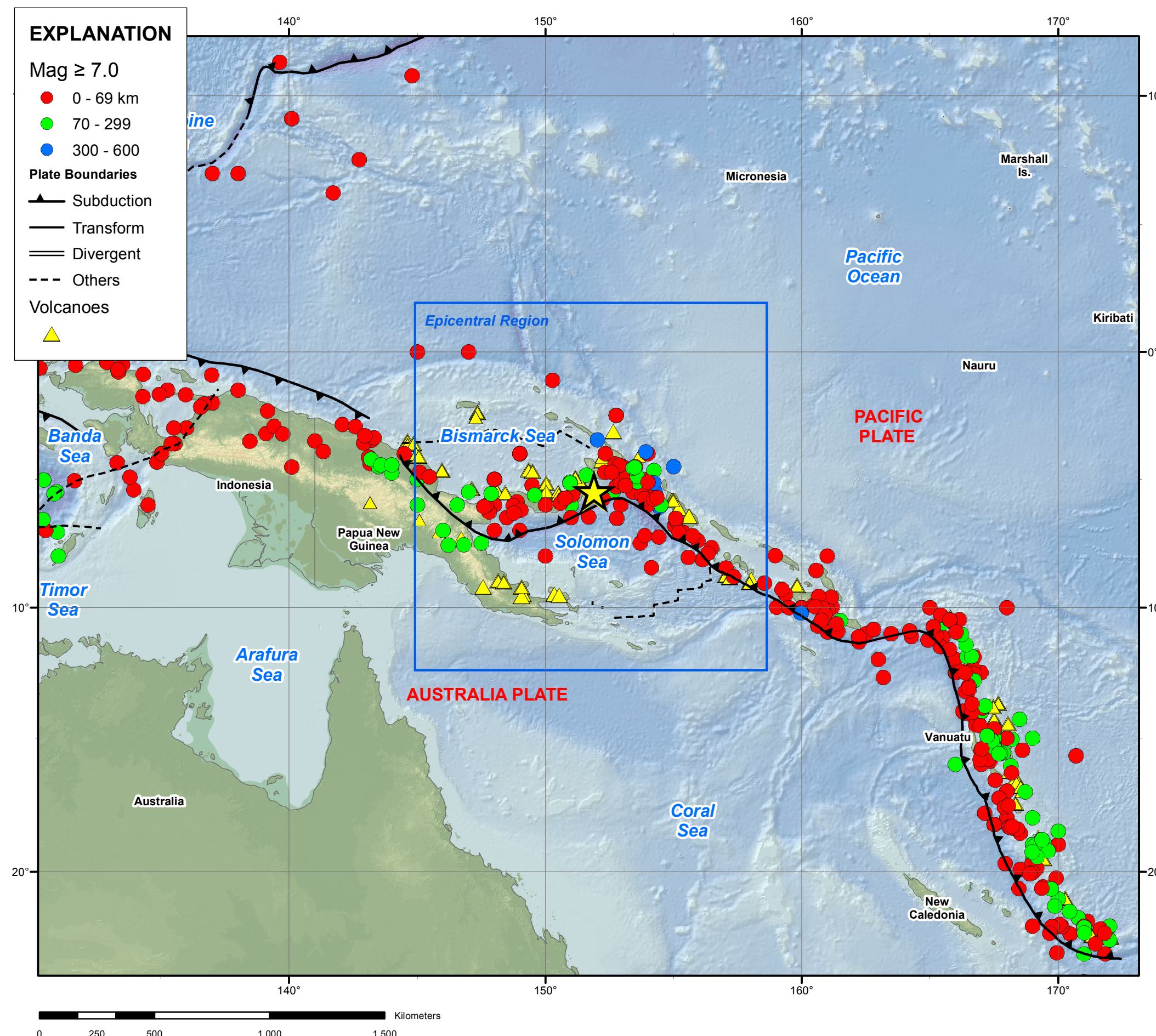
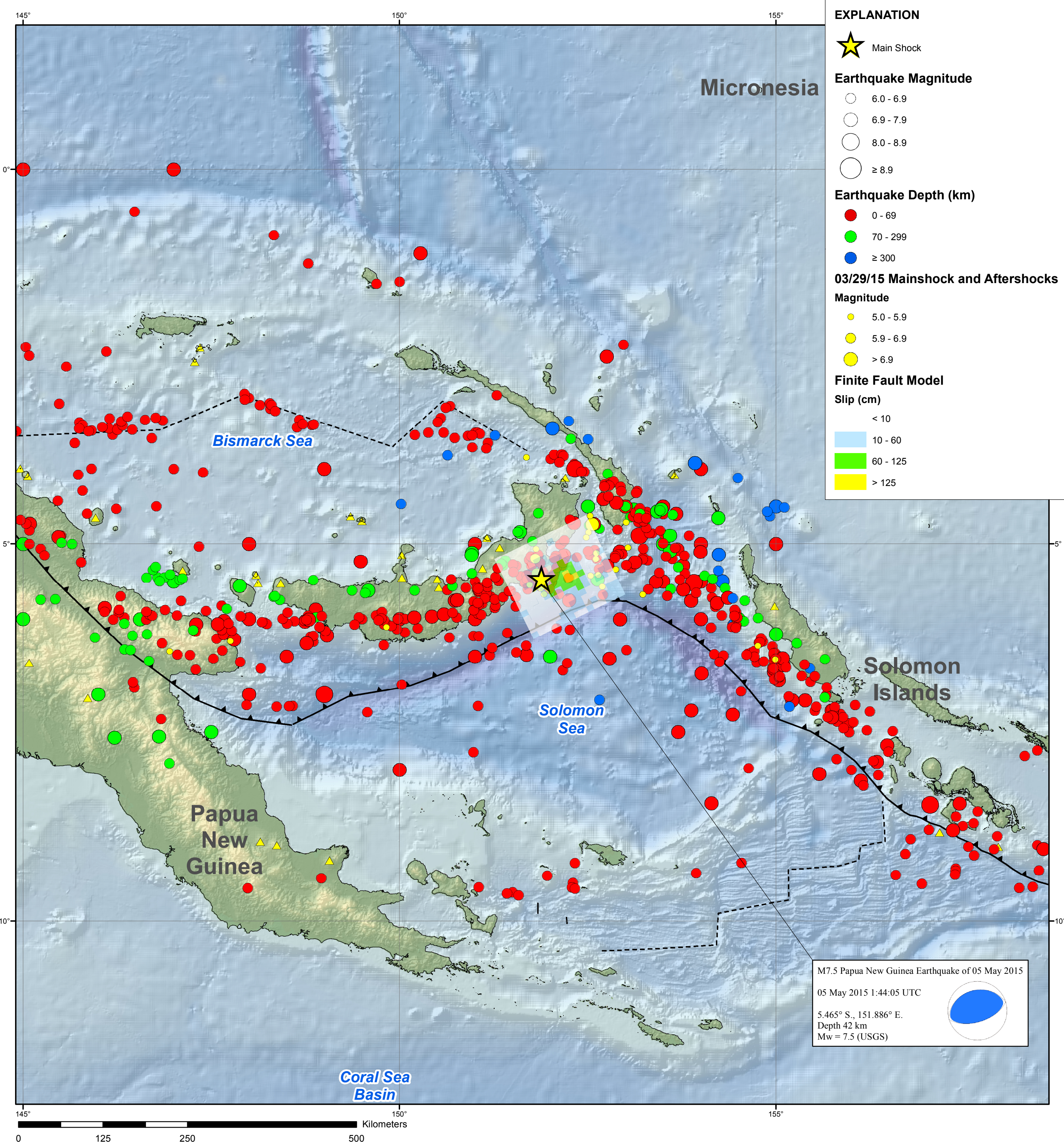


