

## GIANT CANYONS AND CHUTE POOLS IN DEEP-SEA CARBONATE ENVIRONMENT (BAHAMAS)

Thierry MULDER<sup>(1,@)</sup>, Hervé GILLET<sup>(1)</sup>, John REIJMER<sup>(2)</sup>, André DROXLER<sup>(3)</sup>, Thibault CAVAILHES<sup>(1)</sup>, Vincent HANQUIEZ<sup>(1)</sup>, Kelly FAUQUEMBERGUE<sup>(1)</sup>, Stéphane BUJAN<sup>(1)</sup>, David BLANK<sup>(4)</sup>, Sara BASHAH<sup>(5)</sup>, Léa GUIASTRENNEC<sup>(1)</sup>, Natacha FABREGAS<sup>(5)</sup>, Audrey RECOUVREUR<sup>(6)</sup>, Chloé SEIBERT<sup>(7)</sup>

<sup>(1)</sup> Environnements et Paléoenvironnements Océaniques et Continentaux, Université de Bordeaux (France)

<sup>(2)</sup> College of Petroleum Engineering and Geosciences, King Fahd University of Petroleum and Minerals (Saudi Arabia)

<sup>(3)</sup> Rice University, Houston (United States)

<sup>(4)</sup> CSL-Center for Carbonate Research University of Miami (United States)

<sup>(5)</sup> Ecole Nationale Supérieure en Environnement Géoresources et Ingénierie du Développement Durable, INP Bordeaux (France)

<sup>(6)</sup> Centre Européen de Recherche et d'Enseignement de Géosciences de l'Environnement, Université d'Aix-Marseille (France)

<sup>(7)</sup> Institut de Physique du Globe de Paris, Université Sorbonne (France)

<sup>(@)</sup> thierry.mulder@u-bordeaux.fr

New high-resolution multibeam mapping, in the Bahamas, images in great details the southern part of Exuma Sound and the deep part of the Little Bahama Bank. In both area, the most singular feature concerns the transition area to the deep abyssal plain (water depth: 5000 m) of the Western North Atlantic bounded by the Bahama Escarpment (BE). In both areas, the newly established map reveals the detailed and complex morphology of giant valleys formed by numerous gravity flows, the Great and Little Abaco canyons along the Little Bahama Bank (LBB) slope, and the Exuma Canyon in the Exuma area. In the Great Abaco Canyon, the sediment is fine grained and originates essentially from valleys side (LBB) including slid material and supply from many secondary slope gullies and smaller tributaries draining the surrounding upper slopes. In the Exuma Canyon, a part of the material comes from the adjacent slope but adds to a fraction of sediment coming from the upper slope. In both cases, the initial valley abruptly transforms itself into a deep incised canyon, rivaling the depth of the Colorado Grand Canyon, through two major knickpoints with outsized chutes exceeding several hundred of meters in height, a total of almost 2,000 m. The sudden transformation of the wide valley into a deep narrow canyon, occurring when the flows incised deep into an underlying lower Cretaceous drowned carbonate platform, generates a large hydraulic jump and creates an enormous plunge pool and related deposits with mechanisms comparable to the ones operating along giant subaerial waterfalls. In the Exuma Sound example, the high kinetic flow energy, constrained by this narrow and deeply incised canyon, formed, when it is released at its mouth in the abyssal plain, a wide deep-sea channel with well-developed levees and fan, made of coarse-grained carbonate defined layers separated by fine carbonate sediments mixed with fine siliciclastics transported along the BE by the energetic Western Boundary Undercurrent. Conversely, in the Little Bahama Bank example, the canyon mouth only reveals a small lobate structure with a thickness that does not balance the volume of sediment missing in the canyon, probably because of the pirating of fine-grained sediment by deep-sea contour currents.