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Along-strike variations in Himalayan present-day seismicity and modern convergence rate: an overview

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Based on observations mainly acquired in Nepal over the last two decades, the Main Himalayan Thrust is often considered as a fairly uniformly locked fault with no major variations of geometry (e.g. Stevens & Avouac 2015). Since 2010 the Bhutan Himalaya has been intensively instrumented to record characteristic signals in gravity, geodesy and seismology. The level of knowledge has therefore sharply increased and approaches – in some places equals – that in the Central part of the Himalaya, in Nepal. This provides a good basis to compare GPS and seismicity characteristics along the Himalayan orogen. Geodetic convergence rate varies from 19.5 +/- 1.5 in Nepal to 17 +/- 2 mm/yr in Bhutan (Marechal et al., 2016). The shortening across the Shillong Plateau does not seem to affect the behaviour of convergence rate across the Bhutan Himalaya. Eastern Bhutan seems to show evidence a unique place in the Himalaya with an only partially locked and microseismically active zone (Marechal et al., 2016; Diehl et al., 2017). Seismicity recorded by global networks (∼40yrs data) and regional temporary networks such as HIMNT and GANSSER (∼2yrs data each) shows quite some variability along arc, but this bears a heavy signature of variable magnitude of completeness. Instead of providing simple histograms of event frequency, the total released seismic moment along the arc, supposed to be complete for M6-7+ events, may be more representative of the past half century's output. On the longer term, the studies of past earthquakes reveal the occurrence of large (M8+) events in both Nepal and Bhutan (Le Roux-Mallouf, 2016). The associated rupture areas seem to delimit segments corresponding to marked changes in gravity anomalies (Hetényi et al. 2016).