ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA

OVPF

IPGP INSTITUT DE PHYSIQUE DU GLOBE DE PARIS

OSU-RÉUNION Observatoire des Sciences de l'Univers de La Réunion

ENVRIplus

ENVRIplus is a Horizon 2020 project bringing together Environmental and Earth System Research Infrastructures, projects and networks together with technical specialist partners to create a more coherent, interdisciplinary and interoperable cluster of Environmental Research Infrastructures across Europe.

The Instituto Nazionale di Geofisica e Vulcanologia of Palermo participated in the EVRIPlus Transnational Access (TNA) program with two projects at La Reunion. The access provider of the infrastructure has identified both of these projects as excellent showcases to be presented during the ENVRIplus meeting.

The projects

NICO - Natural Impact of passive and active volcanic CO_2 degassing activity on the atmosphere

P. I. **Marco Liuzzo**[(1)]

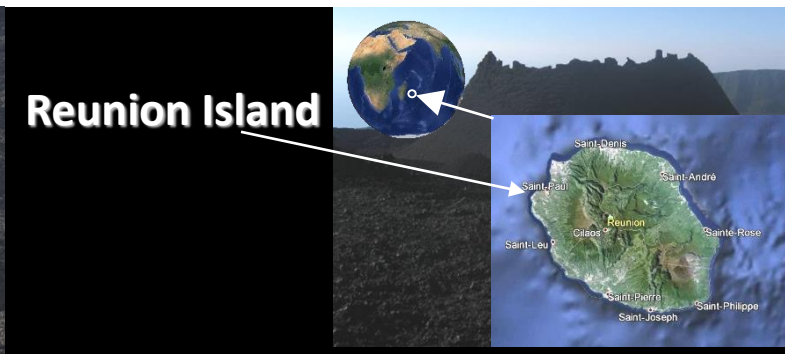
Andrea Luca Rizzo[(1)]; Andrea Di Muro[(2)]; Patrice Boissier[(2)]; Philippe Kowalski[(2)]; Guillaume Boudoire[(1)]; Pierre Tulet[(3)]; Jean-Marc Metzger[(4)]

[1)]Istituto Nazionale Di Geofisica E Vulcanologia – Palermo

[(2)] Institut de Physique du Globe de Paris (IPGP) Observatoire Volcanologique du Piton de la Fournaise (OVPF)

[(3)]LACy, Laboratoire de l'Atmosphère et des Cyclones - Maïdo Observatory

[(4)]OSU-R, Observatoire des Sciences de l'Univers de la Réunion



On the left: photo of eruptive fracture at Piton de la Fournaise during initial phases of September-October 2018 eruption. Photo credit by Andrea Di Muro

ENTER - Emission in atmosphere of Natural gases and TEmporal variations Related to volcanic activity

P. I. **Andrea Luca Rizzo**[(1)]

Fausto Grassa[(1)]; Marco Liuzzo[(1)]; Andrea Di Muro[(2)]; Patrice Boissier[(2)]; Philippe Kowalski[(2)]; Guillaume Boudoire[(1)]; Pierre Tulet[(3)]

[1)]Istituto Nazionale Di Geofisica E Vulcanologia – Palermo

[(2)] Institut de Physique du Globe de Paris (IPGP) Observatoire Volcanologique du Piton de la Fournaise (OVPF)

[(3)]LACy, Laboratoire de l'Atmosphère et des Cyclones - Maïdo Observatory

ENVRI week
14 - 18 May 2018
NH Hotel Zandvoort
Netherlands
6th #ENVRIweek

NICO - Natural Impact of passive and active volcanic CO_2 degassing activity on the atmosphere

P. I. **Marco Liuzzo**[(1)]
Andrea Luca Rizzo[(1)]; Andrea Di Muro[(2)]; Patrice Boissier[(2)]; Philippe Kowalski[(2)]; Guillaume Boudoire[(1)]; Pierre Tulet[(3)]; Jean-Marc Metzger[(4)] corresponding author marco.liuzzo@ingv.it

