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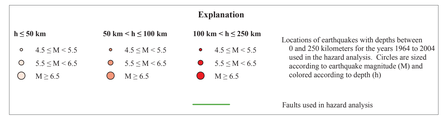
Plate 2 of 2

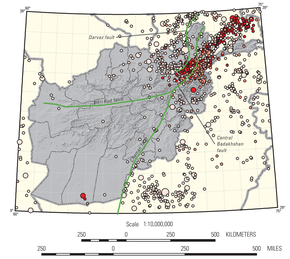
This report is USGS Afghanistan Project Product No. 156
Pamphlet accompanies map

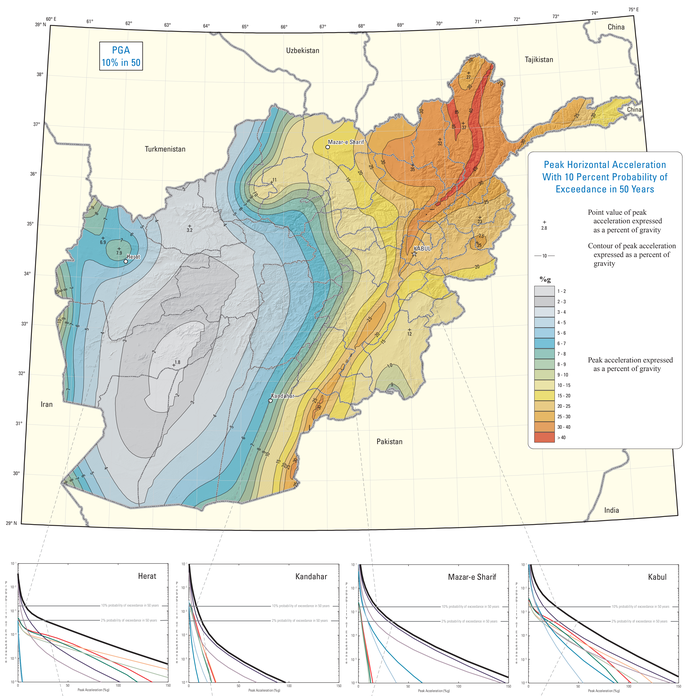
Earthquake Hazard Maps for Afghanistan

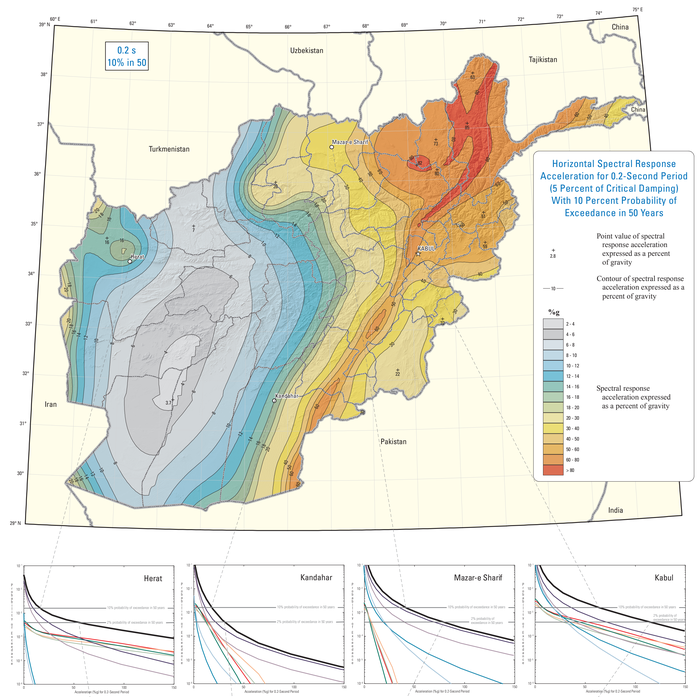
By Oliver S. Boyd, Charles S. Mueller, and Kenneth S. Rukstales

