



Cenozoic denudation and deformation of eastern Tibet and the Qinling. Is Tibetan lower crustal flow diverging around the Sichuan basin?

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Topographic data, characterizing the transition of the Tibetan Plateau to the adjoining Qinling morphologically, show that elevations decrease gradually from southwest to northeast across the northeastern Plateau margin and contrast with much steeper gradients along the Longmen Shan and Min Shan adjacent to the Sichuan Basin. Forty-eight apatite fission-track analysis samples reveal the cooling/exhumation history of the Qinling, in particular the extent to which the Qinling was affected by the raising Tibetan Plateau. Most samples yielded Cretaceous to Eocene ages without an areal distribution pattern or vertical correlation. However, the track-length distributions show that continuous cooling in the northern and eastern Qinling contrasts with rapid cooling at the end of the thermal history in the southwestern Qinling. A compilation of major Cenozoic faults in the eastern Tibetan Plateau and the Qinling, and their kinematic and dynamic characterization show that deformation in the Qinling is prevailingly strike-slip. Sinistral and dextral strike-slip boundaries, active at the end of deformation history, bound the area of rapid Late Cenozoic cooling outlined by apatite fission-track analysis, delineating an area of eastward rock flow. Two interpretations are put forward: In terms of a lower crustal flow model, our study indicates that flow has affected the southwestern Qinling, following its division around the Longmen Shan and causing active Plateau uplift in this area. Alternatively, northeastern Tibet is currently growing faster eastward in the western Qinling than the entire Southern China Block is extruding to the east. Our study provides data explaining the geodetic difference between the displacement velocities across the northeastern Tibetan Plateau

and the Longmen Shan. It also documents horizontal and vertical material motion at the eastern growth tip of the Tibetan Plateau.