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# Tracking aeolian transport patterns across a mega-nourishment using video imagery

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Coastal dune areas protect the hinterland from flooding. In order to maintain the safety level provided by the dunes, it may be necessary to artificially supply the beach-dune system with sand. How to best design these shore nourishments, amongst others with respect to optimal dune growth on the long-term (decadal scale), is not yet clear. One reason for this is that current models for aeolian transport on beaches appear to have limited predictive capabilities regarding annual onshore sediment supply. These limited capabilities may be attributed to the lack of appropriate input data, for instance on moisture content of the beach surface, or shortcomings in process understanding. However, it may also be argued that for the long-term prediction of onshore aeolian sand supply from the beach to the dunes, we may need to develop some aggregated-scale transport equations, because the detailed input data required for the application of process-scale transport equations may never be available in reality.

A first step towards the development of such new concepts for aggregated-scale transport equations is to increase phenomenological insight into the characteristics and number of aeolian transport events that account for the annual volume changes of the foredunes. This requires high-frequency, long-term data sets to capture the only intermittently occurring aeolian transport events. Automated video image collection seems a promising way to collect such data.

In the present study we describe the movement (direction and speed) of sand patches and aeolian bed forms across a nourished site, using video imagery, to characterize aeolian transport pathways and their variability in time. The study site is a mega-nourishment (21 Mm3 of sand) that was recently constructed at the Dutch coast. This mega-nourishment, also referred to as the Sand Motor, is a pilot project that may potentially replace current practice of more frequently applying small scale nourishments.

The mega-nourishment site has been, and still is, monitored intensively since its construction in 2011. The monitoring program includes an Argus video system consisting of 8 cameras, mounted on a 40 meter high tower in the middle of the Sand Motor, which collects snap shots and time-exposure images every half an hour. Also two Pan-Tilt-Zoom cameras can be used to zoom in at specific locations. In addition to the remote sensing by Argus, also bathymetric and topographic surveys are conducted every two months, LIDAR flights cover the beach and dune area every six months, and in the near future dune topography will be measured using Terrestrial laser scanning. A weather station mounted at the tower also collects wind data. These additional data sources will be used later on to explain observed aeolian transport pathways and assess their effect on dune evolution.