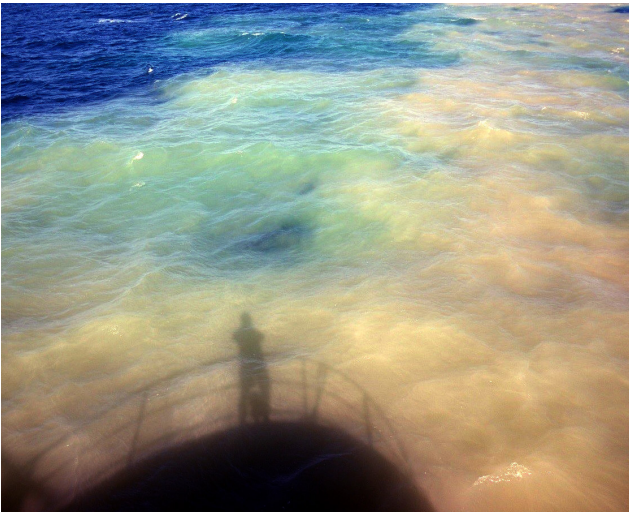


International Marine and Dredging Consultants (IMDC) is an engineering and consultancy company specialised in a vast range of water related projects. Our highly qualified staff offers advice based on recent research results of leading universities and research institutes and hands-on experience acquired throughout the years.

One of IMDC's core activities is presented in this booklet: Dredge Plume Modelling.

More information can be found on our website: www.imdc.be

Dredge Plume Modelling



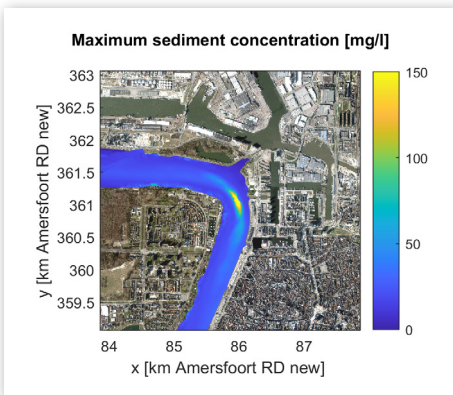
IMDC has a long experience in the domain of dredge-related projects, in the fields of dredging techniques, turbidity simulations and monitoring and environmental impact management of dredging. IMDC has specifically executed many projects in which the sediment plumes related to dredging (head and overflow losses, prop wash) and

dredge spoil placement, or similar turbidity generating activities have been predicted, monitored or both.

Plume modelling is a valuable tool with regard to prediction and fate of dredge-borne sediment originating from any of above activities in EIA, preparation and planning and operational phases of maintenance or capital dredge operations for foundations, harbours, navigation channels, land reclamation, pipeline-, cable- or tunnel trenches, or any other wet construction works.

Software-Independent Approach

Whether it be for a near- and/or far-field study, a 2D or 3D approach, IMDC has access to a number of state-of-the-art software tools, when modelling this multitude of phenomena, of which one can be selected according to the specific needs required. IMDC has vast experience with Delft3D, Telemac, Mike21 and Coherens modelling packages.



Map of maximum increase in sediment concentration occurring during a period of 14 days of disposal activities.

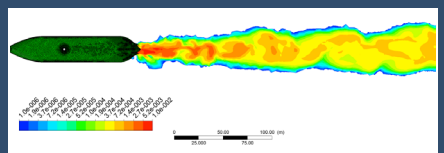
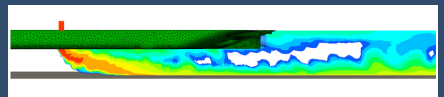
Source terms

IMDC's 30+ years of dredge consultancy results in a very detailed knowledge on sediment flux and source terms generated from measurements, CFD PhD research and in-depth operational knowledge on dredge processes, sediment characteristics and production parameters.



