DEFINITION OF THE NATURAL SEDIMENT DYNAMICS BEFORE THE DREDGING OF THE PORT OF GENOA (ITALY)

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Introduction: Moving marine sediments, particularly contaminated sediments such as port ones, can have numerous negative effects on the environment, even at a considerable distance from the site of origin itself.
Dredging normally induces major resuspension phenomena, with an increase in turbidity and a consequent mobilisation of contaminants associated with the suspended particles. It is therefore necessary to pay particular attention, in both the short- and long-term, to the content of suspended solid material coming from a port zone, bearing in mind that above certain limits it can be a danger to the marine life of the surrounding area.
The Port of Genoa will shortly undergo a major dredging effort (about 2,000,000 m^3 of material from the port mouth, to be used as contained land fill) and it will be necessary to protect certain *Posidonia oceanica* meadows lying to the east, in front of a beach housing numerous popular swimming establishments.
It will, therefore, be essential to study the characteristics of the area before the dredging begins to determine the critical limits that must not be superseded during the dredging operation. These critical limits can be calculated as the acceptable turbidity limits of the dredging.

Methods: The a-priori strategy for monitoring the dynamics of the resuspended sediments will be adapted to the port area on the basis of knowledge of all the parameters governing the processes occurring there, such as the concentration of suspended particulate matter (SPM), the physical characteristics of the water column, wave action, wind and current movements in the area, port movements. This analysis should provide the turbidity and TPM measurements inside and outside the port area and in those surrounding areas influenced by port activity and enable us to establish the range of "natural" values ("blank" values) and determine the acceptable critical limits for the suspended matter coming from the port area during the dredging.
The physical characteristics of the water column and turbid plume will be measured with a CTD probe. The turbidity measurements obtained will then be compared with the concentration of suspended solids (TSS) in in-situ water samples. Acoustic profile measurements (obtained with an ADCP) will supply current and turbidity data for the entire water mass. The data will be checked and compared with values obtained with the turbidimeter. To obtain a complete analysis of the turbid plume the dimensions of the particles in the water samples will be determined with a Coulter Counter Multisizer.

Results: The physical and dynamic data obtained will be used to build sedimentary dispersion models to determine the potential effects of the dredging by characterising the sedimentary transport at a distance from the dredging site.
The material released during the dredging can be classified as coarse-grained aggregates and sediments and fine-grained sediments, which naturally have different behaviours. The coarse-grained sediments resettle almost immediately in the surrounding area, not passing beyond the immediate dredging zone and so not affecting the dynamics of the sedimentary regime. Instead, the fine-grained sediments are transferred from the turbulent dredging zone by currents or the dredging machinery.
The turbid plume passes from the dredging zone to the surrounding areas and the resuspended material can be carried a considerable distance by the current, so that it is possible to describe the plume of resuspended material that forms.

Discussion: The critical limits will be defined on the basis of the normal turbidity and hydrodynamic characteristics we'll find in the port area before the dredging.
This study will determine the hydrodynamic, chemico-physical and sedimentological characteristics of the Port of Genoa under "natural" pre-dredging conditions. It will then be possible to determine the best site to position the instruments for monitoring the turbidity during the dredging operations.