M7.5 Papua New Guinea Earthquake of 05 May 2015

Tectonic Setting



Epicentral Region

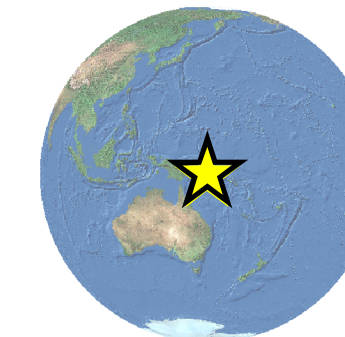


TECTONIC SUMMARY

The May 5, 2015 M 7.5 earthquake south-southwest of Kokopo, Papua New Guinea, occurred as the result of thrust faulting on or near the plate boundary interface between the subducting Australia and overriding Pacific plates. At the location of the earthquake, the Australia plate moves towards the east-northeast at a velocity of 105 mm/yr with respect to the Pacific plate, and begins its subduction into the mantle beneath New Britain at the New Britain Trench, south-southeast of the earthquake. The moment tensor and depth of the event 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 edges of the Australia and Pacific plates into several microplates that take up the overall convergence between Australia and the Pacific, including the Solomon Sea and South Bismark microplates local to this event. 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 southeast of the May 5 earthquake, facilitating the classic subduction evident beneath New Britain. While commonly plotted as points on maps, earthquakes of this size are more appropriately described as slip over a larger fault area. Events of the magnitude of the May 5, 2015 earthquake are typically about 70x40 km in size (length x width).

