



## **A 3D model of the long-term landscape evolution of the Rwenzori Mountains, Albertine Rift, Uganda**

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The Rwenzori Mountains, situated SW of Lake Albert, form a striking feature within the Albertine Rift of the East African Rift System (EARS). They follow along the border of the Democratic Republic of Congo and Uganda, and extend about 120 km NS and 50 km NW. The Rwenzoris are built up by a dissected Precambrian metamorphic basement block that has been uplifted to great heights of more than 5 km. Due to these significant heights and the extraordinary position within an extensional setting, the Rwenzori Mtns represent a key area to investigate processes related to rifting.

One of the major questions related to the Rwenzori Mtns is the timing of their formation; if their uplift has to be entirely ascribed to rift movements in Neogene times or if they represent an old basement block that formed a mountain high long before. The presented study, therefore, seeks to confine the thermal, uplift and denudation history of the Rwenzori Mtns by low-temperature thermochronology. Apatite fission-track (AFT) as well as (U-Th-Sm)/He data of apatite (AHe) and zircon (ZHe) were determined to establish the cooling history (time-temperature-paths) for this region.

Cooling paths, that match the measured AHe and ZHe data and that are consistent with the AFT data, show (1) rapid Mid to Late Jurassic cooling of  $\sim 50$  °C ( $\sim 170$  –  $\sim 150$  Ma), (2) period of very slow and constant cooling of  $\sim 45$  °C through most of the Cretaceous and Paleogene time ( $\sim 150$  –  $\sim 10$  Ma), (3) rapid cooling of  $\sim 25$  °C to surface temperatures in very short time ( $\sim 10$  Ma to recent) during the Neogene.

Testing geological constraints against the AHe, ZHe and AFT data set (central ages, confined FT-length, etch pit size) of the Central Rwenzori Mtns by using the computer code Pecube (Braun 2002) allows modelling the long-term landscape evolution of this area.

Based on the thermochronological ages distinct regions from north to south within the Rwenzori Mtns can be differentiated with a general increase in ages towards the south. The accordant modelling also shows, that individual blocks with differentiated block movements need to be considered, pointing to a complex denudation history of the Rwenzori Mtns.