Laws of Depositional Architecture Atop Modern Carbonate Platforms

Purkis, Sam J.[1]; Kohler, Kevin E.[1]; Riegl, Bernhard [1]; Dunn, Shanna [1]; Rowlands, Gwilym [1] (1) National Coral Reef Institute, Nova Southeastern University, Dania Beach, FL.

It has been observed that aspects of the heterogeneity of modern marine carbonate depositional landscapes are predictable through scaling functions that describe the size, shape, and complexity of geobodies. Hitherto neglected has been a thorough treatment of the impact that environmental factors such as exposure, water depth, tidal range, and climate, as well as depositional constraints, such as platform type, have on the form of these functions. To quantify these influences, a diverse suite of reef sites, covering >10,000 km2, are assembled for which facies architecture has been mapped using satellite and/or airborne LiDAR data. Each site is analyzed for morphometric properties of the facies mosaic, including rules of facies juxtaposition. In parallel to these analyses, a forward-model is presented that imitates the process of sub-aerial dissolution of exposed carbonate by rainwater. The results of this exercise, combined with the analysis of the remote sensing data, serve to decouple the influence of antecedent karst topography from depositional environment as the driver of predictability in modern reefal systems.