Using an idealised process-based model to analyse sediment dynamics in the Scheldt estuary

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Idealised process-based models are a complementary tool to numerical modeling. Their advantages are that they are computationally efficient and are particularly suited to identify the importance of individual physical mechanisms. Currently, an idealised modeling suite for estuarine hydrodynamics and sediment transport is developed by Flanders Hydraulics Research and TU Delft. This activity is part of the hyperturbidity project within the framework of the "Agenda for the future" research program. The aim of the project is to study the risk of the Scheldt Estuary becoming a hyperturbid system and to identify mitigating measures.

The idealised model has been used to understand the mechanisms that underly the qualitative relation between sediment distribution and river discharge in the Ems and Scheldt estuaries (Schramkowski *et al.* 2015). The results show explicitly that the sediment balance in both systems is totally different due to the differences in tidal hydrodynamics. Moreover these findings indicate that the Ems is more efficient at trapping sediment because gravitational circulation is a more important transport agent.

In this contribution the model is applied to assess the changes in tidal wave propagation and turbidity dynamics of the Scheldt as a result of measures including channel widening, channel deepening and changes in the location of the weir at Merelbeke. Primary parameters to be studied are enhancement of the tide, changes in tidal asymmetry, location of turbidity maxima and the ability to flush sediment at higher discharges.

Reference

Schramkowski G.P., Brouwer R.L., Verwaest T., Mostaert F. 2015. "Geïdealiseerde processtudie van systeemovergangen naar hypertroebelheid: WP 2.2 Gevoeligheidsonderzoek en vergelijking tussen Zeeschelde en Eems", Flanders Hydraulics Research, WL2015R13_103_3