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TITLE: Geomorphological variability among microtidal estuaries from the wave-dominated South African coast

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ABSTRACT:

Over 300 independent river outlets exist around the microtidal, wave-dominated South African coast. Most of these are located in drowned river valley settings and have acquired their present morphology during the Holocene marine transgression. A variety of geomorphological forms are identified in these estuaries that result from variation in antecedent topography, fluvial sediment supply and marine sediment supply. Five distinctive estuary types are identified on the basis of contemporary morphodynamics. These are categorised into three types of normally open estuary (that maintain a semi-permanent connection with the open sea) and two types of normally closed estuary, which are separated from the sea for long periods by a continuous supratidal barrier. The contemporary morphodynamics and sedimentary environments of each estuary type are discussed. Open estuaries include barrier-inlet systems maintained by fluvial discharge (termed river-dominated estuaries) and tidal discharge (termed tide-dominated estuaries). A third category of open estuary lacks a supratidal barrier due to inadequate marine sediment availability. Closed estuaries receive marine influence via barrier overwash and occasional breaching but are typically enclosed behind a continuous supratidal barrier. Two categories of closed estuary are identified: perched and non-perched. Perched estuaries develop behind high berms and maintain a water level above high tide level in the open sea. They are often dominated by fresh to brackish water and breach and drain periodically. Non-perched estuaries are developed behind low-elevation barriers fronted by wide dissipative beach profiles. High overwash frequency introduces marine water into such systems. Breaching of such estuaries does not produce dramatic draining as the water level may only drop according to the stage of the open sea tidal cycle. The variety of estuary types suggests several potential pathways may exist in estuarine development and that the progressive infilling model is an over simplification.

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