



Aeolian sand transport: Experiment and Theory

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Experiments on aeolian sand transport were carried out in a wind tunnel at the University of Aarhus in Denmark for a wide range of wind speeds. The saltating particles were analyzed using imaging techniques (PIV and PTV). Vertical profiles of particle concentration and velocity were extracted. The particle concentration was found to decrease exponentially with the height above the bed and the characteristic decay height was independent of the wind speed (*Creyssels et al., 2009*). In contrast with the logarithmic profile of the wind speed, the particle velocity was found to vary linearly with the height. In addition, the particle slip velocity is finite and invariant with the wind speed. These results are shown to be closely related to the features of the splash function that characterizes the impact of the saltating particles onto a sand bed. A numerical simulation was developed that explicitly incorporates low velocity moments of the splash function in a calculation of the boundary conditions that apply at the bed (*Creyssels et al., 2009*). The overall features of the experimental measurements are well reproduced by the simulation.

Reference:

M. Creyssels, P. Dupont, A. Ould el Moctar, A. Valance, I. Cantat, J. T. Jenkins, J. M. Pasini and K. R. Rasmussen, *J. Fluid Mech.* **625**, 47 (2009).