State volcano Observatories of Southern South America and VAAC Buenos Aires - Collaborations and challenges for the next decade

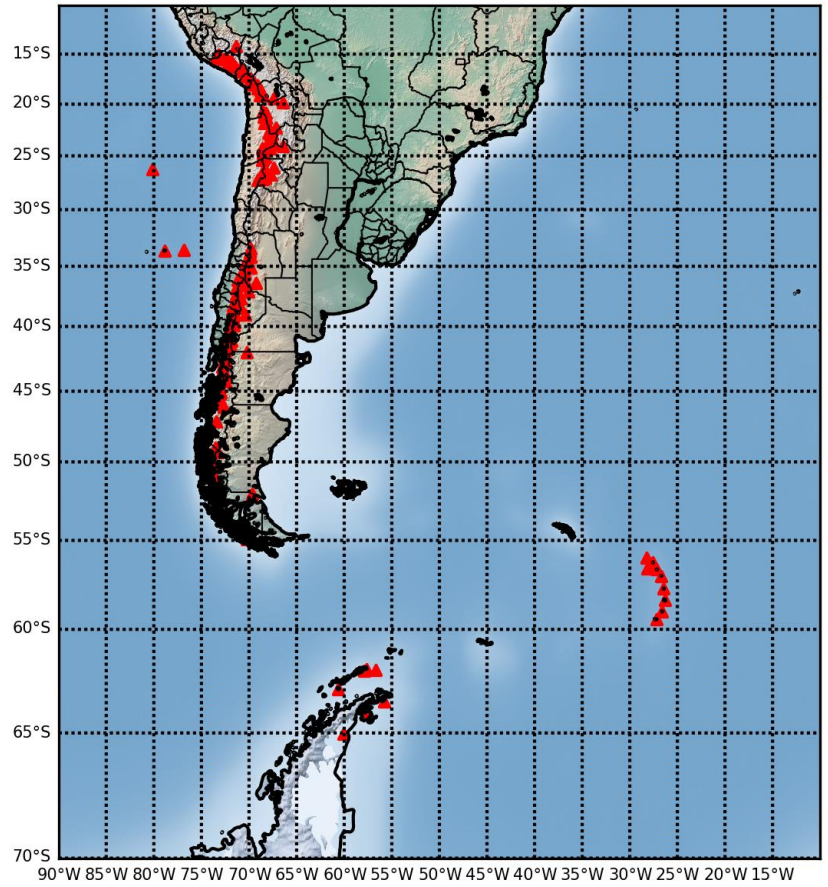
Ivonne Alejandra Lazarte Zerpa [1] , Álvaro Amigo [2] , Sebastián García [3] , José Alberto del Carpio Calienes [1] , Pablo Forte [3] , Soledad Osores [4].

VAAC Buenos Aires Area of Responsibility and State Volcano Observatories

144 active volcanoes in VAAC Buenos Aires area of responsability (Smithsonian data base)

State volcano Observatories

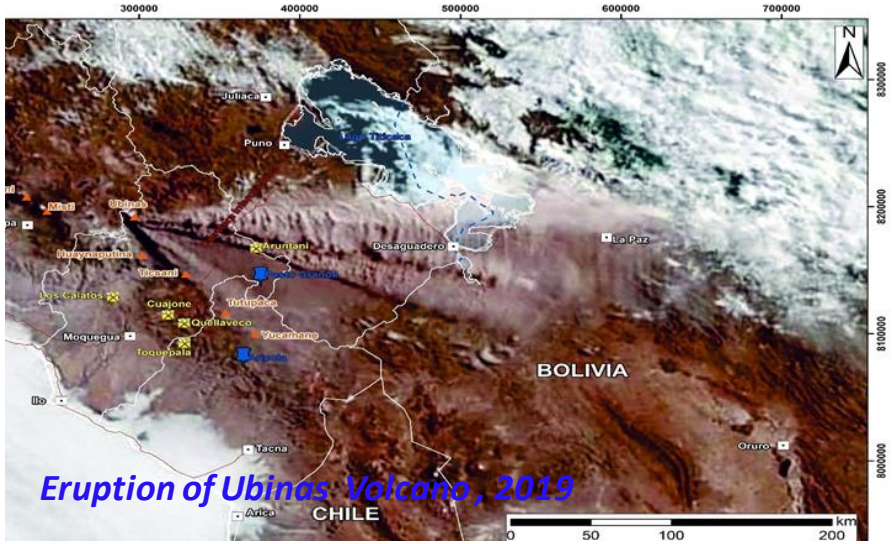
- Instituto Geofísico del Perú - Perú
- Servicio Nacional de Geología y Minearía – Chile
- Servicio Geológico Minero Argentino – Argentina



State Volcano Observatory from Peru

The National Volcanological Center- CENVUL

The National Volcanological Center (CENVUL) is the official service of the Peruvian State, implemented and managed by the Geophysical Institute of Peru (IGP), responsible for monitoring and early warning of volcanic eruptions in the country.



