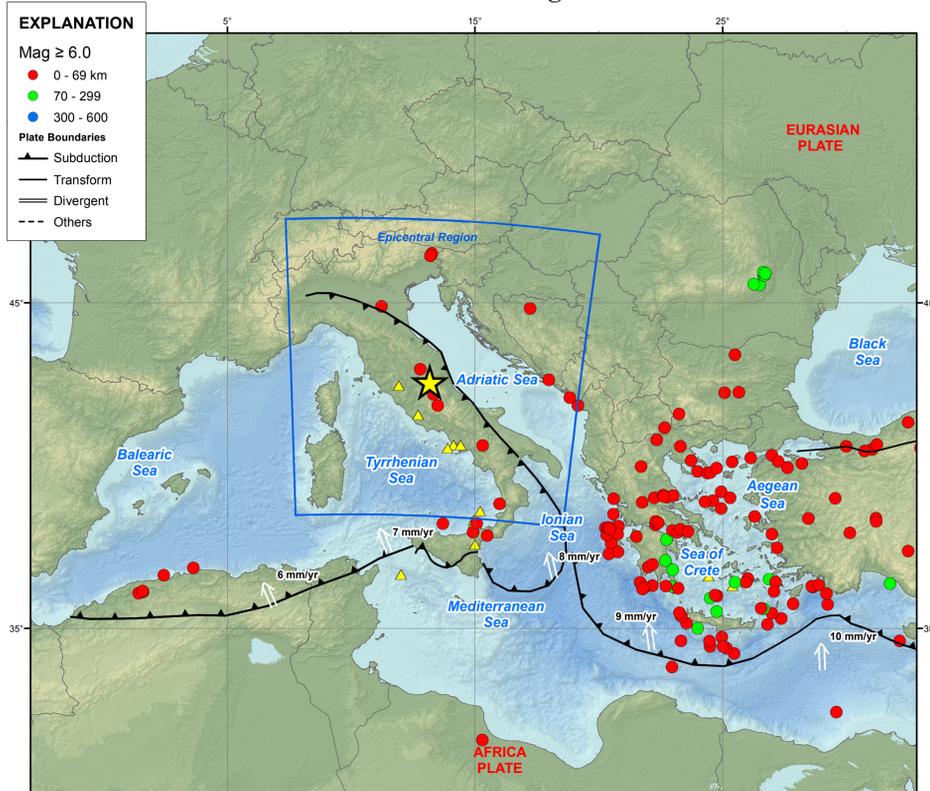


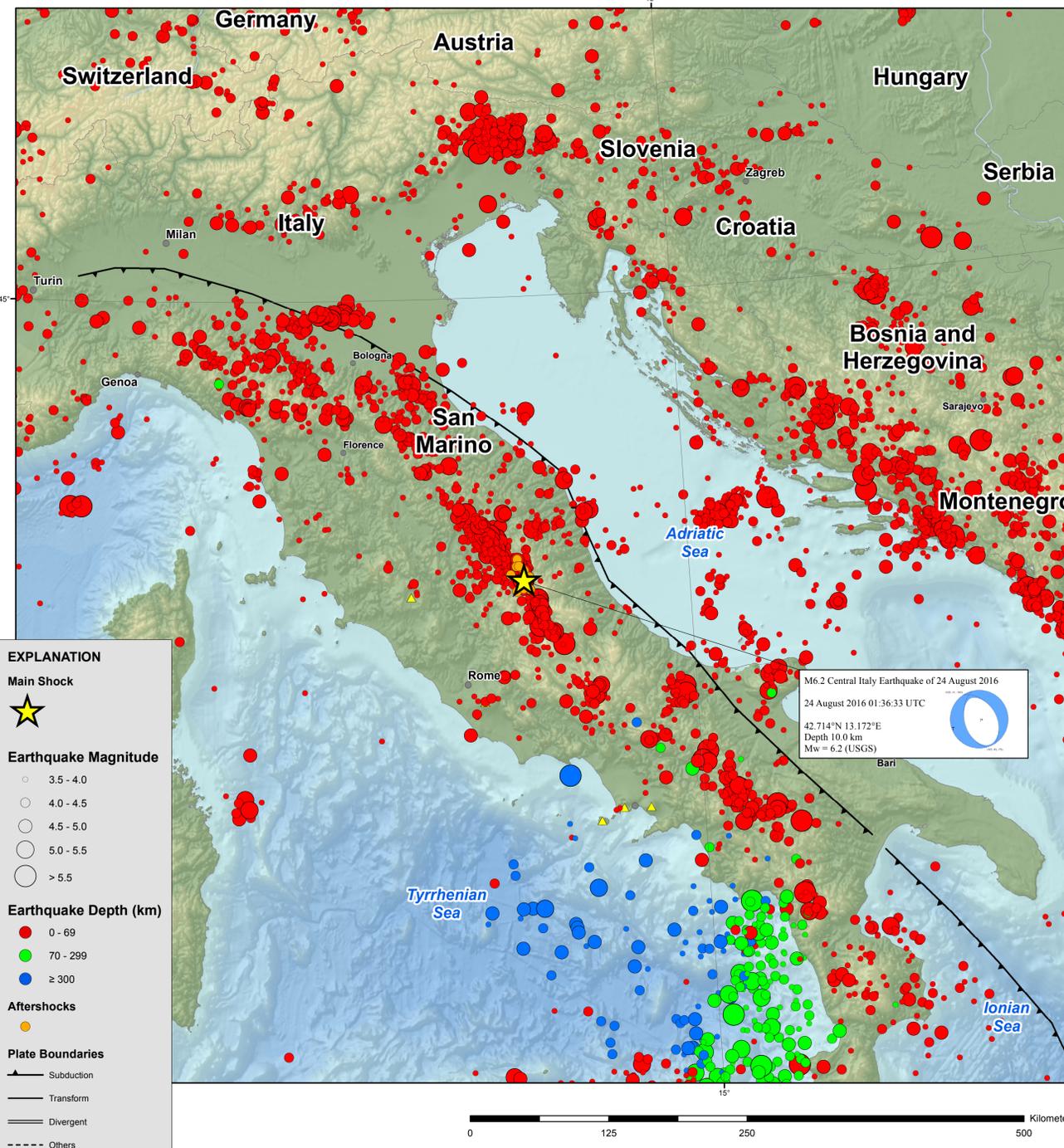
M6.2 Central Italy Earthquake of 24 August 2016



