Félicitations à Valentin Gueugneau qui a reçu le prix *Outstanding Student Presentation* pour sa présentation "Numerical modelling of the surge-derived pyroclastic flow of 25 June 1997 at Soufriere Hills Volcano, Montserrat" à l'IAVCEI 2017 Scientific Assembly.

BRAVO VALENTIN !

Abstract:
Numerical modelling of the surge-derived pyroclastic flow of 25 June 1997 at Soufriere Hills Volcano, Montserrat.
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Deposits from ash-cloud surges associated with dome-collapse block-and-ash flows can, under some conditions, be immediately remobilized to form dense, surge-derived pyroclastic flows (SDPF). SDPFs, such as that generated on 25 June 1997 at Soufrière Hills, Montserrat, are hazardous because they can follow drainages different from those exploited by the block-and-ash flows.
We investigate by numerical modelling the conditions that favor the generation of SDPFs during dome-collapse events. We developed a new version of the numerical model VolcFlow that simulates both components of a block-and-ash flow: the basal avalanche and the overriding ash-cloud surge. In the model, mass transfer into the ash cloud is caused by particle entrainment from the basal avalanche, while particle sedimentation from the ash cloud transfers mass in the opposite sense. The dense pyroclastic flows (block-and-ash flows and SDPFs) are assumed to have a plastic rheology, as suggested by earlier modelling work. If the deposit from the ash-cloud surge is thick enough to exceed the plastic limit, then the ash will remobilize and amalgamate to form a SDPF.
The parameter governing entrainment from the block-and-ash flow to the overriding ash cloud is poorly constrained, and is being measured using laboratory experiments. We generate a dilute mixture of air and particles (analogous to the surge) by passage of air through an agitated bed of hot volcanic particles (analogous to the block and ash flow), and use the system to quantify the mass exchange parameters.
Application of the model to the 25 June 1997 dome collapse at Soufrière Hills successfully reproduces the extent and thickness of deposits formed by the block-and- ash flow, the ash-cloud surge, and the SDPF. The formation of the SDPF is, however, highly dependent on topography. The modelled ash-cloud surge detaches from the block-and-ash flow at a bend in Mosquito Ghaut (a river valley). This allows the surge to sediment over a large area with steep slopes, and the deposit is locally thick enough to remobilize and amalgamate to form the observed 3 km long SDPF in the Dyer's River Valley. The detachment of the ash-cloud surge from the block-and-ash flow, combined with the sedimentation on steep slopes, is the most likely mechanism that led to the formation of a SDPF. Our work aims to generate physically robust models that can be used for hazard forecasting of surge-derived pyroclastic flows.