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Comparison of sediment dynamics during "wet" and "dry" storm events on the Têt Prodelta

J. Guillén[1], F. Bourrin[2], R. Buscail[2], A. Palanques[1], P. Puig[1]and X. Durrieu de Madron[2]

(1) Institut de Ciències del Mar (C.S.I.C.), Passeig Maritim de la Barceloneta, 37. 08003 Barcelona, Spain (2) CEntre de Formation et de Recherche sur l'Environnement Marin. Université de Perpignan 52, Avenue Paul Alduy, 66860 Perpignan, France, (jorge@icm.csic.es)

The importance of short-term processes, such as floods or storms, on sediment delivery and reworking on the Têt prodelta was investigated in the framework of the EU EUROSTRATAFORM Project (EVK3-CT-2002-00079). The Têt prodelta is a small, event-dominated system, located at the southwestern part of the Gulf of Lions. The expected sedimentary scenario in this environment is that sediment inputs coming from the river should be deposited on the prodelta and later dispersed around the shelf and slope by waves and currents reworking during storms. Since storm events can simultaneously occur along with river flood events ("oceanic floods"), this paper investigates differences on prodelta sediment dynamics between storm events occurring during usual river discharges and storm events during river floods.

Waves, currents, water temperature and turbidity, bottom sediment, seafloor erosion/accretion and meteorological conditions were simultaneously measured at 28 m water depth from November 2003 to March 2004. Two severe storms occurred on 4 December 2003 and 21 February 2004 and two medium-energy storms occurred on 8 December 2003 and 14 March 2004. Both major storms displayed similar wave characteristics: maximum Hs higher than 7 m, Tp $>$ 12 s and wave direction around 90 degrees. Main environmental differences during both storm events correspond to the amount of water and sediment discharged from the Têt River. Average water and sediment discharge from the Têt River ranges between 10-20 m^3/s and 20-30 mg/l, whereas these values were 235 m^3/s and 715 mg/l and 43 m^3/s and 49 mg/l during the December (flood condition) and February storms respectively. Therefore, the December event corresponds with high water and sediment discharge period ("wet storm")

while the water and sediment discharge were moderate during the February event ("dry storm").

Sediment dynamics were quite similar during both storm events: resuspension caused by waves and sediment advection towards the southeast (150º) due to along shelf currents were the dominant sedimentary processes. The result is a bottom sediment erosion of several centimetres at the study site during both events. Main differences between the observed "wet" and "dry" events occur after the storm. Immediately after the December "wet" storm, big amounts of sediment supplied by the Têt River were deposited around the river mouth and this non-consolidated sediment was resuspended, transported offshore and deposited at the prodelta during the medium storm occurred few days later (8 December). On the other hand, a similar medium storm occurred after the "dry" event of February caused the bottom erosion on the prodelta, because no "fresh-sediment" was available on the shallower area. Results from this study indicate that the Têt prodelta at 28 m water depth is mainly a "bypass" zone for sediment that is transported S-SE towards the outer shelf and slope, although ephemeral sediment deposits can be created after flood events. Sediment transport across the shelf, from the river to the slope follows a complex, multi-step pattern that needs to be addressed considering a multi-event approach.