HUMAN IMPACT ON INTERTIDAL FLATS IN THE EASTERN AND WESTERN SCHELDT

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Introduction

The Eastern Scheldt (ES) and Western Scheldt (WS), as shown in Figure 1A, have been exposed to human activities over the past decades (e.g., dredging works and the construction of barriers). The WS showed mainly a tendency of heightening flats (Cleveringa, 2013), whereas the ES flats eroded severely after the construction of the storm surge barrier in 1986 (Louters, 1998). In this research, we compare the morphological evolution of the intertidal flats between both systems and further analyse the response to human interventions.

Methodology

We focus on the major intertidal flats which are surrounded by water (see Figure 1A), each vertically limited by their local MLW and MHW lines. Robust bulk-indicators for the morphology are formulated (average height, area and volume), together with average bed slope profiles for each flat derived from local hypsometric curves. With this method, the morphological response of individual flats can be studied, and an objective inter-comparison between flats is possible. Apart from DEM maps (Vaklodingen & LiDAR), also more frequently measured RTK cross-sections are consulted.

Results

We found the WS flats to be substantially steeper compared to the flats of the ES (e.g., Figure 1B). Although a net steepening and heightening of the WS flats and a net flattening and lowering of the ES flats are observed, these trends were not necessarily monotone in time or consistent for all flats. A relation between the height and the steepness of a flat is found when comparing the various intertidal flats, but also when analysing the development of individual flats over time. Furthermore, confidence is gained that the erosion of the intertidal flats in the ES might have decreased over the recent years.

Summary and conclusion

We developed a method to objectively compare various intertidal flats. We conclude that the observed morphological changes in both systems were driven for a substantial part by human interventions, which enforced differences in hydrodynamics between both systems.

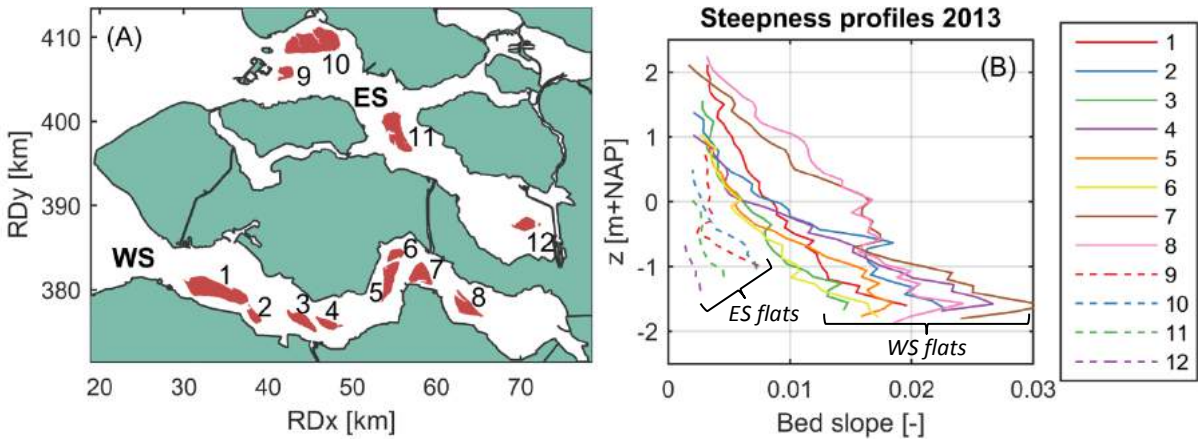

Figure 28 (A): overview studied intertidal flats, (B): average bed slope profiles over depth for all the considered flats (2013 LiDAR data), indicating substantially milder flats in the ES compared to the WS.

References

Cleveringa, J. (2013). Ontwikkeling mesoschaal Westerschelde: factsheets. Technical Report.
Louters, T., van den Berg, J. H., & Mulder, J. P. M. (1998). Geomorphological changes of the Oosterschelde tidal system during and after the implementation of the delta project. Journal of CR.