

## **Analog for Exploration- and Development-Scale Heterogeneity in Grainstone Reservoirs; Exuma Islands, Bahamas**

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The complexity of ooid sands as reservoirs has caused us to revisit the modern bank-margin grainstone setting to improve our understanding of exploration- and development-scale heterogeneity. In the Exuma Islands, Bahamas, one can observe spatial variability of both depositional and diagenetic facies that create potential reservoir heterogeneity and stratigraphic traps. The Exuma island chain (250 km long) contains hundreds of islands, often two or three paralleling each other, which are both Holocene and Pleistocene in age. On an exploration scale the islands and surrounding sands form a large sand-body parallel to the platform edge. This elongated sand belt is extremely heterogeneous on the smaller scale. A variety of facies are juxtaposed because both antecedent and syndepositional topography set the stage for a complex pattern of modern ooid sand accumulation. The sands form lobate deltas, marine bars, and along beaches and are locally transported to accumulate in sand-rich tidal flats, dune ridges, and deeper water settings in both a platform and seaward direction. The spatial patterns of facies as viewed on satellite images show the potential complexity of a similar fossilized example.

Specific lessons learned from this modern analog are: 1- antecedent eolian topography forms a template for the distribution of modern ooid sands (tidal delta, stacked eolianites, tidal flat); 2- the geometry (lobate to elongate to bank interior) of the modern ooid sand bodies is dictated by the focused energy between the antecedent template; 3- the discontinuous island morphology allows focused tidal circulation that sweeps lime mud from the margin and platform interior; 4- widespread marine and meteoric cementation form Holocene islands creating new topography; 5- reservoir-scale heterogeneity in tidal delta and grainy tidal flat settings is apparent at the 100-m scale, with variation between clean ooid grainstone and muddy ooid packstone textures.

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