THE EVOLUTION OF THE STRAITS OF FLORIDA AND THE MIAMI TERRACE

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PROJECT OBJECTIVES

- To revise the age model for Oligocene to Pliocene deposits throughout the Straits of Florida.
- To investigate whether the partial drowning of the Florida platform was influenced by the strengthening of the Gulf Stream.
- To assess the relative importance of oceanographic factors relative to sea level and tectonics on the evolution of the Straits of Florida.

PROJECT RATIONALE

The Straits of Florida is a major seaway between carbonate platforms of the Bahamas-Florida region. The origin and the evolution of the seaway have been discussed for years. There are two main competing ideas with regards to origin; one postulating that the seaway is an unfilled graben that formed during the extension of the continental crust when the Atlantic opened in the late Jurassic (Mullins and Lynts, 1977). Others proposed a shallower and younger origin of the seaway, attributing genesis to a partial drowning of a megabank that existed in the early Cretaceous in the Florida Bahamas region (Sheridan et al., 1981; Schlager and Ginsburg, 1981). Based on a large data set of regional seismic lines, Massaferro and Eberli (1999) postulated that tectonic loading during the Cuban-American collision caused reactivation of Jurassic faults and drowning of the once larger platform. Since the late Middle Miocene the Straits of Florida has also been the main getaway of the Florida Current, which influences the sediment distribution in the Straits (Bergmann, 2005). The partial drowning of the Florida Platform that created the Miami and



Figure 1. Seismic section across the Miami Terrace and the buried older platform in the Straits of Florida. The two partial drowning events are the focus of this study (modified from Bergman, 2005).

Pourtales Terrace occurred around the time of the onset of the Florida Current. There is increasing evidence in other carbonate platform systems that the onset of strong ocean currents may have contributed to the drowning of platforms, for example, the Marion platforms (Eberli et al., 2010) and parts of the Maldives (Betzler et al., 2009). Here, we evaluate if the oceanographic changes or tectonics caused the platform demise that formed the Miami Terrace.

SCOPE OF WORK

This research will focus on the Neogene environmental impact on the Florida Platform in the Straits of Florida. To estimate the timing and causes of the drowning we will focus on the pre-, syn, and post-drowning sediments by determining their ages and composition. New seismic data collected during the CARAMBAR 1 cruise allow the drill sites of ODP Leg 101 and 166 to be correlated to the seismic data for the first time. Seismic-core correlation of the ODP Sites 626 and 1007 will provide the data for the precise dating of the seismic horizon, including the onset of drift deposition. Dating of hardgrounds on the Pourtales Terrace will produce independent timing of the partial drowning of the Terrace. A causal relationship between partial drowning and current onset is likely if the two dates are similar.

SIGNIFICANCE

The impact of paleoceanographic changes, in particular currents, on the evolution of carbonate platforms is still not fully understood. This study likely shows how these oceanographic changes, together with tectonic and eustatic histories, need to be taken into account in order to correctly reconstruct the depositional architecture of a carbonate platform.

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