

## **A statistical approach to determine the earthquake probability, calculation of Peak Ground Acceleration for Karachi**

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The city of Karachi is constructed on the southernmost folds of the Kirthar range with several faults (Surjan, Lakhni, and Jhimpir) within 125 km of the city. Karachi is close to a plate boundary and within reach of earthquakes and numerous tectonically active structures surrounding the city. Most effective seismogenic source areas were selected for this study on the basis of the past activity and slip rates. The documented historical and latest seismicity record shows the presence of various seismic zones such as Pab fault, Ornach Nal fault, Kutch fault and Surjan- Jhimpir faults. The Runn of Kutch earthquake of June 1819 was a large earthquake of 7.6Mw near Lakpat that killed about 1500 people. Similarly, an earthquake of 7.1 occurred in Kutch in January 2001. Along other sources, major earthquakes occurred, with magnitudes ranging from 4.5 to 5.8Mw according to catalogs of Pakistan Meteorological Department (PMD) and Incorporated Research Institutions of Seismology (IRIS). Therefore, it is very important to remember that any devastating earthquake can strike Karachi in future due to the presence of active tectonic in its surrounding. The aim of this study is to determine the probabilities for the generation of earthquakes of specific magnitudes in Karachi in the future years using Annual Extreme Values Method of Gumbel (1958). Also, analysis of peak ground acceleration is made by using Idriss attenuation relation (2002). The Gumbel's, extreme value distribution method yielded that the probability of an earthquake occurrence of equal or greater than magnitude = 7 in 100 years is 18 percent and its return period is 500 years and 0.24g can be the maximum g value.