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'Seismic Cycle' and Occurrence of Large Earthquakes

Cyclicity in seismic activity is important for earthquake hazard studies, because these patterns may lead to the prediction of large earthquakes. The observations of temporal variation of seismic activity in Northeast India as well as Gujarat and adjoining region indicate that a periodic seismicity probably exists. In the present study, data from 1819 to 2006 of shallow earthquakes distributed over Gujarat and vicinity have been analyzed on the basis of stationary model of seismicity rates and seismic energy released in 11-years' time window, for future earthquake occurrences. Harmonic variation of seismic energy release shows a system of periodicities with predominant period in low seismicity rate intervals followed by in high seismicity rate intervals with a period of 105 years. However, the time interval of low seismicity rates is slightly larger than high seismicity rates. The frequency distribution of small magnitude (M 4.0-5.9) earthquakes follow the Poisson distribution while large earthquakes (M 6.0-7.8) follows the nonrandom distribution (exponential distribution). The non-randomness characteristics indicate that the prediction of magnitude and time of occurrences of forthcoming large earthquakes may be possible. The occurrence of large earthquakes lies on the maxima of the harmonic curve.

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