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Laboratoire PMMH
10 rue Vauquelin, 75231 Paris Cedex 05

Séminaire PMMH

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Unified model of sediment transport threshold and rate across subaqueous bedload, windblown sand, and windblown snow

Loose sedimentary grains cover much of the wind-blown (i.e., aeolian) and water-worked (i.e., fluvial) sedimentary surfaces of Earth and other planetary bodies. To predict how such surfaces evolve in response to aeolian and fluvial flows, one needs to understand the rate at which sediment is transported for given environmental parameters such as the flow strength. In particular, one needs to know the threshold flow conditions below which most sediment transport ceases. Here, we present a conceptually simple model that unifies most aeolian and fluvial sediment transport conditions, predicting both the sediment transport threshold and rate in agreement with a large range of measurements and numerical simulations. In this regard, the term "sediment transport threshold" is actually ambiguous because they are several such thresholds with different physical meanings. We therefore also present a novel framework distinguishing the different thresholds and the regimes they delimit, and explain how the model predictions fit into this framework.

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