

From local physical processes to global dynamics driving turbidity currents

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Turbidity currents are self-sustained flowing particle suspensions. Many geophysical flows involve them: pyroclastic flows, sandstorms, snow avalanches, underwater turbidity



pyroclastic flows

/power snow avalanche

/turbidity cloud

currents, blowing snow in katabatic winds... Given their humongous strength they are still nowadays synonyms of very high costs when it comes to infrastructures or lives.. The goal of the study is to investigate the connections between the local processes and the global dynamics, from the interaction of particles near the bed or in the suspension to the scale of topographic features like mountains, lakes or continental shelves. The phd student will handle the experimental studies. A 2D channel with an inclination angle that can be varied going from 0° to 45° will be used together with the 3D plane that can be seen on the picture. Volumes of suspended particles will be prepared at the upper end of the channel/plane. A sluice gate will be used to release the turbidity cloud created. With the help of a laser sheet and a video camera the dynamics of both particles and fluid will be investigated through PIV and particle tracking. The processes investigated will be the interaction between particles and turbulence in the dilute configuration investigated ($1\% < \phi < 10\%$), pickup mechanisms from an erodible bed, turbulence modulation by the presence of particles and settling velocity modification by turbulence and group effects.



3D Lab avalanche (INRAE)

Experimental skills and interest are highly expected. The project is supported by ANR and part of the PALAGRAM project. The phd grant is secured from the project.

Dufek J. *Annu. Rev. Fluid Mech.*, **48**, 459-485 (2016).

Hopfinger E. J. *Annu. Rev. Fluid Mech.*, **15**(1), 47-76(1983).