



## **Switch from thrusting to extension in the Zaskar Shear Zone, NW Himalaya: structural and metamorphic evidence**

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The Zaskar Shear Zone (ZSZ) is the NW continuation of the South Tibetan Detachment System, an extensional ductile shear zone of the Himalaya. The ZSZ nucleated on the contact between the High Himalayan Crystalline Series and the Tibetan Sedimentary Series, and consists of a zone of NE-directed normal shearing that overprinted an earlier stage of SW-directed thrusting. The shear zones are co-planar and co-directional; the switch to normal shearing simply involved inversion of the movement sense. Metamorphic isograds in the ZSZ define an overall pattern of colder rocks on top of hotter, a result of normal shearing. However, we find preserved lithons recording hotter rocks on top of colder; a consequence of the earlier stage of thrusting. Miocene leucogranitic intrusions accumulated within and below the ZSZ. They intruded during thrust and normal shearing, and continued after normal shearing ceased. Peak metamorphism during thrusting has been dated previously at  $\sim 33\text{--}28$  Ma. We have dated magmatism during normal shearing at  $29.4\text{--}21.7$  Ma ( $\text{Ø} = 24$  Ma; U-Pb monazite in-situ SHRIMP). Dating of undeformed leucogranites indicates normal shearing ceased at  $25.5\text{--}21.6$  Ma ( $\text{Ø} = 23$  Ma). However, younger ages of  $\sim 20\text{--}19$  Ma have been reported previously. We conclude that the switch from thrusting to normal shearing occurred between 30 and 22 Ma and that normal shearing finished only a few million years later. We postulate that Miocene anatexis triggered extension, doming, and then cooling of the anatectic core of the HHC at  $\sim 20$  Ma.