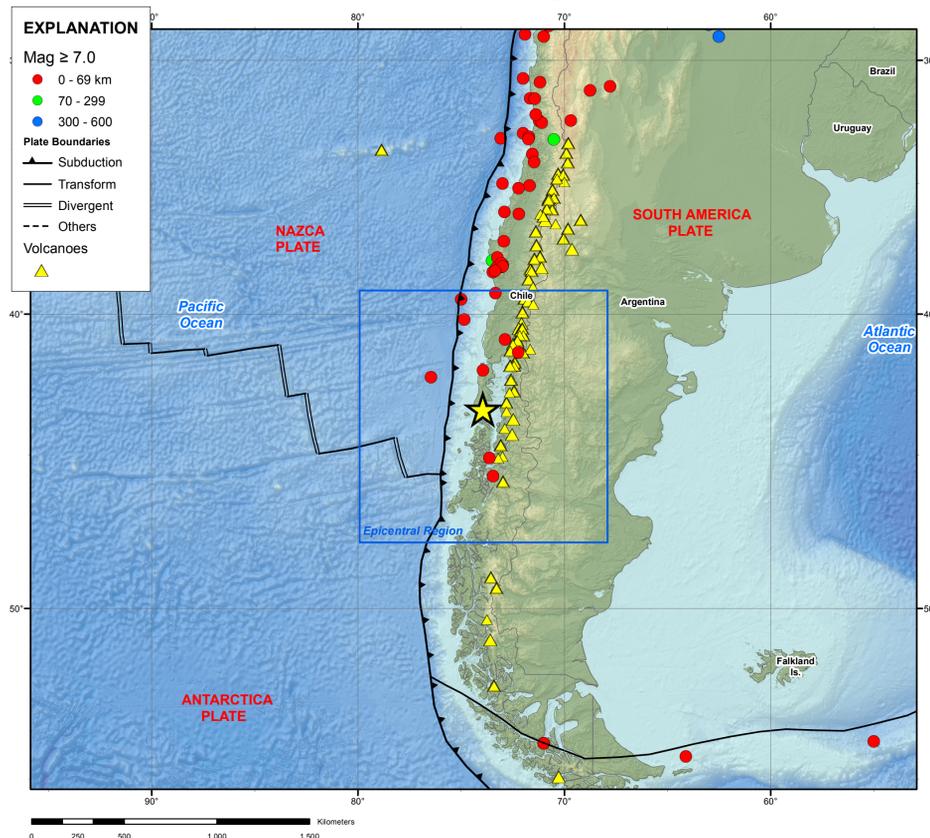


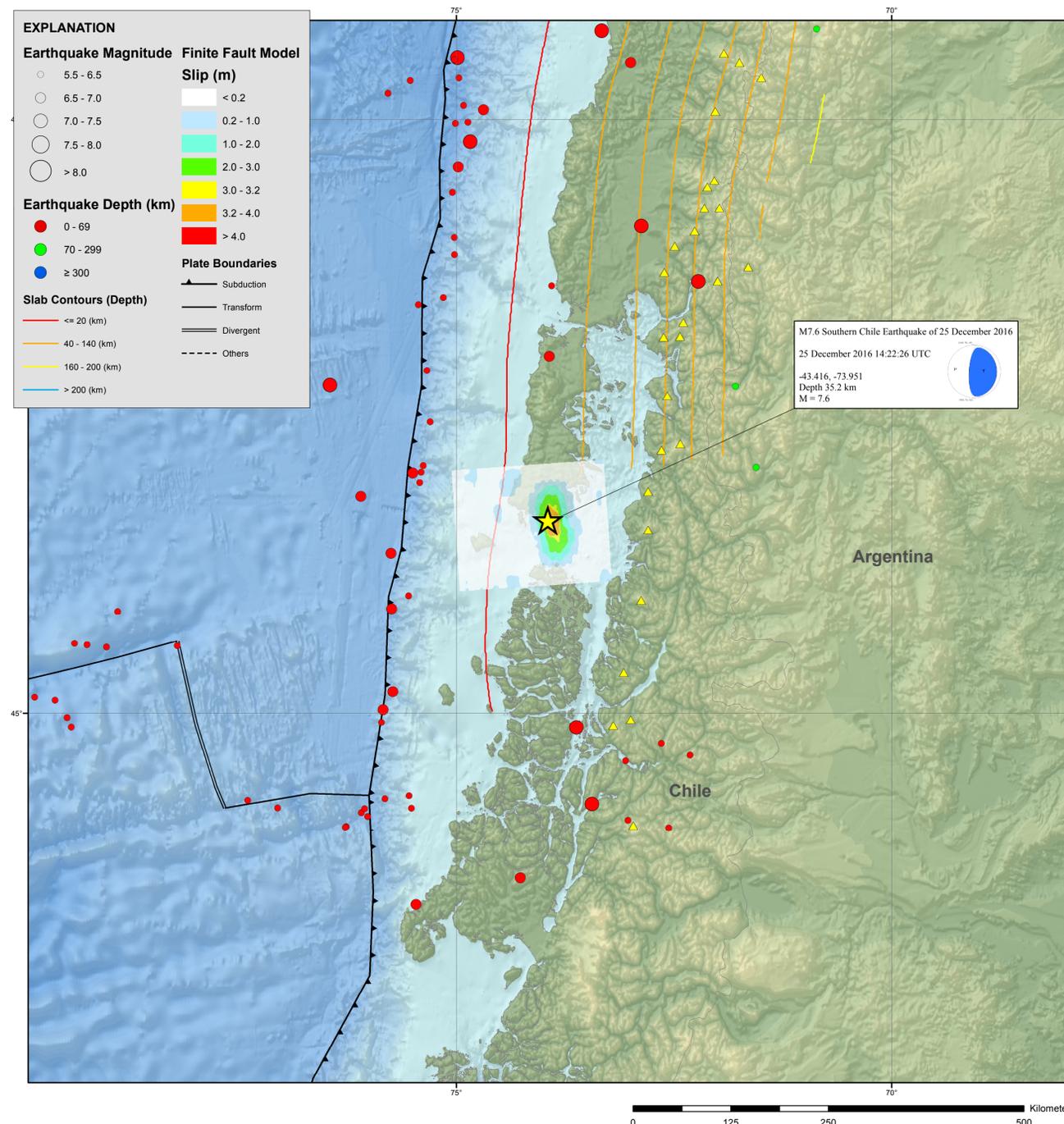
M7.6 Southern Chile Earthquake of 25 December 2016



