



Large Temporal and Spatial Variations in the Eastern Himalayan Syntaxis Exhumation From Detrital Thermochronology

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The exhumation rates at the Eastern Himalayan Syntaxis, and in particular at the Namche Barwa anticline, are some of the highest in the Himalaya. At the core of the anticline high-grade metamorphic rocks of Indian crust were exhumed from ca. 40 km depth within <10 Ma. Bedrock thermochronology shows rapid exhumation since <4 Ma that has since migrated north and west of the anticline. The structural history of the anticline and its northern and western surroundings are relatively well studied. However, the geology and exhumation history of the southeastern flank is largely unknown.

We present 1500 new detrital zircon fission track cooling ages from 15 modern river samples of the Tsangpo-Siang River and its tributaries. These samples provide cooling ages from drainage basins in the Namche Barwa anticline and the region north, west, and south of it (China and India). Results are as follows: (1) we find eight age populations (0.9 ± 0.2 Ma, 3.5 ± 1 Ma, 7 Ma, 11 ± 2 Ma, 18 ± 2 Ma, 24 ± 2 Ma, 35 ± 5 Ma and 50 - 55 Ma) that quantify temporal variations in the exhumation history of the eastern syntaxis since the Paleocene/Eocene. (2) Cooling ages are consistent with the development of the anticline structure since the Late Miocene. (3) Previous studies have suggested that $\sim 50\%$ of the Siang River sediments exiting the Himalaya today originate from only a small area of the Namche Barwa massif. However, our data reveal that the zone of localized rapid exhumation extends significantly (ca. 40 km) further to the southwest of the anticline than previously assumed. Finally, (4) spatial variations in cooling age populations suggest structural differences between the northwestern and southeastern flanks of the anticline. Northwest of the anticline rapid exhumation has migrated beyond the anticline and into the hangingwall (Asia). In the Southeast, the zone of exhumation is strictly limited to the anticline and bounded by a sharp structural boundary along by the Siang River. This spatial pattern suggests a northwestward migration of the syntaxial zone of exhumation in the last ca. 10 Ma.