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The role of shelf morphology and antecedent setting in the preservation of submerged shoreline sequences

Green, A.N.¹, Cooper, J.A.G.,^{1,2} and Salzmann, L.^{1,3}

¹Geological Sciences, University of KwaZulu-Natal, Westville, South Africa

²School of Environmental Sciences, University of Ulster, Coleraine, United Kingdom

³Marine Geoscience Unit, Council for Geoscience, Bellville, South Africa

Shelf stratigraphy and shoreline preservation on the high wave energy shelves of KwaZulu-Natal, South Africa, were examined using ultra-high and high-resolution seismic and multibeam bathymetric methods. This paper examines variations in shoreline preservation in relation to shoreline slope and width from two different shelf sectors.

The central shelf sector is 2-4 km wide with a gradient of ca. 2.7°. Three seismic units are preserved and represent cemented barrier shorelines, back-barrier sediments and a highstand sediment wedge. Barriers are best preserved at -100 m and -60 m with an intervening erosional surface between each. Scarps in the surface represent now buried headland-embayment cells separated by rocky headlands on the high gradient coast.

The central shelf sector is 8-15 km wide with a gradient of ca. 1°. Five seismic units are identified that record a large-scale cemented barrier complex with back-barrier systems comprising lake/lagoon depression and extensive, well-preserved parabolic dune fields.

Differences in shelf setting cause variations in the style of barrier-preservation and associated transgressive stratigraphy. A much thicker post-transgressive sediment drape, higher degrees of ravinement and only partial barrier preservation exist on the steeper and narrower shelf section. A simpler transgressive arrangement of shelf elements is produced. In contrast, the more gently sloping shelf shoreline complex contains large-scale equilibrium forms, dune fields and significantly higher degrees of preservation of the shoreline features.

