Propagation of the deformation and growth of the Tibetan-Himalayan orogen: A review

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Propagation of the deformation and growth of the Tibetan-Himalayan orogen: A review

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Abstract

Long-standing problems in the geological evolution of the Tibetan-Himalayan orogen include where the India-Asia convergence was accommodated and how the plateau grew. To clarify these problems, we review the deformations and their role in the plateau's growth. Our results show that ~1630 km of shortening occurred across the Tibetan-Himalayan orogen since ~55 Ma, with more than ~1400 km accommodated by large-scale thrust belts. These thrust belts display an outward expansion from central Tibet and couple with the surficial uplift. The development of the Tibetan plateau involved three significant steps: Primitive plateau (~90–55 Ma), Proto-plateau (~55–40 Ma), and Neoteric plateau (~40–0 Ma). Several processes have collaborated to produce the Proto-plateau, including the pre-existing Primitive plateau, the India-Asia collision, and subductions of Greater India and Songpan-Ganzi beneath the Lhasa-Qiangtang terrane. Since ~40 Ma, the Proto-plateau, which was dominated by a topographic gradient, lower crustal flow and continuous India-Asia convergence, experienced three periods of rapid outward growth (~40–23, ~23–10, and ~10–0 Ma) in general. The N-S trending rifts were caused by the eastward growth of

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