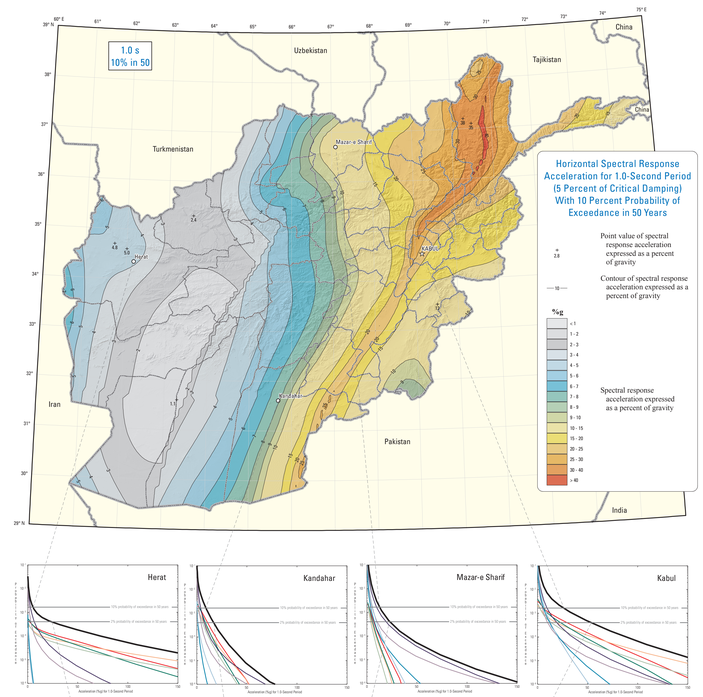
2007

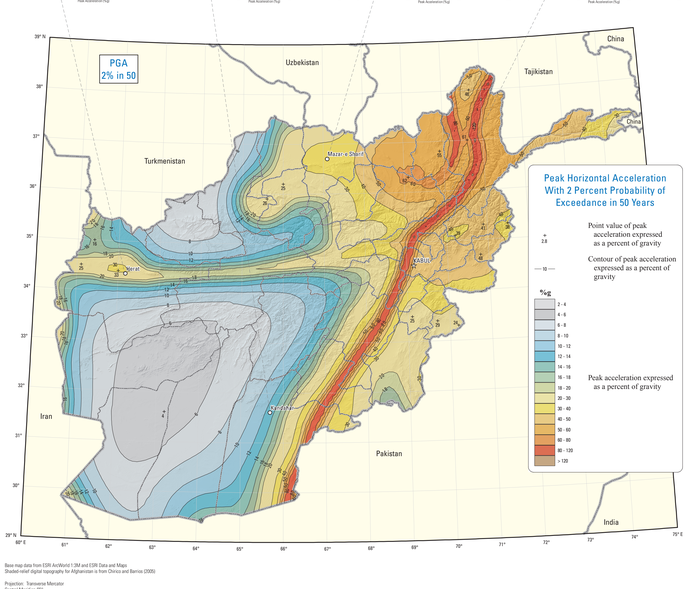


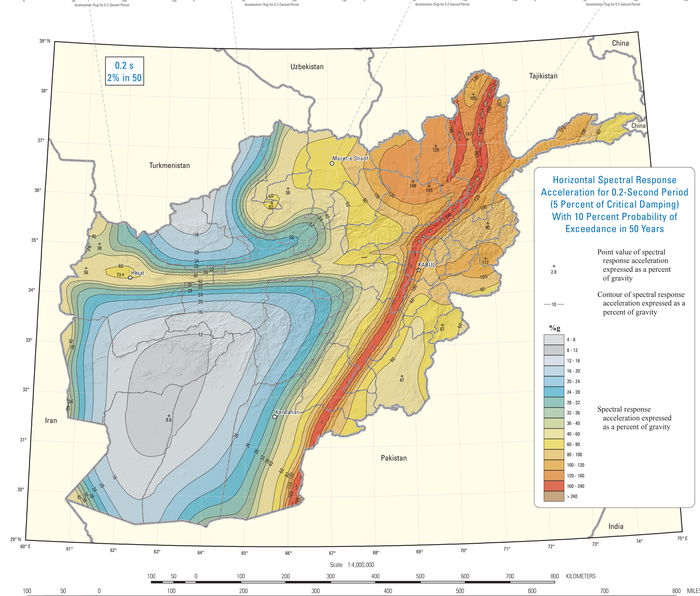


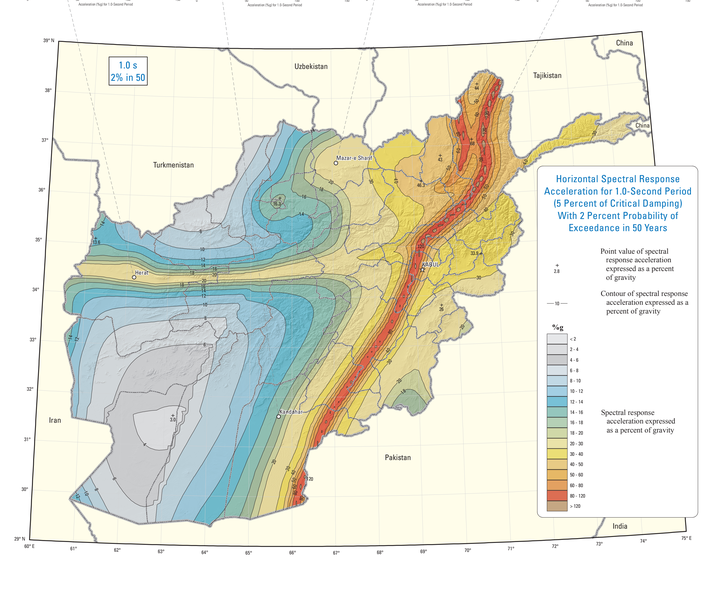


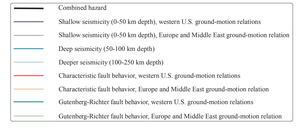












As part of a United States Agency for International Development (USAID) effort to assess the resource potential and seismic hazards of Afghanistan , the Seismic Hazard Mapping group of the United States Geological Survey (USGS) has prepared a set of seismic hazard maps of Afghanistan . We employ a probabilistic methodology that accounts for all seismic sources and their rates of earthquake activity. Modeling uncertainty is incorporated using logic trees for source and ground-motion parameters.

Production of the maps is challenging because the geological and seismological data required to produce a seismic hazard model are limited. The data that are available for this project include historical seismicity and poorly constrained slip rates on only a few of the many active faults in the country. The four faults that we include in this hazard analysis are the Chaman and Central Badakhshan faults, to which we assign a slip rate of 10 mm/yr, the Darvaz fault with an assigned slip rate of 7 mm/yr, and the Harī Rud fault with an assigned slip rate of 2 mm/yr. For these faults and shallow seismicity less than 50 km depth, we incorporate published ground-motion-prediction relations from tectonically active regions of Western North America, Europe, and the Middle East . We apply relations derived for tectonic regions where subduction is the main tectonic process for intermediate-depth seismicity between 50 and 150 km depth.

