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Sedimentological record over the last million year on a modern carbonate contourite system: example of the Little Bahama Bank

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The Bahamian Banks are a classic study area for carbonate sedimentation because it provides many modern analogues for ancient limestones. Several sedimentary and seismic dataset collected during oceanographic research cruises (including ODP expeditions) have revealed significant accumulation rates along the slopes of the slopes of the Bahama Banks. In this work, we focus on the major sedimentary body of the northwestern slope of the Little Bahama Bank (LBB), the second largest carbonate bank of the Bahamian archipelago. Our main topic is a better understanding of the export processes from the bank to the northern slope of the LBB, exposed to the prevalent winds (windward side), and of the sediment deposition related to the regional Antilles Current.

Analyses of two marine cores allow to determine the sediment sources (nature and origin of the particles) and to generate a high-resolution stratigraphic model. Those two cores (CARKS-20 and CARKS-21) are located along the western side of the northern slope of the LBB and have been collected during the CARAMBAR cruise (2010). CARKS-21 penetrates the wedge of this major sedimentary body over 12 m. CARKS-20 penetrates the same sedimentary body in its thickest part over 13.25 m.

The stratigraphical methods include faunal and floral analyses (planktonic foraminifera and coccoliths), radiometric dating, XRF analyses and isotope stratigraphy. The sedimentary analyses encompass spectrophotocolorimetry and grain-size measurements, indurated thin sections petrographical study and identification of bioclasts. Stratigraphical results from core CARKS-21 allow to consider long-term climatic trends extending from present to the marine isotope stage (MIS) 11 (424 kyr, from the top to 9.3 m), and highlight perturbation in the sedimentation from 9.3 to 12 m (from MIS 12 to MIS 25). Higher resolutions are highlighted in core CARKS-20 which extends from MIS 1 to MIS 11.

Glacial periods and sea-level lowstands corresponding to exposure of the bank are related to low production and exportation of sediment. These periods are characterized by reduced deposits showing a coarsening-up unit followed by a finning-up unit (bigradational sequences) and are associated with allochtonous particles constituted by phosphatized foraminiferal tests and pteropods shells. From MIS 1 to MIS 11, interglacial periods are well developed and exhibit higher sediment rates (e.g. $\sim$ 5 cm/kyr in CARKS-20). Three clay-rich beds have been observed and the two most recent one are well dated and correspond to a part of MIS 7 and MIS 11 in both cores. The oldest bed (only found in core CARKS-21) is older than MIS 15.

Off-bank processes are the major sedimentary processes during sea-level highstands, whereas current-related deposits dominate during sea-level lowstands in the northern Bahamas slope at least over the last 424 kyr. Clay-rich deposits may be related to a slowdown of currents, allowing clay-size particle settling on the contouritic system, and/or an increase of clay production and export from continental areas during a short period of MIS 7, MIS 11 and around MIS 15 - 25. Phosphatized particles result from a phase of early diagenesis concomitant with transport in the basin by the Antilles Current.