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## GSA Connects 2023 Meeting in Pittsburgh, Pennsylvania

Paper No. 248-6

Presentation Time: 8:00 AM-5:30 PM

### ALONG-STRIKE THERMOBAROMETRIC DISCREPANCY IN THE NORTHWESTERN TETHYAN HIMALAYA

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The Tethyan Himalaya (TH) fold-thrust belt comprises a deformed Neoproterozoic-Cretaceous section of sedimentary rocks that record the early stages of deformation of the Himalayan orogen. In the northwestern Himalaya, rocks at the base of the TH are metamorphosed and are useful for reconstructing the thermal evolution of the Himalaya during initial stages of crustal thickening. Here, we present results of multi-method thermobarometry (thermodynamic modelling, Si in white mica barometry, quartz in garnet barometry, raman spectroscopy of carbonaceous material (RSCM) thermometry) on metasedimentary samples from two transects across the TH, with apparently continuous stratigraphy separated along strike of the orogen by ~40 km.

Samples from the Pin Valley region record peak pressure-temperature (P-T) conditions of 0.4-0.5 GPa, 600 °C, suggesting a paleo-geothermal gradient of 30-40 °C/km. These samples are from the base of a continuous ~10-12 km-thick TH section in which the stratigraphically highest units are undeformed, fossil-bearing sedimentary rocks. RSCM thermometry on samples from stratigraphically higher levels of the TH suggest a continuous ~40 °C/km geothermal gradient through the entire TH section in the Pin Valley region. In contrast, previous thermobarometric studies from the Sutlej Valley ~40 km to the east report peak P-T conditions of 0.7-0.8 GPa, 600-650 °C, suggesting a paleo-geothermal gradient of 20-25 °C/km. Our new data indicate significant along-strike variation in peak P-T conditions and paleo-geothermal gradients at the base of the TH.

Possible explanations for this along-strike thermobarometric discrepancy include: 1) pre-Himalayan metamorphic assemblages preserved in the TH resulting in erroneous Himalayan peak P-T estimates, 2) along-strike structural differences that resulted in differential burial and exhumation during Himalayan orogenesis, or 3) non-lithostatic pressure during orogenesis. Thermobarometric work on samples from different stratigraphic levels of the basal TH in the Sutlej Valley is in progress to determine paleo-geothermal gradient continuity both across- and along-strike of the orogen.

Session No. 248--Booth# 272

[T160. Convergent Margin Systems \(Posters\)](#)

Wednesday, 18 October 2023: 8:00 AM-5:30 PM

Hall B (David L Lawrence Convention Center)

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