Agglomeration of a comprehensive model for the wind-driven sand transport at the Belgian Coast

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Methods

To gain a better understanding of the Aeolian processes governing the beach and dune formation, a research route consists of measurement campaigns (Fig. 2) at the beach and physical modelling (Fig. 3) at lab scale, both on event scale and decadal time scale.

1) Measurement campaigns (Fig. 2)

Measurements will be performed over a number of fixed measurement stations aligned, along, and across the intertidal zone, aerial beach and embro and foredune. They will provide accurate data of meteorological conditions, morphology, and wind-driven sand transport events. Aeolian sand transport and wind flow measurements (wind speed and wind direction) will be undertaken:

- at regular interval (one campaign per month and a campaign with consecutive days every 3 months)
- event related (e.g. before, during and after storm events).

2) Physical Scale Modelling (Fig. 3)

In order to eliminate the random and the chaotic behavior of the variables in the field campaigns (for example, wind speed and direction), small-scale wind tunnel experiments will be carried out. Therefore, an Aeolian wind tunnel is designed and currently made at the university. The wind tunnel is constructed in modules and has a cross-section of 1×1.4m and a working length of 7.5m. Nine radial fans, in a square matrix, provide a suction flow through the tunnel.

Concluding Remarks

For the first time, the interaction between beach-dune and beach-dike environments is studied so intensively at the Belgian coast. A model will be developed which relates the wind-driven sand transport, with physical parameters such as the wind speed, fetch distances, surficial moisture content, grain size of the sand, and the slope of beach and dune surface.

References


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