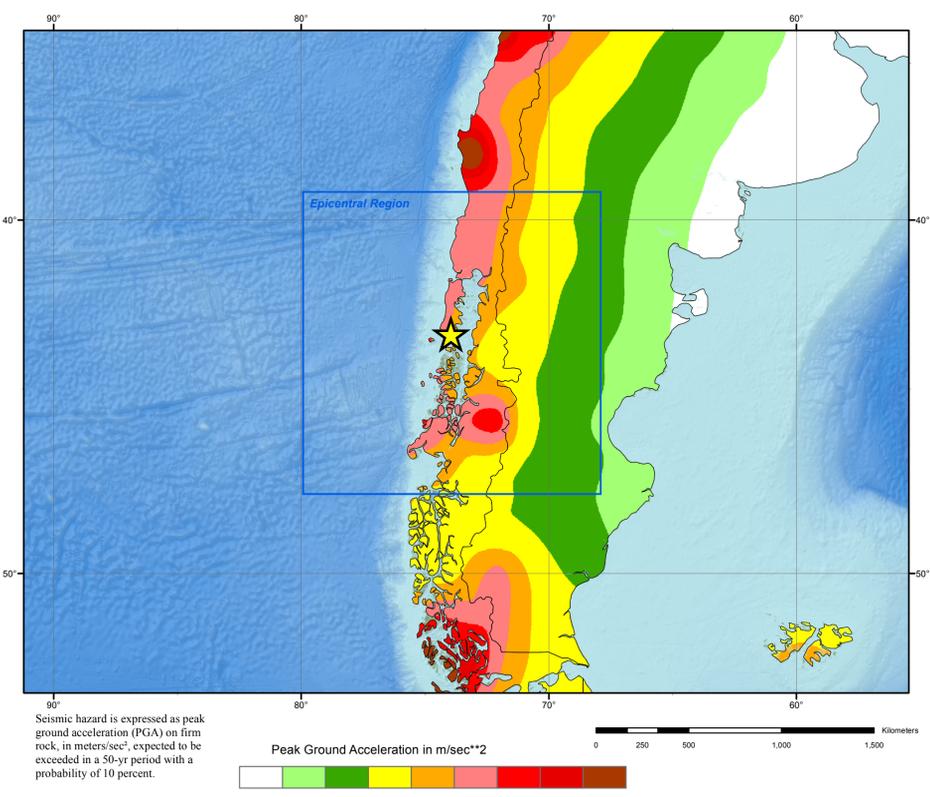
Tectonic Setting



Epicentral Region



Seismic Hazard



PAGER

USGS Earthquake Shaking **Yellow Alert**

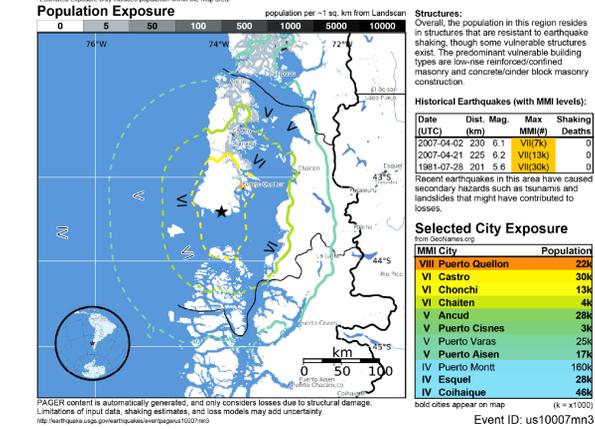
M 7.6, OFFSHORE LOS LAGOS, CHILE
Origin Time: Sun 2016-12-25 14:22:26 UTC (14:22:26 local)
Location: 43.42°S 73.95°W Depth: 35 km
FOR TSUNAMI INFORMATION, SEE: tsunami.gov

Estimated Fatalities
Estimated economic losses are less than 1% of GDP of Chile.

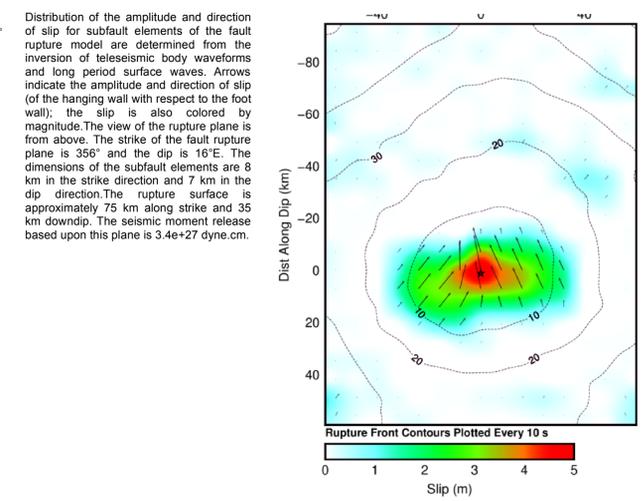
Estimated Economic Losses

Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)	0	1	2	3	4	5	6	7	8	9	10
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	V. Heavy
	Vulnerable Structures	None	None	None	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy	



Finite Fault Model



TECTONIC SUMMARY

The December 25, 2016, M 7.6 earthquake occurred as the result of shallow thrust faulting in southern Chile. At the location of this earthquake, the oceanic Nazca plate converges with and subducts beneath the South America plate in an east-northeast direction, at a rate of approximately 73 mm/yr. The earthquake location, depth and shallow thrusting focal mechanism solution, all indicate this earthquake likely occurred on the subduction zone interface.

While commonly plotted as points on maps, earthquakes of this size are more appropriately described as slip over a larger fault area. Thrust-faulting events of the size of the December 25, 2016, M 7.6 earthquake are typically about 90x45 km (length x width).

