



Scaling laws in aeolian sand transport

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Via wind tunnel experiments on aeolian sand transport, we provide evidences that over an erodible bed the grain velocity in the saltation layer and the saltation length are almost invariant with the wind strength, whereas over a non-erodible bed these quantities vary significantly with the air friction speed. It results that the particle transport rate over an erodible bed does not exhibit a cubic dependence with the air friction speed, as predicted by Bagnold, but a quadratic one. This contrasts with saltation over a non-erodible bed where the cubic Bagnold scaling holds. Our findings emphasize the crucial role of the boundary conditions at the bed and may have important practical consequences for aeolian sand transport in natural environment.

Reference: T.D. Ho, A. Valance, P. Dupont and A. Ould El Moctar, Phys. Rev. Lett. 106, 094501 (2011).