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Topo-Mendocino - The link between topography and lithospheric processes in the wake of the Mendocino triple junction in northern California, USA

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Fundamental modifications to the North American lithosphere occur in response to the migration of the Mendocino triple junction (MTJ) in northern California. The framework model for this evolution involves the abrupt transition from subduction to translation, the formation of a slab window, and the ultimate development of the San Andreas plate boundary system. However combining observations of surface topography, its change through time, and the coupling between that surface evolution and lithospheric-scale processes allows us to place strong constraints on the mechanisms by which the primary Pacific-North America plate boundary forms. The Mendocino Crustal Conveyor (MCC) model of Furlong and Govers (1998) provides a geodynamic prediction of crustal deformation and surface topographic response to MTJ migration. The resulting topography reflects the competition among isostatically driven elevations (crustal structure), dynamic topography, and erosion/exhumation. Testing this MCC model against observations embedded in the topography - such as the evolution of drainage basins, the position and temporal migration of river divides, and the development and subsequent tilting of relict surfaces allows us to further refine the MCC model and gain insight into plate boundary geodynamics. In particular, there is a characteristic topographic pattern of two drainage divides migrating with the MTJ that is produced by the superposition of a domal uplift from a migrating welt of thickened crust modified by a flexural downwarp (dynamic topography) produced by the effects of mantle flow in response to slab removal. Linking these surface patterns to detailed imaging of crustal structure provides insight into the nature of coupling between the shallow crust and the upper mantle. The development of the San Andreas plate boundary in response to the migration of the MTJ provides an important exam-

ple of the strong coupling between surface processes and tectonism and deformational processes acting at lithospheric scales.