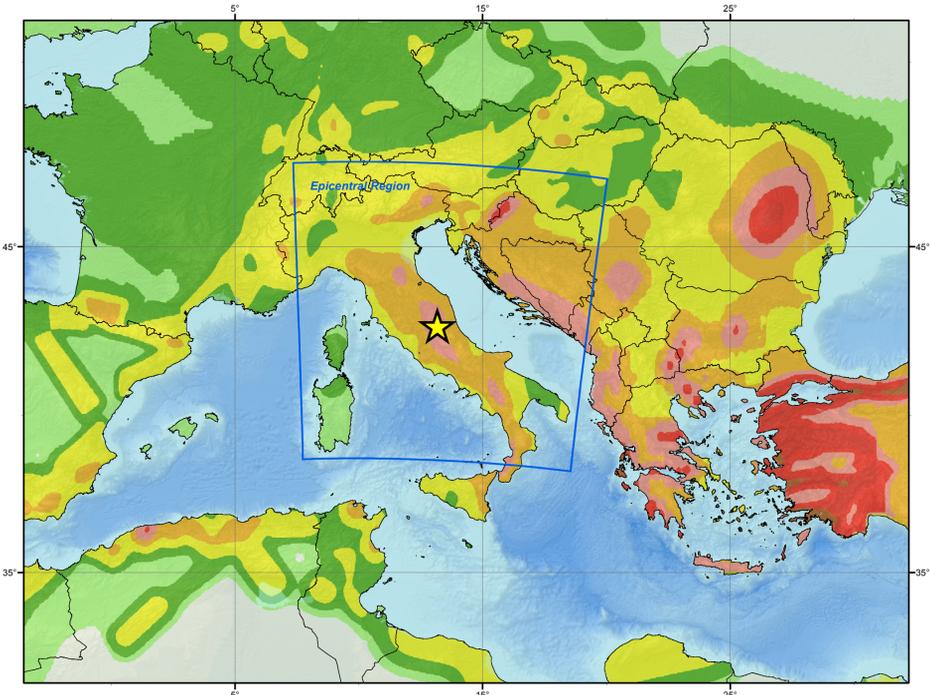
Tectonic Setting



Epicentral Region



Seismic Hazard



EXPLANATION

Main Shock
★

Earthquake Magnitude
○ 3.5 - 4.0
○ 4.0 - 4.5
○ 4.5 - 5.0
○ 5.0 - 5.5
○ > 5.5

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

Aftershocks
○

Plate Boundaries
— Subduction
— Transform
— Divergent
- - - Others

M6.2 Central Italy Earthquake of 24 August 2016
24 August 2016 01:36:33 UTC
Depth 10.0 km
Mw = 6.2 (USGS)

PAGER

USGS Earthquake Shaking **Red Alert**

M 6.2, CENTRAL ITALY
Origin Time: Wed 2016-08-24 01:36:33 UTC (03:36:33 local)
Location: 42.714°N 13.172°E Depth: 10 km

USAID **PAGER** Version 2
Created: 2 hours, 16 minutes after earthquake

Estimated Fatalities
Red alert level for economic losses. Extensive damage is probable and the disaster is likely widespread. Estimated economic losses are less than 1% of GDP of Italy. Most events with this alert level have required a national or international level response.

Estimated Economic Losses
Orange alert level for shaking-related fatalities. Significant casualties are likely.

Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (N = 11000)	I	II-III	IV	V	VI	VII	VIII	IX	X+
ESTIMATED MODIFIED MERCALLI INTENSITY	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	Resistant Structures: none	Resistant Structures: none	Resistant Structures: none	V. Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
	Vulnerable Structures: none	Vulnerable Structures: none	Vulnerable Structures: none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy

Population Exposure
Estimated exposure only, includes population within the map area.

Historical Earthquakes (with MMI levels):

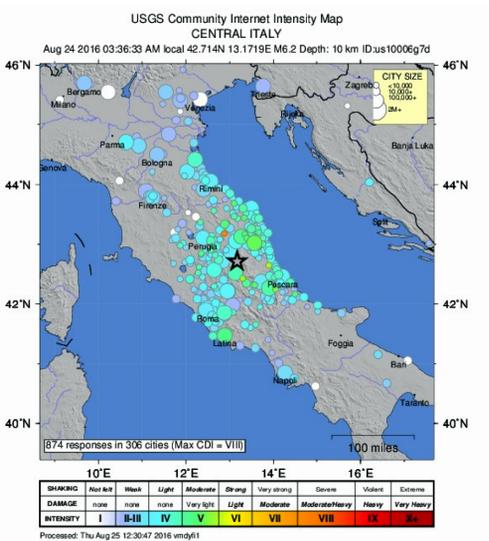
Date (UTC)	Dist. (km)	Mag.	Max Shaking (MMI)	Deaths
1997-09-26	51	6.0	VIII(IX)	11
1997-09-26	48	5.7	VIII(IX)	14
1998-11-23	278	6.5	VIII(IX)	24

Selected City Exposure

MMI City	Population
VIII Norcia	38
VIII Matignano	38
VIII Cascia	38
VIII Arquata del Tronto	< 10
VIII Pisciotta	< 10
VIII Accumoli	< 10
V Perugia	149K
IV Napoli	969K
IV Roma	2,653K
IV Firenze	372K
IV Bologna	371K

Event ID: us10006g7d

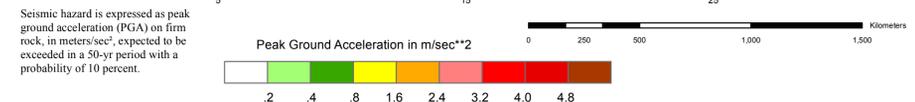
Did You Feel It?



TECTONIC SUMMARY

The August 24, 2016 M 6.2 earthquake southeast of Norcia, Italy, occurred as the result of shallow normal faulting on a NW-SE oriented fault in the Central Apennines. The Apennines is a mountain range that runs from the Gulf of Taranto in the south to the southern edge of the Po basin in northern Italy. Geologically, the Apennines is largely an accretionary wedge formed as a consequence of subduction. This region is tectonically and geologically complex, involving both subduction of the Adria micro-plate beneath Eurasia and the Apennines from east to west, continental collision between the Eurasia and Nubia (Africa) plates building the Alpine mountain belt further to the north and the opening of the Tyrrhenian basin to the west. The evolution of this system has caused the expression of all different tectonic styles acting at the same time in a broad region surrounding Italy and the central Mediterranean. The August 24, 2016 normal faulting earthquake is an intraplate event, an expression of the east-west extensional tectonics that now dominate along the Apennine belt, primarily a response to the Tyrrhenian basin opening faster than the compression between the Eurasia and Nubia (Africa) plates.

The central Apennine region has experienced several significant earthquakes in recorded history. In September 1997, a Mw 6.0 earthquake 50 km north-northwest of the August 24, 2016 event killed 11, injured over 100 and destroyed approximately 80,000 homes in the Marche and Umbria regions. This 1997 event was part of a series of earthquakes known as the Umbria-Marche seismic sequence, which included eight events of magnitude greater than M5.0 in a two-month period between September and November of that year, including the events that substantially damaged the Basilica of St Francis in Assisi. In April 2009, a Mw 6.3 earthquake 45 km to the south-southeast of the August 24, 2016 event, near the town of L'Aquila, killed at least 295, injured over 1,000 and left 55,000 or more homeless. The L'Aquila earthquake resulted in significant landsliding in the local area, and was also followed by a vigorous aftershock sequence, including 5 other events of M 5.0 or larger. The largest instrumentally recorded earthquake within 100 km of the 2016 event was the January 13, 1915 M6.7 earthquake, which occurred 68 km to the south-southeast near Avezzano. The 1915 earthquake killed approximately 32,000 people. The preliminary location of the 2016 earthquake appears to be in a gap between the aftershock sequences of the 1997 and 2009 events.



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 Villasebor, 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)
J. C. D. J. Wald, and D. V. Helmenberger, 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 Villasebor, 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
25 August 2016
http://earthquake.usgs.gov/
Map not approved for release by Director USGS