Eruption of Ubinas Volcano , 2019

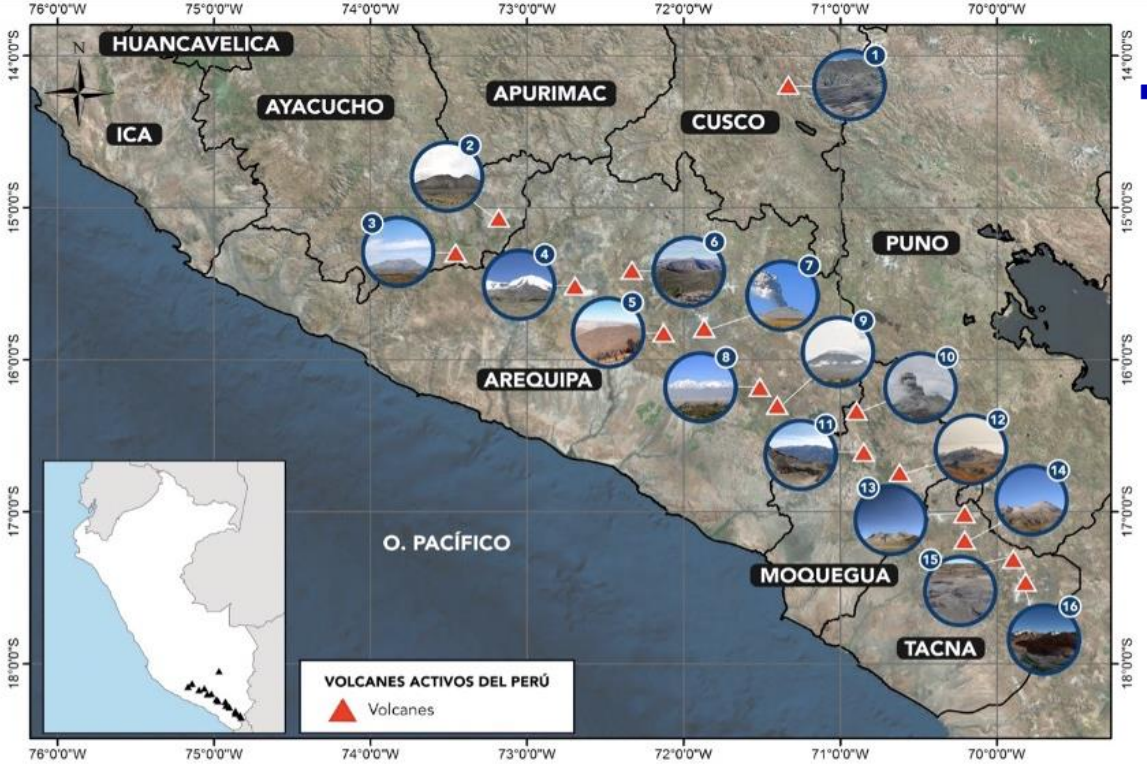
The CENVUL staff consists of 24 scientists and techni-
cal specialists such as:
2 geologists, 6 seismologists, 2 geodesists, 2 specialists in remote sensing
3 electronics engineers, 2 technicians in electronic and computer sciences), and administrative support (4profession-and 3 drivers).

Sachaca- Arequipa

The National Volcanological Center (CENVUL)

