

## Fluid-mediated particle transport along a particle bed under gravity ("sediment transport")

new insights from experiments, theory, and numerical simulations

**Thomas Pähtz**

Department of Ocean Science and Engineering, Zhejiang University, China



Sediment transport along the surface drives a wide variety of geophysical phenomena, including wind erosion, dust aerosol emission, and the formation of dunes and ripples on ocean floors, river beds, and planetary surfaces. Although the different modes of sediment transport have been studied for almost a century, even the simplest case, namely steady, homogeneous sediment transport by a unidirectional fluid stream, still gives room for surprising discoveries.

In my talk, I will present two of such discoveries, which were made during my PhD studies. First, using numerical simulations by means of the Discrete Element Method (DEM), we found a first-order phase transition in the wind-blown sand transport rate at the transport threshold. Second, we found that dissipative collisions between transported particles surprisingly enhance the rate of sand transport by wind. Moreover, I will present my current research project: While most studies focus on sediment transport under either very low or very high fluid densities, we aim to achieve a unified understanding of sediment transport which also includes intermediate transport regimes.

