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# Dating the emergence of the Africa Superswell: a window into mantle processes using combined (U-Th)/He and AFT thermochronology

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Southern Africa contains the second largest elevated plateau on Earth, however despite decades of study the evolution of the "African Superswell" remains poorly understood. The mantle anomaly beneath Southern Africa provides a mechanism that can account for both the distribution and the amount of uplift observed, however the timing of uplift cannot be constrained from models of mantle flow because of uncertainties in density and viscosity parameters in the convection models. In order to improve the models of topographic evolution in response to mantle convection, and improve our understanding of the coupling between mantle flow and dynamic topography at the surface we require better quantitative constraints on relatively modest ($\sim$1 km) long wavelength surface uplift.

Efforts to provide the necessary temporal constraints from geomorphic and stratigraphic evidence in southern Africa have led to the development of three competing evolutionary models: A) the major phase of uplift occurred in the late Cretaceous [1], B) the major phase of uplift occurred at $\sim$30 Ma [2], and C) that $\sim$ 900m of the modern topography being generated rapidly 100m/Ma in the Plio-Pleistocene (c. 3 Ma) [3]. The aim of the current study is to provide better quantitative information in order to distinguish between these models.

Apatite fission track thermochronology has been widely used to constrain the onset and evolution of the South African passive margin [e.g. 4, 5], but used alone it is relatively insensitive when trying to resolve the small amounts of uplift predicted for the onset of the African Superswell. Recent advances in the combined interpretation of fission track and (U-Th)/He data sets now enables us to provide preliminary quantitative constraints on the pattern of denudation through the Cenozoic. We present apatite fission track and (U-Th)/He data from a suite of deep boreholes from the high elevation plateau. When integrated with published fission track data and multi-chronometer modelling techniques we can constrain the temporal and spatial distribution of denudation across Southern Africa. Ultimately we aim to constrain both the timing and rate of the emergence of the African Superswell and to provide quantitative constraints on when the first-order topography of Africa was created.

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