CARBONATE CONTOURITES AND DRIFTS – SEDIMENTOLOGIC CHARACTERISTICS AND DIMENSIONS

Gregor P. Eberli, Christian Betzler[1], Thomas Lüdman[1], and Sara Bashah
[1)] *CEN, University of Hamburg, Germany*

PROJECT OBJECTIVES

- Assemble a comprehensive overview of carbonate contourites and drifts from literature and from unpublished examples.
- Relate current dominated sedimentologic processes to their products in particular to contourite/drift body architecture, facies and sedimentary structures.
- Provide dimensions of the various contourite/drift systems.

PROJECT RATIONALE

The recognition and investigations of contourites and drifts in siliciclastic deep-water systems has been fuelled by the exploration of deep-water clastics. Seismic and core data, and subsequently outcrop analogs have led to the formulation of depositional models for both the large-scale geometries and the bed-size characteristics (Rebesco et al., 2014). Bottom and contour currents are, however, also affecting the deep-water carbonate environment. In fact, isolated carbonate platforms restrict and focus the ocean gyres and thus produce a variety of contourite and drift regimes and bodies (Fig. 1). Yet, the carbonate contourites and drifts have not been studied systematically, mostly because few hydrocarbons are found in deep-water carbonate sequences.

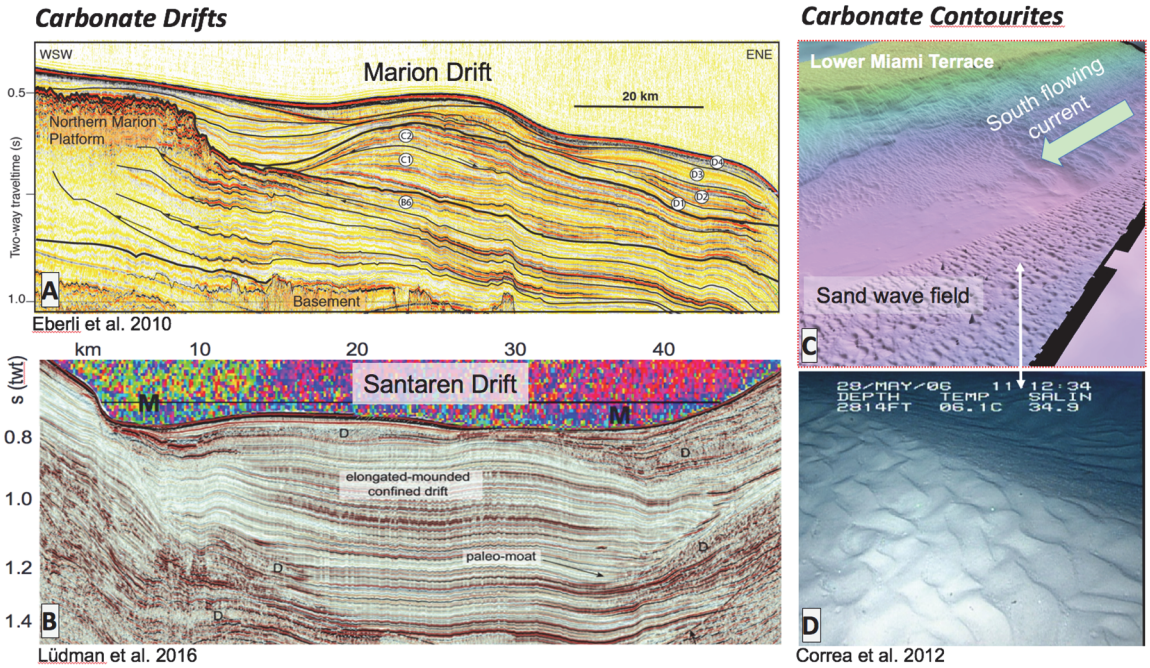

Figure 1: Examples of carbonate drifts and contourites. A) The Marion Drift is a complex separated drift. B) The Santaren Drift is an elongated-mounded confined drift (Lüdmann et al., 2013). C) A sand wave field at the base of the Miami Terrace (865 m water depth) is a contourite deposit. D) The sand waves are ornamented by ripples.

High-resolution seafloor mapping, as well as seismic and oceanographic data, combined with sedimentological sampling from modern deep-water carbonate slopes and basins during the last few years have produced a wealth of data that can document the characteristics of carbonate contourites and drifts. That together with the oceanographic data can provide robust depositional models for the current controlled carbonate deposits.

APPROACH

This study will rely on published and newly acquired data in sites where current controlled sedimentation occurs. The results will be published in a special volume of Sedimentology that aims to present the state of the art of the research in current controlled carbonate strata. One focus of the volume will be on the findings of the recent IODP Expedition 359 to the Maldives (Betzler et al., 2016). Bathymetry and seismic data from the Bahamian archipelago (Bergman, 2005; Lüdmann et al., 2016) and examples from the current swept Marion Plateau (Isern et al., 2004) will make this a comprehensive treatment of these deposits.

SIGNIFICANCE

The deep-water carbonate environments are the emerging but underexplored depositional settings in carbonates. This review study aims to elucidate the role of currents on the slope and basin deposits that are at least as important as gravitational transport mechanisms.

REFERENCES

Bergman, K.L., 2005, Seismic analysis of paleocurrent features in the Florida Straits: insights into the paleo-Florida Current, upstream tectonics, and the Atlantic-Caribbean connection. Ph.D. dissertation, University of Miami, pp.189.

Betzler, C.G., Eberli, G.P., Alvarez Zarikian, C.A., and the Expedition 359 Scientists, 2016. *Expedition 359 Preliminary Report: Maldives Monsoon and Sea Level*. International Ocean Discovery Program. http://dx.doi.org/10.14379/iodp.pr.359.2016

Isern, A.R., Anselmetti, F.S., and Blum, P., 2004, A Neogene carbonate platform, slope, and shelf edifice shaped by sea level and ocean currents, Marion Plateau (northeast Australia): AAPG Memoir 81:291-307.

Lüdmann, T., Kalvelage, C., Betzler, C., Fürstenau, J., Hübscher, C., 2013. The Maldives, a Giant Isolated Carbonate Platform Dominated by Bottom Currents. Marine and Petroleum Geology 43:326-340.

Lüdmann, T., Paulat, M., Betzler, C., Möbius, J., Lindhorst, S., Wunsch, M., and Eberli, G.P., 2016, Carbonate mounds in the Santaren Channel, Bahamas: A current-dominated periplatform depositional regime: Marine Geology, 376:69–85.

Rebesco, M., Hernández-Molina, F.J., Van Rooij, D., Wåhlin, A., 2014. Contourites and associated sediments controlled by deep-water circulation processes: State-of-the-art and future considerations: Marine Geology 352,111-154.