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TI Boundary Conditions for the Geodynamic Evolution of Southeastern Tibet

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AB Southeastern Tibet hosts the termination of the Himalayan orogen in the Eastern Himalayan Syntaxis and a transition between the geodynamic setting of the main plateau, its eastern margin, and the lithosphere of southeastern Asia. As part of a project aimed at understanding the geodynamics within this active "indentor corner," we have been working to constrain boundary conditions for a region extending east from Lhasa toward the eastern margin of the plateau and north-south from the Tsangpo suture across the Bangong Suture into the Qiangtang terrane. Receiver-function analysis shows that the depth to the Moho varies from 68 to 78 km across the central plateau and its eastern margin. Within the syntaxis, the depth to the Moho shallows to 58 km. There is considerable topography on the Moho

beneath the plateau and a distinct offset in the Moho across a major structural boundary in the core of the syntaxis. Regionally Poisson's ratio is low (0.24-0.25) indicating relatively felsic crustal composition; locally higher values (0.26-0.29) are found. We see no evidence for pervasive laterally continuous melts in the crust but local zones of partial melt are not ruled out by our data. Shear-wave splitting of core phases shows azimuthal anisotropy in the upper mantle. The axis of fast polarization shows southeastward clockwise rotation around the eastern Himalayan syntaxis, a trend also observed in the structural grain and the GPS velocity field. Along the Bangong Suture, the fast axis of shear-wave splitting parallels the suture along its length indicating faulting into the lithospheric mantle and highlighting the role of strike-slip faults in accommodating rotation of material around the syntaxis. Away from the suture, splitting patterns are more complicated and suggest internal deformation within the Lhasa terrane, and potential crustal anisotropy. Our studies also constrain the nature and evolution of the region's surface boundary. The GPS-determined velocity field wraps tightly around the Namche Barwa massif in the core of the syntaxis and requires considerable strain to be taken up across SE Tibet. Erosion rates and exhumation patterns inferred from cosmogenic dating and thermochronogical studies document very rapid erosion within the core the eastern syntaxis and variation in cumulative Neogene exhumation across the region, from 1-2 to well over 10 km. Analysis of topography clearly shows a great increase in relief, slope, and overall dissection from west to east. These data suggest that across the transition from the Tibetan plateau to the eastern indentor corner, changes in lithospheric rheology control changes in topography and lithospheric mechanics; erosion is an important control on lithospheric dynamics through rheological-erosional interaction as well as the (re)distribution of mass, and within the syntaxial region, there is significant coupling between deformation in the crust and lithospheric mantle such that crustal deformation is generally predictable from mantle kinematics.

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