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## Middle Miocene rise of the High Himalaya and the disruption of transverse drainage due to basal accretion

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The Himalaya is the highest and steepest mountain range on Earth and an efficient north-south barrier for moisture-bearing winds. The close coupling of changes in topography, erosion rates, and uplift has previously been interpreted as an expression of a climatic control on tectonic deformation. Here, we present 17 new zircon U/Th-He (ZHe) bedrock-cooling ages from the Sutlej Valley that – together with >100 previously published mica <sup>40</sup>Ar/<sup>39</sup>Ar, zircon and apatite fission track ages – allow us to constrain the crustal cooling and exhumation history over the last ~20 Myr. Using 1D-thermal modeling, we observe a rapid decrease in exhumation rates from >1 km/Myr to <0.4 km/Myr that initiated at 15-13 Ma across the entire Greater Himalaya and the north-Himalayan Leo Pargil gneiss dome, both in the hanging and footwall of major Miocene shear zones, suggesting that cooling is associated to surface erosion and not due to tectonic unroofing. We explain the middle Miocene deceleration of exhumation by the onset of the growth of the Lesser Himalayan duplex, which resulted in accelerated uplift of the Greater Himalaya above a mid-crustal ramp and the establishment of an efficient orographic barrier. The period of slow exhumation in the upper Sutlej Valley coincides with a period of internal drainage in the south-Tibetan Zada Basin farther upstream, which we interpret to be a consequence of tectonic damming of the upper Sutlej River. External drainage of the Zada Basin was re-established at ~1 Ma, when we observe exhumation rates in the upper Sutlej Valley to accelerate again.