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Quantifying the evolution of the African topography from sedimentary archives.

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The African topography is characterized by elevated regions, such as the South-African plateau ($>$ 1000 m), which do not relate to any orogenic setting. Several models have been proposed in the literature to account for these topographic anomalies, but could not be discriminated because of the lack of clear geological constraints on the history of uplift. To solve for this, our group has recently quantified fluxes of silico-clastic sediments preserved in the margins, and has re-assessed the evolution of the continental surface by re-interpreting paleogeographic constraints and by gathering available low-temperature thermochronological data. To interpret all these data and place quantitative constraints on the spatio-temporal evolution of the African topography over the last $\sim$180 Myr, we have derived erosion and transport laws that may apply at large spatial and temporal scales. These laws have been tested in light of physical experiments of relief production, and in light of available data on present-day denudation rates and sediment yield measured in large ($\geq 10^4$ km^2) river basins. These laws have subsequently been implemented into a numerical model that investigates quantitatively the histories of surface uplift and topography in Africa that are consistent with all the data. Our approach is validated by the capacity of the model to reproduce the various geological constraints, and provides useful guidelines to quantitatively interpret sedimentary fluxes and paleogeographies in terms of paleotopographies.