

## MET PANEL MET OPERATIONS GROUP (MOG) VA

### SECOND MEETING

Buenos Aires, Argentina, 27 to 28 April 2016

### VAAC BUENOS AIRES REPORT

#### Volcanic eruptions

VAAC Buenos Aires has 158 volcanos under its AoR, most of them along the Andes mountain range. The majority of those 158 volcanos are ranked in a “high threat ranking list” by the vulcanological Institutes of the countries involved (see SERNAGEOMIN, Chile <http://www.sernageomin.cl/archivos/Ranking-de-Volcanes.pdf> and SEGEMAR, Argentina <http://www.segemar.gov.ar/index.php/peligrosidad-geologica/proyectos/evaluacion-de-peligrosidad-volcanica>). The National Meteorological Service of Argentina (NMS) and, as of 1998 the VAAC BA operated by the NMS, dealt with severe eruptive events: Hudson (1991); Chaitén (2008); Cordón Caulle (2011); Calbuco (2015) volcanos.

For the present meeting VAAC BA considered appropriate to include a comprehensive table on volcanic eruptions/ issuance of VAAs, VAGs and VAGs T+24 for the period

**1<sup>st</sup> Jan 2015 - 7<sup>th</sup> March 2016**

#### Issuance of VAAs, VAGs and VAGs T+24

VOLCANO	2015	(1 JAN - 7 MAR) 2016	TOTAL/VOLCANO
ANTUCO	1	-	1
CALBUCO	72	1	73
CALLAQUÍ	2	1	3
COPAHUE	104	<b>137</b>	<b>241</b>
CORDON CAULLE	2	-	2
LASCAR	1	-	1
MICHINMAHUIDA	1	-	1
NEVADOS DEL CHILLAN	-	4	4
PLANCHÓN DE PETEROA	-	1	1
SABANCAYA	73	10	83
UBINAS	<b>119</b>	-	<b>119</b>
VILLARRICA	32	-	32

<b>TOTAL/YEAR</b>	<b>407</b>	<b>154</b>	<b>561</b>
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During the period, 561 VAAs, VAGs and VAGs T+24 have been issued for 12 volcanos, 241 of which correspond to the Copahue v. and 119 to the Ubinas v.

In 2015 Ubinas ranked top on the list with a total of 119 VAA/VAG/VAG T+24 followed by a total of 104 issued for the Copahue v. During the first months of 2016 Copahue v. is at the peak of the table with 137 VAA/VAG/VAG T+24 already issued.

### **Service changes**

-Better regionalized use of dispersion /concentration numerical model, FALL 3D (Eulerian dispersion and concentration model for VA). Coupled to the local numerical model WRF-ARW (\*) -on experimental basis- and to the local operational version of ETA NMS meteorological model or the Global Forecast System GFS. It provides ash concentration, ground load and deposition thickness. (The local version of the ETA SMN meteorological numerical model provides a better grid resolution).

(\*) Nowadays, the WRF-ARW is not running due to cluster hardware problems.

-Improved observations including a Global service for lightning activity; New Lidar network covering strategic areas at risk.

**--Interagency Volcanic Ash Information management protocol for Argentina.** National Agencies involved: MinCyT, SEGEMAR, NMS; CONAE; CONICET; IGN; CIN; APN. Objective: to better articulate the scientific, technological and administrative capacities of all agencies involved for a better management of the hazardous situations posed by the presence of VA in the Argentinian territory.

-Enhancing the variety of products and relation with users:

VAG T+24 (as of July 1<sup>st</sup>, 2014) and Graphic reports depicting VA deposits/re-suspended VA by cities.

New International Volcano Database ID numbers for VAACs (as of October 1st, 2013; IAVWOPSG Conclusion 7/30).

### **Future challenges**

-Studies on the complexity of re-suspended VA events.

