Himalayan evolutionary models: constraints from Eocene-Miocene granitoid bodies

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Orogenic reconstructions depend on adequate knowledge of the spatial and temporal associations between processes, structures and lithotectonic units. However, the present gamut of Himalayan evolutionary models may be biased by the paucity of data from the ca. 55-25 Ma period following the initiation of collision, the lack of constraints on the structural assembly of many parts of the orogenic zone, and traditional focus on the frontal parts of the High Himalaya.

The record of granitoid magmatism preserved in the eastern North Himalaya and southern Tibetan plateau places important new constraints on the time-dependent structural architecture and locus of tectonic activity in the Himalaya since at least the mid-Eocene.

Combined geochronologocal, geochemical and thermometric studies of undeformed Eocene granitoid plutons emplaced into Tethyan metasediments at 92°E (the Dala granites) constrain the timing of deformation in the structurally highest (and inferred earliest accreted units of the Himalayan fold and thrust belt) to be older than 45 Ma. A similar study of nearby Miocene granites (the Yala-Xiangbo granites) provides further insight into subsequent reorganisation of the Himalayan thrust system and the formation of the north Himalayan gneiss domes (NHG).

Petrogenesis of both suites, combined with documented evidence for essentially continuous arc-type magmatism along the southern margin of Eurasia argue strongly against underthrusting of Indian lithosphere beneath southern Tibet, either as a means of thickening the crust, or providing insulation to promote development of a weak mid-crustal layer.

This study demonstrates the integrated application of geochemistry, geochronology and structural geology in probing the time-dependent structural evolution of an active orogenic zone.