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A 3500-yr-long paleoseismic record for the Himalayan Main Frontal Thrust (Western Bhutan)

Romain Le Roux-Mallouf (1), Matthieu Ferry (2), Jean-François Ritz (2), Rodolphe Cattin (2), Dowchu Drukpa (3), and Phuntsho Pelgay (3)

(1) Geolithe, Research & Development, Crolles, France (romain.lerouxmallouf@geolithe.fr), (2) Géosciences Montpellier, CNRS, UMR5243, Université de Montpellier, Place E. Bataillon, 34095 Montpellier, France, (3) Seismology and Geophysics Division, Department of Geology and Mines, Post Box 173, 9 Thimphu, Bhutan

In spite of an increasing number of paleoseismic studies carried out over the last decade along the Himalayan arc, the chronology of historical earthquakes is still poorly constrained. The unusually large displacements of several meters associated with great Himalayan earthquakes point out the limits of classical trenching studies that do not allow the characterization of a long rupture history and may only document one or two events during the last millennium. In this paper, we present geomorphologic and paleoseismic studies conducted over a large river-cut exposure along the Main Himalayan Front in south-western Bhutan near the village of Piping. This site reveals a 30-m-cumulative deformation characterized by a well-developed uplifted terrace system associated with a pluri-decametric fault-propagation fold. Paleoseismic excavation along with 16 radiocarbon ages chrono-stratigraphic modeling reveal the occurrence of at least six major and great earthquakes between 1070 $\pm$ 270 BC and AD 1714 with an average recurrence interval of 550 $\pm$ 300 yr.