



## SNOV

### Type

TS-ANO1

### Coordination

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### Description

The SNOV collects geophysical, geochemical, geological data over long periods of time in order to understand and monitor dynamic geological processes acting at short and long timescales on or nearby active volcanoes. It also collects, analyses, archives, and distributes digital data on instrumental and felt seismicity and regional deformation in the Lesser Antilles volcanic arc. All data are distributed, a large part in real time, to the international scientific community for research aiming at understanding the behaviour of volcanoes and their regional tectonic context. All volcanic targets presenting either a threat to French territories or an interest in methodological and instrumental developments are considered. In particular when they have important implications for improving monitoring and knowledge of French active volcanoes. The SNOV achieves these goals via two main structuring and contributing institutions, that have various common and integrated actions : 1) the Institut de physique du globe de Paris (Université Paris Cité) which manages its 3 overseas volcanological and seismological observatories (OVS) in Guadeloupe (OVSG), Martinique (OVSM), and La Réunion (OVPF) that operate large monitoring networks set at the regional scale on the lesser Antilles Arc and on the Réunion Island hot spot, under the scientific and technical coordination of the Paris OVS group; 2) the OPGC (Observatoire de Physique du Globe de Clermont-Ferrand). at the University Clermont Auvergne (UCA) that operates various volcanic observational actions. The remote sensing component of the OPGC has expertise both in satellite and ground-based remote sensing of active volcanoes that includes operating in real and near real time two officially labelled platforms: The Thermal infrared satellite observations platform (HOTVOLC) and the VOLDORAD platform that operates ground based instruments, such as doppler radars and disdrometers. The OPGC group has also structured other observation actions such as (i) gas remote sensing and gas in-situ measurements (fumarole, volcanic plume, soil), (ii) a multi parameters database of the volcano dynamics: systematic textural, sedimentological, petrological and geochemical analysis, (iii) thermal budget and flux determination, (iv) geophysical imaging, among several other structured actions (modelling, deformation, instrumental developments performed along with the Pôle Technique of OPGC). The main goal of the SNOV aims at understanding the volcanological phenomena via monitoring 3 active volcanoes: A very active hot spot volcano, the Piton de la Fournaise at La Réunion. Since the 1980's, the mean eruption rate has been more than 2 lava flows per year, giving fantastic opportunities to observe the development of eruptions in the context of the state of strain of the volcanic edifice. A particular attention is given to build eruption precursors for predicting the lava flow parameters (time, amplitude, lava flow emission point, ...). The monitored area, initially restricted to the Piton de la Fournaise volcano, was extended to include the whole La Réunion Island. Two subduction zone volcanoes, the Soufrière of Guadeloupe and the Montagne Pelée in Martinique, for which potential volcanic hazards are very large, as illustrated by the 1902 Montagne Pelée Crisis and the ongoing nearby Montserrat Island volcanic crisis and more recently the Kick'em Jenny crisis and the Soufrière of Saint-Vincent eruptions. These edifices rest on the Lesser Antilles subduction where the tectonic structures at large scale play an essential role on the activity of the volcanoes of the Arc and consequently for some parameters, the monitored areas are extended to the Lesser Antilles Arc via partnerships with regional actors (UWI-SRC, USGS, PRSN, Funvisis, ...) and possibly, other volcanoes, for testing new technology. In the aftermath of the major submarine eruption ongoing since ca. June 2018 offshore from Mayotte island (Mozambique channel, Indian Ocean), there is now a 4th active volcano in France. In the aftermath of this major geological event, its data gaps, and the risks associated with it, the French Prime Minister has agreed on the urgent need to establish in the long term a new operational monitoring network and observation system for volcanic and seismic activity in Mayotte and surrounding region. On 18 June 2019, the French government gave the responsibility to IPGP, with support from BRGM, CNRS-INSU, and IFREMER, to design, install, and operate the new REVOSIMA (Réseau de surveillance volcanologique et sismologique de Mayotte / Volcanological and seismological monitoring network of Mayotte) (see [www.ipgp.fr/revosima](http://www.ipgp.fr/revosima)). The data from the REVOSIMA are produced by a large consortium of

