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Study of the plume created by the spillage of dredged material in the area overlooking the Port of Fiumicino (Rome, Italy)

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The present paper describes the analysis of the evolution of the plume of material according to the hydrodynamic field in different weather conditions for two possible zones for the spillage of dredging material in the area overlooking the Port of Fiumicino. The study was conducted through the use of the coastal circulation model ADCIRC and the transport model PTM, both included in the hydrodynamic suite models SMS 9.2.
For the numerical modelling was identified a physiographic unit comprising Cape Linaro to the North and Cape Anzio to the South. The physiographic representation of this area was obtained from bathymetric campaigns conducted by DECOS in the years 2002 and 2003. In addition, a detailed bathymetric measurements of the spillage zone, and a campaign of currentometric measures in order to calibrate the hydrodynamic model, carried out both in 2007.
To study the movement of sediment from the spillage zone towards the surrounded area, was used a numerical Lagrangian model (Particle Tracking Module - PTM) that allows to simulate the movement of a group of particles in relation with the hydrodynamic field.
There were selected two classes of particles sizes that describe the typology of the dredged material from the Port of Fiumicino.
Dominant wind pattern of the region is Tramontana (in autumn and winter) and Ponente (in spring and summer) although intense events concerned Libeccio and Scirocco directions.
In the case of Tramontana the velocity field is slightly reduced and creates zones of reverse current near the coast. In case of Libeccio, the velocity field slightly moves towards the coast direction and in case of Scirocco there can be noticed an increase of the current intensity in the spillage area.
From the simulation studies conducted through the PTM model, it can be noticed that the coarse material (Dm = 0.8 mm) is quickly deposited in the neighbour area, while the finer material (Dm = 0.03 mm) is carried by the current creating a plume of sediment that is deposited on the bottom in terms of its diameter (the finest particles may reach a distance of 18-20 km).