The level of seismic hazard in northeastern Afghanistan significantly exceeds the hazard in the remainder of the country. The region of elevated hazard extends from the northeastern region southwestward down the corridor defined by the Chaman fault all the way to southwestern Pakistan . Our analysis indicates that earthquake shaking in Kabul , primarily resulting from earthquakes on the Chaman fault, could generate a peak ground acceleration of nearly 0.5 g at a 2 percent probability of exceedance in a time period of 50 years. In the United States , this level of hazard is comparable to the seismically active regions of the intermountain west, but is not as high as the most seismically active regions in California . Because the slip rate on the Chaman fault is poorly known, the estimated peak acceleration at nearby sites could be higher or lower by nearly a factor of two. In southwestern Afghanistan , the seismic hazard is relatively low because there are very few recognized Quaternary faults and the region has virtually no recorded seismicity.

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Base map data from ESRI ArcWorld 1:3M and ESRI Data and Maps
Shaded-relief digital topography for Afghanistan is from Chirico and Barrios (2005)

Projection: Transverse Mercator
Central Meridian 66°
WGS (World Geodetic System) 1984 datum

Scale 1:4,000,000
100 50 0 100 200 300 400 500 600 700 800 KILOMETERS
100 50 0 100 200 300 400 500 600 700 800 MILES

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