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ABSTRACT BOOK

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A CRITICAL REVIEW OF ARCHITECTURAL STYLES IN FORESHORE-TO-UPPER-SHOREFACE SAND BODIES: WHAT DOES PRESERVATION TELL US ABOUT MORPHOLOGY AND CONTROLLING FACTORS?

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Despite the knowledge on morphodynamics of regressive, wave-dominated barrier systems, processes responsible for sand accretion and seaward migration operating in the upper-shoreface and foreshore regions are far from been understood. Additionally, as the morphological configuration of this region can vary from non-barred coasts, to more complex bar-and-trough systems in short time spans (10^1-103), it is reasonable to assume that architectural styles of foreshore-to-upper-shoreface deposits would represent the time-averaged, preserved conditions during accretion. In this contribution we analyze architectural styles of sand bodies developed in recent and ancient regressive barrier systems in order to discuss what information is ultimately preserved and their key controlling factors.

The architectural styles of examples from Cainozoic and Cretaceous times were selected. Cainozoic examples include sedimentology, GPR-based architectural analysis, and reconstructions on gradients and morphology. Outcrop examples where facies and architectural styles allowed to reconstruct gradients and infer morphological configurations, were selected.

Foreshore-to-upper-shoreface architectural styles characterized by closely spaced, foreset beds are dominantly developed when foreshore gradients are > 3° (typically 5-11°), or when they are 2-3° , but with a significant break in slope compared to the upper-shoreface gradient (< 0.5°). Both architectural styles are developed in a wide range of sand grain sizes (very fine to coarse sand), but they differ in stratal geometries and facies distribution. In the first case, foreset beds have a tangential geometry, with faint discrimination between foreshore and upper-shoreface sediments (either in facies or slope). Parallel planar lamination and small-scale trough cross-stratification are common, the latter becoming dominant at the bottomsets. In the second case, inclined foreshore strata (1-3° seaward dipping) downlap onto subhorizontal upper-shoreface deposits together with a distinct change in facies, from parallel planar lamination in the foreshore deposits to large-scale trough cross-stratification in the upper-shoreface strata. These two facies associations can be also present in a third architectural style, but in this case without evident foreshore-related inclined foreset beds. This is by far the most common architectural style described in outcrop, and reconstructing gradients indicate relatively gentle foreshores (1-3°) combined with regular upper-shoreface slopes (0.8-1.9°).

The analyzed dataset suggests that the generation and preservation of any single architectural style seems unrelated to the barrier system (e.g., strandplains, barrier islands) or regressive shoreline trajectory (ascending, horizontal, descending), neither linked to a specific grain-size range. In contrast, each architectural style appears to be associated with the relationship between foreshore and upper-shoreface gradients, and the dominant morphology at the time of accretion. Packages of tangential foreset beds seem to record non-barred conditions and steep profiles, with successive beachfaces accreting seaward on short times. The other two architectural styles attest the preservation of barred conditions and gentler profiles, with dune-related deposits, probably developed in trough settings, gradually overlaid by foreshore sediments. Noteworthy, bar-related deposits (swash or longshore bars) and landward dipping surfaces were hardly ever identified in these examples. Therefore, these macroforms and their short-term migrating processes supplying sand to the beachfaces, though well-documented in modern settings, could be geological features with rather low preservation potential in many regressive barrier systems.