

## Magnitude recurrence hazard in and around Pakistan

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### Abstract

The seismotectonic framework of Pakistan has been produced by interaction between the Eurasian, Indian and Arabian plates. Pakistan and its neighboring countries have experienced many large earthquakes throughout recorded history, often resulting in considerable damage and loss of life. A magnitude-complete data set of earthquakes located in and around Pakistan is used to perform a region-wide analysis of seismicity and earthquake hazard in Pakistan, using Gumbel's third ( $G^{III}$ ) asymptotic distribution of extreme values. Results estimate expected extreme magnitudes in and around Pakistan using the  $G^{III}$  distribution for return periods of 50 years, 100 years, 200 years and also with 10% probability of exceedance in 50 years, equivalent to an earthquake with a 475-year return period. Earthquake hazard results are presented as contoured maps. These maps exhibit higher magnitude hazard in Makran, Quetta and Kutch in the south of the considered region, and Hindukush, Karakoram, North-west Himalayan fold and thrust belts in the North. It is clear in these maps that higher magnitude hazard is adjacent to known seismogenic features and faults: for example, the Chaman Fault, Makran Coastal Fault and Kutch Fault in the south and Main Karakoram Thrust, Main Mantle Thrust and Main Boundary Thrust in the North.