The Chilean subduction zone frequently hosts large earthquakes, and has hosted several M 8+ events this century, including the M 8.8 Maule earthquake in February 2010 approximately 850 km to the north of the December 25, 2016 earthquake (but which ruptured to within 650 km of today's earthquake). The December 25 event is also within the ~1,000 km long rupture zone of the 1960 M 9.5 southern Chile earthquake, the largest event ever recorded in human history (about 1,000 times bigger than today's earthquake). Over the preceding century, 6 other M 6.5+ earthquakes have occurred within 250 km of the December 25th earthquake. The 1960 M 9.5 earthquake and tsunami resulted in the loss 1,600 lives in Chile, and the tsunami took another 200 lives in Japan, Hawaii, and the Philippines. That event had several foreshocks over the preceding 36 hours, of M 8.1, M 7.1, and M 7.8.

DATA SOURCES

EARTHQUAKES AND SEISMIC HAZARD
USGS, National Earthquake Information Center
NOAA, National Geophysical Data Center
IASPEI, Centennial Catalog (1969 - 1999) and extensions (Engdahl and Villaseñor, 2002)
EHB catalog (Engdahl et al., 1998)
IHF (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. Helwegger. 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 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.

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
27 December 2016
http://earthquake.usgs.gov/
Map not approved for release by Director USGS