

GEOCHEMICAL FACIES OF THE BAHAMAS REVISITED

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PROJECT OBJECTIVES

- To explore geochemical variations in the surface sediments of the Great Bahama Bank and relate these to sedimentary facies.
- To apply this information to core material from the Bahamas and other carbonate platforms, both in the Neogene and ancient carbonates.

PROJECT RATIONALE

The Great Bahama Bank (GBB), a large (>100,000 km²) shallow-water carbonate complex situated to the east of the Florida Straits, has built up over at least the last 100 myrs (Eberli and Ginsburg, 1987; Schlager et al., 1988) as a result of the activities of carbonate secreting organisms and the inorganic precipitation of calcium carbonate (Purdy, 1963a, b; Traverse and Ginsburg, 1966). In order to calibrate the geochemical signal of these sediments, a series of cruises collected material from the western portion of Great Bahama Bank between 2002 and 2005 (Fig. 1). This work resulted in the publication of a series of sediment facies and geochemical maps (Reijmer et al., 2009; Swart et al., 2009) which were used to calibrate remote sensing images which in turn allowed facies to be mapped in areas of GBB not previously sampled (Harris et al., 2015). This study will concentrate on the areas of GBB not sampled previously.

SCOPE OF WORK

The proposed work will sample the surface sediments of the Bahamas (to the west and south of the island of New Providence and in the southern area of GBB), which were not only not sampled during our previous efforts, but were also largely ignored in the studies of Purdy (1963a) and Traverse and Ginsburg (1966). In these areas we propose two three week cruises, one in 2019 and one in 2020. During these cruises we will collect water and sediment samples on a grid and characterize

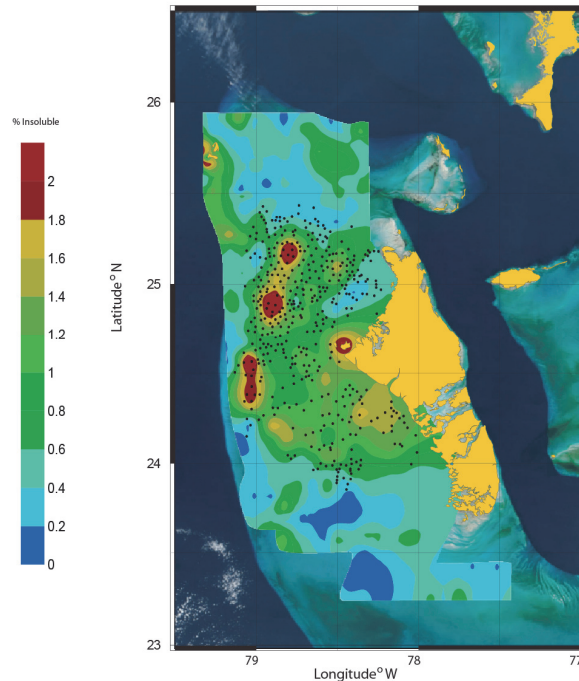


Fig. 1: The percentage of insoluble material in sediment samples collected in cruises between 2002-2006 and the location of whittings.

bottom sediment types using video. Samples will be classified during the cruise using the textural features outlined in Dunham (1962). Once the samples are returned to Miami we will carry out a range of geochemical analyses. These analyses will include stable isotopes of C, O, N, Ca, Mg, Cr, and trace elements on the inorganic components, together with C and N and carbon content analysis of the organic components.

SIGNIFICANCE

Our previous studies provided valuable geochemical data with which to calibrate the sedimentary record. One example of this was the identification of high concentrations of insoluble material linked to the fertilization of GBB by African dust (Swart et al., 2014). This in turn encouraged the activity of cyanobacteria, drawing down the concentration of CO₂ and promoting the precipitation of CaCO₃ as whittings. We propose that the new suite of surface sediment samples will provide new information, both expected and surprising, and be useful in the interpretation of the formation of carbonate sediments and their diagenesis.

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