DECIPHERING THE EVOLUTION OF THE NEW PROVIDENCE PLATFORM, BAHAMAS, USING 2D GPR DATA AND CORE CORRELATION

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PROJECT OBJECTIVES

- Conduct a high-resolution sequence stratigraphic analysis of the Pleistocene carbonate deposits of New Providence Island on 250 MHz 2D GPR data.
- Integrate GPR data with outcrop facies analysis and high resolution drone photography.
- Reconstruct the depositional history of the Tertiary deposits of New Providence Platform using a 670 ft core.

PROJECT RATIONALE

The carbonate deposits of New Providence Island, Bahamas, mainly formed during successive sea-level highstands (Reid, 2010). Detailed analysis of these deposits will be performed using 250 MHz 2D GPR data. This dataset shows high resolution depositional sequences of the Pleistocene sea-level highstands from foreshore to eolianite deposits (Fig. 1). These deposits have proved to be faithful recorders of sea-level oscillations within sea-level highstands (Eberli, 2013; Jackson et al., 2013). For example, during MIS 5e, sea-level oscillated 10+ m, dividing the depositional sequence into early and late substages. In addition, smaller scale sea-level oscillations at the onset of glaciation produced extensive lateral accretion of downstepping beach ridges and associated subtidal deposits (Garret and Gould, 1984). These suborbital sedimentary cycles have major implications for cyclostratigraphy and how we extract high-frequency sea-level fluctuations from depositional cycles. The detailed documentation of depositional units produced by sea-level oscillations is thus of paramount importance.

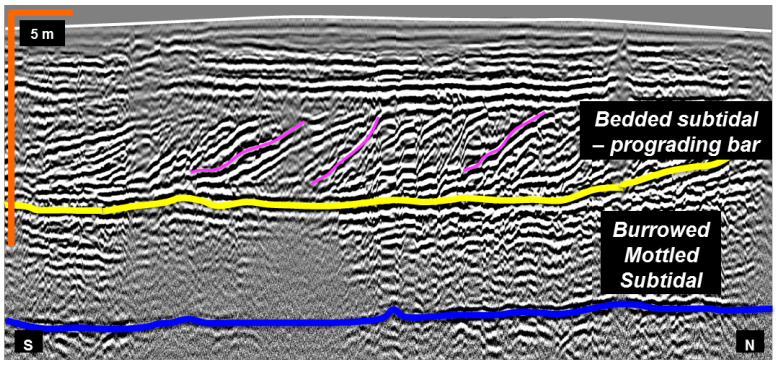

Figure 1. High resolution image from 2D GPR data showing subtidal foreshore and prograding bar deposits.

PROJECT DESCRIPTION

Pleistocene Sediment Analysis Using 2D GPR Data

The high resolution 250 MHz 2D GPR dataset provide a detailed view of the sedimentary successions of New Providence Island. This dataset will be essential in establishing a high-resolution sequence stratigraphic framework. The GPR dataset will serve as a guide to interpreting the sedimentary successions of the Pleistocene. High-resolution drone photography of the Clifton Pier area will be used for a visual perspective of the successions with respect to the GPR dataset. In addition, we plan to correlate the GPR data interpretations with sedimentary features observed in outcrop. This correlation will be done by visiting outcrops along road cuts and waterways that pass through the GPR data acquisition area.

Tertiary Sediments Analysis Using Core Data

The long-term evolution of New Providence Island will be analyzed in a 670 ft core, taken in the northern part of the island as part of the BahaMar Cooling Wells project (Fig. 2). Depositional and diagenetic facies analysis, using core interpretation and petrographic thin sections, will help decipher the depositional history of Tertiary deposits of New Providence Island. The core contains several dolomitic intervals and many exposure horizons that document the complex diagenetic history of these carbonates.

SIGNIFICANCE

Most of the sediments in the New Providence Platform were deposited in the Pleistocene. High resolution 2D GPR imaging will aid in understanding the depositional history of the sediments in more detail. The deeper sections of New Providence can be closely studied using the long core that is available.

Figure 2. Parts of the 670 ft core showing transition from light colored limestone to darker dolomite facies.

REFERENCES

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