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The Tibetan Moho

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The Moho beneath the Himalayas and adjacent Tibetan Plateau embodies a number of key issues regarding the nature and dynamics of the crust-mantle boundary zone. While seismic characterization of the Moho in this unique region is far from complete, a number of important observations have been garnered from major initiatives such the pioneering series of Sino-French seismic surveys (mostly wide-angle reflection/refraction, with some passive teleseismic imaging) and the INDEPTH program (near-vertical reflection, wide-angle reflection/refraction, and detailed passive teleseismic imaging). Among the most significant features that have been reported are: 1) an extremely deep Moho (ca 75 km beneath the Himalaya, ca 65 km beneath the Tibetan Plateau), 2) major offsets in the Moho beneath both the Himalayas and the Tibetan Plateau, 3) a sporadically reflective Moho beneath the Himalaya, with few near-vertical Moho reflections beneath the adjacent southern Tibetan Plateau, 4) an abrupt cessation of crustal reflectivity at Moho depths beneath central Tibet, and 5) distinct changes in Moho convertivity which correlate with major tectonic boundaries at the surface. These characteristics must be considered in the context of northward subduction of Indian continental crust beneath the Himalayas, thermal assimilation of that subducted crust, detachment of Tibetan crust from Indian upper mantle in southern Tibetan, and the proposition of substantial lateral flow in a hot, ductile deep crust. The deepening Moho beneath the Himalayas would seem to offer the ideal opportunity to test whether phase change is important in defining the Moho; however, lateral changes in reflectivity are at best suggestive, but far from compelling. Lateral changes in Moho convertivity in central Tibet suggest vertical continuity of tectonic terranes which is difficult to reconcile with large scale crustal flow. The existence of Moho offsets, though still disputed by some, requires significant tectonic strength in the lowermost crust or uppermost mantle or both, placing an important constrain on tectonic models invoking channel flow. Moreover, such offsets imply that the intra-lithospheric

detachment required by surface geology must occur somewhere *within* either the lower crust or the upper mantle rather than at the Moho *per se*.