

**Active Faulting and Subsurface Structural Variability of the  
Himalayan Foreland Basin, Nepal**

**By: Mike Duvall (University of Alberta)**

**Abstract:**

Foreland basin stratigraphy can be used to investigate the behaviour of basement features during continent-continent collision, and to test links between basement structure, along-strike segmentation of deformation, and lithospheric flexure in a developing orogen. The Himalayan orogen has been segmented along its strike at the scale of hundreds of kilometres. This segmentation is apparent from along-strike changes in earthquake rupture patterns, thickness changes, deformation styles, topographic gradients, thermal evolution, and faults at oblique angles to the orogen. Heterogeneities in the Indian plate, such as crustal scale basement faults and ridges, are possible controls on this lateral segmentation. Understanding the driving mechanisms of this longitudinal variability could further our understanding of the orogen, and potentially improve earthquake hazard assessment.

Using 2D seismic reflection data, we mapped several regional horizons to characterize the geometry of the Ganga Basin, Nepal. Our findings suggest that basement features have been inherited by the Himalayan foreland basin, controlling accommodation. These basement features likely play a key role in the spatial localization of active deformation and may influence seismicity patterns varying along strike of the orogen. We also demonstrate that Himalayan ruptures may pass under the present-day trace of the Main Frontal Thrust as blind faults inaccessible to trenching, and that paleoseismic studies may underestimate Holocene convergence.

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Tuesday, 29th September 2020

1:00 PM Eastern Time

