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Terrestrial Quaternary sediments preserved on the South African shelf shed light on the glacial palaeoenvironment

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As part of a regional seismic stratigraphy, nine discrete seismic sequences containing seventeen seismic units are interpreted for the South Coast of South Africa, within the area from Still Bay in the west to Wilderness in the east and to a maximum water depth of 130 m below Mean Sea Level (BMSL). The deposition of these discrete seismic units spans the time period from the Late Cretaceous to the Recent and they are bounded by two unconformities, three regional sequence boundaries and one wave ravinement surface. This shelf has experienced extensive planation since the Neogene, forming the characteristically broad and relatively featureless 'Agulhas Bank'. At present, localised depocentres of terrestrial sediment exist in the stratigraphy where they are shallowly buried by a veneer of post-glacial marine transgression (PMT) marine sediment.

Active incision of rivers resulted channels on the shelf to be carved into the erodible Mesozoic antecedent strata during times of sea-level lowstand. The incision pattern reveals shallow, broad, fluvial systems with sweeping associated floodplains. Seismic stratigraphy revealed up to four seismic infill units within the South Coast incised channels based on acoustic textures, bounding horizons and observed geometries. The seismic architecture suggests that these infill sequences most likely represent mixed fluvial and estuarine deposits, with subsequent burial by the most recent episode of marine sedimentation. In addition to fluvial channel infill sequences, subtle shelf depressions expressed as bathymetric lows are also present on the South Coast shelf, and have been mapped at depths between 30 and 110 m BMSL. These are filled with fine grained silty material interpreted to represent sediments which were laid down in back-barrier and interdune environments. Morphology of these systems, mapped surficially using multibeam bathymetry, has shown that dune ridges penetrated by narrow entrance channels connected these low-energy lacustrine systems to the open contemporary coast. This is confirmed through microfossil analyses. The RAIN (Regional Archives and Investigations) project has obtained six vibrocores over two marine expeditions from onboard R/V Meteor. The overarching goal of this project is to expand the current state of knowledge on the drivers and dynamics of South African Late Quaternary climate change by directly comparing marine and terrestrial proxy-records. These sediment samples from the South Coast confirm the seismic stratigraphic model and a detailed multi-proxy approach has demonstrated that the deposits under study are remnant of fluvial, lacustrine and estuarine environments and have been deposited and preserved since the time of the Last Glacial Maximum. Age models have revealed that the sequences date back to a maximum of 22 ka. Therefore, regressive terrestrial sediments were deposited onto the Palaeo-Agulhas Plain and rapidly buried by subsequent PMT marine sedimentation and a transgressing shoreline through the Late Pleistocene and

Holocene. Modern shelf processes of sediment distribution ensure that these palaeo deposits remain *in situ*.

