

USING ARGUS VIDEO MONITORING TO DETERMINE LIMITING FACTORS OF AEOLIAN TRANSPORT ON A NARROW BEACH

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Introduction

In most aeolian models, sand is predicted to be transported when the wind velocity exceeds a certain threshold (typically, 8 m/s). When these models are applied to narrow (< \approx 100 m) beaches, they sometimes predict aeolian sand transport while this does not take place in reality. These moments are called limited events. Here, we use signs of aeolian transport visible on camera, together with weather and beach characteristics, to determine what factors, aside from wind velocity, influence aeolian transport on narrow beaches.

Study site

The study site is located between Egmond aan Zee and Castricum, the Netherlands. The beach is approximately north-south oriented, has a gentle slope (\sim 1:30), is relatively narrow (100 m maximum at spring low tide) and consists of quartz sand with a median diameter of about 250 μ m. An optical remote-sensing system consisting of 5 RGB-colour cameras, known as Argus (Figure 1), monitored the site from 1998 to 2015. An automatic weather station in De Kooy, 40 km north of the study site, provided the weather data.

Methods

The Argus images taken between 2005 and 2012 were searched for actual aeolian transport events. These images were classified according to their visual signs of transport. An event is considered to be limited if the Argus imagery shows little or no transport, but the mean wind velocity exceeds the threshold velocity substantially. Next, the wind characteristics of limited and unlimited events were compared to each other.

Results

Westerly winds were more common during limited events. These shore-normal winds resulted in a short fetch length, which is unfavourable for aeolian transport. Some of the limited events were unlimited during a different part of the day. The weather conditions during such days tended to remain the same, but signs of aeolian transport were visible at low tide only (wider beach). This observation shows that fetch is important for aeolian sand transport on a narrow beach. Unlimited events were observed both in summer and winter. In summer, events were numerous but mostly took place when the wind speed was just above the threshold. In winter, in contrast, unlimited events were few, but then showed strong signs of transport.

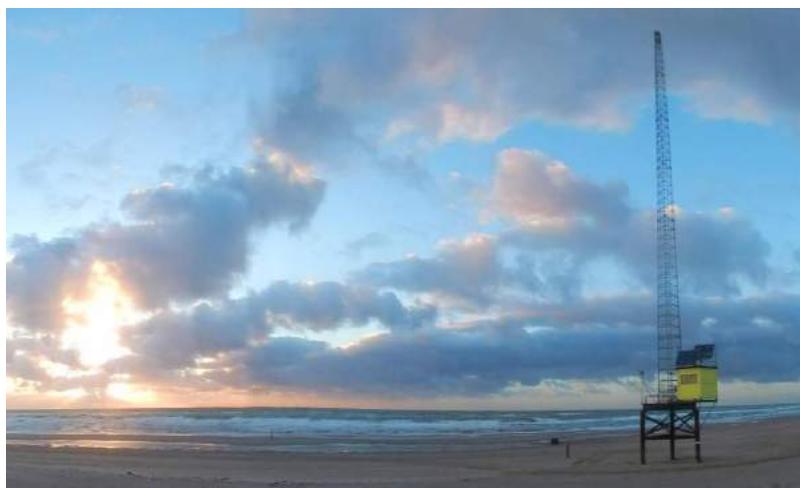


Figure 1. The Argus tower at the study site.