State Volcano Observatory from Peru

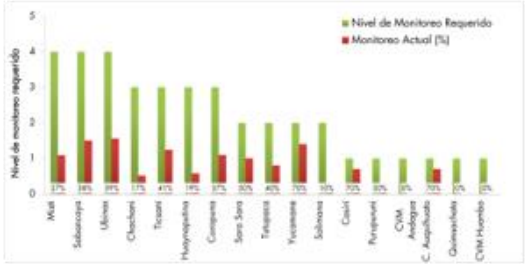
IGP Instituto Geofísico del Perú



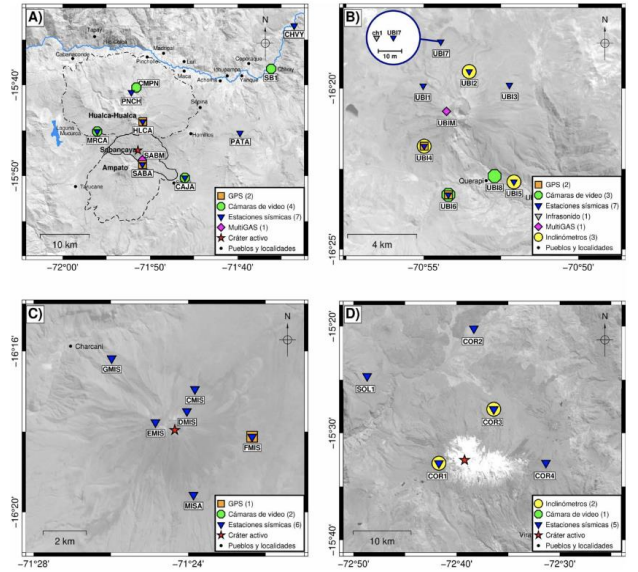
13 monitored volcanoes in the **regions of Ayacucho, Arequipa, Moquegua and Tacna.**

1 volcano in **eruptive process: SABANCAY**A.

MONITORING LEVEL



Maps of the instrument monitoring network operated by CENVUL at the top four highest-risk volcanoes in Peru: [A] Sabancaya, [B] Ubinas, [C] Misti, and [D] Coropuna.



VOLCANES ACTIVOS DEL PERÚ

CUSCO	AYACUCHO	AREQUIPA	MOQUEGUA	TACNA
1.- Quimsachata	2.- Cerro Auquihuato	4.- Coropuna	10.- Ubinas	13.- Tutupaca
	3.- Sara Sara	5.- Andahua	11.- Huaynaputina	14.- Yucamane
		6.- Huambo	12.- Ticsani	15.- Cerros Purupuruni
		7.- Sabancaya		16.- Casiri
		8.- Chachani		
		9.- Misti		

Volcanic alert levels in Peru

State Volcano Observatory from Peru

Letter of agreement between the **Peruvian Airport Corporation and Commercial Aviation CORPAC S. A.** and the **Geophysical Institute of Peru - IGP**

IGP will immediately provide information on significant pre-eruption volcanic activity or volcanic eruption or the presence of volcanic ash clouds to the relevant **ACC, VAAC** and the associated **OVM(Lima)**

IGP Instituto Geofísico del Perú

VONA EMISSION FROM PERU

CORPAC S.A.

Area Control Center **ACC**

Meteorological monitoring office OVM

The National

VAAC-BUE VOLCANIC ASH ADVISORY CENTER – BUENOS AIRES

Servicio Meteorológico Nacional

FORMATO VONA

NOTIFICACIÓN DEL OBSERVATORIO DE VOLCANES PARA LA AVIACIÓN	
Emitido:	(20220505/1400BZ)
Volcán:	Volcán Sabancaya N° 354006
Clave de color aeronáutica actual	Red
Anterior clave de color aeronáutica	Red
Fuente:	Instituto Geofísico del Perú (IGP)
Número de notificación:	012022
Ubicación del volcán:	S1578 W07185
Área:	PERU
Elevación de la cima:	5 967m (19576 ft)
Resumen de la actividad volcánica:	Explosiones con emisiones de ceniza moderadas en el volcán Sabancaya a lo largo del día. La altura máxima alcanzada por la columna eruptiva fue de 3000 m (9842ft) por encima del cráter. Según lo observado, el material viene siendo dispersado hacia los sectores – **NORESTE, OESTE del volcán.**
Altura de la nube volcánica:	3000 m (9843ft)
Otra información de nube volcánica:	Emisiones de coloración gris (cenizas)
Observaciones:	
Contactos:	• Centro Vulcanológico Nacional Teléfono: +5154 251 373 • José Del Carpio Calienes jdelcarpio@igp.gob.pe • Jorge Andrés Concha Calle prensa.concha@igp.gob.pe • Centro Vulcanológico Nacional cenvul@igp.gob.pe
Próxima Notificación:	CUANDO SE REGISTREN CAMBIOS SIGNIFICATIVOS EN LA DIRECCIÓN Y ALTURA DE LAS EMISIONES.

