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Wind-blown sand in beach-foredune and beach-dike environments at the Belgian Coast

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Introduction

At many places, coastal dunes operate as a natural safety barrier against the destructive forces of the sea, protecting the hinterland from flooding. Opposed to sea dikes, wind-blown sand allows dunes to grow naturally and vertically with the rising sea-level, and therefore ensuring a long-term coastal safety.

The 67km long Belgian coastline is highly urbanized and therefore subjected to coastal protection and safety. The coast mostly consists of sandy beaches and dikes. Although, still 33km of dunes exist, whose dynamics are far less understood.
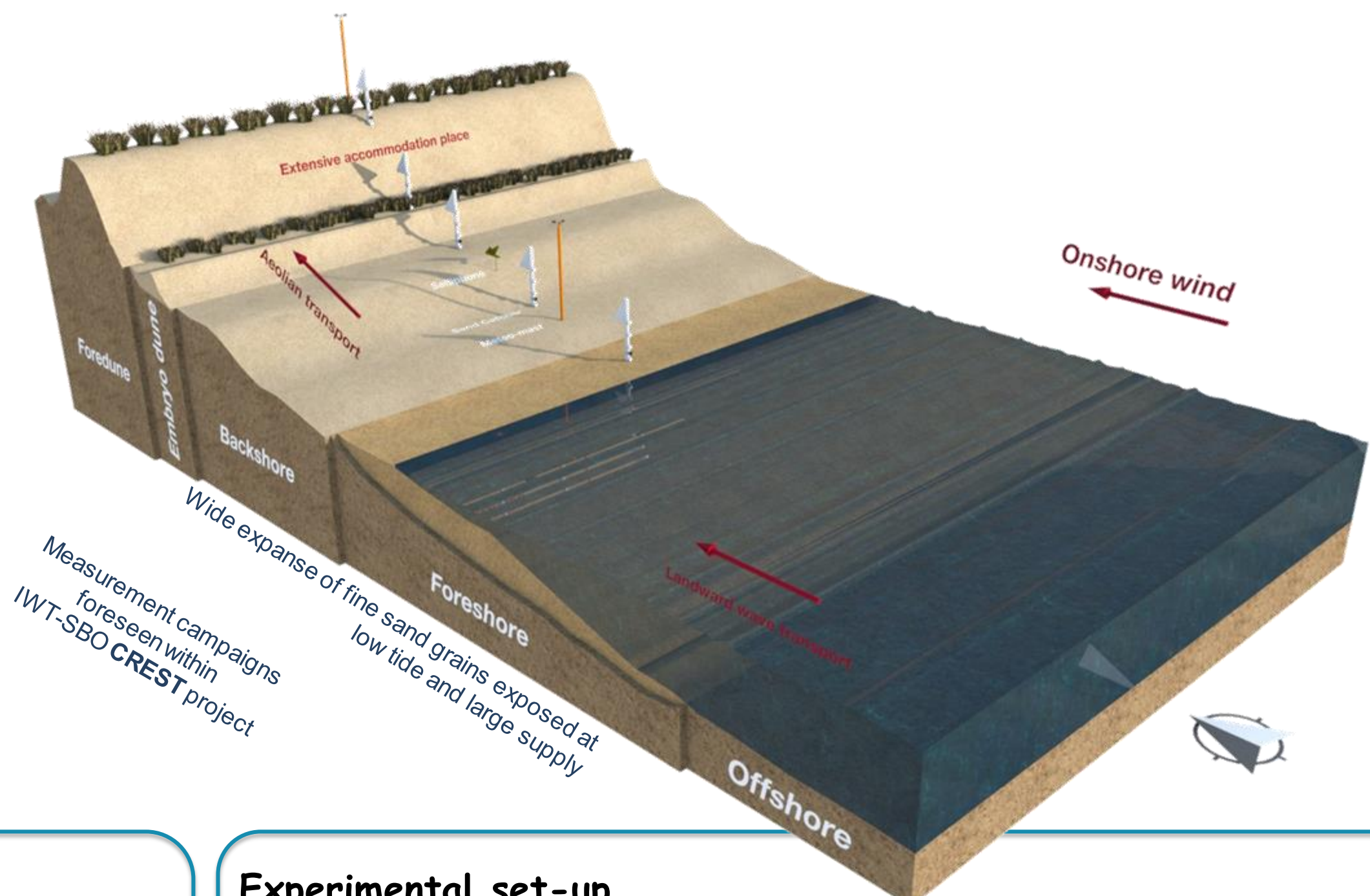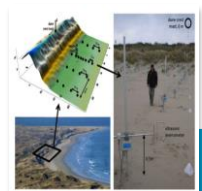
Research Objective

- A transport model similar to that of Bagnold will be developed.
- Optimization of the aeolian processes on the time scale of an event, with the input of additional parameters and variations in time and space.
- Developing of a predictive model at meso-scale by making use of statistical averaging.

