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Book of Abstracts

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

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KUSTGENESE 2.0/SEAWAD - AMELAND INLET FIELD CAMPAIGN

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Climate change challenges us to come up with effective and efficient solutions to protect the Dutch coast. Sand nourishments are part of these solutions. How much, where, and when sediment should be nourished may seem like trivial questions but are not that simple to answer. The fate of the nourished sediment under the action of waves and tidal currents is still hard to predict. This is especially the case for ebb-tidal deltas, where the highly varied bathymetry introduces complex interactions among the different forcings.

As part of projects Kustgenese 2.0 and SEAWAD, a large-scale field campaign was carried out in September 2017 at the ebb-tidal delta of the Ameland Inlet (Figure 1). Five frames were emplaced for a month, equipped with instruments to measure flow velocities, pressure, sediment concentration, sediment composition, bed-level variations, and bedform dynamics. Additionally, the flow through the inlet was measured during 13-hr cross-sectional measurements; boxcores were taken for benthos, sediment composition, and stratigraphy; sediment tracers were released (and partly retrieved); current drifters were employed; and flow meters were installed at the watersheds.

Although not all instruments were retrieved in their original shape and condition, a large and rich data set is now available for further study. Inclusion of the storm Sebastian on the 13th of September means that interactions among wind, waves, tides, and sediment transport can be studied for fair-weather as well as storm conditions. The new dataset will help us to test our numerical models and to better understand the sediment transport pathways in this complex environment. For example, our measurements show that wind-driven flow dominated over tidal flow on the tidal divides and on the shallow lobes of the ebb-tidal delta during the peak of the recorded storm. These and some other initial results are highlights in an overview of the total campaign, including its preparatory phase. In addition, we offer a glimpse of the further steps planned to test existing numerical models and to substantiate future management decisions.

Figure 1. Installation of a main frame on the ebb-tidal delta (left). Installation of flow meters on a tidal divide (right).