

# THE RELATIONSHIP BETWEEN CARBONATE SLOPES AND CONTOUR CURRENTS

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## WORKING HYPOTHESES

- Current strength along carbonate ramps, shelves and isolated platforms determines the
  - dip of the platform flanks
  - dip of the mounded contourite drift
  - grain size of the contourite drift
- Carbonate slopes steepen worldwide in the late Middle Miocene after the onset of modern ocean currents at approximately 13 Ma.

## PROJECT RATIONALE

It has been proposed that carbonate slope architecture is controlled by the amount of deposition, by-pass or erosion of mass gravity flows (Schlager and Camber, 1986) and by the fabric of the slope material (Kenter, 1990). The flanks of carbonate platforms around the world after 13–10 Ma have, however, not only been constructed by mass gravity deposits, but equally by contourites with distinct drift and moat geometries. This style of flank architecture is typical of tropical carbonate platforms growing in the Neogene icehouse world. Ocean currents reduce sedimentation by particle sorting or winnowing and even by eroding slopes (Betzler and Eberli, 2019). In

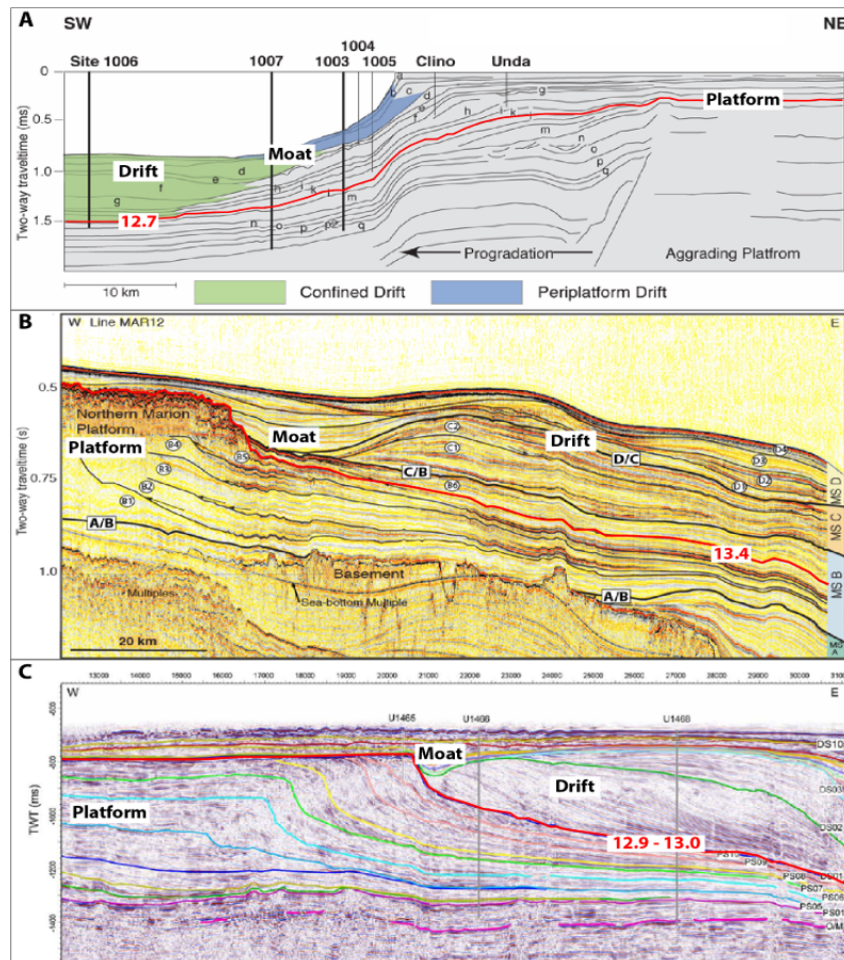


Figure 1: Selected seismic lines from A: Great Bahama Bank, Atlantic. B: Marion Plateau, northeast Australia. C: Maldives, Indian Ocean.

