

Seismic records in the Pleistocene succession, Kathmandu Valley, Nepal

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The Kathmandu Valley was hit by two M 7-class earthquakes in April 25th and May 12th. This basin has been attacked by strong tremor in each 100 to several hundred of years in last 1000 yrs. For taking measures against future earthquakes, the earthquake recurrence period based on the long-term record is crucial for creating effective measures. Therefore we estimated the earthquake recurrence period based on the sedimentary record of the Kathmandu Valley. Soft sediment deformation structures due to earthquake shaking have been reported from this basin by previous studies. In the present study, the Gokarna (34 - 50 ka in uncorrected ¹⁴C age) and (17 - 14 ka; 20 - 17 ka in corrected ¹⁴C age) were focused. The target succession was carefully selected. In the locality of the main focus, fluvial stream deposits, which could indicate the removal of sediments recording the evidence of earthquakes are less frequent than in other Tokha Formation localities, suggesting a higher possibility of discovery of seismic records in the sedimentary succession.

As the results of the survey, 15 horizons with soft sediment deformation structures (SSDs) were discovered from the delta plain deposits of the Gokarna and Tokha Formations. Because of absence of evidence for possible forces generating deformation structures other than shaking, the earthquake shaking is only cause for the deformation structures. 12 horizons with SSDs were identified from the Tokha Formation and 6 of them were slid during or soon after deformation due probably to tilting of the basin, because the study site is located close to one of lineations running in the basin. Some of the horizons with SSDs suffered from two times of strong shaking. The averaged recurrence period of earthquakes strong enough to cause soft sediment deformation, derived from the Tokha Formation is 250 yrs. Because there may be loss of SSDs horizons due to post depositional erosion, the period should be shorter than 250 yrs.

Keywords: earthquake recurrence time, Kathmandu, seismite, Tokha Formation