



ANTARCTICA | Permanent Volcanological Observatory realized

*Created by the University of Catania and the Istituto Nazionale di Geofisica e Vulcanologia,
it will have multidisciplinary expertise for new volcanological research*

[Catania-Rome, 23rd June 2023]

Established the new **permanent volcanological Observatory in Antarctica I-VOLCAN (Italian VOLcanological observatory in ANtarctica)**, run by the [University of Catania \(UniCT\)](#) and the [Istituto Nazionale di Geofisica e Vulcanologia \(INGV\)](#), which aims **to develop a multi-parameter monitoring system of the Melbourne volcano and later the Rittmann volcano**. It will be multidisciplinary in nature and will involve participants with complementary expertise in different areas such as seismology, geodesy, gas and rock geochemistry, tephrochronology, technology and instrumentation, data science, volcano monitoring, and database creation and management.

Active volcanoes are widespread all over the world, even in remote areas such as Antarctica.

In recent years, Antarctic volcanism has attracted the attention of the international scientific community partly as a result of recent eruptions of remote volcanoes, such as Eyjafjallajökull in Iceland in 2010 and Hunga Tonga-Hunga Ha'apai in 2022, which reminded us **how even the most distant and least known volcanoes on Earth can pose significant dangers to large communities**.

The permanent settlement and seasonal presence of scientists, technicians, tourists and logistical personnel in Antarctica have increased significantly in recent decades. Therefore, the need to learn more about and monitor these volcanoes is becoming greater and more urgent.

The University of Catania and INGV have been collaborating intensively for years in the study of Antarctic volcanism through research projects funded by the [National Program for Research in Antarctica \(PNRA\)](#). In particular, with the projects [ICE-VOLC \(Multiparametric Experiment at antarctica VOLcanoes: data from volcano and cryosphere-ocean-atmosphere dynamics\)](#) coordinated by **Prof. Andrea Cannata of the Department of Biological Geological and Environmental Sciences of the University of Catania**, [MIMIC \(Multidisciplinary Investigations on mount Melbourne volcano and its fumarolic Ice Caves\)](#) coordinated by **Eng. Gaetano Giudice of the INGV's Osservatorio Etno (INGV-OE)**, and [CHIMERA \(Cryptotephra In Marine sEquences of the Ross Sea, Antarctica: implications and potential applications\)](#) coordinated by **Dr. ssa Paola Del Carlo of the Pisa Section of INGV (INGV-PI)**, detailed studies were carried out primarily on the Melbourne volcano -, located about 40 km from the Italian base Mario Zucchelli , and secondarily on the Rittmann volcano, located about 140 km from the base.

The results of the studies showed that **both volcanoes are active**, have fumaroles fueled by volcanic gases, and generate seismic signals typical of volcanic environments, such as long-period events and tremors. In addition, tephrostratigraphic and petrological studies performed on rock samples collected from various outcrops of Mount Melbourne have allowed reconstruction of explosive eruptions, with styles ranging from Strombolian/Vulcanian to Subplinian/Plinian that occurred as far back as historical times. This means that **Mount Melbourne is capable of generating highly explosive eruptions and is therefore potentially dangerous to nearby scientific stations and aviation safety throughout the Antarctic continent**.

Other interesting aspects were the exploration and mapping for the first time of **ice-caves**, located at the top of volcanoes, which **are ice caves formed by hot fumarolic gases** that melt the lower layer of ice and snow, leaving a cavity that is accompanied by a typical chimney structure called an *ice-tower*. Exploration of ice-caves has made it possible both to identify incredibly fascinating environments and to identify protected locations suitable for housing the instrumentation needed for continuous monitoring of volcanoes.

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The results of ICE-VOLC, MIMIC and CHIMERA were instrumental in obtaining the establishment of a new permanent volcanological observatory in Antarctica, recently accepted for funding by PNRA and called I-VOLCAN (*Italian VOLCanological observatory in ANtarctica*).

This new **project**, with its multi-parameter network **will provide a continuous flow of multidisciplinary data (seismic, geodetic, geochemical, volcanological) that will be shared with the international scientific community, leading to an advancement in knowledge in volcanology, as well as in other disciplines such as geophysics, geodynamics, glaciology, climate and biology.**

It should also be emphasized that establishing a monitoring network in remote areas such as the Antarctic continent will require **considerable effort from a technological standpoint, as the instruments that make up the network must cope with the most extreme climate on Earth**, which is characterized by very cold temperatures, strong winds, and considerable variations in the duration of solar radiation, which varies from a full day of radiation during Antarctic summers to complete darkness during winters.

This purely technological issue has already been addressed in part in some of the activities conducted by the ICE-VOLC and MIMIC projects, through which both continuous monitoring stations in ice-caves and outdoor stations such as the seismic-acoustic sensors installed on the summit of the Rittmann have been implemented.

Helpful links:

[Università di Catania \(UniCT\)](#)

[Istituto Nazionale di Geofisica e Vulcanologia \(INGV\)](#)

[Programma Nazionale di Ricerche in Antartide \(PNRA\)](#)

[ITALIA IN ANTARTIDE](#)

Project [ICE-VOLC \(*Multiparametric Experiment at antarctica VOLCanoes: data from volcano and cryosphere-ocean-atmosphere dynamics*\)](#)

Project [MIMIC \(*Multidisciplinary Investigations on mount Melbourne volcano and its fumarolic Ice Caves*\)](#)

Project [CHIMERA \(*Cryptotephra In Marine sequences of the Ross Sea, Antarctica: implications and potential applications*\)](#)

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