

Paleo-denudation history of the Ladakh Batholith - new constraints from bedrock and detrital apatite (U-Th-Sm)/He thermochronology

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The Ladakh Batholith is part of the Transhimalayan Plutonic Belt and records the early exhumation history of the Himalayan orogen. The evolution of the Ladakh Batholith is complex and was controversially discussed in the literature (see Kirstein, 2011 for details). Recent data by Kirstein et al. (2006 & 2009) suggest a trend of exhumation rates across the batholith, with earlier exhumation along its southern margin and later exhumation in the north.

Apart from methodological purpose aimed at refining the apatite (U-Th-Sm)/He technique, the goal of our study is to investigate the earliest denudation history of the Ladakh Pluton and thereby that of the Himalayan orogen, using apatite (U-Th-Sm)/He thermochronology (i) applied to bedrocks from the southern margin of the batholith, and (ii) to sediments from the adjacent Upper Indian Group sediments such as Chogdo and Sumda Formations with Oligo–Miocene in age (coincident with initiation of the paleo–Indus River system) and Choksti and Hemis conglomerates. These sediments are thought to be sourced from the Ladakh Batholith (Henderson et al., 2011).

Apatite (U-Th-Sm)/He dating is sensitive to temperatures between ~85 and 40°C and thus to geodynamic movements of the upper ~1.5 to 3 km of the earth's crust. While thermochronology data from present-day bedrock exposures provides denudation rates integrated over the time between cooling age and the present, the earlier denudation history is eroded away from the present exposures and stored in the syn-tectonic sediments. Thus, dating sediments of the Indian Group will yield the paleo-denudation history of the (southern) Ladakh area, including changes of denudation rates back through time. This will reveal new insights into the relation between tectonics, climate, and erosion.

References

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