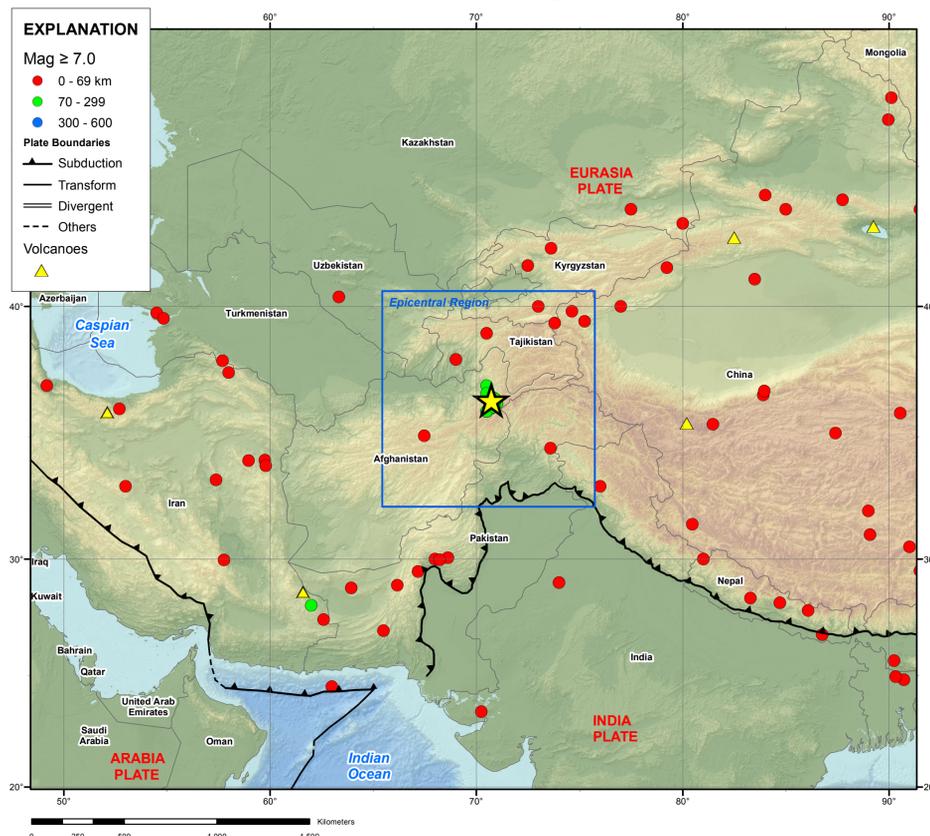


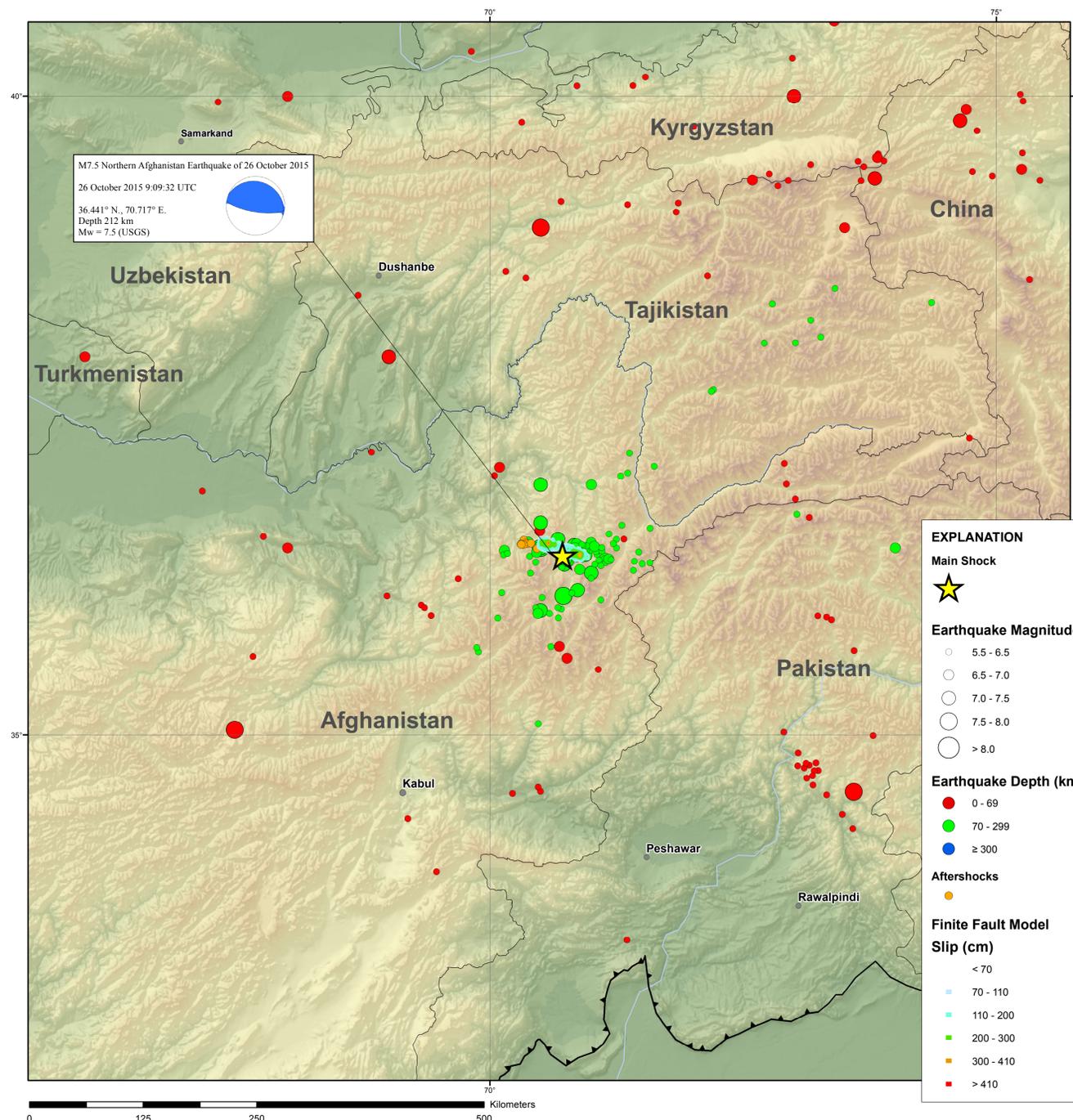
M7.5 Northern Afghanistan Earthquake of 26 October 2015



