

## **The ash mass load of volcanic plumes: retrievals from a new millimeter-wave radar at Stromboli and Sabancaya volcanoes**

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In the framework of the French Government Laboratory of Excellence ClerVolc initiative, two experiments using a new millimeter-wave radar were carried out to retrieve various physical properties of the ash plumes, especially the mass loading parameters which are critical for the modelling of ash dispersal, as well as to study the internal dynamics of the plumes and their fallout. First measurements at Stromboli in 2015 using a 95 GHz cloud radar prototype with a fixed beam pointing above the crater characterized the distribution of plume internal reflectivities, plume widths and durations at unprecedented space-time resolutions. Combining radar in situ measurements with data modelling from a disdrometer and ash sampling on the ground further allowed the retrieval of ash concentration and gradients inside the plumes, and sometimes proximal fallout. Plume maximum ash concentration range from 1 mg/m<sup>3</sup> to about 1 g/m<sup>3</sup>. Structuration of ash concentration with variations by a factor of 3 was also found to occur inside the falling ash in correlation with variations in the sedimentation rate measured on the ground by the disdrometer. New results from radar measurements inside stronger plumes and fallout at Sabancaya volcano (Peru, May 2018) using volume scans will also be presented.