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Structure, kinematics, and timing of rifting in Tangra Yum Co rift, south-central Tibet

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N-S trending rift valleys orthogonal to the Himalayan arc are one of the most prominent features of the central Tibetan Plateau. These Cenozoic normal fault systems and associated strike-slip faults appear to accommodate internal N-S shortening as well as eastward lateral extrusion of Tibet. A 250 km long rift in central Tibet, the Tangra Yum Co rift, is characterized by complexly segmented high-angle normal faults that run orthogonal to the pre-existing structural grain of the plateau established during N-S contraction, such as the Gandese Batholith and the Indus-Yalu suture zone. Young thermochronometric cooling ages from exhumed footwall rocks and spectacular, active fault scarps attest to the continued extensional deformation within this rift system. Detailed examination of structural and kinematic data from rift-bounding normal faults in conjunction with thermochronometric data are used to elucidate the temporal and spatial distribution of strain and the geometric evolution of the highly-segmented rift. Long-term extensional faulting within the rift is manifested by dramatic topographic relief with rugged uplifted footwall blocks and largely internally drained rift basins in contrast to the subdued hanging wall topography. Arcuate N-S trending normal fault segments are linked by roughly E-W trending accommodation zones with a significant strike-slip component, linking rift segments of identical and opposite polarity. Bedrock structural and fault kinematic data show that the central portion of rift segments are characterized by high-angle normal faults with down-dip displacement, while fault dips appear to lessen in the vicinity of the linking strike-slip faults. Active faults commonly cut Quaternary fluvial sediments and/or glacial moraines at the mouth of footwall valleys at the active range front and display as much as $\sim$40 m of surface offset. In some locations multiple parallel faults or splays are observed. How-

ever, temporal aspects of fault linkage and rift integration remain poorly understood. Other large rifts of the Tibetan Plateau (e.g., Daga Co, Xainza) are also characterized by segmented normal fault systems that are laterally terminated by large strike-slip faults, suggesting a clear spatial and kinematic linkage between normal and strike-slip faulting. Apatite and zircon (U-Th)/He data from vertical transects of exhumed footwall rocks in Tangra Yum Co rift are generally characterized by elevation-invariant ages clustering at $\sim$5 Ma, indicative of rapid Pliocene exhumation. Structurally lowest samples from Xuro Co (central Tangra Yum Co) yield apatite (U-Th)/He ages as young as $\sim$1 Ma, illustrating the continued rapid exhumation. Composite zircon and apatite (U-Th)/He data tentatively exhibit both middle Miocene and Pliocene inflection points suggesting two distinct episodes of rifting at 13 Ma and 5 Ma, with the latter being the more dominant pulse responsible for the modern rift topography. Quantitative constrains on the dynamics of rift evolution will dramatically improve our understanding of boundary conditions, driving forces, and the Neogene strain field leading to the formation of these prominent Tibetan rift systems.