

Chris Madden  
GeoDay Abstract

### Strain partitioning in the northwest Himalaya:

What role do faults north of the deformation front play in Indian-Eurasian convergence?

The Indian plate is currently colliding into Eurasia at 36-50 mm/yr. Geodetic and geologic studies indicate that at the longitude of Nepal, ~20 mm/yr of convergence, or nearly half the plate convergence budget is accommodated at the deformation front, south of the central Himalaya. The remaining balance of slip is accommodated by faults north of the Himalaya in Tibet and central Asia. In 2005 a  $M_w$  7.6 earthquake in Pakistan produced over 4 m of surface slip *within* the western Himalaya, suggesting that at this longitude, convergence across the southern part of the orogen may be partitioned between several structures rather than focused at the deformation front. Testing this model requires better constraints on the slip rate for the deformation front in Pakistan, which is broadly constrained between 4 and 14 mm/yr, and slip rates for active faults identified north of the deformation front, which have yet to be characterized.

Preliminary work to constrain the convergence rate for the deformation front in Pakistan has focused on the Kalabagh fault (KF), a northwest-striking tear fault that records southward translation of the frontal thrust sheet. Detailed geomorphic mapping on satellite imagery, and in the field reveals few recently active fault strands. Cosmogenic radionuclide dating of Pleistocene fan surfaces offset across the fault is underway to determine if subdued geomorphic expression reflects low slip rate or fast deposition rate across the KF.

Future work will focus on characterizing the slip rate on potentially active faults identified north of the deformation front.