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Mixed Terrigenous-Carbonate Lagoonal Infill During the Holocene Transgression (Mayotte, Comoro Archipelago, SW Indian Ocean)

High-resolution seismic profiles and gravity cores from various lagoonal settings around Mayotte (SW Indian Ocean; 12850'S, 45810'E) were studied to determine the Holocene sediment distribution and sequence stratigraphic architecture within this barrier-reef/lagoon complex.

The lowstand systems tract consists of a paleosol horizon. The transgressive systems tract comprises four depositional environments: 1) inner transgressive layer, 2) proximal and distal incised valley fills, 3) mid-lagoonal layer and 4) keep-up or catch-up fringing and barrier reef sequences. The highstand systems tract shows three sedimentary systems: 1) proximal terrigenous wedge, 2) mid-lagoonal and distal carbonate sands or mud's and 3) reefal carbonates.

The Holocene sequence stratigraphic development is primarily controlled by the rate and amplitude of sea-level rise and environmental changes, which are documented by changes in clastic sediment supply and carbonate production. Pre-Holocene topography and water dynamics determine the vertical and spatial sediment thickness distribution. Additional important parameters are the source-area proximity (carbonate or terrigenous), the width of the depositional area, and climate dynamics steering carbonate production and terrigenous run-off.

Sedimentation rates in subtidal settings always lacked behind sea-level rates. Thus, a sedimentary environment was formed in which sediment production was not efficient enough to fill-up accommodation space. In addition, wave and/or current energy might have prevented sediment deposition in various lagoonal settings. All these processes resulted in a typical empty bucket morphology. Only a sea-level fall would allow the subtidal lagoon to build up to sea level. So, unfilled accommodation space must be a very common feature in the geologic record.