# INFLUENCE OF OCEAN CURRENTS ON MIOCENE CARBONATE PLATFORM DROWNING

Anna H.M. Ling, Gregor P. Eberli, Christian Betzler<sup>1</sup>, and IODP Expedition 359 Scientists 1) CEN, University of Hamburg, Germany

#### **PROJECT OBJECTIVE**

 Test the hypothesis that ocean currents are a major contributor towards carbonate platform drowning at the Kardiva Carbonate Platform, Maldives and Miami Terrace, Florida, USA.

## **PROJECT RATIONALE**

Carbonate platform drowning is a common phenomenon in the carbonate system for which many theories exist such as global anoxic events, fast sealevel rise, tectonic break-up, and nutrient excess (Hallock and Schlager, 1986). However, evidence also exists for the close relationship between platform drowning and intensification of ocean currents, for example, for the Miocene platforms on the Marion Plateau (John and Mutti, 2005, Eberli et al., 2010). Likewise, Betzler et al. (2013) proposed that in the Maldives the onset of monsoon-related currents correlate with the drowning of the platforms. Similarly, Mullins and Neumann (1979) proposed that the intensification of

the Florida Current may have been responsible for the cessation of growth at the carbonate platform forming the Miami Terrace. All of these examples make it necessary to test if platform drowning is related to ocean currents.

## Approach

The hypothesis that platform drowning is related to ocean currents will be tested by performing the following tasks:

1) Assess the coeval onset of the current system with the platform demise by comparing the age and sediment facies of the platform drowning with the base of the drift deposits.

2) Perform geochemical analyses on proxies of water



Figure 1: Seismic line and interpretation of the physical relationship between platform growth (blue) and drift deposition (yellow) (Betzler et al., 2016).

mass changes with the onset of the current system in the basinal drift deposits and the drowning succession on the platform top.

#### **DATA SETS**

Relevant datasets from IODP Expedition 359 consists of lithostratigraphic data, geochemical data, petrophysical data, and biostratigraphic data while datasets from the Miami Terrace are seafloor dredge samples consisting of phosphatic limestones. Sr-isotope dating will be conducted to assess the onset of current activity at the platform. Geochemical proxies for nutrient enrichment such as Cadmium (Cd), Barium (Ba), Phosphate ( $PO_4^{3-}$ ) and Nitrate ( $NO_3^{-}$ ) in the slope and the drift deposits will test if there is a lead or lag of nutrient enrichment at the time when the platform drowned. Evidence for potential nutrient influx onto the platform by current activity can be identified based on the changes in biota. The increase in nutrients would change the reef-dominated platform into an algal dominated platform.

#### SIGNIFICANCE

This study is significant in providing insights regarding the process of carbonate platform drowning. If the relationship can be established within the Miocene platforms in the Maldives and Florida, this process which appears to be connected with the demise of carbonate platforms can be applied (or tested) in ancient carbonate platforms. If drowned carbonate platforms are current recorders, there is a possibility of reconstructing paleo-current onsets with major drowning events throughout the geological record, in particular for pre-Mesozoic times when the oceanic sediments are not preserved.

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