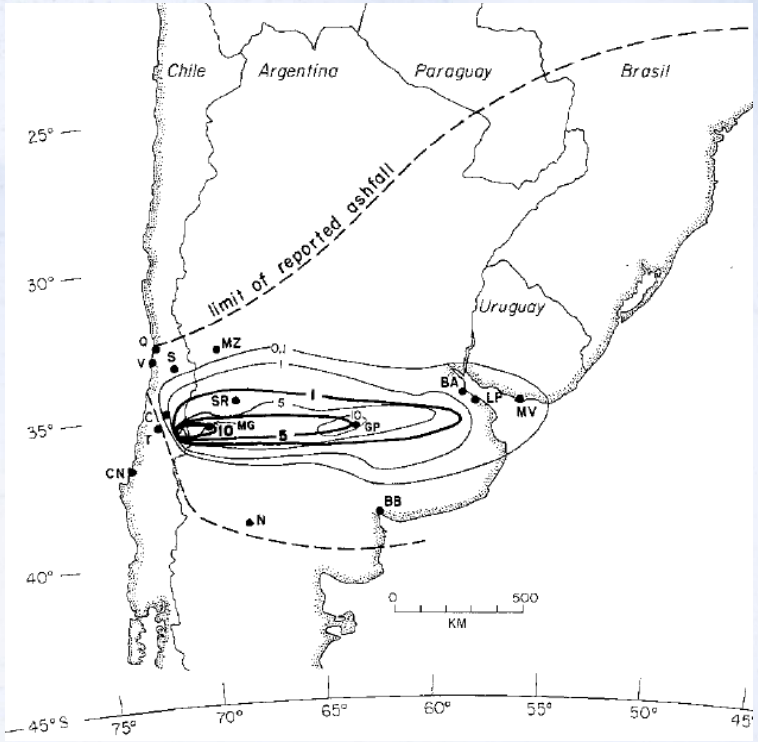
Web: www.igp.gob.pe/servicios/centro-vulcanologico-nacional

