

SUMARE, a tool dedicated to sustainable exploitation of sand bank off the Belgian coast.

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Abstract

Organised extraction of sand from sand bank off the Belgian coast started in the late 70's. Over the last few years, exploited volume of sand approximately doubled raising the question of sustainability of the exploitation. Since 1986, bathymetric surveys using single beam technique are undertaken from aboard the Belgian oceanographic research vessel *Belgica*. Results of this study around Kwintebank emphasizes modification in the morphology of the bank. From last year, R/V *Belgica* is equipped with multi-beam instrument permitting refined view of the sand bank.

SUMARE,(SURvey of MARine RESources) a research project partly funded by the European Union within the frame of the Information Society Technologies program (IST) aims to prove the utility of autonomous sensors for environmental monitoring. One application is dedicated to bathymetric survey of sand bank using Autonomous Underwater Vehicle (AUV). MAUVE is, a low cost, reconfigurable and fully autonomous torpedo vehicle of 1.80m for 35 kg. For the purposes of bathymetric survey application, MAUVE is configured with a specific payload including an altimeter and an obstacle avoidance sensor. Acoustic beacons are used for high accuracy in positioning. One of the SUMARE added value is the adaptive navigation software. A-priori knowledge gained from almost 20 years of data gathering is included into statistical model to extract the best sampling strategy. Specially designed algorithms enable also the robots to adjust it trajectory in reaction to real-time measured data. Moreover, forecast of small scale tridimensional (3D) hydrodynamic model is included for guidance purposes. The MUMM hydrodynamic model is a 3D primitive equation model. It is based on the so-called Boussinesq approximation. The equations are solved by numerical technique in the terrain following sigma co-ordinate system using the hydrostatic assumption. The model is characterised by a free surface and an horizontal grid size of 250 m. The model outputs used for the purpose of SUMARE are mainly velocity vector components and elevation of the free surface. The model use atmospheric forcing from UK met office forecast and boundary condition are given by MUMM larger scale operational model.

After a presentation of sand bank exploitation figures and data, the MAUVE platform will be presented shortly. Presentation will be mainly dedicated to model results, the focus will be on how these results could be used for guidance purposes. Concluding remark will also include information regarding sampling strategy gained by a-priori knowledge.