Computational Fluid Dynamics

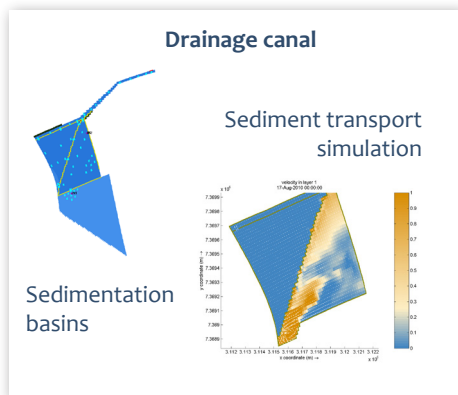
The latest type of simulation software is Computational Fluid Dynamics (CFD), which has found its way from academic applications to engineering due to the increase in computational power. CFD simulations allow a very detailed three-dimensional simulation of complex flow fields. An example is given in the figure below, in which the highly turbulent flows of water, sediment and air bubbles underneath an overflowing Trailer Suction Hopper Dredger (TSHD) have been simulated. This results in an accurate representation of the near-field dynamic plume and the resulting passive plume source terms.



Surface plume and dynamic benthic plume, simulated with CFD software.

Containment Bund Modelling

The simulation of containment bund runoff properties is another application of above know-how. Restrictions on return water turbidity could depend on the arrangement of dikes and weir boxes. Detailed flow and sedimentation modelling can give insight to the optimal arrangement of the containment area. IMDC has experience in this type of modeling.



Online forecasting systems

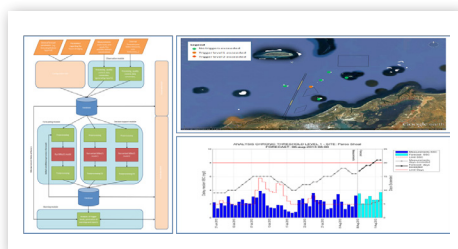
IMDC has set up a real-time system for adaptive management of dredging-induced turbidity.

Extensive monitoring of turbidity at sensitive receptor sites and around the dredge activities is often necessary and obligatory. An operational sediment plume forecasting system has been set up by IMDC to assess the effects of forecasted dredging works on the impact sites as part of a pro-active adaptive environmental management system.

This system is called the Ecological Proactive Adaptive Management system, or ECOPAM.

An online model toolbox, consisting of a hydrodynamic model and a sediment transport model, was developed. This model toolbox can also be used offline in a planning phase to study the impact of dredging execution scenarios.

In real-time modus operational online functionalities e.g. automated input generation and results processing and reporting are introduced, that can be used as a Decision Support System for operational environmental dredge management.

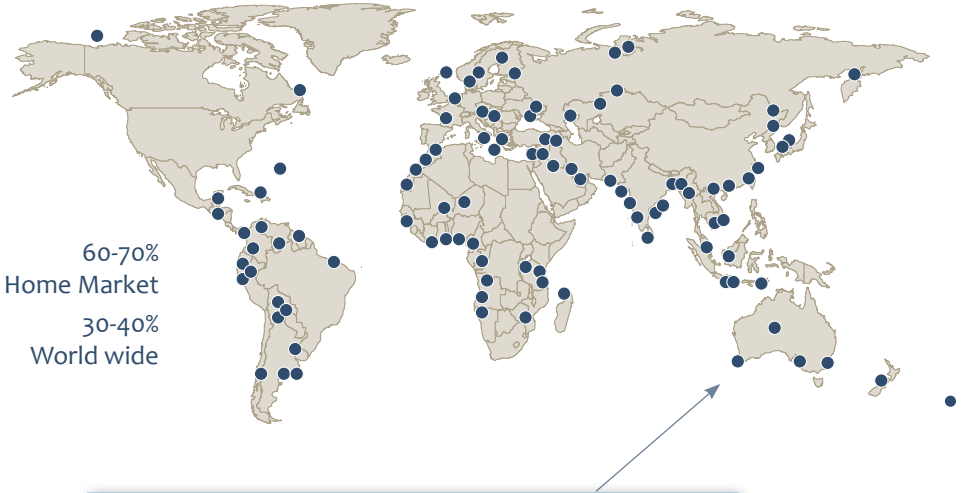


An impression of the system architecture, the geographical user interface and the forecast graphs.

REFERENCES

IMDC has execute plume modelling studies for several tender studies, EIA and permitting phases, operational project phases in Europe, Africa, South-East Asia and Australia.

IMDC in the world



ECOPAM: Implementation of a sediment transport forecasting system for dredging works.

Read more

