



## Andrea Di Muro

IPGP Research Director in Volcanic Systems at the Observatoire Volcanologique du Piton de la Fournaise (La Réunion, France)

email: [dimuro@ipgp.fr](mailto:dimuro@ipgp.fr)

### **TRACKING, SENSING AND MODELING VOLCANIC GAS PLUMES: INSIGHTS FROM THE 'STRAP' PROJECT ON PITON DE LA FOURNAISE VOLCANO**

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Aula Riunioni, Area della Ricerca CNR-INGV, Via Ugo La Malfa n. 153, Palermo

#### ABSTRACT

The STRAP (Synergie Transdisciplinaire pour Répondre aux Aléas liés aux Panaches volcaniques) campaign was conducted in 2015 to investigate the volcanic plumes of Piton de La Fournaise (La Réunion, France). For the first time, measurements at the local (near the vent) and at the regional scales around the island were conducted. The STRAP 2015 campaign has become possible thanks to a strong cross-disciplinary collaboration between volcanologists and meteorologists. Results include the estimates of SO<sub>2</sub>, CO<sub>2</sub> and H<sub>2</sub>O emissions, the altitude of the plume at the vent and over different areas of La Réunion Island, the evolution of the SO<sub>2</sub> concentration, the aerosol size distribution, and the aerosol extinction profile. A climatology of the volcanic plume dispersion was quantified. Simulations and measurements showed that the plume formed by weak eruption has a stronger interaction with the surface of the island. Strong SO<sub>2</sub> and particles concentrations above 1000 ppb and 50,000 cm<sup>3</sup>, respectively, are frequently measured over 20 km of distance from the Piton de la Fournaise. The measured aerosol size distribution shows the predominance of very small particles in the volcanic plume. Several cases of strong nucleation of sulphuric acid observed within the plume and at the distal site of the Maïdo observatory. The STRAP 2015 campaign permitted to record a unique set of multi-disciplinary data that can now be used by modellers to improve the numerical parameterizations of the physical and chemical evolution of gas and aerosol plumes.

Recently published as:

Coppola, D., Di Muro, et al. (2017) Shallow system rejuvenation and magma discharge trends at Piton de la Fournaise volcano (La Réunion Island). *Earth and Planetary Science Letters*, 463: 13-24

Tulet, P., Di Muro A., et al. (2016) First results of the Piton de la Fournaise STRAP 2015 experiment: multidisciplinary tracking of a volcanic gas and aerosol plume. Submitted to *Atm. Chem. Phys.*