

Post Rift Evolution of the Indian Margin of Southern Africa

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The objective of this study is to discuss the evolution of the South African Plateau along the Indian margin of Southern Africa. Since the classical works of A. du Toit and L.C. King and the improvement of thermochronological methods and numerical models, the question of the uplift of South African Plateau was highly debated with numerous scenarios: early Cretaceous at time of rifting (Van der Beek et al., *J.Geophys.Res.*, 2002), late Cretaceous (Braun et al., *Solid Earth*, 2014), late Cenozoic (Burke & Gunnell, *Geol.Soc.of America*, 2008).

Limited attention has been paid on the constraints provided by the offshore stratigraphic record of the surrounding margins. The objective of our study is to integrate onshore and offshore data (seismic profiles and industrial wells) to (1) analyse the infill of the whole margin (21°S to 31°S) from its hinterland to the distal deep water basin, (2) to constrain and quantify the vertical movements. We discuss the impact on accommodation and sediments partitioning, and their significance on South African Plateau uplift history.

1. Sedimentary basins of the Indian margin of Southern Africa are related to the break-up of Gondwana during late Jurassic, resulting in rifts and flexural basins. First marine incursions started during early Cretaceous times (oldest marine outcropping sediments are of Barremian age ~128 Ma). The region developed as a normal continental shelf at the Aptian-Albian transition (~113 Ma).
2. The Cretaceous geological history of the basins is characterized by differential uplift and subsidence of the basement, controlled by structures inherited from break up. As example, major early Cretaceous depocenters of the margin are located on the north of Save-Limpopo uplift (Forster, *Paleogeography, Paleoclimatology, Paleocology*, 1975) showing an eastward drainage pattern, maybe related to a proto Limpopo drainage. Those observations suggest that the escarpment bordering the Bushveld depression is an old relief inherited from early Cretaceous.
3. Two major uplift events occur during upper Cretaceous along the Kwazulu-Maputaland margin (25.5°S to 31°S). During late Cenomanian (~95 Ma) and during late Cretaceous (71-66 Ma). Both events are coeval with a major tilting and erosion of the upstream part of the margin, river incision and the growth of basin floor fans.
4. At first order, the margin shows a retrogradational trend up to a major flooding during mid Eocene time (~54 Ma), dominated by carbonate sedimentation. A widespread tilt of the margin occur during early Miocene (~18 Ma) times leading to progradational geometries and the actual high elevation topography of the margin.

These results suggest that the South African plateau results from a polyphased uplift history. Most of the relief is inherited from three uplift of the margin, during the continental break-up, during late Cenomanian and during late Cretaceous. The actual high elevation topography was acquired during a widespread tilting of the margin during late Cenozoic.