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ANALYSING LARGE-SCALE DIFFERENCES IN LONG-TERM MORPHOLOGIC BEHAVIOUR ALONG THE NORTH SEA COAST

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Introduction

At many locations along the North Sea region (NSR), erosion of the coast is counteracted by supplying sand to the coastal system (nourishments). Nourishments on the shoreface have increasingly been applied in the NSR over the last decades. The implementation and observed behaviour (migration direction, effect on bar-trough system) of these shoreface nourishments are spatially different along the Dutch-Danish NSR (Lodder and Sørensen 2015). To improve the effectiveness of these nourishments, coastal zone managers seek better understanding of the regional morphologic response in relation to hydrodynamic forcing and geophysical characteristics, such as sediment distribution (Wilmink *et al.* 2017).



Figure 1. Location of cross-shore profiles in dataset.

Methods

The regional morphological differences can be studied through a recently developed trans-national database, containing more than 135,000 mostly yearly cross-shore bed profiles from 5840 locations, comprising the NSR from Belgium to Denmark (Figure 1) and covering typical time spans of 20-50 years. By applying data-analysis techniques, e.g. empirical orthogonal functions (EOF), the existence of regional differences in morphologic behaviour can be examined. There will be a specific focus on the pre- and post-nourishment behaviour of nourished regions (Figure 2), in order to assess the impact of nourishments on the regional-scale morphologic evolution of the coast. The results of this research are expected to contribute to the understanding of the effectiveness of nourishments in the NSR.

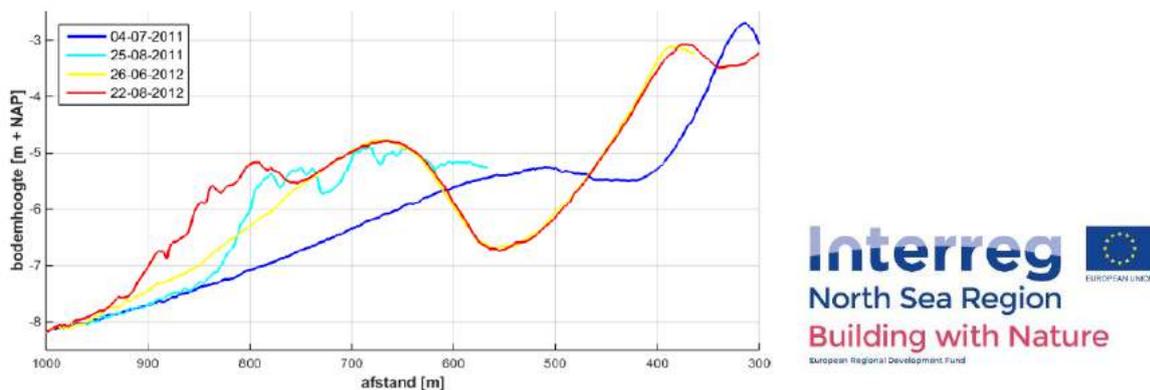


Figure 2. Cross-shore redistribution of nourishment near Heemskerk (Deltares 2017).

Deltares (2017), Ontwikkeling Suppletie Heemskerk 2011-2016, Delft: Deltares. Report number: 1230043-001

Lodder, Q.J., Sørensen, P. (2015). Comparing the morphological behaviour of Dutch-Danish shoreface nourishments. In: A. Baptiste (ed.): *Coastal Management: Changing coast, changing climate, changing mind*. DOI:10.1680/cm.61149.397.

Wilmink R.J.A., Lodder Q.J., Sørensen, P. (2017). Assessment of the design and behavior of nourishments in the North Sea Region. *Proceedings of Coastal Dynamics*, Helsingør, Denmark, No. 043, 801-809.