209 Volcanic Activity bulletins and 365 Special Volcanic Activity Reports issued during the year 2022

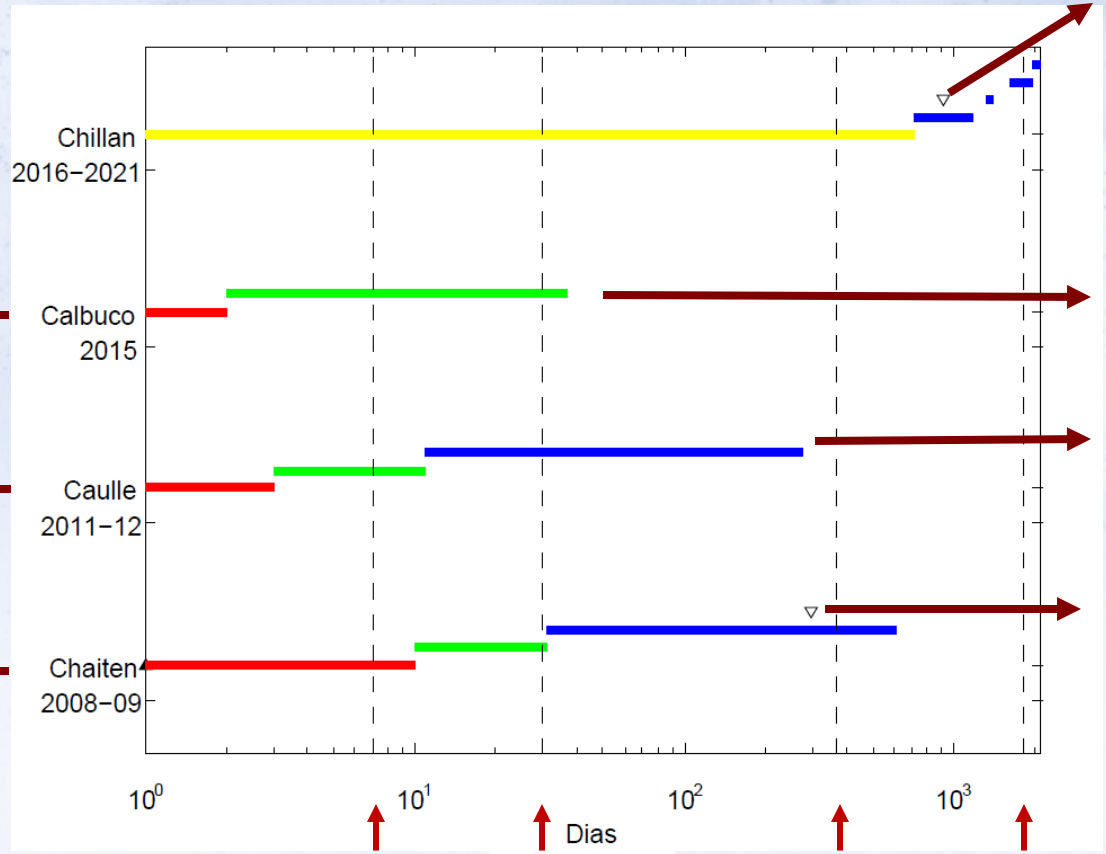
State Volcano Observatory from Chile

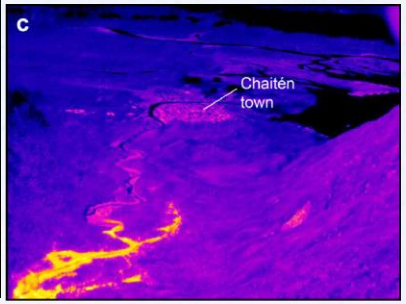
Explosive activity in the last decades

+ last century (eg Quizapu, 10 km3, 35ºS, 1932)



Long eruptive cycles:





1 day -1 week
Strong plumes >15 km column-height
Few events

Months - years
Weak plumes < 10 km column-height
Several events

Short explosions:

Minutes - Hours
- **Strong or weak plumes**
- **2 to >10 km column-height**
- **Rare events**

