Geophysical Research Abstracts
Vol. 19, EGU2017-6841, 2017
EGU General Assembly 2017

Partial megathrust ruptures and high frequency radiation, the Gorkha earthquake example.

Sylvain Michel (1), Jean-Philippe Avouac (2), Nadia Lapusta (2), and Junle Jiang (3)

(1) University of Cambridge, United Kingdom (sylvain_michel@live.fr), (2) California Institute of Technology, Pasadena, USA, (3) University of California, San Diego, USA

The M7.8 Gorkha earthquake in Nepal of April, 2015 ruptured the megathrust along which India underthrusts the Himalaya. Seismological and near-field high-rate geodetic records revealed a number of robust characteristics: a slip pulse propagating eastwards at $\sim$3 km/s unzipped the bottom edge of the locked portion of the Main Himalayan Thrust fault (MHT); the lower edge of the rupture produced dominant high-frequency radiation (>1 Hz); the earthquake did not rupture the shallow portion of the MHT. We use forward modeling of the seismic cycle to explore the conditions that could explain these characteristics. Our simulations incorporate inertial wave-mediated effects during seismic ruptures (they are thus fully dynamic) and account for all phases of the seismic cycle in a self-consistent way. We explore to what extent partial rupture and high frequency radiation can naturally arise in models with spatial variations of laboratory-motivated friction properties of the MHT.