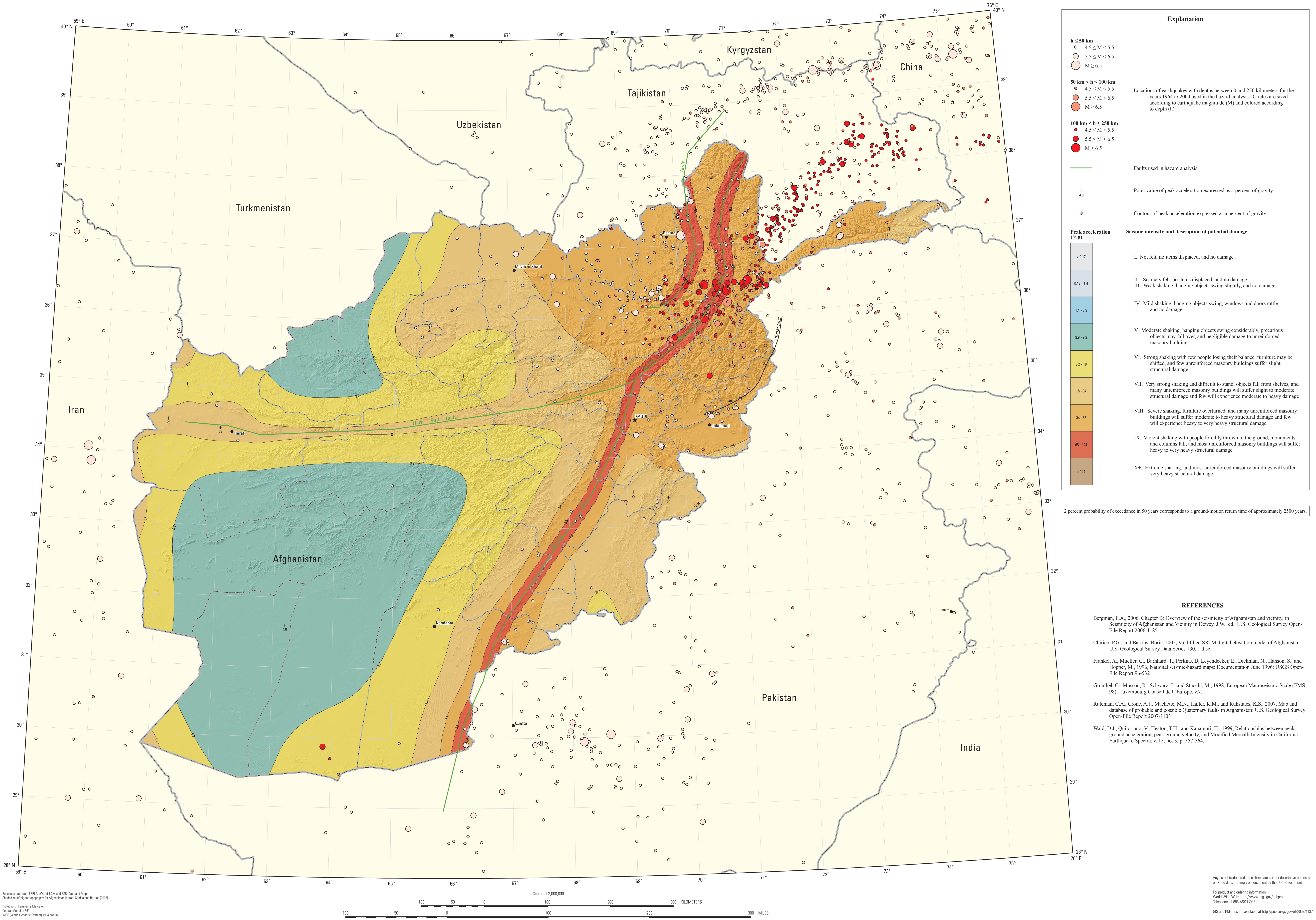


Earthquake Hazard Map for Afghanistan

Peak Horizontal Acceleration with 2 Percent Probability of Exceedance in 50 years

By Oliver S. Boyd, Charles S. Mueller, and Kenneth S. Rukstales
2007



Explanation

h ≤ 50 km
 ○ 4.5 ≤ M < 5.5
 ○ 5.5 ≤ M < 6.5
 ○ M ≥ 6.5

50 km < h ≤ 100 km
 ○ 4.5 ≤ M < 5.5
 ○ 5.5 ≤ M < 6.5
 ○ M ≥ 6.5

100 km < h ≤ 250 km
 ● 4.5 ≤ M < 5.5
 ● 5.5 ≤ M < 6.5
 ● M ≥ 6.5

Locations of earthquakes with depths between 0 and 250 kilometers for the years 1964 to 2004 used in the hazard analysis. Circles are sized according to earthquake magnitude (M) and colored according to depth (h)

