



Comparing the internal geometry of mass transport deposits in fossil and modern carbonate systems

Johan Le Goff (1), Johannes Jozef Gerardus Reijmer (1), Thibault Cavailhes (2), Emmanuelle Ducassou (2), Herve Gillet (2), and Thierry Mulder (2)

(1) King Fahd University of Petroleum & Minerals, College of Petroleum Geosciences, Saudi Arabia (johan.legoff@kfupm.edu.sa), (2) Université de Bordeaux, UMR 5805 EPOC, 33405 Pessac cedex, France

Mass-failures in carbonate platform systems may result in the deposition of Mass Transport Deposits (MTDs) that comprise significant amounts of sediments (1-1000 km³). The motion of these large volumes may trigger tsunamis or may affect the stability of seafloor infrastructures. However, the downslope transport of unlithified sediments and the internal geometry of MTDs are still poorly understood.

The aim of this study is to compare the deformational patterns observed within MTDs in modern and fossil environments, with a special focus on the along-dip/strike variabilities as well as the volumes of the sediments involved.

The Apulian carbonate platform margin and associated Ionian Basin that are preserved across the Adriatic domain, have been studied in detail in Albania. The MTDs encountered in the Ionian Basin evidence significant lateral variability which is associated with both brittle and ductile deformations. The sequences studied also contain large-scale slumps made up of sediment density flow deposits. The lateral extent of detachment surfaces, syn-sedimentary faults and folds evidenced in the Ionian Basin, point towards multiple regional destabilization events affecting the Apulian platform margin during the Late Campanian – Early Maastrichtian. The large-scale outcrops allow for precise mapping and detailed analysis of the syn-sedimentary deformation structures for each syn-sedimentary deformed MTD interval.

Recent studies of the modern Bahamian carbonate system show kilometer-scale failure scars positioned at the platform margin. Along-dip seismic lines retrieved from the western slope of the Great Bahama Bank were studied with regards to kinematic indicators, allowing a better understanding of the MTD deposits. The carbonate succession at the toe of slope typically shows an alternation of packages with continuous reflectors and discrete intervals exposing low-amplitude discontinuous and chaotic reflectors. A detailed analysis of the distribution of deformational structures provided information on: a) the size and geometry of slides/slumps; b) extensional, strike-slip and compressional structures associated with downslope transport in the respective headwall, translational and toe domains.

The comparison of both MTD systems will enable us to better characterize the processes involved and to assess the kinematic indicators as well as the sedimentary variability of these systems.

Keywords: Mass Transport Deposits, carbonate slopes, Plio-Quaternary, Late Cretaceous, Bahamas, Albania