



Uplift of the South African Plateau: mantle-scale deformation, long wavelength relief growth and offshore sediment budget

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The South African Plateau is one of the largest very long wavelength relief (x1000 km) of the world that could be related to mantle dynamics and the effect of the African superplume. Unfortunately, the timing of the uplift and the different steps of the relief growth are still debated with a Late Cretaceous uplift scenario and an Oligocene one. Whatever model, few attentions were paid to the evolution of the overall geomorphic system, from the upstream erosional system to the downstream depositional system.

This study is based, onshore, on the mapping and chronology of all the macroforms (weathering surfaces and associated alterites, pediments and pediplains, incised rivers, wave-cut platforms) dated by intersection with the few preserved sediments and the volcanics (mainly kimberlites pipes) and, offshore, on a more classical dataset of seismic lines and petroleum wells (characterization and dating of forced regression, sediment volume measurement, etc..).

The main result of this study is that the South African Plateau is an old Late Cretaceous Plateau reactivated during Paleogene times and fossilized since the Middle Miocene.

- During Late Cretaceous, in a semiarid climatic setting, the main uplift occurred from the east (around 95 Ma) to the west (around 75 Ma) and could result from the migration of the African plate over the African superplume: This is the paroxysm of the erosion with the growth of a large delta offshore present-day Orange River mouth (sedimentation rate around 100 000 km³/Ma).
- During Paleocene - Mid Eocene times, in more humid conditions and in response to a more subtle long wavelength deformation, pedimentation occurred mainly localised along Cape Fold Belt feeding a large delta offshore western Cape Peninsula. During Mid Eocene times, all those landscapes are fossilized and weathered by laterites.
- Late Eocene and Oligocene is the second period of uplift of the Plateau, localised along its Indian Ocean side (Drakensberg Mountains), feeding a smaller delta offshore Tugela River (Durban area - sedimentation rate around 15 000 km³/Ma). The mechanism of uplift, located along the Agulhas – Falklands Fracture Zone, is unknown.
- Since at least Middle Miocene times, all those relief have been fossilized, with very low erosion rates (x1m/Ma), in response to the major aridification of southern Africa.

Keywords: South Africa, Plateau uplift, Mantle dynamics, Climate, Siliciclastic sediment fluxes