QUANTITATIVE INTERROGATION OF DEPOSITIONAL PATTERNS AND DIAGENETIC MODIFICATION OF THE MIAMI OOLITE

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PROJECT OBJECTIVES

- Exposure of the Miami oolite in the vicinity of Miami, Florida, provides excellent examples for analysis of preserved primary sedimentary features and subsequent diagenetic changes of a "fossilized" ooid sand body.
- Continued analysis of the depositional patterns and stratigraphy of the Miami oolite from interrogation of outcrops, cores and ground penetrating radar (GPR) within the framework of an airborne LiDAR digital terrain model (DTM).
- Investigation of the varied styles of karst overprint of the outcrops and the amount of modification to the depositional profile.

PROJECT RATIONALE

Harris et al. (2011) quantitatively analyzed three of the main modern carbonate sand bodies on Great Bahama Bank (GBB), which show a range of depositional facies patterns typifying modern deposits as well as their ancient counterparts. Their work introduced several interrogation approaches that we (Purkis and Harris, 2016) applied to the fossil shoals of the Miami oolite as resolved in a LiDAR bare-earth terrain model as the first part of a 2-year project (Fig. 1). The comparison between the modern examples and the Pleistocene deposits of the Miami oolite also explored the preservation potential of various aspects of grainy carbonate systems.

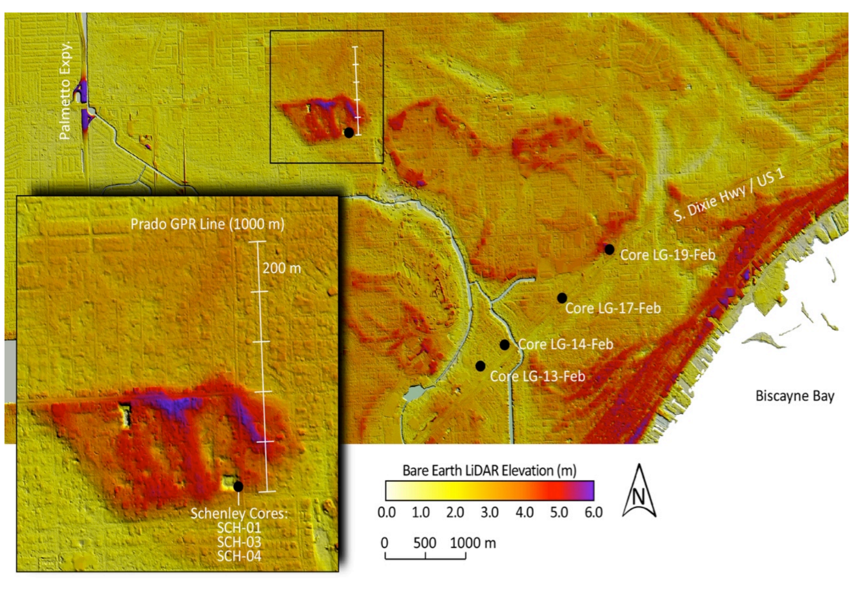

Figure 1. Example of superb resolution of the airborne LiDAR DTM. A NE-SW trending high ridge – the barrier bar of the Maimi oolite – occurs in front of bars and channels (partially shown here) that trend perpendicular to the strike of the sand body. Locations of some cores and a GPR line are shown.

Scope Of Work

Mapping of Miami oolite shoals in the LiDAR DTM uses similar techniques as employed on the imagery from GBB, except that thresholds in elevation values are used to delineate features as opposed to spectral Landsat values. We will continue our analysis of the depositional patterns of the fossil shoals and channels by further investigating key outcrops, which are precisely positioned on the DTM. We will also continue to evaluate the stratigraphy of the Miami oolite, deposited during Pleistocene Marine Isotope Stage 5e, by evaluating key cores and GPR lines within the framework of the DTM, as well as morphometric comparisons to modern analogs in the Bahamas. The DTM and outcrops also offer a unique opportunity to analyze the varied styles of karst overprint and amount of diagenetic modification to the depositional profile during the >100 ky of subaerial exposure (Fig. 2).

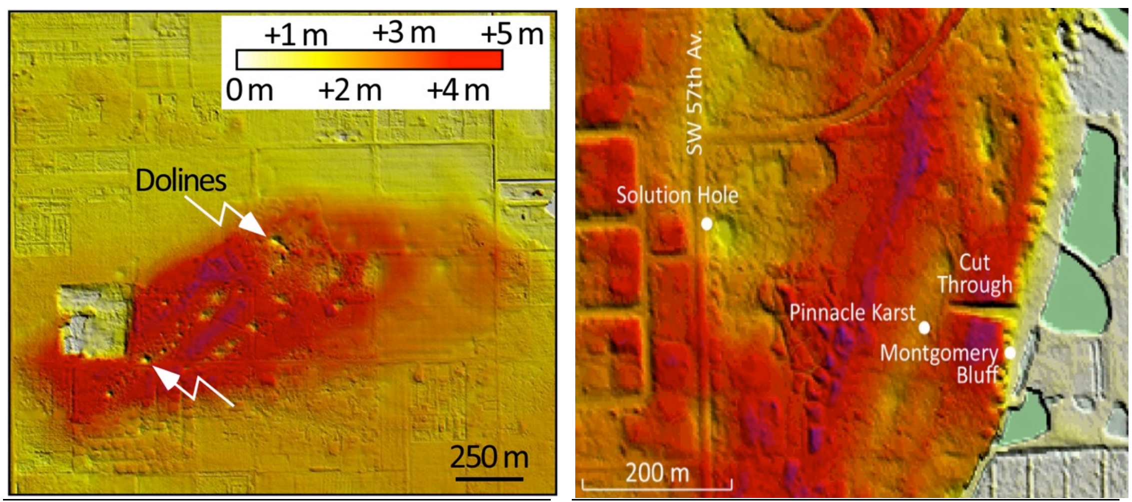

Figure 2. Scenes from the LiDAR DTM showing regions of the Miami oolite where karst features are well developed.

Significance

Continued interest in modern and outcrop analogs for carbonate sand reservoirs is warranted based on the substantial number of these types of reservoirs. The spatial variability of depositional environments and early diagenetic overprint that potentially creates reservoir heterogeneity within a fossilized carbonate sand system can be interrogated in the Miami oolite.

References

Harris, P.M., Purkis, S.J., and Ellis, J., 2011, Analyzing Spatial Patterns in Modern Carbonate Sand Bodies from Great Bahama Bank, Journal of Sedimentary Research, v. 81, p. 185-206.

Purkis, S.J. and Harris, P.M., 2016, Morphometric Comparison of the Miami Oolite and Modern High-Energy Sand Bodies of Great Bahama Bank, CSL Annual Review Meeting Abstracts Volume, p. 133-138.