— Faults used in hazard analysis

+ 4.0
 — 18 —
 Contour of peak acceleration expressed as a percent of gravity

Peak acceleration (%g)

< 0.17	I. Not felt, no items displaced, and no damage
0.17-1.4	II. Scarcely felt, no items displaced, and no damage
1.4-3.9	III. Weak shaking, hanging objects swing slightly, and no damage
3.9-9.2	IV. Mild shaking, hanging objects swing, windows and doors rattle, and no damage
9.2-18	V. Moderate shaking, hanging objects swing considerably, precarious objects may fall over, and negligible damage to unreinforced masonry buildings
18-34	VI. Strong shaking with few people losing their balance, furniture may be shifted, and few unreinforced masonry buildings suffer slight structural damage
34-65	VII. Very strong shaking and difficult to stand, objects fall from shelves, and many unreinforced masonry buildings will suffer slight to moderate structural damage and few will experience moderate to heavy damage
65-124	VIII. Severe shaking, furniture overturned, and many unreinforced masonry buildings will suffer moderate to heavy structural damage and few will experience heavy to very heavy structural damage
> 124	IX. Violent shaking with people forcibly thrown to the ground, monuments and columns fall, and most unreinforced masonry buildings will suffer heavy to very heavy structural damage
X+	Extreme shaking, and most unreinforced masonry buildings will suffer very heavy structural damage

2 percent probability of exceedance in 50 years corresponds to a ground-motion return time of approximately 2500 years.

REFERENCES

Bergman, E.A., 2006, Chapter B: Overview of the seismicity of Afghanistan and vicinity, in *Seismicity of Afghanistan and Vicinity* in Dewey, J.W., ed., U.S. Geological Survey Open-File Report 2006-1185.

Chirico, P.G., and Barrios, Boris, 2005, Void filled SRTM digital elevation model of Afghanistan: U.S. Geological Survey Data Series 130, 1 disc.

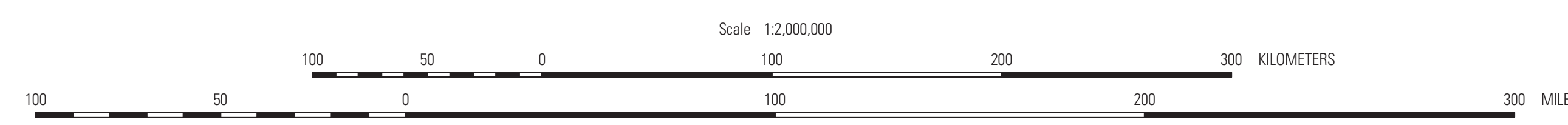
Frankel, A., Mueller, C., Barnhard, T., Perkins, D., Leyendecker, E., Dickman, N., Hanson, S., and Hopper, M., 1996, National seismic-hazard maps: Documentation June 1996: USGS Open-File Report 96-532.

Grunthel, G., Musson, R., Schwarz, J., and Stucchi, M., 1998, European Macroseismic Scale (EMS-98): Luxembourg Conseil de L'Europe, v. 7.

Ruleman, C.A., Crone, A.J., Machette, M.N., Haller, K.M., and Rukstales, K.S., 2007, Map and database of probable and possible Quaternary faults in Afghanistan: U.S. Geological Survey Open-File Report 2007-1103.

Wald, D.J., Quitoriano, V., Heaton, T.H., and Kanamori, H., 1999, Relationships between peak ground acceleration, peak ground velocity, and Modified Mercalli Intensity in California: *Earthquake Spectra*, v. 15, no. 3, p. 557-564.

Base map data from ESRI ArcWorld 1.2M and ESRI Data and Maps
 Shaded-relief digital topography for Afghanistan is from Chirico and Barrios (2005)
 Projection: Transverse Mercator
 Central Meridian 60°
 WGS 1984 datum



Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

For product and ordering information:
 World Wide Web: <http://www.usgs.gov/bu/oprod>
 Telephone: 1-888-453-4533

GIS and PDF files are available at <http://pubs.usgs.gov/of/2007/1137>