Modern carbonate slopes from shelf to abysses: example of the Little Bahama Bank

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Over the past decade, the Little Bahamas Bank (LBB) in the Caribbean has been the target of a series of oceanographic cruises Carambar (2010), Carambar 1.5 (2014) and Carambar 2 (2016-2017). These scientific expeditions were carried out with the aim of improving our knowledge of the processes controlling sediment export during the Quaternary in this tropical factory. Bathymetric data covering some 24,270 km² of seafloor, 6,398 km of high-resolution seismic lines and 42 sediment cores ranging from 177 to 4,873 m water depth were collected from the upper slope to the abyssal plane of the LBB depositional system. Our study focusses on the sediment cores retrieved in the upper (Carambar 1.5) and lower slope of the LBB and those from the Great Abaco Canyon (Carambar 2) which is connected to the abyssal plain. These results are complementary to previous studies led on the middle and lower northern slope of the LBB (Tournadour, 2015; Chabaud, 2016). A highstand accretionary wedge, previously dated Holocene, expands at water depths ranging between 177 and 360 m. Sediment deposition in this wedge is mainly the result of hurricanes and density cascading. Its initiation is dated at 13. 6 ± 3.5 ka cal BP, following Meltwater Pulse 1A. Melwater pulses led to the formation of shallow terraces which enhanced carbonate production and ultimately supplied the wedge. The height of the development of the wedge occurred at 6.56 ± 0.9 ka cal BP when the sea level reached the shelf-break. The wedge is cross-cut by small channels supplied by tidal flushing. Sediments on the lower slope are indicative of pelagic processes, since bottom currents play a greater part in their deposition than on the shelf. Variability in the facies of theses deposits are thus the result of climate variations (e.g. strengthening of deep currents, influxes of Arctic water). Sediments in this area share similarities with those observed along the Blake Outer Ridge, 400 km north of the LLB. At water depth of 1,300-4,800 m, the slope is cut by a giant canyon, namely the Great Abaco Canyon. The canyon is probably structurally-controlled. Its supply is preferentially from canyon sides (sliding processes and tributaries). Sedimentary records from cores highlighted the extent of highstand shedding export on this windward slope, and allowed a comparison to those obtained on the leeward western GBB slope.