



Recent carbonate firm- to hardgrounds in the Abu Dhabi lagoon: Environmental controls and petrography

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Marine carbonate firm- and hardgrounds have been described from the Precambrian to the recent sedimentary archive. In comparison to the numerous publications dealing with fossil case examples, well-constrained studies of shoalwater hardground formation from modern (sub)tropical seas are comparably scarce. This comes as a surprise as only modern depositional environments offer direct insight into the plethora of environmental, geochemical, kinetic, and biological parameters that affect these features at formation and during diagenetic pathways. Here, we present the first results of a combined field and laboratory study with focus on firm- to hardgrounds (also termed “discontinuity” in the sense of a catch-it-all term) forming both in the shallow inner lagoon and the outer lagoon ooid shoals of the Abu Dhabi barrier-island complex. Essentially, the discontinuities found represent sub-grounds in the sense that they form a few centimetres beneath the sediment surface. Sub-grounds in the outer lagoon ooid shoals are cemented by characteristic needle-shaped aragonite crystals and essentially represent lithified crab burrows. In contrast, sub-grounds in the inner lagoon of Abu Dhabi form brittle intervals, perhaps 5 cm in thickness, that are cemented by platy aragonitic crystals that show uncommon morphologies. Botryoids are abundant and generally seem to affect crystal morphologies. First evidence suggests that these features form below the uppermost oxic layer of pore fluids in the shallow sedimentary column. These findings are placed in context with temporally-resolved data on sea and porewater chemistry.