Láscar 2000
> 5 km column-height

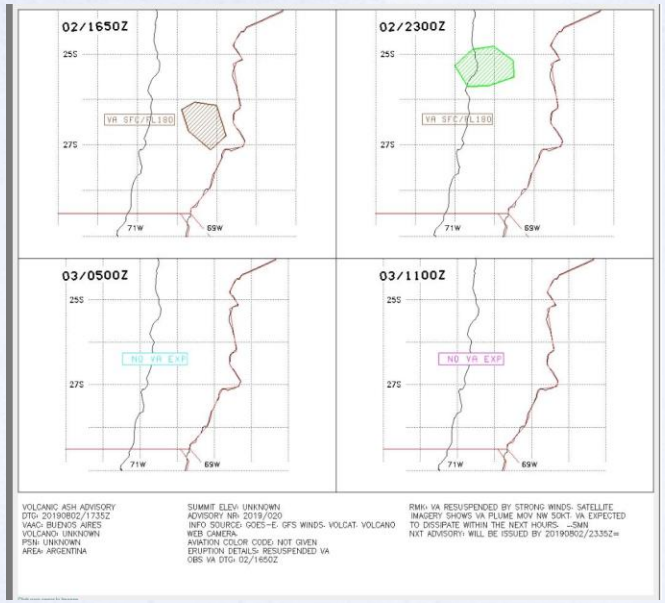
Láscar 2015
3 km column-height

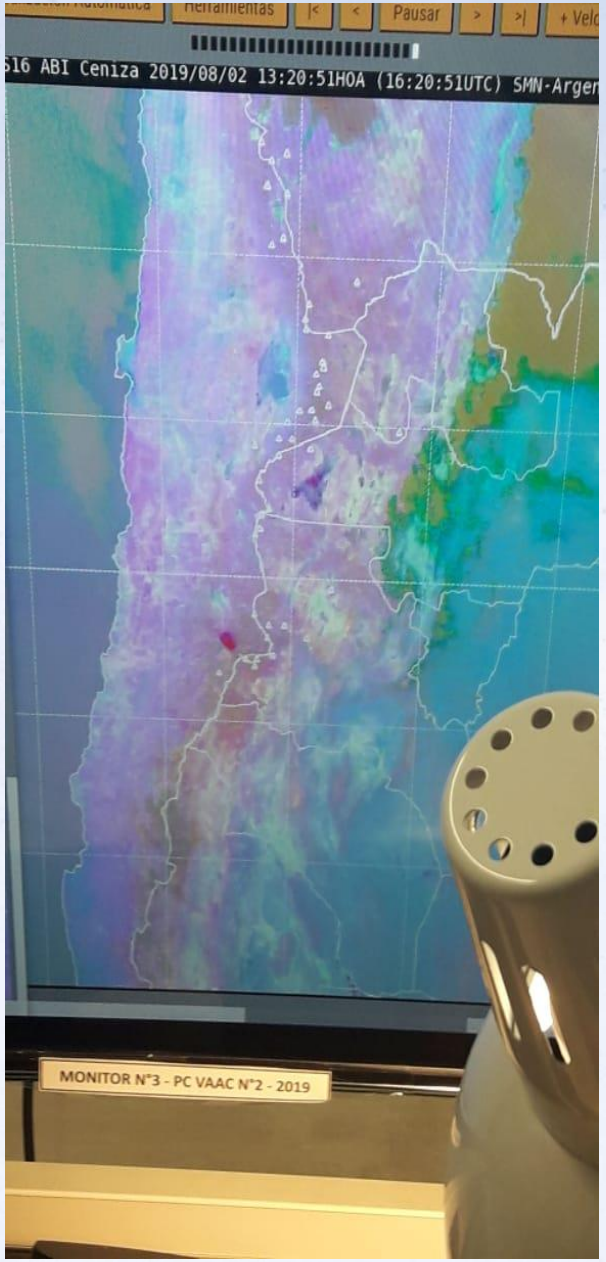
Láscar 2022
> 5 km column-height

Impact of ash remobilization on populated regions not related to recent eruptions (from historical and holocene fall and PDCs deposits)

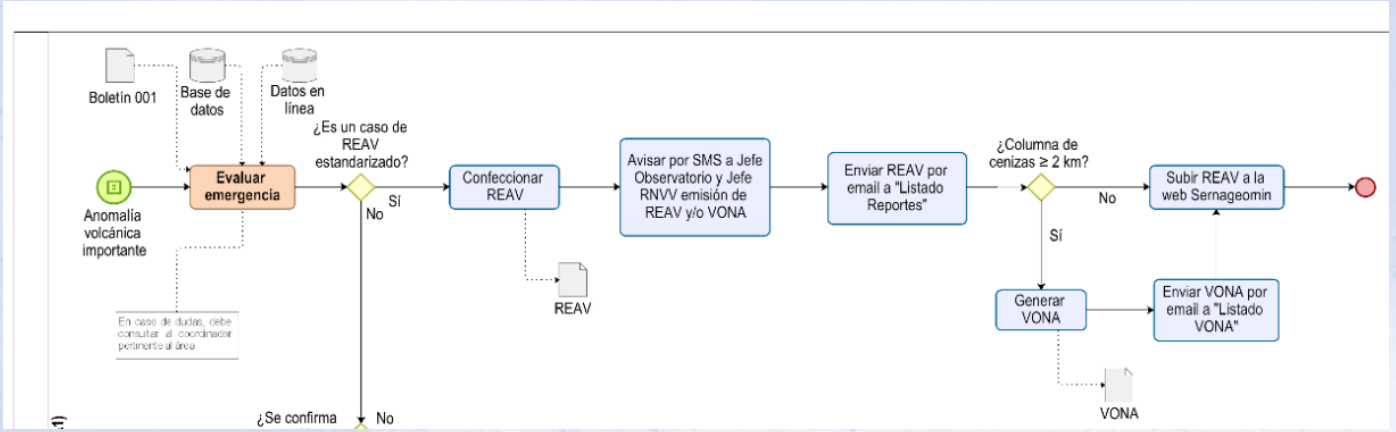
In 2019, first time since the new volcanic network set up: Air quality problems also

- Quizapu 1932 Plinian deposits
- Ojos del Salado, holocene deposits





VONA agreement in 2021, between Sernageomin & Civil Aviation authority in Chile



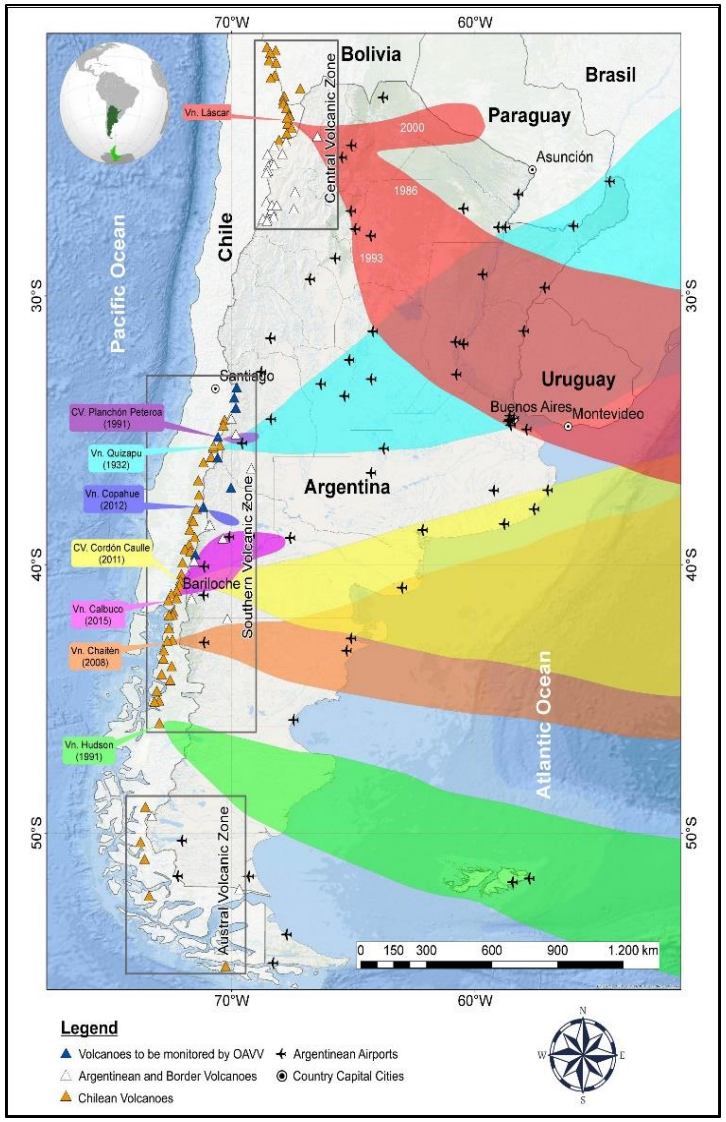
Challenges:

