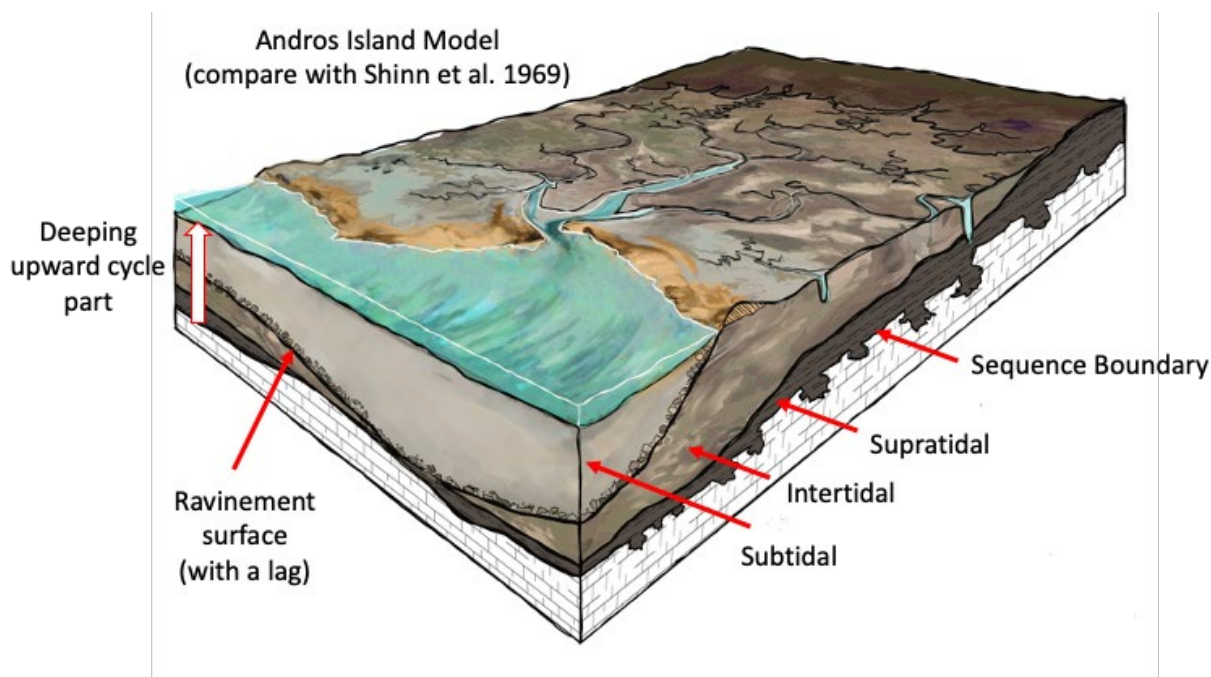


Do your coastal limestone cycles always shallow-upward?

Coastal carbonate sequence stratigraphic models have changed little since they were first developed in the 1990s for characterization of subsurface sedimentary limestone bodies. Their initial development relied on the understanding of modern coastal carbonate systems investigated during the 1970s and 1980s. These vintage field studies largely focused on surficial coastal carbonate deposits of the Caribbean, Western Australia, and the Arabian Gulf. Since then, many additional coastal studies have been undertaken in these carbonate-producing areas, as well as other regions. Perhaps as importantly, new information is available regarding the nature of sediments covering the carbonate-producing continental shelves that are now sitting in deeper water (> 60 m), but that were formed in the coastal zones during the early stages of the Flandrian Transgression (18,000-10,000 years before present). Together, these studies (new and old) point to an understanding of how stratigraphic successions are formed in limestone-producing systems that is significantly different from that which had been assumed in the 1990s. Specifically, carbonate coastal systems appear to act similarly to siliciclastic coastal systems, in that shallow-water transgressive deposits, long assumed by early workers to be missing from the carbonate rock record, or only represented by a lag interval, in fact make up an important component of modern carbonate depositional successions. Based on a synthesis of these modern-system studies (Dalrymple and Rivers, 2023), gradually shallowing-upward parasequences are less anticipated cycle types than highest-order sequences that either deepen upward (e.g. exposure surfaces bounding packages of tidal flats overlain by open platform deposits) or that display both deepening and shallowing. Because of wave ravinement, facies changes in transgressive legs of these highest-order sequences are anticipated to be abrupt (sharp flooding surfaces) whereas regressive deposits may gradually shallow. The implications of this discovery are wide-ranging and have generated a need for updated sequence stratigraphic models for coastal carbonates, one that is meaningfully different with respect to predictions of large-scale subsurface connectivity and fluid-flow pathways from those generated by the models currently in use. In this session we are looking to explore how coastal carbonate cycles are being defined in your ancient system, how variable the cycles are, and how they compare with modern systems observations.



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