CARBONATE SLOPE MORPHOLOGY REVEALING DEEP-SEA SEDIMENT TRANSFER IN LITTLE BAHAMA BANK, BAHAMAS

Natacha FABREGAS[(1,@)], Thierry MULDER[(2)], Vincent HANQUIEZ[(2)], Hervé GILLET[(2)], Emmanuelle DUCASSOU[(2)], Kelly FAUQUEMBERGUE[(2)], Mélanie PRINCIPAUD[(2)], Gilles CONESA[(3)], Johan LE GOFF[(2)], Jérémy RAGUSA[(4)], Sara BASHAH[(5)], Stéphane BUJAN[(2)], John REIJMER[(6)], Thibault CAVAILHES[(2)], André DROXLER[(7)], Audrey RECOUVREUR[(3)], Léa GUIASTRENNEC[(2)], David BLANK[(7)], Chloé SEIBERT[(8)]

[(1)] Ecole Nationale Supérieure en Environnement Géoressources et Ingénierie du Développement Durable, INP Bordeaux (France)
[(2)] Environnements et Paléoenvironnements Océaniques et Continentaux, Université de Bordeaux (France)
[(3)] Centre Européen de Recherche et d'Enseignement de Géosciences de l'Environnement, Université d'Aix-Marseille (France)
[(4)] Institute for Environmental Sciences, University of Geneva (Switzerland)
[(5)] CSLCenter for Carbonate Research, RSMAS (United States)
[(6)] Sedimentology and Marine Geology group (Netherlands)
[(7)] Department of Earth Science, Rice University (United States)
[(8)] Institut de Physique du Globe de Paris, Université Sorbonne (France)
[(@)] natacha.fabregas@gmail.com

The first leg of the CARAMBAE 2 cruise off the Bahamas occurred in December 2016 on the R/V l'Atalante. New high-quality multibeam data acquired during this mission depict the area located between Little Bahama Bank (LBB, Bahamas) and Blake Plateau (BP). The survey details the morphology of a giant 150 km-long submarine canyon, the Great Abaco Canyon (GAC) and its main characteristics. The canyon axis runs parallel to the margin. Its head does not apparently represent the main source of material. The sediments supplied through the LBB canyon system does not reach this area which only shows erosion lineaments related to the pathway of currents flowing along the seafloor and restricted failure scars. Most of the supply comes from the canyon flanks. In the north, tributary canyons drain the contourite deposits forming large flat plateaus above the drowned carbonate platform of the BP. These contourite plateaus are subjected to translational slides moving towards the northern edge of the canyon forming a dissymmetric debris accumulation along the toe of the north canyon edge. Another sources of sediment are two large tributaries connecting directly the LBB upper slope to the GAC. Sub bottom seismic profiles suggest the presence of a turbiditic levee on the tributary canyon sides and inferred turbiditic activity. The transition from the Blake Plateau to the North Atlantic Abyssal plain occurs through a series of giant (several hundred of meters thick) chutes often associated with plunge pools. The most important one is underlined by an abrupt change of slope in the canyon thalweg. The last one leads to the opening towards the abyssal plain. Along the Abyssal plain, a 200-m-thick lobe develops. Its size is unbalanced with the size of the Great Abaco Canyon incision, reflecting probably the pirating by deep-sea current belonging to the thermohaline circulation, of the finegrained particles reaching the canyon mouth. Little Abaco Canyon (LAC) shows morphologic similarities with GAC but at a smaller size (75-km-long). However, the LAC seems more active in terms of sediment transport. Small canyons draining the easternmost part of LBB and discharging in LAC show lobate morphologies with fresh sedimentary structures (sediment waves) suggesting recent sedimentary processes. These structures are made of clean carbonate sand with shallow water organisms indicating a direct supply from the carbonate platform edge. The plunge pools in the two canyons can reach 250 meters in depth. They are located between 3.500 and 4.500 meters deep. Although plunge pools are frequent in siliciclastic environment, both in continental and marine context, it is the first time that such large elements are observed. These Bahamian plunge pools are 5 to 10 times bigger than the plunge pools observed in the Niagara Falls. In term of size, the GAC compares to the largest canyons in siliciclastic environments. Its originality comes from the fact it is only supplied by carbonate sources. These two canyons present the same axis as the Blake-Bahama fracture zone which represents a transform fault linked to the mid-oceanic ridge.