Petrographic Characterization of Deep Water Ooids on the Florida Shelf

James Lachterman, Donald McNeill (advisor)

University of Miami, jel162@Miami.edu

Introduction

- Formation of ooid sands is generally thought to be a process that operates at relatively shallow (water) depth through tidal processes. 11, 12, 13, 14
- Extensive formation during lowstands of sea level are not widely documented. 9, 16, 18
- Deeper shelf ooids beds are generally rare. Drowned ooid samples have been previously sampled off the Florida coast. 18
- Carbonates diagenesis can be linked to microbial activity. The level and rate of micritization and alteration observed in the ooid can potentially give insight into the site (depth) of diagenesis. 3, 4, 17, 20

This study examines ooid grains formed during the last glacial and found at a depth on the shelf below the generally accepted level of the last sea level lowstand (~120 m). 7

- As such, our working hypothesis is that ooids can form by relatively strong currents during sea level lowstands. These formation environments are generally much less common (at least today) than tidal environments.

Methods

- Ooid sediment samples were collected from a series of cores part of an unrelated study from the east Florida shelf (Figure 1)
- Core 20 was chosen for analysis recovery of several meters of oolitic sand and mud. (Figure 2)
- Oolitic grains were collected in sample sizes of 200 grains per carbon stub. (Figure 3)
- Phillips XL-30 environmental scanning electron microscope (SEM)

Results

- With reference to radiocarbon ages (Table 1, Figure 17) and the water depths at which the cores were collected (Figure 1), the ooids formed below the last glacial lowstand. 5
- Ooids below the 3200-year hiatus display slight differences: less endolithic boring, a mix of tangential and radial crystal orientation, and a tendency to display less evidence of micritization
- Tangential as well as radial/botryoidal crystal structures are found within Core 20. Most modern (Bahamas, Turks and Caicos) shallow-water ooids typically do not contain radial structures.
- Discussion of formation, age discontinuity within ooid formation, and unique preservation status, and a lack of intense micritization supports the idea of a deep water ooid factory.

Conclusions

1. Ooids from Core 20 off southeast Florida at a depth over 150 m were produced at depths below the last glacial lowstand (of ~120 m). Core 20 contains a hiatus of ~3200 years at 171 m depth confirmed by carbon-14 ages. Ooids below the 3200-year hiatus display slight differences: less endolithic boring, a mix of tangential and radial crystal orientation, and a tendency to display less evidence of micritization

References