Quantitative Assessment of Seismic Hazard in the Andaman-Sumatra Subduction Zone

Uma Ghosh^{1*}, Sohini Roy², Sugata Hazra² and J R Kayal²

Lalbaba College, Howrah-711202, India
School of Oceanographic Studies, Jadavpur Univesity, Kolkata 700032, India .
* Corresponding author, email: ugpal@yahoo.co.in

Temporal occurrence of earthquakes of magnitude ≥ 6.0 is satisfically analysed for the Anadaman-Sumatra subduction zone that produced the December 26, 2004 mega thrust tsunamigenic earthquake (M_w 9.3). Seismic hazard analysis usually assumes that earthquakes in a defined source zone follow a Poisson distribution. Based on this, return period for earthquakes of magnitude $(m_b) \ge 6.0$ is estimated using the Poisson's probability distribution. We have used about 120 earthquakes of magnitude $(m_b) \ge 6.0$, recorded during the period 1963 - 2007 and relocated by the EHB method in the region. It is estimated that there is a 99% probability for occurrence of at least one earthquake of magnitude $m_b \ge 6.0$ in this region in a time window of two years. The result has been verified by using other probabilistic models namely, Weibul, Gamma and Lognormal. The model parameters have been estimated by the method of Maximum Likelihood Estimates (MLE) for these three probability distributions. The cumulative probability is estimated using all the three models for a period of 5 years from 2007, and it is found to be 0.99 by the year 2010. Probability density function maps, using Poisson distribution for the threshold magnitude, were prepared for $2^{\circ} \times 2^{\circ}$ blocks with rate of occurrence (λ) for each 1° overlapping grid in the region. These maps are used to estimate the percent probabilities with different return periods.