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Mechanical conditions for the activation of the Main Himalayan Thrust: A view from the limit analysis theory

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In the Himalayan mountain range, great earthquakes with Mw >8 episodically rupture the upper part of the Main Himalayan Thrust (MHT) and reach the surface along the Main Frontal Thrust (MFT). In this presentation, we propose a new approach based on the limit analysis theory (Cubas et al, 2008, Souloumiac et al, 2009) in order to quantify the mechanical parameters (primarily the effective friction along the MHT) necessary to allow the translation of the entire belt during those big events. We explore the mechanical parameters for three sections: the classic Kathmandu cross-section which ruptured during the Gorkha 2015 Mw 7.8 earthquake, and two adjacent cross-sections located at about 70 km along strike, where significant variations of the MHT geometry have been suggested (Hubbard et al, 2016). We first show how varying geometries of the décollement impact the frictional properties necessary to activate the MHT. In particular, we observe significant differences between the Gorkha cross-section and the western cross-section known as a seismic gap since 1505.
We will also discuss the mechanical conditions necessary to reactivate possible out-of-sequence thrusts within the Himalayan wedge.