



Late Cenozoic tectonic evolution of the Ailao Shan-Red River fault (SE Tibet): implications for kinematic change during Plateau growth

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The India-Eurasia continental collision has created the Tibetan Plateau, a spectacular example of continental plateaus. Along its southeastern margin, surface uplift, river incision, shear-zone exhumation and displacement along active faults have all interacted to shape the landscape. The Ailao Shan-Red River fault, a continental-scale strike-slip fault striking over 1000 km from the Tibetan Plateau to South China Sea, is an excellent recorder for those processes, providing important insights into the evolution of the southeastern plateau margin. However, its late Cenozoic tectonic evolution still remains elusive. This work presents new structural and stratigraphic data from the Miocene basin in the bend area and apatite (U-Th)/He thermochronological data from the shear zone to put constraints on the timing and nature of structural and geomorphic evolution of the Ailao Shan-Red River fault region. Our observations indicate that the major bend in the fault was a releasing bend in the early Miocene, but became a restraining bend after the late Miocene reversal of displacement. The strata preserved in bend area record the nature and timing of exhumation of the shear zone. Apatite (U-Th)/He data show two phases of rapid exhumation in the Miocene. The first rapid exhumation occurred before 16 Ma, the timing of which is supported by the early Miocene sedimentary record and previous geochronologic results. It may have ended before the formation of a low-relief erosion surface. The second episode of rapid exhumation began at ~ 14 -13 Ma, lasting 2-3 Myr. During this interval, the Ailao Shan range may have uplift to the modern elevation and the high relief may have developed along the range due to river incision. Metamorphic clasts from the shear zone were deposited in the Red River valley. Regional compilation reveals a coincidence of tectonic events in the Tibetan Plateau and its surroundings in the middle-late Miocene, indicating dramatic kinematic change during the course of plateau growth.