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NCK - Days 2015

Book of abstracts

March 18 - 20, 2015

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Recording aeolian sand transport using laser particle counters

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1. Introduction

Quantitative prediction of aeolian transport rates on beaches is still a difficult task, an important reason being the large spatio-temporal variability inherent to this type of transport. In order to validate new approaches to calculate aeolian transport, in situ field measurements are needed, combined with the knowledge on how to interpret point measurements in this spatio-temporal varying transport field. In this contribution we present the first results of field experiments that aimed at exploring the effects of sensor positioning on the recording of Aeolian transport, including possible sensor related influences.

2. Methodology

The data on rates of aeolian sand transport were collected at the Zandmotor (fall 2014) using laser particle counting sensors with fork widths of 8 and 3 cm (Wenglor YH08PCT8 and Wenglor YH03PCT8 respectively). These sensors were mounted in arrays, in a mast and at surface level, to study the variation in counts in a horizontal and vertical direction. In the horizontal array, also the influence of the angle of the fork sensor relative to the mean wind direction was tested. Wind speed and direction were measured using a Gill Windsonic anemometer at 1.8 m elevation. The average wind speed during the experiments ranged from 5 to 15 m/s.

3. Preliminary Results

During the test with sensors in a vertical array most of the transport occurred in the lower 30 cm. Figure 1b shows that a large part of this transport is counted by the sensor that was positioned at 4 cm from the surface.

In the horizontal array we observed large (yet unexplained) variation in counts (Figure 2b). Possible explanations include physical causes such as large gradients in concentration (Tan et al. 2014) or a varying sensor height due to bed level changes of micro topography (i.e. ripples). It can also be due to sensor properties, because at very high concentration sensor saturation may occur (Barchyn et al. 2014).

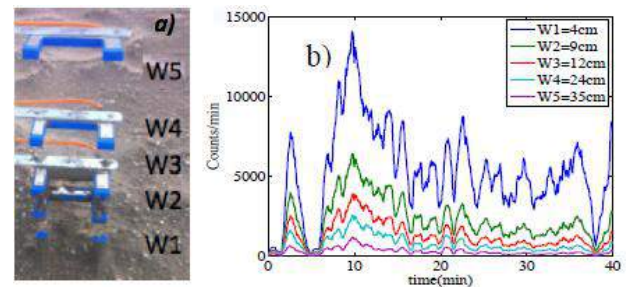


Figure 1: Sensors of 8cm fork width in a vertical array (a) and grains counted per minute (b).

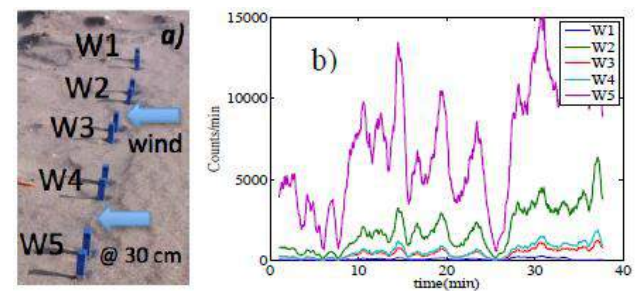


Figure 2: Sensors of 8cm fork width in a horizontal array (a) and grains counted per minute (b).

Future work

Follow-up experiments are planned at the Zandmotor as well as on a natural beach near Egmond aan Zee.

Acknowledgments

We greatly appreciated the support in the field by the TUDelft “MegaPex Team” and Caroline Fredriksson (Lund University). This research is financially supported by STW (NatureCoast) and Conicyt-Chile.

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