



# **1 Continuous monitoring of suspended sediment fluxes during an extreme climatic event in the Gulf of Lions: from rivers to canyons**

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The Gulf of Lions, located in the north-western Mediterranean basin, is formed by a wide continental margin deeply incised by submarine canyons. Sediment supply to the shelf is mainly controlled by the Rhône, one of the largest rivers of the Mediterranean Sea, and several smaller torrential rivers.

To determine the suspended sediment transport pathways from source to sink especially during severe climatic events (floods and storms), we instrumented, in the frame of the EU project EUROSTRATAFORM, one of these torrential rivers, the Têt, located in the south-western part of the margin. The corresponding prodelta, as well as the adjacent continental shelf and slope were also surveyed.

In early December 2003, a typical Mediterranean storm occurred over southern France and the whole Gulf of Lions. Heavy rainfalls associated to strong south-easterly winds generated a major decadal flood of the Rhône and the secondary rivers. Measurements on the Têt prodelta from a wave-gauge ADCP showed that the transport of the suspended sediment - introduced by the river and resuspended by the waves - was di-

rected southwards. Remote sensing data confirmed in fact that all river plumes were directed southward, forming a brackish and turbid alongshore stream. Seaward, turbidity measurements from moorings deployed in several canyon heads over the entire Gulf of Lions further showed that most of the sedimentary material issued from river plumes or resuspended by waves on the inner shelf, was advected towards the western canyons, an observation that has been reproduced by model runs.

Satellite pictures during minor flood events that occurred later also indicated that the Cap Creus Canyon situated at the south-western exit of the gulf acts as a major drain for particulate matter entering the system. Finally, all measurements and simulations showed that the transport of fine particles from rivers to canyons was extremely rapid, within a few hours.