Volcanoes are important emitters of gases responsible for local atmospheric pollution and, during exceptional eruptions, climate changes. Understanding the origin of gases released by volcanic activity and the physical-chemical transformations at increasing distance from the source as well as the effect of these in the atmosphere is of crucial importance to the evaluation of possible hazard conditions. Piton de la Fournaise (PdF) volcano (Reunion island) is a very active volcano and an important source of gas released into the atmosphere, representing an excellent site to investigate the complexity of the above problems from different scientific perspectives. The origin of volcanic gases and their incidence and modification in the atmosphere, particularly during quiescent periods is still poorly investigated owing to few interdisciplinary research initiatives thus far. An initial attempt to address this was during STRAP project (Agence Nationale de la Recherche) which focused on the track of volcanic plume and aerosol at distal areas [Coppola, D. et al.; 2017; Tulet, P. et al.; Submitted].

In this project, we intend to further address the gap in knowledge by 1) defining the chemical and isotopic characteristics of magmatic fluids (CO2, SO2 and noble gases) either at source or in distal areas; 2) quantifying the amount of volatiles emitted from the volcano and their evolution in the atmosphere; 3) evaluating the impact of volcanic emissions in the local atmosphere. To achieve our objectives, we plan to carry out field surveys to locate and quantify the most important emission areas and gas and rock sampling for laboratory measurements to define the origin of fluids and their evolution over distances. The obtained data will be integrated by geochemical and volcanological observations made in collaboration with the Observatoire Volcanologique du Piton de la Fournaise (OVPF) and by further atmospheric measurements made in cooperation with the local Maïdo Observatory (MO). Data already acquired from the Research Infrastructures ICOS and from ACTRIS will complement this study and will contribute to an interpretative model for the evaluation of the dispersion of the pollutant gases in the atmosphere and the possible effect on a local and global scale.

7th ENVRI week
5 - 9 November 2018
Tallink Hotel Riga
Latvia
#ENVRIweek

ENTER - Emission in atmosphere of Natural gases and TEmporal variations Related to volcanic activity

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Fausto Grassa[(1)]; Marco Liuzzo[(1)]; Andrea Di Muro[(2)]; Patrice Boissier[(2)]; Philippe Kowalski[(2)]; Guillaume Boudoire[(1)]; Pierre Tulet[(3)] corresponding author andrea.rizzo@ingv.it

CO_2 is one of the most important greenhouse gases and plays a critical role in global climate change [e.g., Ciais et al., 2013]. It is also one of the major species emitted from volcanoes and its study is critical for determining their activity state and for estimating its impact on the global carbon budget [Aiuppa et al., 2008]. The isotope composition of CO_2 ($\delta^{13}C$) is a complementary tool for distingushing environmental processes [Battipaglia et al., 2013] from changes due to magmatic activity [Rizzo et al., 2009; Hilton et al., 2010; Gennaro et al., 2017].

Piton de la Fournaise (PdF) is one of the most active volcano on Earth with frequent eruptions. Thus, it represents an excellent site for investigating the origin, temporal variations, and contribution of volcanic gases into atmosphere. Early studies have shown that PdF emits relatively little CO_2 in spite of its high rate of activity (Di Muro et al., 2016), but that CO_2 emissions and their link with volcanic activity (Liuzzo et al., 2015; Tulet et al., 2017) and environmental parameters can be quantified. A recent research on fluid inclusions in minerals (Boudoire et al., submitted to GCA) suggests that extensive CO_2 degassing occurs already at mantle depth and contributes to diffuse CO_2 emissions from soil and sources and leave little CO_2 contents in magmas erupted from the volcano.

Our project aims at improving the knowledge on the $\delta^{13}C$ of CO_2 emitted on La Réunion island, and its temporal variations due to volcano-tectonic activity and environmental conditions. This study will use new technical approach to quantify magmatic CO_2 and its interaction with the hydrosphere-biosphere-atmosphere. We plan to achieve these goals by a field survey using i) an analyzer of CO_2-CH_4-H_2O concentration in atmosphere, ii) a laser for $\delta^{13}C$ real-time measures, iii) by UAS measurements with a drone equipped with electrochemical sensors. The laser will be installed for a few weeks in a CO_2-rich thermal spring (Cilaos) for testing temporal variability. The obtained data will be integrated geophysical and geochemical monitoring data of the Observatoire Volcanologique du PdF and chemical and environmental parameters recorded by the Maïdo Observatory.