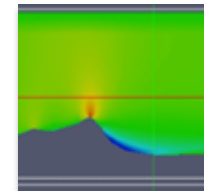$$q = C\sqrt{\frac{d}{D}}\frac{\rho}{g}u_*^3 \implies q = f(d, g, U, F, w, \alpha)$$

Research Approach

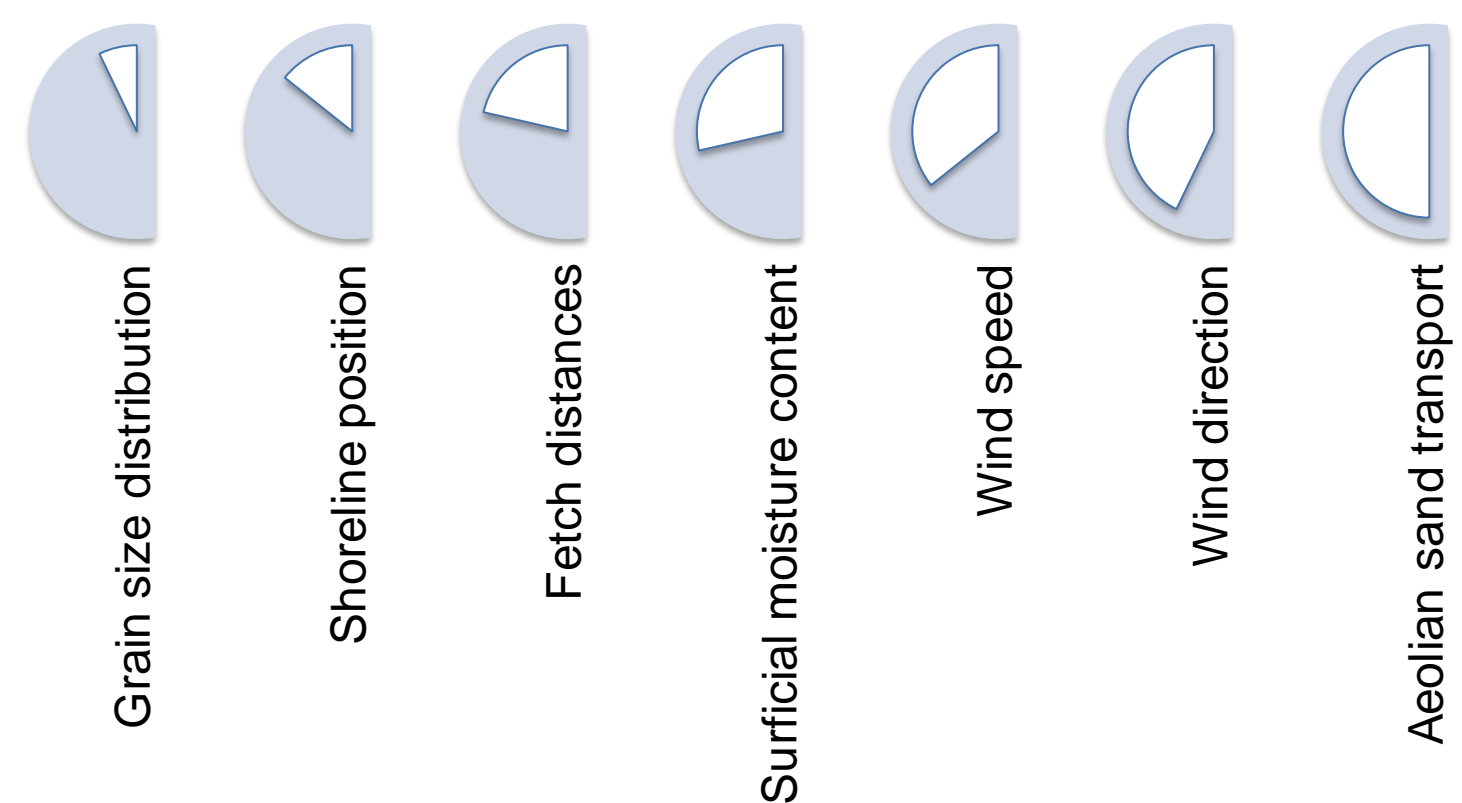**Field Experiments** — Investigating the interaction between beach-dunes and beach-dike dynamics in practice

**Physical Model Tests** — Obtaining data that is difficult to measure in the field

Numerical Simulations — Getting a better insight in the physics of Aeolian Sand Transport

Experimental set-up

The experimental set-up for the field campaigns consists of a monitoring station, which will provide time series of:

Grain size distribution · Shoreline position · Fetch distances · Surficial moisture content · Wind speed · Wind direction · Aeolian sand transport

- 12 MWAC sand traps
- 2 saltiphones
- 2 meteomasts
- A moisture sensor
- Topographic laser surveying
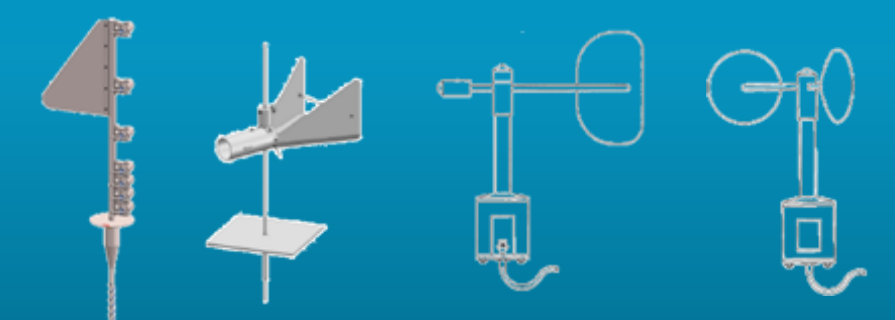
Study sites

I. The typical beach – dike system (Mariakerke),
II. A second site involves the coastal foredunes (Broersbank)

Acknowledgements

References

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