- Timing for delivering VONA reports by the Observatory
- Feedback & information exchange with the VAAC (not all volcanoes are monitored)
- Rapid characterization of column heights (surveillance cameras vs satelital estimations)
- Recommendations for local air traffic near or above volcanoes in activity (eg Villarrica 2022/2023)

State Volcano Observatory from Argentina

OAVV
OBSERVATORIO ARGENTINO DE VIGILANCIA VOLCÁNICA

SegemAR
Servicio Geológico Minero Argentino



The Argentine Observatory of Volcanic Surveillance (OAVV) is a new specialized area within SEGEMAR whose main objective is the study and monitoring of volcanoes whose activity may affect the Argentine Republic.

OAVV is the youngest Volcano Observatory in Latin America


Eruption of Copahue Volcano , 2012

Volcanoes monitored

10 Volcanoes selected to be monitored

4 Monitoring Networks Already Installed

Volcano Observatory Staff

10 profesionals
+9 during 2023

Staff Training

- Geology
- Geophisics
- Geodesy
- Electronic Eng.
- Computer Eng.

Volcano Obs. Operations

- Office Hours
- Rotating guard shifts with alarm setups after office time.
- 365 days a year

Techniques Used To Monitor Volcanoes

Visual cameras

Seismology

Geodesy

Water and Gas Geochemistry

Satellite Images

Geology

State Volcano Observatory from Argentina

OAVV
OBSERVATORIO ARGENTINO DE VIGILANCIA VOLCÁNICA

SegemAR
Servicio Geológico Minero Argentino

Est. AGS

Est. EPU

Est. FEA

2017: Creation of **OAVV-SEGEMAR**

2019: **OAVV-SEGEMAR** becomes operational

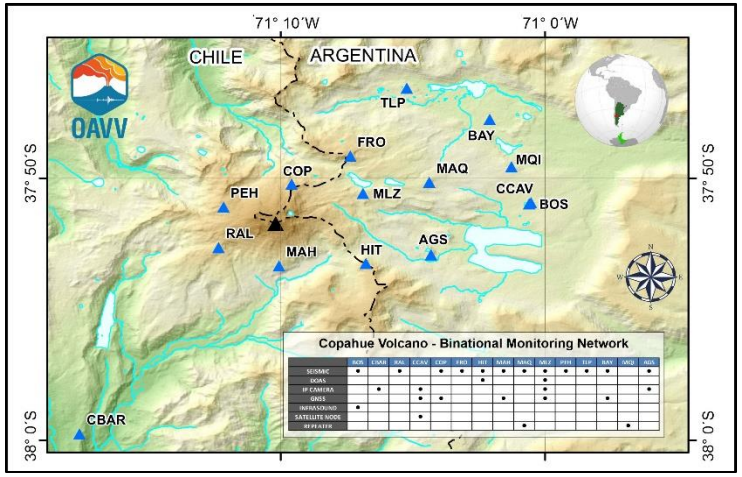
2020: Expansion of the monitoring network in the **Copahue Vn.** (Neuquén)

2021: Expansion of the monitoring network in the **Lanin Vn.** (Neuquén)

2021: Expansion of the monitoring network in the **Laguna del Maule V.C.** (Neuquén-Mendoza)

Planned 2023: - Deployment of monitoring networks in **Domuyo and Tromen** volcanoes (Neuquén)
- Deployment of monitoring network in **Deception Island** volcano (Antartica).

