THE ORIGIN OF PELOIDAL NUCLEI IN BAHAMIAN OOIDS

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PROJECT OBJECTIVES

- Determine the provenance of the nucleus in the ooid shoals in the Bahamas.
- Test the hypothesis that the peloidal nuclei are produced on the shoal itself.

PROJECT RATIONALE

Ooid shoals require high energy environments to form that are accomplished in tidal regimes or along beaches. The largest ooid shoals form at the end of embayments in the platform where the tidal wave is focused (Fig. 1). Despite the fact that these areas are mud-deprived, the predominant nucleus of the ooids in these sand bodies has been reported to consist of peloids (Harris et al., 2019). Micritic grains that are called peloids can form by micritization of skeletal grains and older ooids but it is generally assumed that most of the modern peloids on Great Bahama Bank are pelleted mud. Filter-feeding organisms like shrimps and worms are producing pellets. The question is how the peloids are transported into the active portions of the ooid shoals where ooids preferentially form? Storms do not bring peloids to the shoal areas but it is well-documented that storm surges laden with mud deposit a mud layer on the shoals (Fig. 2; Major et al., 1996). It is our hypothesis that the pellets are subsequently produced from this mud directly on the shoal.

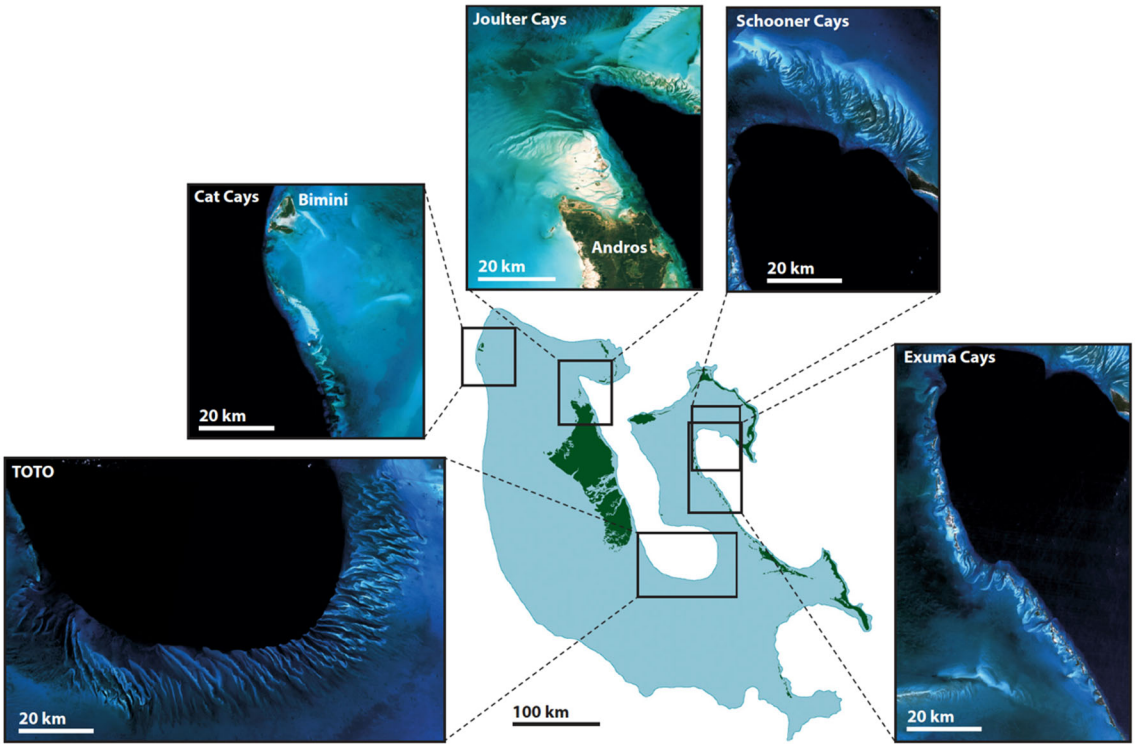

Figure 1: Map of Great Bahama Bank and landsat images of the largest ooid shoals at the end of embayments on the bank top: the Cat, Joulter, Schooner, and Exuma Cays and the Tongue of the Ocean (TOTO). Figure adapted from Purkis and Harris (2017) as published in Harris et al. (2018).

Figure 2: Discontinuous mud layer deposited on a well-sorted ooid shoal on Joulter Cays after Hurricane Andrew (Major et al., 1996). The photograph was taken several days after the hurricane had passed. The mud is then utilized by shrimps to stabilize their burrows. See below.

APPROACH

To test the hypothesis a quantitative analysis of the abundance of peloidal nuclei on the ooid shoal is needed. Microscopic inspection of modern ooids will be conducted to identify the various nuclei. Point-counting will give the quantification of the different nuclei. SEM images will be used to document the process of hardening of the ooids to reach the induration needed for movement in the tides and the accumulation of the cortices.

IMPLICATION AND SIGNIFICANCE

Validation of our hypothesis will imply that the large accumulations of modern ooid sands are facilitated by storm activity. This might also help to explain why large ooid shoals are missing in tropical areas where hurricanes do not exist.

BIBLIOGRAPHY

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