

## A model as time machine for benthos distribution in the Westerschelde: past, present and future

Smolders Sven<sup>1,3</sup>, Francesco Cozzoli<sup>2</sup>, Stefaan Ides<sup>4</sup>, Yves Plancke<sup>3,4</sup>, Patrick Meire<sup>1</sup> and Stijn Temmerman<sup>2</sup>

<sup>1</sup> Ecosystem Management research group, University of Antwerp, Universiteitsplein 1, 2610 Wilrijk, Belgium

E-mail: [sven.smolders@ua.ac.be](mailto:sven.smolders@ua.ac.be) , [patrick.meire@ua.ac.be](mailto:patrick.meire@ua.ac.be) , [stijn.temmerman@ua.ac.be](mailto:stijn.temmerman@ua.ac.be)

<sup>2</sup> Royal Netherlands Institute for Sea Research, Spatial Ecology group, Korringaweg 7, 4401 NT Yerseke, Netherlands

E-mail: [francesco.cozzoli@nioz.nl](mailto:francesco.cozzoli@nioz.nl)

<sup>3</sup> Flanders Hydraulics Research, Berchemlei 115, 2140 Antwerp, Belgium

E-mail: [sven.smolders@mow.vlaanderen.be](mailto:sven.smolders@mow.vlaanderen.be) , [yves.plancke@mow.vlaanderen.be](mailto:yves.plancke@mow.vlaanderen.be)

<sup>4</sup> Antwerp Port Authority, Havenhuis, Entrepotkaai 1, 2000 Antwerp, Belgium

E-mail: [stefaan.ides@haven.antwerpen.be](mailto:stefaan.ides@haven.antwerpen.be) , [yves.plancke@haven.antwerpen.be](mailto:yves.plancke@haven.antwerpen.be)

A 2D hydrodynamic Telemac model for the Scheldt Estuary was built with the bathymetry of 2009. The model was calibrated on water levels throughout the entire estuary, discharges in the channels and especially for ecology on flow velocities on shoals.

A second 2D hydrodynamic Telemac model was built for the Scheldt Estuary with the bathymetry of 1955. This model was calibrated on water levels of the main tide gauge stations along the estuary and discharges in the channels.

Both models deliver the following parameters: maximum flow velocity (a good relationship between maximum flow velocity at a location and the D50 sediment value was found, so sediment composition is included in the model by the maximum flow velocity), salinity range, average salinity, depth and dry time, i.e. the time a location is not covered by water. These parameters are used by a benthos distribution model (developed by Cozzoli F.) to predict for every location (= calculation node) in the model the community indices and distribution of single species.

The model with the bathymetry of 1955 gives an idea of the benthos distribution in the past for the Westerschelde; and this can be compared with the model that describes the current situation. The lessons from the past, i.e. by comparing the past with the present, can be used to predict the future. The results of model simulations of future morphological scenarios can be inserted into the benthos model and give a prediction of the ecological situation for the new estuarine morphology. This new tool provides a straightforward way to assess the ecological value of different future morphological scenarios for the Westerschelde.