



netherlands centre for coastal research

Book of Abstracts

NCK Days 2018

Geo-logic in coastal and shelf research: a matter of multi-disciplinarity

March 21-23

Teylers Museum – Haarlem

Sponsored by:



Organized by:



MODELING THE EVOLUTION OF OBSERVED TIDAL SAND WAVES IN THE NORTH SEA

J.M. Krabbendam^{1,2*}, A. Nnafie^{1,2}, H.E. de Swart¹, B.W. Borsje³, L.E. Perk²
¹ Utrecht University, ² WaterProof B.V., Lelystad, ³ University of Twente
* j.m.krabbendam@students.uu.nl

Sand waves on the outer shelf are rhythmic bedforms with wavelengths of 100-1000 m, wave heights up to 10 m. They have migration speeds of up to 10 m/year. Because of their dynamic nature they may expose previously buried cables and pipelines. Since the burial of cables and pipelines is a costly procedure, there is a need to determine the optimum burial depth for cables and pipelines. So far, this has been done empirically by extrapolating trends from historical bathymetry data over periods of order 50 years, which is the typical lifetime of the structures. This empirical method may lead to uncertain results and is limited by the lack of high-quality bathymetry data. Therefore, there is a demand to study the long-term evolution of sand waves with the use of models.

In this research the Delft3D sand-wave model by Van Gerwen *et al.* (2018) is used to study the evolution of observed sand waves in the North Sea on decadal timescales. Rijkswaterstaat measurements made in 1999 of the sand-wave field in windpark Hollandse Kust Zuid are taken as the initial bathymetry. The model is run for a 17-year period and the output is compared with measurements done by Fugro (2016) at the same location. The results are shown in Figure 1, with the red lines representing the observations and the blue line showing the model output. The interest is in the migration speed, shape and maximum crest height and trough depth. The depth and migration of the troughs is predicted well by the model, but this is not the case for the crests. The reasons for this difference will be discussed during the presentation.

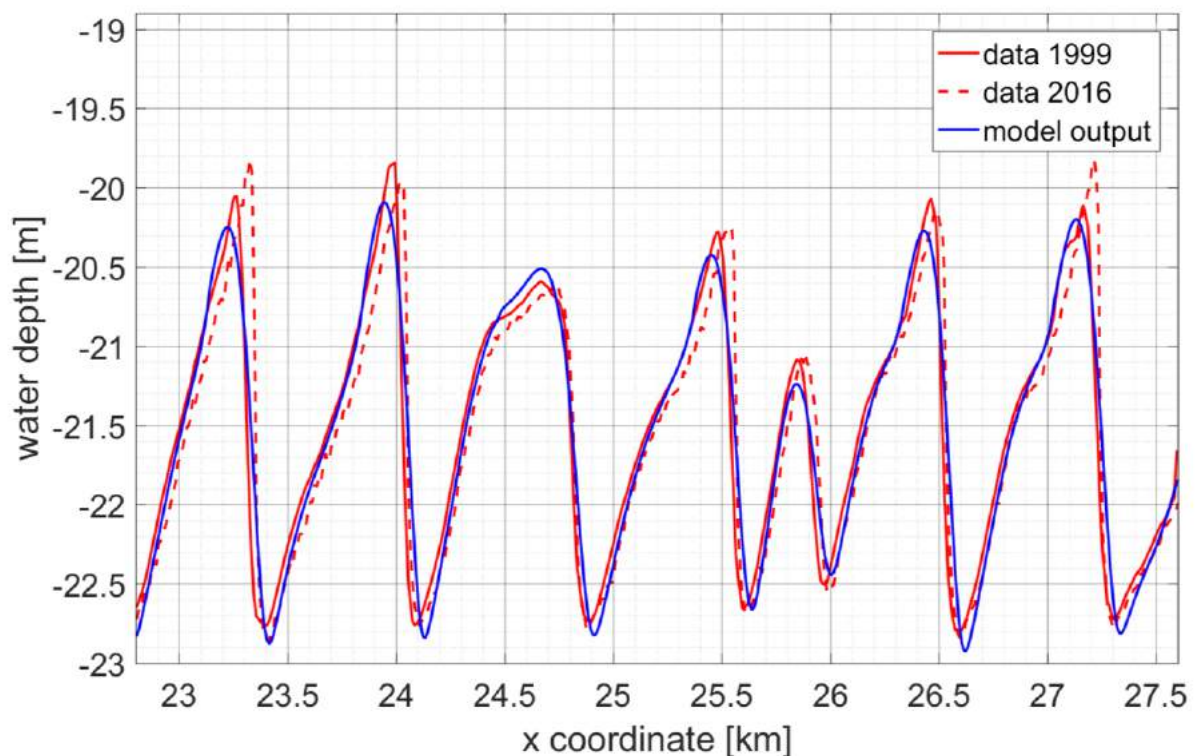


Figure 1. Comparison between data and model output for Hollandse Kust Zuid. Solid red line = measurements by Rijkswaterstaat 1999, dashed red line = measurements by Fugro 2016, blue line = model output.

van Gerwen, W., Borsje, B.W., Damveld, J.H., Hulscher, S.J.M.H. (2018). Modelling the effect of suspended load transport and tidal asymmetry on the equilibrium tidal sand wave height. *Coastal Engineering*, 136, 56-64.