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**Onset of erosion and sediment transport by a fluid flow over a granular bed<sup>1</sup>**

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Erosion and deposition of grains by a fluid flowing past the surface of a granular bed occurs in many natural and industrial processes. While considerable number of empirical studies has been conducted, very little is in fact known in detail on conditions which lead to erosion and deposition of sediments and their transport coefficients. We discuss a series of laboratory experiments to develop the physics of erosion starting with a single particle resting on a surface in a fluid flow. Fluorescent fluid-particle index matching techniques allow us to visualize not only the particles at the surface of a granular bed but also the flow within the bed and the individual particles within the bed. We will discuss the conditions governing the onset of particle motion under simple shear and their transport as a function of bed and fluid flow properties.

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