institutional and academic national scientific partners in France. Given the exceptional situation of this major eruption and implementation of a new observatory service on France's new and 4th active volcano, funding for this new monitoring network was earmarked especially by the French government outside of the SNOV budget, under the coordination of the MAPPPROM (Mission de pilotage des politiques publiques de prévention et de gestion des risques naturels en outre-mer). However, a large part of the observatory tasks and data acquisition are performed by scientists of the SNOV. In addition, SNOV actions on analogous volcanic targets are also performed in order to, for instance, (i) constrain more the impacts of foreign explosive eruptions on French territories (ash and gas dispersion), with the example of the 2021 Soufrière of St Vincent eruption; (ii) provide important data to the French Volcanic Ash Advisory Centres for foreign eruptions that could impact our territory, such as Etna, Cumbre Vieja, Fagradalsfjall etc.; and (iii) test instruments and protocol techniques on explosive eruptions (e.g. the Cumbre Vieja eruption at La Palma) but also on highly accessible analogue targets such as Chaîne des Puys volcanoes to be more operational in case of an explosive eruption on our territory. The governance of the SNOV includes the Leader (Jean-Christophe Komorowski, IPGP) and Co-leader (Séverine Moune, OPGC, LMV, UCA) and the COPIL Steering Committee is composed of the main actors in volcanology in France, and has 17 members : V Pinel (OSUG), N. Feuillet (IPGP), F. Donnadieu (OPGC), L. Gurioli (OPGC), S. Guillot (DAS TI INSU), P. Labazuy (OPGC, EPOS Europe and EPOS-France), F. Beauducel (IPGP), J. Corbeau (Ass. Dir. OVSM-IPGP), J-M. Saurel (IPGP), C Martel (OSUC), I. Vlastelic (Dir. OVSG-IPGP), A. Peltier (Dir. OVPF-IPGP & Operational Dir REVOSIMA, Mayotte), F. Albino (representing ISDeform SNO), J-P. Mallet (representing OMIV SNO), M. Chaussidon (Dir. IPGP EPSCT), E. Thebault (Dir. OPGC). The Steering Committee meets at least and if possible 2 times a year by visioconference with the overseas observatories and issues written minutes of the meetings. It provides guidance on key issues of the SNOV, establishes the priorities in terms of observational data and the means necessary to achieve the yearly roadmap, organizes the distribution of means among the observatories in charge of collecting, and distributing data. It analyzes and evaluates new fields and techniques important to develop to improve the nature, quality, and quantity of observational data and to tackle new research challenges in volcanology. It liaises with other national services of observations in Solid Earth (RESIF, RéNAG, BCMT, OMIV, BCSF-RéNaSS, Geoscope, ISDeform) and also the Critical Zone (Obsera) and insures the distribution of the data to the scientific community. In 2022, the SNOV leaders have proposed to improve the governance and integration of the SNOV community by organizing a yearly General Assembly of all the SNOV community, setting a structure of thematic working groups with specific leaders to structure better the actions, and a web page. The SNOV is coordinating efforts with the new leaders (P. Lesage, P. Bachèlery) of Volcanology section of the Comité National Français de Géophysique et de Géodésie (CNFGG) linked to the IUGG, in their organisation of a yearly meeting of the volcanological community in France. The 3 OVS of the SNOV and the REVOSIMA operate daily with the WebObs platform and webservice developed by F. Beauducel and collaborators at IPGP over the last decades. WebObs received the Open Science Award for Open Source Research in 2022 in the "Accessit" community category, awarded by the Ministry of Research, Higher Education and Innovation, and recently labelled in 2022 as Code Communautaire by INSU. It is a tool to manage, archive, analyse, visualise, and distribute observatory data for the OVS. WebObs is a stand-alone software package initially designed to meet the daily needs of French volcanological and seismological observatories, in particular the management of permanent and temporary networks and the operational and real-time monitoring of multidisciplinary data in support of the surveillance of natural phenomena. Designed around a minimalist web interface, WebObs currently offers about twenty real-time data flow processing modules compatible with international standards (Seiscomp3, Earthworm, FDSN for seismology), some of which go as far as real-time modelling, as well as a flexible structural database for the technical management of instrumental pools, measurement sites and phenomenological observations. WebObs is now used routinely in about fifteen observatories around the world. It has become the daily tool, a real pillar of the operational functioning of the volcanological and seismological observatories of the IPGP for over 20 years. It is also a development environment allowing to test new innovative monitoring methods and to apply them quickly to real-time data sets. In coordination with the CNRS, the MESR (French Ministry of Higher Education and Research) in the process of creating a French mirror of EPOS (European Plate Observing System), EPOS-France (replacing Résif/EPOS). The objective is to integrate EPOS-France on the next Roadmap of national Research Infrastructures (RI). The SNOV is strongly involved in preparing for this formalisation of EPOS-FRANCE given its major contributor of data to the EPOS Thematic Core Service 'Volcano Observations' (VOLC-TCS). Seismological data from the SNOV are distributed through the RESIF-SI, the seismological data information system of the RESIF-EPOS research infrastructure. Locations of volcano-tectonic and tectonic earthquakes determined by the volcanological and seismological observatories for the SNOV (OVSG-IPGP, OVSM-IPGP, OVPF-IPGP, REVOSIMA/IPGP-BRGM-CNRS) are available in real-time through BCSF-RéNaSS public website at <https://renass.unistra.fr/fr/zones/les-antilles/> and IPGP datacenter FDSN webservice. Slow rate geophysical data from the SNOV are distributed through the Volobsis portal by IPGP datacenter (<http://volobsis.ipgp.fr/>). GNSS data from the SNOV are distributed through IPGP Glass node, part of the EPOS GNSS Glass infrastructure. Satellite data from the SNOV are distributed through the Hotvolc portal by OPGC datacenter (<http://www.obs.univ-bpclermont.fr/SO/televolc/hotvolc/>). The SNOV also maintains other databases developed by OPGC-LMV-UCA (OPGC Virtual Observatory portal : <http://opgc.fr/vobs/>). All geological samples (> 10 000) collected on the French active volcanoes (Piton de la Fournaise, Soufrière of Guadeloupe, Montagne Pelée, Mayotte) are now integrated in a bar-coded digital database (<https://www.igns.cnrs.fr>) using the tools of CNRS and international standards (maintained and in development by IPGP and OPGC-LMV-UCA)