# Fluid-particle suspension by gas release from a granular bed

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Gas release at the ocean floor is a widespread phenomenon which can have drastic consequences on the environment or the industry [1,2]. Striking examples include natural seep areas [3], possible links between giant methane release and climate change [4], gas blowout and subsequent bubble plumes during offshore drilling [2]. A key question that may be addressed is how particles are entrained by the gas and then mixed into the ambient fluid. Polluting particles from Canadian oil sands have for example drastic consequences on the environment [5] .

This process is studied experimentally by injecting gas in water-saturated sands in a vertical Hele-Shaw cell. We focus on the short and long-term dynamics of gas rising at a constant flow rate through the sediment layer, as well as bubble rise, sediment transport and particle suspension in the above liquid layer. The existence of a stationary state, resulting from the competition between particle entrainment and sedimentation is observed. A phenomenological model based on the balance between particle lift by bubbles at the center of the cell and their settling on its sides demonstrates that most of the particle entrained come from the fluid recirculation.

When inclining the cell, the existence of a stationary state depends on the tilt angle and the gas release rate. Indeed, a puzzling behavior is observed with an alternance between a slow growth of the settled particle layer and violent particle resuspension events.

## Références

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