



Modelling study of the coastal processes induced by the new Port of Fiumicino (Lazio Region, Italy)

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The present study concerns the analysis of the hydrodynamic circulation and littoral sediment transport effects due to the construction of the new Port of Fiumicino.

This physiography area of the study is considering the Lazial coast from Capo Linaro (North) to Capo d'Anzio (South) with a total length of about 150 km. On one hand, the hydrodynamic field was analysed using the ADCIRC numerical model that solves the two-dimensional shallow water equations. On the other hand, the sediment movement and morphology change has been analyzed with the CSM-M2D model, through transport rate formulations, the advection-diffusion equation, and the sediment continuity equation for updating change in the sea bottom. Wave forcing is included in CMS-M2D through coupling with a wave model.

The hydrodynamic analysis carried out including medium and extreme intensities conditions for the following wind directions: Libeccio (SW), Scirocco (SE) and Maestrale (NW), together with the general current circulation of the Tyrrhenian sea. Furthermore, the water and sediment inflow from the rivers in the region were taken into account for the littoral transport analysis.

The results of hydrodynamic model ADCIRC indicates that Maestrale and Scirocco wind conditions generates an increase of velocity currents near underwater terraces and in the surrounding of the Fiumara Grande river. On the other hand, the Libeccio wind condition generates anti cyclonic circulation in both the Northern and Southern areas of the new port structure.

Furthermore, a detailed analysis of the new Fiumicino Port zone has shown that the Scirocco and Libeccio scenarios create a shadow zone to the North; while the Maestrale scenario generates a little shadow zone to the South. In addition, the dominant sediment transport which is oriented from SE to NW generates an erosion process at the Northern zone of the new port.