Tracking the Yadong-Gulu Rift belt with multiple thermochronometers on modern detritus from Yarlung-Tsangpo River

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The Himalaya-Karakorum-Tibet orogenesis has featured dramatic surface expression of highly levelled plateau, spectacular gorge along the plateau margin, and stepwise closure and suturing between micro-plates. The plateau therefore has displayed mainly three stages of surface deformation: the N-S compression between the Eurasia and India plates; the thickening of the crust with strike slip faults; and the E-W extension mostly occurred in the south and central Tibet. It is obvious that the plateau has long accommodated distributed strain in both spatial and temporal wise. The role of the most recent extension has raised numerous discussions in terms of its initiation timing, fault behavior, underlain mechanics, and most important of all, whether it can be linked to the crustal thickening stage.

In this study, we traced the impact of the Yadong-Gulu rifting, one of the major E-W normal faulting systems in south Lhasa Terrane, through modern detrital material from the Yarlung-Tsangpo River and its tributaries. Multiple thermo-chronological results revealed a discordant pattern for the studied catchments and suggested significant footprints of the rifting system only in the Lhasa river drainage. Catchment-scale data allowed us to pin out the origin of young thermal grain age population and suggested focused exhumation along the Nyainqentanglha shear zone. The zircon fission track age spectrum therefore suggest that the activity of Yadong-Gulu rift belt has already initiated before ca. 15 Ma and led to high fraction of sediment loading into the catchment of Lhasa River.

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