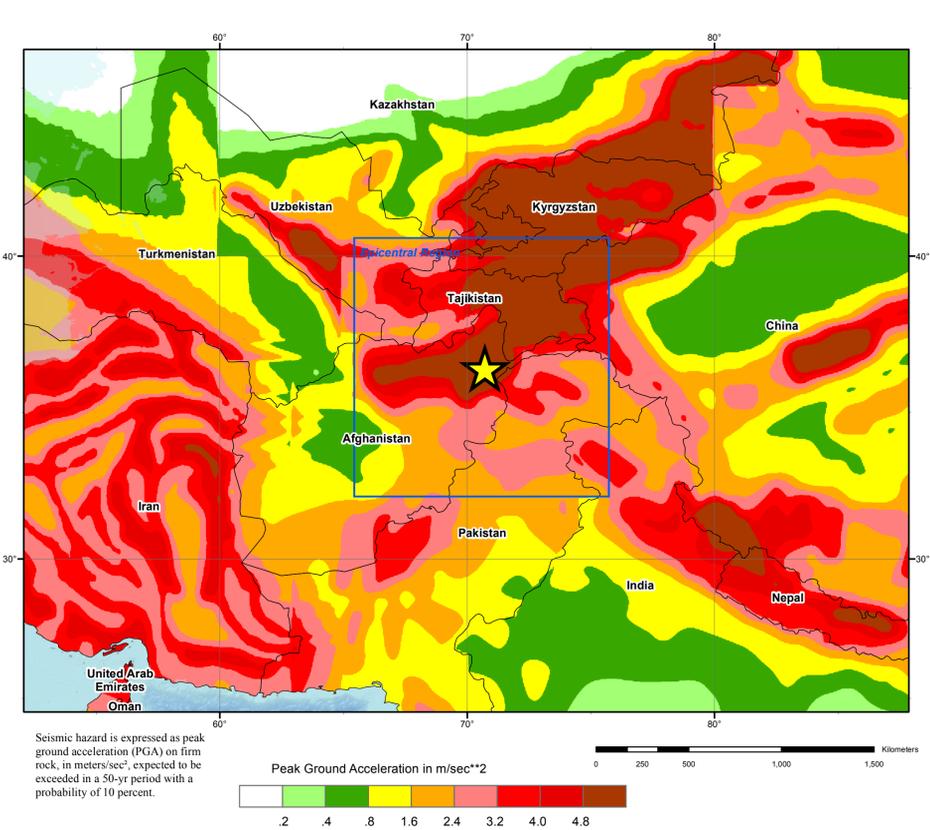
Tectonic Setting



Epicentral Region



Seismic Hazard



PAGER

USGS Earthquake Shaking Orange Alert

M 7.5, HINDU KUSH REGION, AFGHANISTAN

Origin Time: Mon 2015-10-26 09:32 UTC (13:30:32 local)
Location: 36.44°N 70.72°E Depth: 212 km

Estimated Fatalities

Estimated Economic Losses

Estimated Population Exposed to Earthquake Shaking

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	Vulnerable Structures: none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy

Population Exposure

Overall, the population in this region resides in structures that are highly vulnerable to earthquake shaking, though some resistant structures exist. The predominant vulnerable building types are adobe block and unreinforced brick with timber floor construction.

