New estimates of minimum geological convergence for the eastern Himalaya, India

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We re-investigate the geological slip along the frontal Nameri Thrust, a local name for the Himalayan Frontal Thrust in the eastern Himalaya, India. Four levels of tectonically displaced and uplifted fluvial terraces preserved along the Kameng River were dated using the Optically Stimulated Luminescence (OSL) method. The OSL ages of the terraces bracket the timing of their abandonment post ~14, 11, 7.2 and 3 ka respectively. Considering the minimum timing of vertical uplift and height of the uplifted and incised bedrock strath beneath the lowermost river terrace T1, we use trigonometric method to infer a vertical uplift rate of ~0.44 mm/a on the Nameri Thrust during the Holocene Period. The mismatch in the geodetic convergence and the geological slip rates proposed for the Himalayan Frontal Thrust in the eastern Himalaya in earlier studies provoked us to re-evaluate the scenario of geological slip in the area. Our results suggest a contrasting estimate of geological slip rate as compared to the earlier studies. Though the results are indicative of a decrease in the Indo-Eurasian convergence in the eastern Himalaya in accordance with the recent GPS observations and models proposed for the region, we, however, suggest that the lower estimation in our study compared to that reported previously could be due to the use of different dating methods for the materials obtained for assigning chronology to the landforms and events. Since the ¹⁴C AMS radiocarbon dating method requires a contemporary organic component in the sediments to be dated, an overestimation of the dates is also possible if the sediment has mixed with old carbon, which makes it inferior to the OSL method in which the mineral grains are assumed to have been fully bleached before their burial. This makes the OSL method more reliable to date sediments since it does not encounter the ‘old-carbon’ error problem of overestimation of the ages. Two additional samples obtained to the south of the active mountain front yield southwardly-increasing luminescence ages of ~19 and 26 ka suggesting deposition of older sediments toward downstream by the Kameng River as a result of rampant incision in the upstream triggered by episodes of tectonic uplift prior to ~26 ka.