# DECONSTRUCTING THE SEDIMENTOLOGY OF MIXED CARBONATE-SILICICLASTIC DEPOSITION: CIBAO BASIN, DOMINICAN REPUBLIC

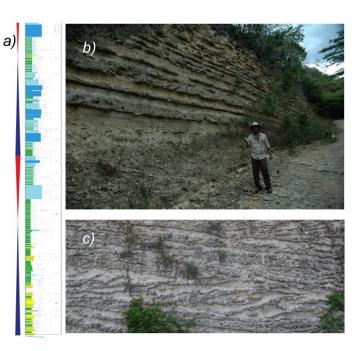
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#### **PROJECT OBJECTIVES**

- Provide a textural, geochemical, and paleo-ecological calibration of an outcrop section through an unconformity-bounded mixed system sequence.
- Develop a depositional model for tropical mixed skeletal (reef) and mudsourced deposition that includes the timing of siliciclastic inputs and variability in carbonate production.
- Assess the magnitude of the late Miocene Zanclean transgression and compare the mixed systems response to other global signatures from this event.

## **PROJECT RATIONALE**

The diverse settings in which carbonates and siliciclastics mix provides a challenge in developing predictive models of lithofacies distribution and geobody geometry. The primary goal of this project is provide to а textural geochemical, and paleoecological calibration of a newly discovered outcrop through section а unconformity-bounded The clinothem package. Gurabo Formation of the Cibao Basin in the Dominican Republic is late Miocene and early Pliocene in age and forms one of the best of examples low-latitude margin progradation in a mixed system setting (McNeill 2012). The new et al., outcrop section vertically transects the middle part of the depositional sigmoid and



*Figure 1. a) Stratigraphic column for Gurabo section* 

*b)* Outcrop exists between 68 m to 80 m in stratigraphic section

c) Stratigraphy within the Rio Mao terraced section, 93 m to 102 m in section

records the sedimentologic and stratigraphic archive of deposition during and after a major global transgression (the Zanclean Flood near the Miocene-

Pliocene boundary and the early Pliocene highstand). These deposits are unusual in being largely unconsolidated and amenable to sedimentologic characterization; providing an ideal outcrop analog for tropical mixed system deposition on the shelf margin.

The resultant sequence "ground truthing" will be used to refine a depositional model for tropical mixed skeletal and mud-sourced deposition. The data generated from this section can be used to forward model the development of potential reservoir beds in a conventional (vuggy carbonates) and unconventional (mud rich) framework.

## SCOPE OF WORK

During the first phase of this project we measured a 178 m thick section, with some additional outcrop still remaining above our top level, but below the upper sequence boundary. Lithologic and biostratigraphic samples were collected at ~1 m intervals with a small gasoline-powered rock drill. The drill enabled rapid collection of fresh material away from the weathered outcrop surface. These samples will be used for mineralogy (XRD), total organic carbon analysis, bulk stable isotopic composition (P.K. Swart, SIL), determination of benthic and planktic foraminifera (B. Lutz, Shell), calcareous nannofossil stratigraphy (R. da Gamma, Shell), and grain size and compositional analysis. In addition, we will collect the key coral fauna in the transect for two purposes: water depth and possible aragonite samples for radiometric age dating (U/Pb, J. Woodhead, U. Melbourne). The benthic and planktic foraminifera provide integrated water depth, upwelling, and age constraints for the section.

### SIGNIFICANCE

The expected results of this research will provide a calibrated lithofacies section that penetrates the thickest part of the margin sigmoid, and will resemble data that might be recovered in a core or borehole log. Regionally, this calibration will provide a new, additional record of the nature of carbonate and siliciclastic mixing in a mud-rich, tropical shelf margin. Globally, this section records the magnitude of the Zanclean transgression. This global transgression is recorded in seismic profiles and cores from several locations around the world (Gulf of Papua shelf margin, Belize shelf, isolated platforms in the South China Sea, and the Great Barrier Reef in Northern Australia) and will be further refined (Tcherepanov, 2008).

### REFERENCES

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- Tcherepanov, E.N., Droxler, A.W., Lapointe, P., and Mohn, K., 2008, Carbonate Seismic Stratigraphy of the Gulf of Papua Mixed Depositional System: Neogene Stratigraphic Signature and Eustatic Control, Basin Research, v. 20, p. 185-209.