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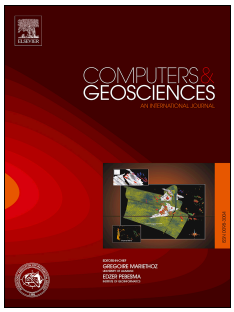

Forecasting of future earthquakes in the northeast region of India considering energy released concept

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Forecasting of future earthquakes in the Northeast region of India considering energy released concept

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ABSTRACT

This study presents the forecasting of time and magnitude size of the next earthquake in the northeast India, using four probability distribution models (Gamma, Lognormal, Weibull and Log-logistic) considering updated earthquake catalog of magnitude Mw $\geq$ 6.0 that occurred from year 1737 to 2015 in the study area. On the basis of past seismicity of the region, two types of conditional probabilities have been estimated using their best fit model and respective model parameters. The first conditional probability is the probability of seismic energy ($e*10^{20}$ ergs), which is expected to release in the future earthquake, exceeding a certain level of seismic energy ($E*10^{20}$ ergs). And the second conditional probability is the probability of seismic energy ($a*10^{20}$ ergs/year), which is expected to release per year, exceeding a certain level of seismic energy per year ($A*10^{20}$ ergs/year). The logarithm likelihood functions (ln L) were also estimated for all four probability distribution models. A higher value of ln L suggests a better model and a lower value shows a worse model. The time of the future earthquake is forecasted by dividing the total seismic energy expected to release in the future earthquake with the total seismic energy expected to release per year. The epicentre of recently occurred 4 January 2016 Manipur earthquake (M 6.7), 13 April 2016 Myanmar earthquake (M 6.9) and the 24 August 2016 Myanmar earthquake (M 6.8) are located in zone Z.12, zone Z.16 and zone Z.15, respectively and that are the identified seismic source zones in the study area which show that the proposed techniques and models yield good forecasting accuracy.

Keywords: Forecasting, Seismicity, Seismic Energy, Seismic source, Conditional Probability, Probability Distribution Models.

1. INTRODUCTION

The earthquake forecasting gives the probability of time, location and magnitude of occurrence of next earthquake which is necessary to understand the seismic hazard of any region (**Parvez and Ram, 1997).** An earthquake is the most precarious natural hazard that