TITLE: Characterization of volcanic aggregates

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Context

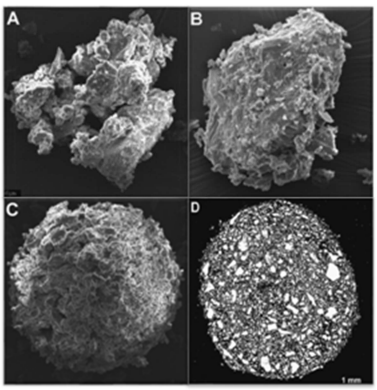
The large amount of fine ash released in the atmosphere by explosive volcanic eruptions constitutes a serious hazard to infrastructures, various economic and transport sectors (e.g. aviation), and to both human and animal health. Since most of the fine ash sediments in the form of aggregates, which commonly fall considerably faster than single particles, a quantitative understanding of aggregation mechanisms is of primary importance for an accurate estimation of ash concentration over time and space. In order improve our understanding, we need to predict the probability that two particles will collide (collision efficiency) and, in case they collide, the probability that they will stick (sticking efficiency). Both efficiencies depend on a large number of variables (temperature, humidity, turbulence intensity, electrical charge of the particles, collision velocity, size of the particles, etc.).

Objectives and Methods

A large variety of volcanic aggregates collected during the 2010 eruption of Eyjafjallajökull volcano (Iceland) and the 2013 and 2014 eruption of Sakurajima volcano (Japan) will be characterized based on image analysis, laser diffraction and Scanning Electron Microscope investigations. In particular, we will characterize aggregate size, internal grainsize, density, porosity, presence of internal structures, componentry, presence of secondary minerals in order to better understand their formation and we will determine the associated settling velocity in order to better describe their sedimentation dynamics. New data will also be collected in case of a new ash-producing eruption that will provide the opportunity to combine traditional sampling and in situ high-speed imaging.

Literature

- *Bagheri G, Rossi E, Biass S, Bonadonna C (2016) Timing and nature of volcanic particle clusters based on field and numerical investigations, Journal of Volcanology and Geothermal Research*
- *Bonadonna C, Genco R, Gouhier M, Pistolesi M, Cioni R, Alfano F, Hoskuldsson A, and Ripepe M. (2011) Tephra sedimentation during the 2010 Eyjafjallajökull eruption (Iceland) from deposit, radar, and satellite observations, J. Geophys. Res., 116, B12202, doi:10.1029/2011JB008462.*
- *Brown R, Bonadonna C., Durant A., (2011) A review of volcanic ash aggregation, Physics and Chemistry of the Earth (http://www.sciencedirect.com/science/article/pii/S1474706511003172)*
- *Burns F.A., Bonadonna C., Pioli L., Cole P.D, Stinton A. (2017) Ash aggregation during the 11 February 2010 partial dome collapse of the Soufrière Hills Volcano, Montserrat, J. Volcanol. Geotherm. Res.*



Scanning Electron Microscope images of aggregates of volcanic ash

Sites WEB

http://cms.unige.ch/sciences/terre/research/Groups/physical_volcanology/physical%20volcanology.php

Choice of orientation :

Geological Risks