Receiver function imaging in the western Himalaya

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We imaged crustal structure in the western Himalaya using an array of broadband seismometers located at 80°E (Figure 1) (Caldwell *et al.*, 2010). The array crossed the Himalayan thrust belt from the Main Frontal Thrust (MFT) to the South Tibetan Detachment (STD), and was operated in in 2005-2006 by India's National Geophysical Research Institute.

We generate crustal images by stacking P-S receiver functions. Our results (Figure 2) show the Moho conversion at a depth of 40 km beneath the southern margin of the Himalaya and at a depth of 55 km beneath the Tethyan Himalaya, with the majority of this 15 km increase in depth occurring in a 40 km wide step beneath the Greater Himalaya.

We also image two upper-crustal conversions which we attribute to two strands of the Himalayan thrust system: the Main Himalayan Thrust (MHT) and Munsiari Thrust (MT). The MHT is the primary decollement between Indian crust and thrust wedge material, and, in our image, is ~20 km deep and connects with the surface expression of the Himalayan Frontal Thrust (HFT). The Munsiari Thrust, which forms the lower bound of the Main Central Thrust zone (Searle *et al.*, 2008), splays off from the MHT beneath the Greater Himalaya. That the MHT, HFT and MT are the most readily-observable crustal converters is consistent with observations of local seismicity (summarized in Vannay *et al.*, 2004) indicating that these are the currently-active strands of the Himalayan thrust system. The observed depths of the MHT and Moho imply that the thickness of intact subducting Indian crust is, at its thinnest point, ~22 km.

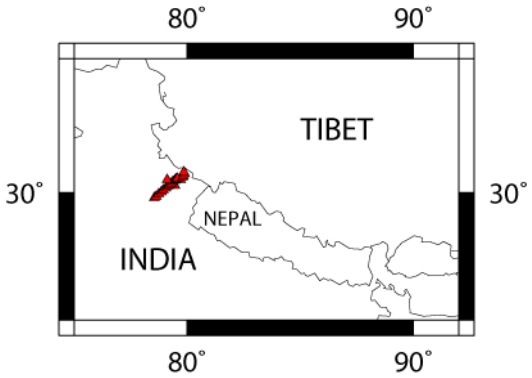

Figure 1. Location of array used for this study. The array spanned ~200 km and was composed of ~20 stations.

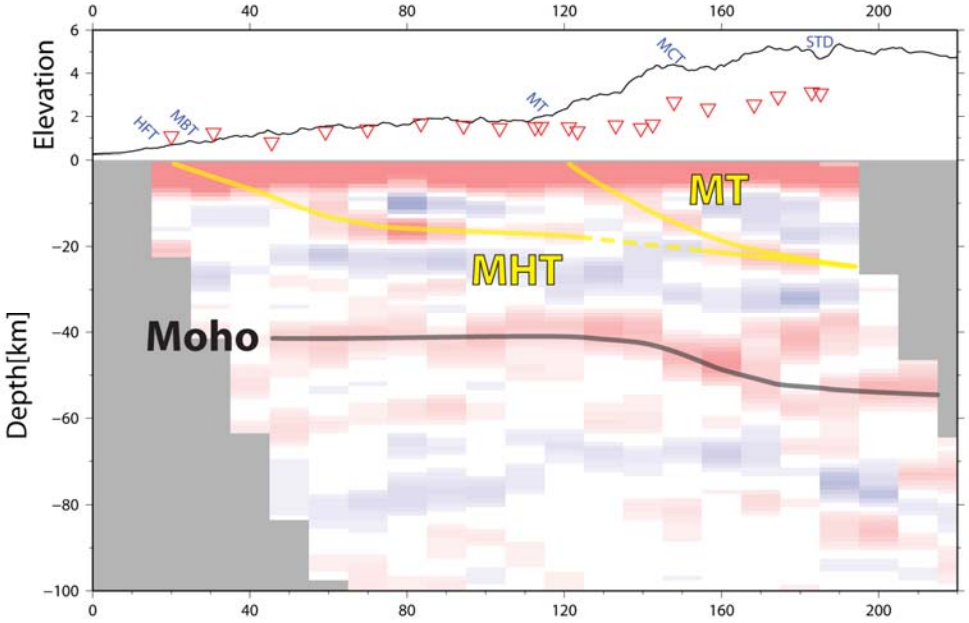

Figure 2. Receiver function CCP image (red indicates positive impedance contrasts and blue indicates negative impedance contrasts). Upper panel shows vertically-exaggerated topography, station locations and approximate locations of the surface expressions of major faults. MHT = Main Himalayan Thrust, MT = Munsiari Thrust.

References

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