

## **Structural Variations and Seismogenic Character of the Hikurangi Margin, New Zealand**

**VAN AVENDONK, H. J.**, University of Texas at Austin, Texas, USA, harm@ig.utexas.edu;  
**GASE, A. C.**, University of Texas at Austin, Texas, USA, agase@utexas.edu; **BANGS, N. L.**,  
University of Texas at Austin, Texas, USA, nathan@ig.utexas.edu

The Hikurangi margin of New Zealand exhibits contrasting slip behavior from south to north. Whereas the southern Hikurangi margin has a locked plate boundary that can potentially produce large megathrust earthquakes, the northern section of this margin accommodates plate motion by creep and recurring shallow slow-slip events. To investigate these different modes of slip we use marine seismic reflection data to image the reflectivity and seismic velocity structure along profiles across the accretionary wedge. Seismic velocity images up to 12 km deep and prestack depth migrations together characterize the nature of incoming basement, sediment subduction and accretion, and faulting and compaction of the accretionary wedge. Our seismic velocity models show that a layer of sediment, with seismic wavespeeds of  $\sim 3.5$  km/s, is entrained beneath the accretionary prism in the southern Hikurangi margin, but there is no coherent subducted sediment layer to the north. This is a significant result, because it implies that the sediment layer covers basement roughness and forms a smoother plate boundary in the south. In addition, the deepest sediments on the incoming plate in the southern Hikurangi margin are believed to be quartz-rich turbidites, which are prone to unstable slip along the plate boundary. In contrast, the accretionary prism of the northern Hikurangi margin exhibits more variation in accretionary wedge thrust geometry due to interactions with large seamounts on the downgoing oceanic basement. These findings are consistent with the geodetically locked nature of a smooth, quartz-rich plate boundary along the southern Hikurangi subduction zone, and the creeping nature of a heterogeneous plate boundary along the Hikurangi margin to the north.

**2023 Annual Meeting**, Seismological Society of America  
Technical Sessions, 17–20 April • San Juan, Puerto Rico