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Tectonic and metamorphic discontinuities in the Greater Himalayan Sequence in Central Himalaya: in-sequence shearing by accretion from the Indian plate

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The Greater Himalayan Sequence (GHS) is the main metamorphic unit of the Himalayas, stretching for over 2400 km, bounded to the South by the Main Central Thrust (MCT) and to the North by the South Tibetan Detachment (STD) whose contemporanous activity controlled its exhumation between 23 and 17 Ma (Godin et al., 2006).
Several shear zones and/or faults have been recognized within the GHS, usually regarded as out of sequence thrusts. Recent investigations, using a multitechnique approach, allowed to recognize a tectonic and metamorphic discontinuity, localized in the mid GHS, with a top-to-the SW sense of shear (Higher Himalayan Discontinuity: HHD) (Carosi et al., 2010; Montomoli et al., 2013). U-(Th)-Pb in situ monazite ages provide temporal constraint of the acitivity of the HHD from $\sim$ 27-25 Ma to 18-17 Ma. Data on the P and T evolution testify that this shear zone affected the tectono-metamorphic evolution of the belt and different P and T conditions have been recorded in the hanging-wall and footwall of the HHD. The HHD is a regional tectonic feature running for more than 700 km, dividing the GHS in two different portions (Iaccarino et al., 2015; Montomoli et al., 2015).
The occurrence of even more structurally higher contractional shear zone in the GHS (above the HHD): the Kalopani shear zone (Kali Gandaki valley, Central Nepal), active from $\sim$ 41 to 30 Ma (U-Th-Pb on monazite) points out to a more complex deformation pattern in the GHS characterized by in sequence shearing.
The actual proposed models of exhumation of the GHS, based exclusively on the MCT and STD activities, are not able to explain the occurrence of the HHD and other in-sequence shear zones. Any model of the tectonic and metamorphic evolution of the GHS should account for the occurrence of the tectonic and metamorphic discontinuities within the GHS and its consequences on the metamorphic paths and on the assembly of Himalayan belt.

References

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