

RAPID MORPHOLOGY ASSESSMENT FOR ESTUARIES

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Introduction and research question

A basic estimate of estuarine morphology is relevant for the management of channels, bars or shoals, because they provide valuable habitat, shipping fairways and flood-safety areas. However, this information is only available for a few estuaries (e.g. Western Scheldt). Here we present and test a rapid morphological assessment tool that requires minimal information, the Estuarine space And Morphology Estimator (EAME).

Methodology

The tool predicts bed-level distributions, inundation duration and typical flow conditions along the estuary on the basis of the estuary outline, tidal amplitude and calibrated predictors. To this end, we developed a comprehensive set of empirical, hypsometry-type relations that accurately predict the channel and bar patterns as well as typical flow conditions (Leuven *et al.* 2017, 2016; Savenije 2005). We calculated flow velocities using the local tidal prism and depth of the estuary. The model is validated with data of the Western Scheldt.

Results, discussion and conclusion

The depth distribution along the estuary is modelled well ($R^2=0.95$) as is its derivative, the tidal prism (Figure 1). Flow velocity is predicted less well; underestimated within a factor 2. The required input data can be collected and processed in the tool within minutes for any estuary. The tool and code will be made available with the publication.

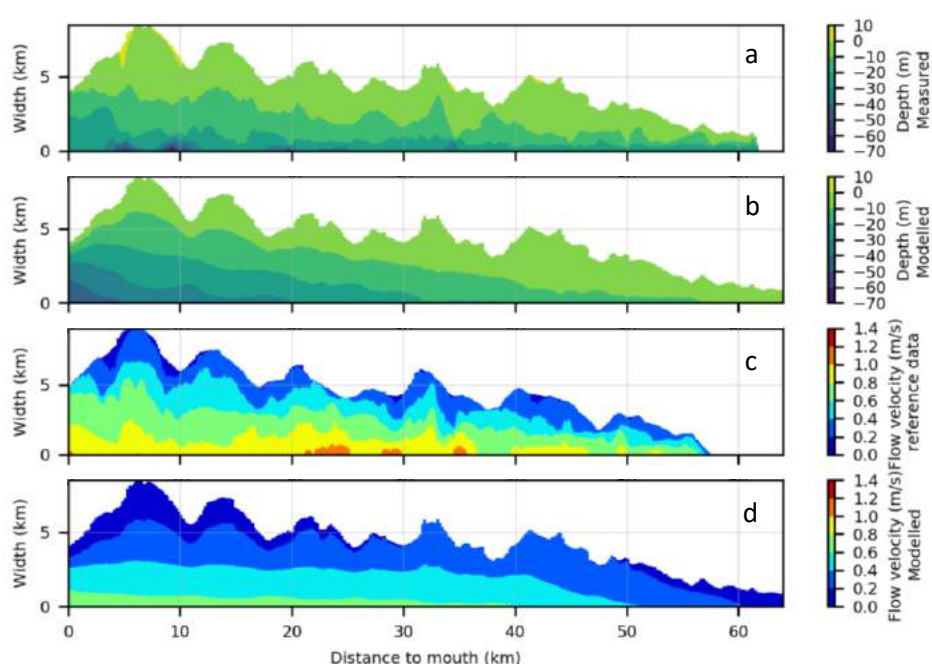


Figure 1: Depth and mean flow velocity in the Western Scheldt estuary during low tide. (a) Measured bathymetry of the Western Scheldt, (b) modelled bathymetry of the Western Scheldt (c) mean flow velocity from the available dataset, and (d) flow velocity calculated from the local tidal prism.

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