

Sedimentary and thermochronologic evidence for Middle to Late Miocene uplift of the Northern Tibetan Plateau

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The Altyn Tagh Fault (ATF) plays a central role in accommodating strain related to the India-Asia collision. Previous work has documented 375 ± 50 km of Cenozoic sinistral offset on the ATF, which is in turn fundamental to crustal thickening in the northern Tibetan Plateau (Yue and others, 2003). However, questions regarding the timing and extent of deformation and associated uplift of the northern Plateau remain unanswered. Two end-member models, the “two-stage” and “continuum” models, exist to characterize the coupled evolution of the ATF and the Northern Plateau (Yue and Liou, 1999; Yin and others, 2002). Both of these models yield distinct and readily testable predictions for the basin evolution, exhumation history, and structural growth of the northern Tibetan Plateau. Here we present sedimentary sequences from the northern Qaidam basin and Hexi corridor as well as low-temperature thermochronology cooling ages from the North and South Qilian Shan.

Upward coarsening sequences within the Qaidam Basin and Hexi Corridor and rapid cooling throughout the Qilian Shan suggest rapid uplift and attendant exhumation in the Late to Middle Miocene. These events are nearly synchronous with a decline in slip rate along the ATF and suggest a shift from strike-slip dominated deformation to distributed crustal thickening. Additionally these events coincide with tectonic reorganizations along the south China and Pacific plate margins during the mid-Miocene that resulted in a relatively confined margin (Northrup and others, 1995), potentially favoring crustal thickening within the orogen over lateral escape.

References:

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