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Himalayan earthquakes and their recurrence patterns: new perspective from a 6000-year time series

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Understanding the temporal distribution and recurrence patterns of large Himalayan earthquakes is bound by the resolution and the extent of seismic catalogues. Here, we present a statistical analysis of 6000 years of seismic activity recorded as turbidite sequences in Lake Rara, western Nepal. When considered as a seismic catalog, the inter-event time of the earthquake-triggered turbidites reveals a Poisson distribution of recurrence times. This pattern rejects any periodic or quasi-periodic pattern for long-term seismic slip in the central Himalaya. These patterns are validated when calibrated against data from instrumental catalogues for the Himalayan arc. Using the robust 1973-2017 instrumental database and the statistical laws that drives earthquake interactions (i.e. Gutenberg-Richter, Omori and Bath laws), the Poisson inter-event time distribution images a paleo-seismic sequence with a magnitude range ΔM=1.2. Based on the approximate magnitude of the 1505 event (Mmax=8.2), the series roughly corresponds to 50 events of a minimum range of magnitude 7<Mmin<8.2. In this presentation, we will discuss the possible implications of these results in the context of other models recently proposed for slip patterns on the Main Himalayan Thrust.