

VOLCPLUME, an open access interactive web platform dedicated to the monitoring of volcanic emissions and their multiscale impacts on the atmosphere

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The VOLCPLUME web platform is dedicated to the near-real time and retrospective tracking and analysis of the 4D physico-chemical properties of volcanic plumes in the atmosphere (Boichu and Mathurin 2022). This open access platform allows for jointly analysing a broad panel of satellite and ground-based active/passive remote sensing observations of both volcanic gas and particles, including Low Earth and Geostationary Orbit imagery, spaceborne or ground-based lidar, and photometric measurements. The platform also gives access to in-situ ground-level air quality monitoring networks. This synergy enables users to detect and isolate a volcanic plume signature down to the ground, from source to regional or global scales. Interactivity and flexibility of the platform aims at facilitating assessment of the multiscale atmospheric impacts of volcanic plumes that include – depending on the type and magnitude of the eruption – modifications of the atmospheric chemistry, degradation of air quality, aviation hazards, and climate impacts.

An additional feature of the platform is its ability to quantify temporal variations of gas and particle emissions, over daily to annual timescales, from any active volcano in the world. To this end, a companion interactive web application, named « SO₂ Flux Calculator », has also been developed to automate the estimation of daily SO₂ gas flux emissions from TROPOMI observations with a robust noise estimation (Grandin *et al.* 2024). Knowledge of the volcanic source, often highly variable with time, is indeed crucial for accurately initialising models of volcanic plume dispersion and robustly assessing atmospheric hazards. Regarding local volcanological hazards, this focus on emissions is also essential as it allows to remotely track changes in the degassing or eruptive activities of any isolated or non-instrumented volcano.

VOLCPLUME is an interdisciplinary platform, under the umbrella of the DATA TERRA and ACTRIS Research Infrastructures, which is relevant for atmospheric scientists and institutions in charge of air quality or aviations hazards, but also to the earth science community, in particular volcanologists and volcanological observatories.

For illustration, we present different case-studies including the eruptions of Cumbre Vieja (La Palma, Canary Islands), Piton de La Fournaise (La Réunion), Soufrière Saint-Vincent (Lesser Antilles) and Hunga Tonga.

Boichu, M. and Mathurin, T. (2022). VOLCPLUME, an interactive web portal for the multiscale analysis of volcanic plume physico-chemical properties [Interactive Web based Ressource], AERIS, DOI: [10.25326/362](https://doi.org/10.25326/362), Portal access: <https://volcplume.aeris-data.fr>, Homepage: <https://www.icare.univ-lille.fr/volcplume/>

Grandin, R., Boichu, M., Mathurin, T. and Pascal, N. (2024). Automatic estimation of daily volcanic sulfur dioxide gas flux from TROPOMI satellite observations: application to Etna and Piton de la Fournaise. *J. Geophys. Res.*, DOI: [10.1029/2024JB029309](https://doi.org/10.1029/2024JB029309)