The plate boundary between the Australia and Pacific plates in the Papua New Guinea region is very active seismically; 36 M 7+ events have occurred within 250 km of the May 5, 2015 earthquake over the past century. Few are known to have caused shaking-related fatalities because of the remoteness of the region, though a M 8.0 earthquake in November 2000 – one of three similarly sized events over a 2-day period – did cause several deaths. The largest nearby earthquake was an M 8.1 event, 150 km to the east-northeast of the May 5, 2015 earthquake, one of two M8+ earthquakes 140 km apart in July 1971. The May, 2015 earthquake is just 10 km to the east-northeast of the November 17, 2000 M 7.8 earthquake, also thrust-faulting event on the plate boundary interface.

The May 5 earthquake has also been preceded by a series of moderate-to-large earthquakes on this portion of the plate boundary over the past several weeks, beginning with a M 7.5 event on March 29, 2015, 110 km to the northeast of the May 5, 2015 earthquake. Between these two large events, 25 other earthquakes of M 5+ have occurred in the same area; including M 6.7 and M 6.8 events just to the northwest of the May 5 earthquake, on April 30 and May 1, respectively.

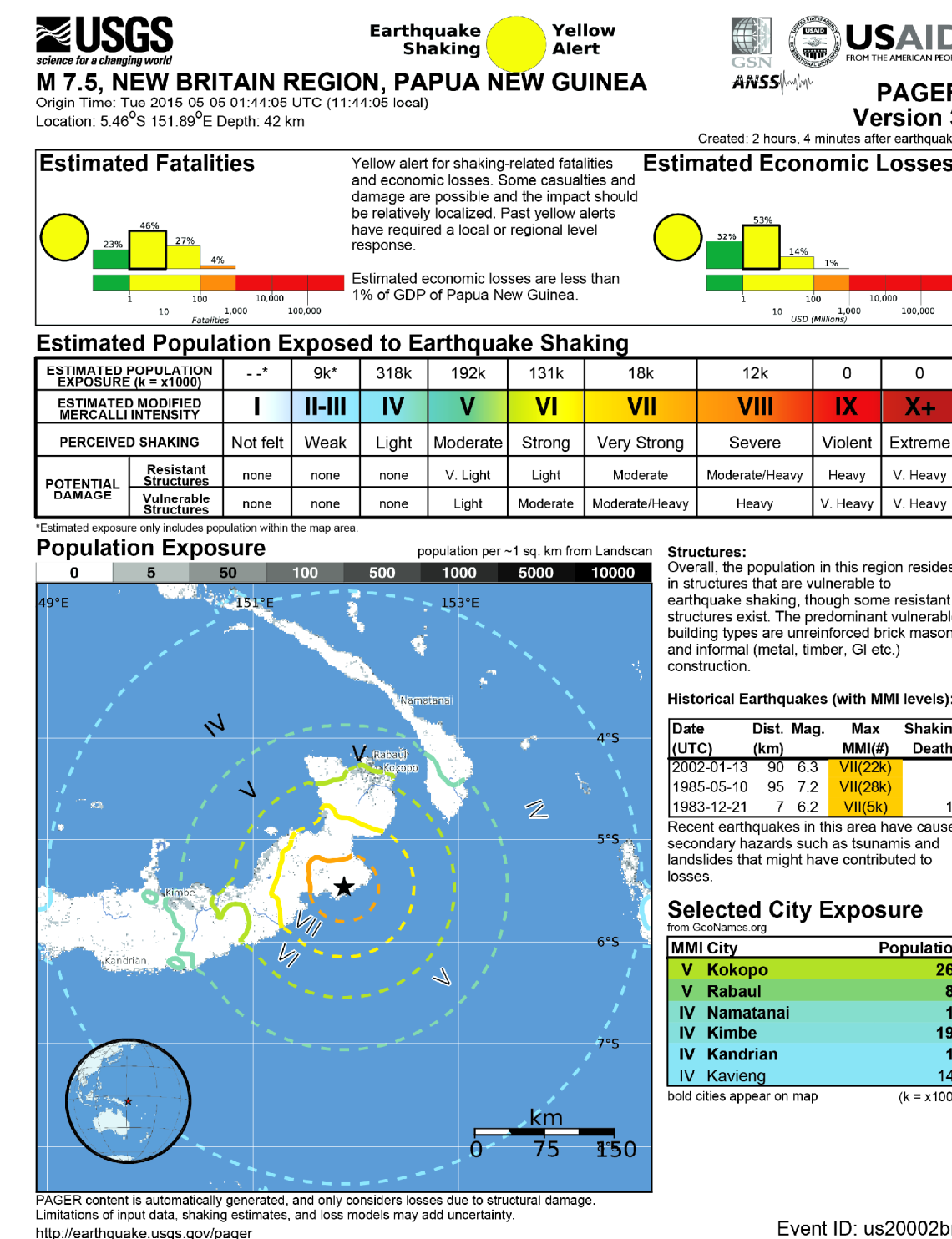


EARTHQUAKE SUMMARY MAP

Prepared in cooperation with the
Global Seismographic Network

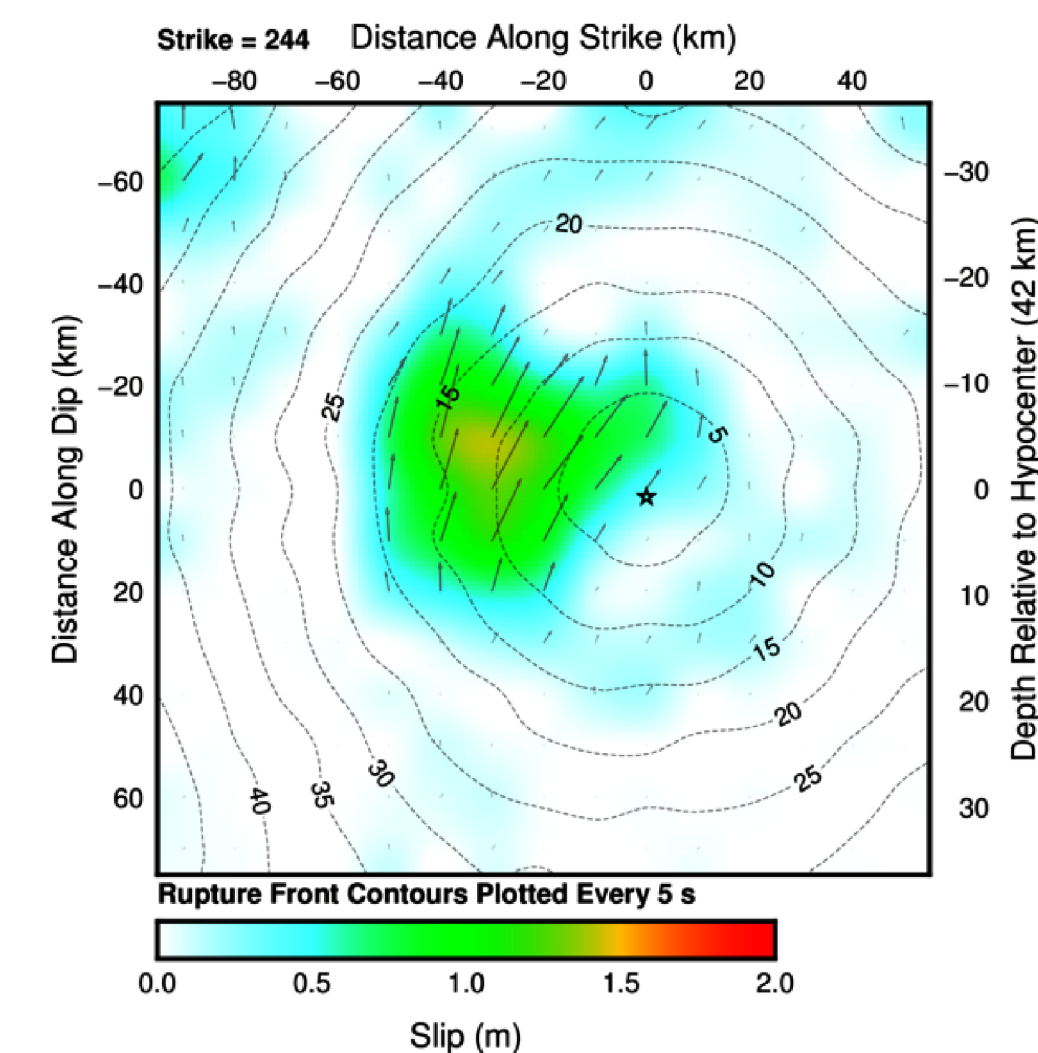


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Finite Fault Model

Distribution of the amplitude and direction of slip for subfault elements of the fault rupture model are determined from the inversion of teleseismic body waveforms and long period surface waves. Arrows indicate the amplitude and direction of slip (of the hanging wall with respect to the foot wall); the slip is also colored by magnitude. The view of the rupture plane is from above. The strike of the fault rupture plane is 244° and the dip is 29°NW. The dimensions of the subfault elements are 10 km in the strike direction and 10 km in the dip direction. The rupture surface is approximately 55 km along strike and 45 km along down-dip. The seismic moment release based upon this plane is 2.1×10^{27} dyne cm.



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

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, Geophysics, 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

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Bird, P., 2003, An updated digital model of plate boundaries: Geochem. Geophys., v. 4, no. 3, pp. 1027-80.

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 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.

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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
5 May 2015
http://earthquake.usgs.gov/
Map not approved for release by Director USGS