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Palaeoenvironmental fluctuations during a terminal Oligocene-early Miocene transgression at the southwestern tip of Africa

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We present a multi-proxy study from an offshore core in Saldanha Bay 130 km northwest of Cape Town spanning the Palaeogene-Neogene transition. Ten meter thick fluvio-paludal organic sediments provide perspectives on fluvial depositional mechanism, ecosystems, phytogeography, and sea-level history that developed after the Oligocene cool period. The transition is documented in the marine record, but peri-coastal or terrestrial sediments documenting this period have been lacking in southern Africa. Here, offshore seismic data illuminate the control of bedrock topography on Cenozoic stratigraphy and provide evidence of relative sea levels that receded to as low as -100 m in the Oligocene. The rich and diverse pollen indicates subtropical vegetation types including mangroves, lianas and vines, evergreen arboreal elements, palms and ferns. The forested environment revealed by the palynoflora implies higher precipitation than at present and probably reduced seasonal drought. 3D landscape reconstruction reveals a complex topography with hills, plains and a wide anastomising river system close to the site. From the topography, sedimentology and palynology we hypothesise an environment comprising Podocarpaceae-dominated forests, proto fynbos, swamp/riparian forests with palms and other angiosperms along the water courses. Subtropical woodland-thicket with Combretaceae and *Brachystegia* (*Peregrinpollis nigericus*) developed near the coast and possibly also on the wider coastal plains. Mangroves with Rhizophoraceae and associated ferns were restricted to the estuaries. Typical Gondwana elements, which became extinct during the Neogene in South Africa, e.g., Araucariaceae, still prevailed in the Western Cape during the Oligocene-Miocene transition. Abundant undifferentiated fungal elements together with *Tetraploea* sp., *Involutisporis* sp., and *Brachysporisporites* sp., hyphae and fruit bodies were also recovered with charred particles suggesting seasonal fires. A late Chattian to early Miocene age for the sediments is confirmed by dinoflagellate taxa *Distatodinium craterum, Chiropteridium lobospinosum, Homotryblium plectilum, Impagidinium paradoxum*. Marine microfossils (dinoflagellate cysts,

microforaminiferal linings), pollen and spores, stable carbon and nitrogen isotopes and organic geochemical composition of deposits suggest a gradual glacio-eustatic sea-level rise which began during a late Oligocene warming phase that maintained pace with wetland sedimentation. The sequence sheds light on southern hemisphere biogeography and regional climate history and enables a comparison and correlation with marine and terrestrial records from other Gondwanan continents.