

Internship Proposal

Laboratory approach of fluid mechanics of environmental hazards

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Massive landslides and coastal erosion are two striking examples of complex environmental flows that involve soil and water dynamics, through the interplay between grains and fluids (Figure 1). Extreme weather events will increasingly impact human activities, driving the development of engineering solutions to mitigate their impact. Therefore, a fundamental understanding of the multi-scale dynamics of the fluid-like materials involved (water, mud, snow, ...) is necessary to develop more accurate strategies to alleviate the impact of natural hazards on ecosystems and human lives. In particular, the sediments that constitute the granular material are typically separated into two classes: cohesive and non-cohesive. Various studies have considered the coupling between a non-cohesive granular bed and laminar or turbulent flows. In contrast, the physical mechanism underlying the dynamics of cohesive sediments, such as clay particles, remains poorly understood and mainly described empirically.



Figure 1: Example of coastal erosion highlighting the cohesive properties of the material.

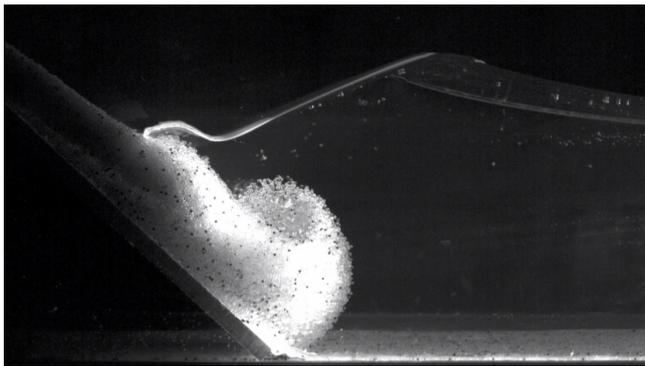


Figure 2: Example of impulse wave generated in the laboratory by the entry of a landslide into water.

Through international collaborations, our group develops experimental approaches to characterize different environmental flows that involve granular media: tsunami wave generation by landslides (Figure 2), erosion of model cohesive sediments, influence of vegetation on slope stability, etc.

Our group proposes internships in projects on the erosion of a sediment bed, granular flows, and dispersion of aggregates of particles in a fluid. The projects will be mainly experimental, involving high-speed imaging, PIV measurements, image processing, and measurement of topography.

The internship will be carried out in the Mechanical Engineering department at the University of California at Santa Barbara (USA). The ideal applicant will have a strong taste for experimental studies and modeling. For more information, feel free to contact A. Sauret (asauret@ucsb.edu).