

248-1 - Booth No. 267: RECONSTRUCTING THE ELUSIVE TETHYAN HIMALAYA THRUST BELT BY EXAMINING THE ALONG-STRIKE THERMAL STRUCTURE IN THE HIMACHAL HIMALAYA, NW INDIA



Wednesday, 18 October 2023



8:00 AM - 5:30 PM



Hall B (2, David L Lawrence Convention Center)

Booth No. 267

Abstract

The thermal conditions during orogenesis exert first-order control on the style, magnitude, and extent of deformation. The Eocene Tethyan Himalaya (TH) thrust belt is the structurally highest part of the Himalayan orogen and deforms a ~10-km thick Neoproterozoic–Cretaceous stratigraphic section. The Pin Valley region preserves the northernmost exposed TH in the Himachal Himalaya, NW India, and is a classic site for stratigraphic, paleontological, paleoenvironmental, and structural reconstructions. The base of the TH in Pin Valley records minor garnet-grade metamorphism and relatively undeformed fossils throughout the middle to upper TH. However, thermobarometric data from the basal TH along the structurally continuous Sutlej Valley to the east (<20 km map distance) is consistently 7–8 kbar, indicative of deep intra-orogen burial to 26–30 km depths in the Eocene, which is inconsistent with structural and stratigraphic observations in Pin Valley. Ongoing geothermobarometry estimates and Ar thermochronology from Pin Valley are being conducted to constrain the timing and pressure of peak metamorphic conditions. Here, we integrate structural observations and geologic mapping, Raman spectroscopy of carbonaceous material (RSCM) thermometry, detrital zircon geochronology, and Ar thermochronology to place constraints on the geometry, kinematics, stratigraphy, and thermal structure along the Pin Valley transect. This, in turn resolves the viability of deep burial of the TH along the Sutlej Valley. Important observations show: (1) detrital zircon geochronology along the Pin Valley transect shows strong correlation with regional TH strata, which will be further compared with the TH section along the Sutlej Valley; and (2) temperature-depth relationships record a regionally elevated, but continuous, geothermal gradient (40 °C/km), which is inconsistent with gradients predicted by *P-T* estimates along the Sutlej Valley (≤ 25 °C/km). Preliminary results show no evidence for large magnitude burial of the upper crust, suggesting limited thickening of the Tethyan Himalaya thrust belt.

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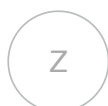
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