IMDC

International Marine and Dredging Consultants (IMDC) is an engineering and consultancy company specialised in a vast range of water relatedprojects. 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.

The IMDC North Sea Continental Shelf Model is presented in this product sheet.

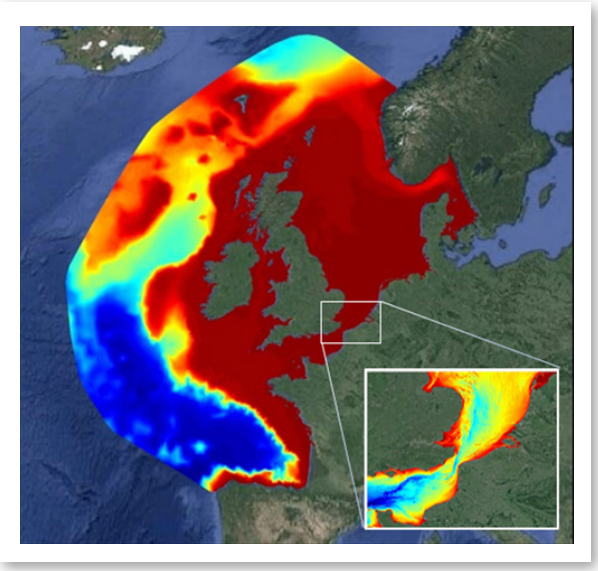
More information can be found on our website: www.imdc.be

A North Sea Continental Shelf Model by IMDC

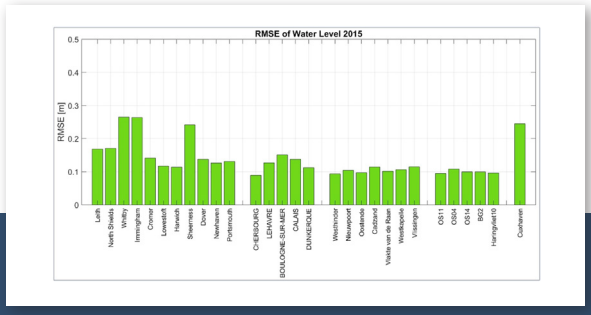
The IMDC's continental shelf model (iCSM) is a TELEMAC-2D barotropic tidal-surge model developed in-house, covering the domain of the North Sea, the Irish Sea, the Celtic Sea and the Bay of Biscay.

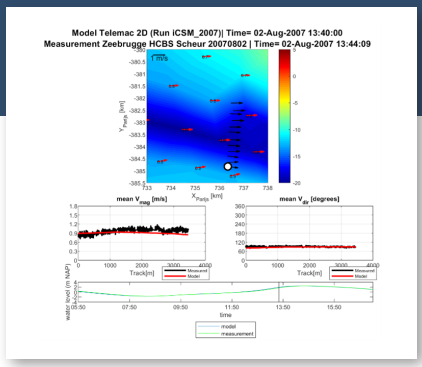
The model mesh consists of 150,000 computation nodes. A time step of 2 minutes is used, running 2 hours for 1 year simulation with 48 cores which is extremely efficient. The model is recently updated with EMODNET 2018 bathymetry (~115 × 115 meters) and ERA5 hourly data of space- and time varying wind (at 10-meter height) and air pressure at MSL. At open boundaries, the model is forced by both harmonic tide (TPXO9.v1) and surges due to variations of atmospheric pressure (inverse barometer correction) and ocean water density changes (steric sea level correction). Besides, the pronounced internal tide dissipation occurred in Bay of Biscay is successfully simulated in the model, together with the impact of self-attraction and loading.

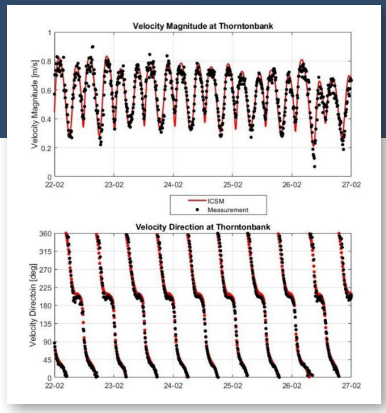
The model is automatically calibrated on bottom friction on the platform of SALOME – Hydro with three-dimensional variational assimilation (3D-Var). The model shows reliable ability to precisely reproduce the hydrodynamics in the North Sea. The averaged Root-Mean-Square Error (RMSE) of water level at the Belgian coast is **10** cm.



Region	|BIAS| [cm]	RMSE [cm]	|ΔM2| [cm]	|ΔM2| [deg]
Eastern British	8.0	17.1	1.8	2.9
French	2.2	12.3	6.3	0.8
Belgium & Western Scheldt	1.6	10.4	1.8	0.6
Dutch Eastern Scheldt	2.2	10.0	1.6	0.5
All	3.5	12.4	2.8	1.3







iCSM is a powerful tool for both hindcasting and forecasting of hydrodynamics in the North Sea. As an end product, the IMDC's Metocean Database fulfills the needs of using reliable metocean data for various engineering and scientific studies.