High resolution time-lapse morphobathymetry and short-term evolution of the upper part of the Capbreton submarine canyon

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Abstract

The Capbreton canyon stands out by its deep incision through continental shelf and slope and its present turbidite activity. The head of the canyon is disconnected from the Adour River since 1310 AD but is located close enough to the coast to allow a direct supply by longshore drifting. Gravity processes in the canyon body are well described, but many questions remain for the head and the upper part of the Capbreton submarine canyon such as: Do any others supply sources of the canyon exist (lateral supply)? Which processes provide sediment transfer from the head to the canyon? Our study is based on the analysis and comparison of eight multibeam bathymetric survey acquired between 1998 and 2018. This data set covers the same area of the canyon upper part and allows the comparison and morphologic follow-up of this outstanding dynamic area. The morphological evolutions in the upper part of the canyon over the last 20 years especially affect the floor of the talweg and the canyon head. Times of flat talweg are observed and suggest a partial filling, succeeded by periods of talweg surincision (low lateral terraces and narrow talweg), suggesting a return to the equilibrium profile. The surincisions are induced by regressive erosion and are evidenced by regressing knickpoints. Recent surveys show that regressive erosion is higher around the flanks meanders where key morphodynamic processes are generated. First accurate volume quantification in the canyon talweg has been undertaken. This underlines an alternation of filling and erosive period in the canyon axis and a continuous sediment deposition in the canyon head during the last 20 years.

Key words: capbreton canyon, time lapse bathymetry, knickpoints, regressive erosion, volume quantification