Planned 2024: - Deployment of monitoring networks in **Planchón-Peteroa and Tupungatito** volcanoes (Mendoza)



State Volcano Observatory from Argentina

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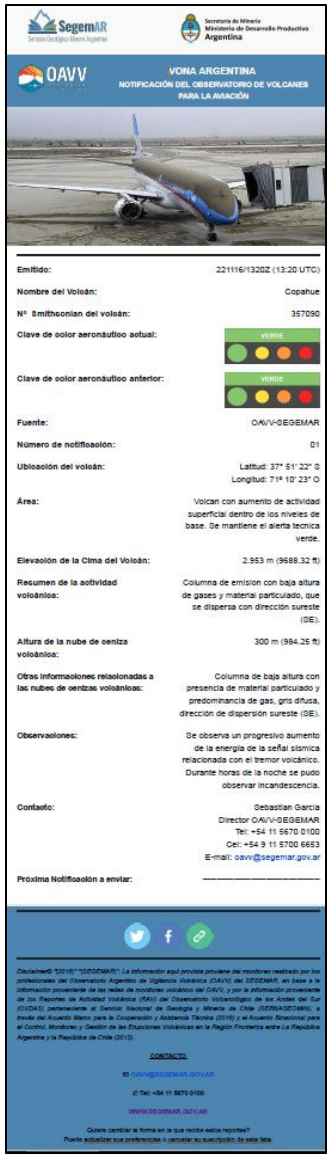
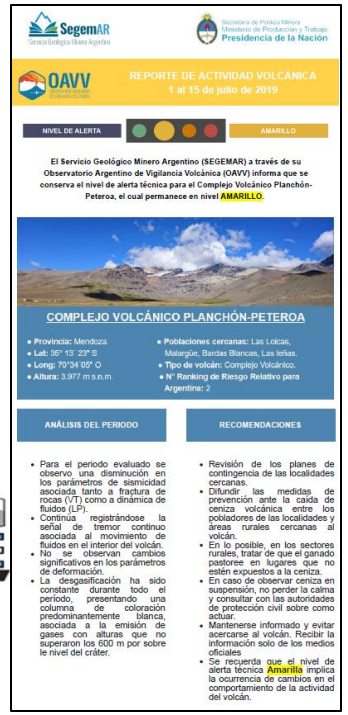


VONA EMISSION FROM ARGENTINA

Public information and Reports through the Observatory Website: Oavv.segemar.gov.ar



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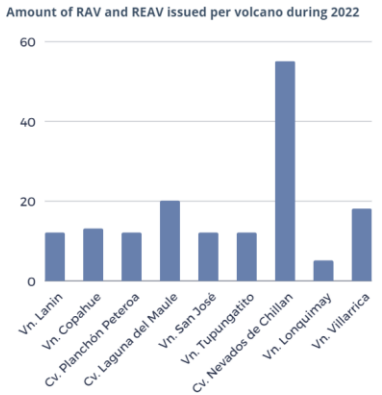
Volcanic Activity Reports (RAV) and Special Volcanic Activity Reports (REAV) issued during the year 2022



152 Volcanic Activity Reports (RAV) and Special Volcanic Activity Reports (REAV) issued during the year 2022

OAVV
OBSERVATORIO ARGENTINO DE VIGILANCIA VOLCÁNICA

Servicio Meteorológico Nacional

VAAC-BUE
VOLCANIC ASH ADVISORY CENTER - BUENOS AIRES

Area Control Center ACC

Adjacent MWOs

International NOTAM Office

EANA
NAVEGACIÓN AÉREA ARGENTINA

ANAC
Administración Nacional de Aviación Civil

1. OACI Letter of Agreement between ANAC-SMN-SEGEMAR (In progress to be renewed to include EANA)
2. Agreement of Cooperation Between SEGEMAR-SMN
3. VONA emitted officially for the first time by OAVV-SEGEMAR during 2022 (Copahue Volcano Ash Emission)
4. Periodic Communications between OAVV and VAAC
5. Future trainings between OAVV and VAAC planned for 2023

Regional challenges for the next decade

- VONA's increasing demand will imply additional needs (human resources, technological changes, and improvements, etc.) to guarantee the quality of the service
- Cost Recovery
- Trainings
- Improvements in the information exchange flow to receive information from Area Control Center, Pilots, Weather Meteorological Offices, and VAAC (not only issue VONA).