



STOCHASTIC OCCURRENCE OF LARGE EARTHQUAKES IN SOUTH AMERICA

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The well known stochastic model of the Markov-chains is applied in South America in order to search for a pattern of great earthquakes recurrence. The model defines a process in which successive state occupancies are governed by the transition probabilities p_{ij} , of the Markov process, and are presented as a transition matrix say P , which has $N \times N$ dimensions. The process $\{X(t), t \geq 0\}$ describes the visits to the states and is said to be Markov process provided that: $p_{ij} = \text{Prob}\{X(t+s)=j \mid X(h)=i, 0 < h \leq t\} = \text{Prob}\{X(t+s)=j \mid X(t)=i\}$ for $t, s \geq 0$ and $i, j = 1, 2, 3, \dots, N$. In an earlier work, South America was divided in six zones. These predefined zones are considered as states in the present study. Thus the visits from zone to zone, which is from state to state, carry with them the number of the zone in which they occurred. If these visits are considered to be earthquake occurrences we can inspect their migration between the zones (states) and estimate their genesis in a statistical way, through transition probabilities. Attention is given in zones where very large earthquakes with $M \geq 7.8$ have occurred. A pattern is revealed which suggests migration of these very large earthquakes from south towards north. The migration (visits) from zone to zone (from state to state) is given in a quantitative way through the estimated transition probabilities. The use of Monte Carlo simulations verify the define pattern.