Historical Earthquakes (with MMI levels):

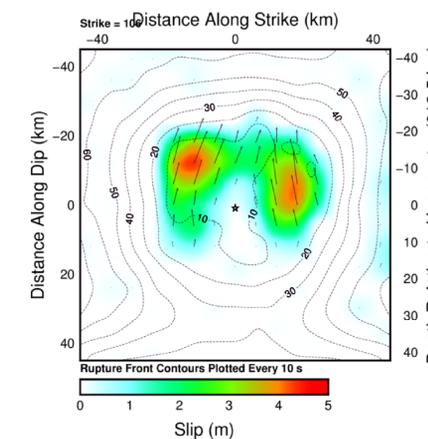
Date (UTC)	Dist. (km)	Mag.	Max. Shaking (MMI)	Deaths
1985-07-29	38	7.4	VII(454)	0
1986-02-04	90	6.9	VII(29)	2k
1986-05-30	83	6.5	VII(24)	4k

Selected City Exposure

MMI City	Population
VII Taloqan	64k
VI Dashi-e-Qar'ah	< 1k
VI Vireg-Qar'ah	7k
VI Dorogod	< 1k
VI Dashi-e-Archi	8k
VI Darayim	< 1k
VI Peshawar	1,219k
V Kabul	3,044k
V Srinagar	976k
V Islamabad	809k
V Dushanbe	543k

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 106° and the dip is 70°SSW. The dimensions of the subfault elements are 6 km in the strike direction and 6 km in the dip direction. The rupture surface is approximately 40 km along strike and 25 km along down-dip. The seismic moment release based on this plane is 2.3×10^{27} dyne-cm.



TECTONIC SUMMARY

The October 26, 2015 M 7.5 earthquake near the Hindu Kush region of Afghanistan (SW of Jarm) occurred as the result of reverse faulting at intermediate depths, approximately 210 km below the Hindu Kush Range in northeastern Afghanistan. Focal mechanisms indicate rupture occurred on either a near-vertical reverse fault or a shallowly dipping thrust fault. At the latitude of the earthquake, the India subcontinent moves northward and collides with Eurasia at a velocity of about 37 mm/yr. Active faults and their resultant earthquakes in northern Pakistan and adjacent parts of India and Afghanistan are the direct result of the convergence between the India and Eurasia plates. This collision is causes uplift that produces the highest mountain peaks in the world including the Himalayan, the Karakoram, the Pamir and the Hindu Kush ranges. Earthquakes such as this event, with focal depths between 70 and 300 km, are commonly termed "intermediate-depth" earthquakes. Intermediate-depth earthquakes represent deformation within subducted lithosphere rather than at the shallow plate interfaces between subducting and overriding tectonic plates. They typically cause less damage on the ground surface above their foci than is the case with similar magnitude shallow-focus earthquakes, but large intermediate-depth earthquakes may be felt at great distance from their epicenters. "Deep-focus" earthquakes, those with focal depths greater than 300 km, also occur beneath northeastern part of Afghanistan. Earthquakes have been reliably located to depths of just over 300 km in this region. Seven other M 7 or greater earthquakes have occurred within 250 km of this event over the preceding century, the most recent being a M 7.4 earthquake in March 2002 just 20 km to the west of the October 26, 2015 event, and with a similar depth and thrust fault orientation. The 2002 event caused over 150 fatalities and the damage or destruction of over 400 houses in relation to an associated landslide. A M 7.4 event at a similar depth just 8 km to the south of the October 26, 2015 earthquake, in December 1983, resulted in 26 fatalities, hundreds of injuries and extensive damage in the region. The most deadly recent event in the region occurred 330 km to the southeast of the October 26, 2015 earthquake, in the Kashmir region of Pakistan on October 8th, 2005. This 2005 event killed at least 86,000 people and caused extensive damage. The 2005 event was shallow (26 km) and caused by geologic forces that are distinctly different to those driving deep earthquakes in the Hindu Kush.

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 Villaseior, 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)
J. 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 Systems 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 Villaseior, 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 October 2015
http://earthquake.usgs.gov/
Map not approved for release by Director USGS