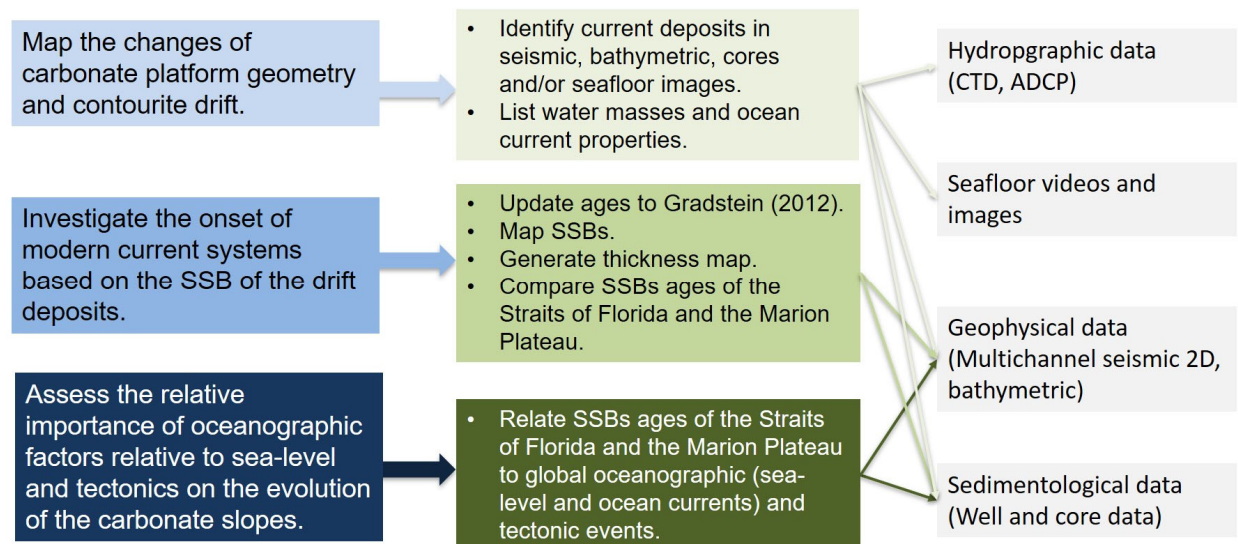
this project we will document the evolution of carbonate slopes in the Bahamas, on the Marion Plateau, and in the Maldives, and their relationship with the along slope sediment transport by contour currents. These platforms show an abrupt onset of current activity along their slopes (Red lines in Fig. 1).

## DATA SETS

For this study, four data sets consisting of seismic, cores, and log data, from ODP Leg 194, ODP Leg 133, ODP Leg 166, and IODP Expedition 359 are analyzed. Age models are based on biostratigraphy and Sr-isotope dating from these ODP and IODP sites.

## APPROACH AND WORKFLOW

To achieve the goals regarding the influence of contour currents on the carbonate platform slopes, we use the following workflow:



## SIGNIFICANCE

The outcome of this study will improve our understanding of the influence of currents on carbonate platform architecture. The results will prompt a revision of facies models of carbonate platform slopes that have been based mostly on the assumption that they have been constructed by mass gravity flow deposits. This knowledge potentially helps discriminate current-influenced platforms from those evolving during times with less ocean circulation.

## REFERENCES

- Betzler C. and Eberli, G.P., 2019, Miocene start of modern carbonate platforms. *Geology*, v. 47, p. 771–775
- Schlager, W. and Camber, O., 1986, Submarine slope angles, drowning unconformities and self-erosion of limestone escarpments: *Geology*, v. 14, p. 762–765.
- Kenter, J. A. M., 1990. Carbonate platform flanks; slope angle and sediment fabric. *Sedimentology* v. 37, p. 777-794.