The VAAC BA Research Group implemented the FALL3D version for volcanic ash re-suspension events. This version includes three emission schemes originally developed for mineral dust. The 14-16 October 2011 outbreak episode of re-suspended ash observed in Argentina was taken as a test case (Folch et al., 2014) for model calibration and

verification. The simulations and evaluations were performed at the NMS of Argentina in collaboration with the Barcelona Supercomputing Center (BCS). Not operational.

-Improve the performance of the short range forecasts of re-suspended ash for regions closest to the VA deposits and for which now, the adapted schemes of the FALL3D model tend to overestimate the plume concentration. Experiments with HYSPLIT (HYbrid Single Particle Lagrangian Integrated Trajectory VA dispersion model) activating the mineral dust component are also under way.

- **VORHISE** volcanoes database

Design and develop a database of volcanoes VORHISE (Volcanes de la Región y su Historia Eruptiva), as well as to collect and validate its data. The volcano information thus collected will be used to adjust the initialization of dispersion forecast models and to create future eruption scenarios. (The Univ. of Bristol, U.K. was consulted on the LaMEVE -Large Magnitude Explosive Volcanic Eruptions- world data base for this project).

The information contained in VORHISE will include volcano location, ID number, type/height; and for each recorded eruption, the dates and/or the duration of the activity, height/s column/s eruptive/s, granulometric characteristics and parameters of shape of the ash emitted by volcanoes, explosivity index (VEI), volume, petrographic and geochemical characteristics of the material erupted, among other relevant data.

-Volcanic Risk Assessment (in collaboration with SEGEMAR)

Enables to identify the volcanoes that pose a higher RISK (Argentina-Chile) following the NVEWS methodology (National Volcanic Early Warning System - USGS, Ewart et al., 2005). Applied by SERNAGEOMIN (Lara et al.: NVEWS-Chile)

FALL3D Esemble Forecasts (in collaboration with BSC and DCAO (UBA)

Research on Probabilistic Ensembles Forecasts using FALL3D is underway and the subject of a PhD thesis of a graduate student.

- Remote sensing (in collaboration with CONAE)

Evaluation and implementation of algorithms for qualitative detection and retrieval of volcanic ash following the work of Prata (Prata & Grant, 2001; Prata, 2011) and the developments of Pavolonis (2010) for the GOES R ABI.

Development of a multi-sensor, multi-band detection algorithm using Chaitén and Cordon Caulle volcanos data. Characterization of the re-suspended VA event of October 2011 using MODIS, and work on the identification of the plume event of December 14<sup>th</sup>, 2013 informed to VAAC BA by M. Pavolonis.

Operational product: BTM (Brightness Temperature Difference) derived from MODIS data on daily basis.

#### **-Other challenges**

Finalize the VAAC BA Operations Manual; the Competency assessment of VAAC BA personnel and QMS ISO 9001-2008 processes.

Lidar operation/ interpretation training (Met. Observers / Forecasters) One training course already done with plans to perform new ones in the near future

Real time processing, quality control and transmission on the WMO GTS of the automated air reports originated by Aerolíneas Argentinas and Lan Argentina's aircrafts through AMDAR (Aircraft Meteorological Data Relay).

Plans to enhance the present network of:

Cielometers with VA detection capabilities;

TOPAS (Turnkey Optical Particle Analysis System). There's an arrange of 3 TOPAS (Neuquén, Bariloche, Trelew) in Argentina; and

-LIDARS (arrange of 5 LIDARS at present in Argentina: Buenos Aires, Neuquén, Bariloche, Com. Rivadavia, Río Gallegos).

Eruption/re-suspension VA hazard maps for the VAAC BA's AoR.

The maps would depict the probability of presence of VA, its concentration in the atmosphere and the thickness of its ground deposits exceeding certain given thresholds. This cartography would combine the most probable volcanological scenarios for the more explosive volcanos, combined with the typical regional synoptic situations.

Buenos Aires, March 11<sup>th</sup>, 2016





