



## **Initiation and evolution processes of submarine instabilities and canyons: insights from the Northern margin of the Gulf of Aden.**

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The study of turbiditic systems and their interactions (sea-level falls, floods, earthquakes) are not well known and require the comparison of observations in various geological contexts. On young continental margins, it provides informations on sedimentological processes during early phases of rifting, for which vertical movements (subsidence, uplift) can be more important.

The understanding of facies and depositional sequences is a major challenge for the knowledge of the post-rift tectono-sedimentological evolution of the Gulf of Aden, rare current example of young passive margin.

The data were acquired during oceanographic cruises (ENCENS-SHEBA (Leroy et al 2004; and ENCENS; Leroy et al 2006). The Northern margin has been studied by both a stratigraphic (seismic reflection data) and a semi-quantitative geomorphologic approach (acoustic imagery, bathymetry and ground DEM) leading firstly to a morphologies classification. This “seismic geomorphology” study let us to distinguish three sedimentological domains, which match to the structural segmentation inherited from the formation of margin in oblique rifting context.

All the incision/erosion stages of continental slope (from slope instabilities set up to the formation of mature canyon) observed on the eastern part of the margin lead to an incision shaping model on a steep continental slope. The sedimentary record is strongly controlled by a recent tectonic phase. Vertical movements lead to the formation of numerous instabilities on the continental slope and Mass-Transport Deposits (MTDs) on the lower slope and deep basin. The drainage network extraction shows the sporadic connexion between some of rivers and noticed deep sea fans (which extending canyons with axial incision). Links with the continental drainage network are probably interfered with the recent vertical movements.

The quaternary uplift rate increase eastward, toward the Socotra-Hadbeen transform fault zone. The recurrence of the gravitational events shows that the margin history can be divided into active and passive periods since the beginning of the post-rifting evolution of the Northeastern Aden margin (about 17.6 Ma; d’Acremont et al 2006). There is a main sedimentological switch in the studied zone around 7-10 Ma. This major change of sedimentation rate and facies types (slope-wash detritus, Mass-transport deposits MTDs, first occurrence of deep sea fans) is probably due to the uplift of the margin and climatic change (first occurrence of the Monsoon in this region).