



**MET PANEL (METP)
MET OPERATIONS GROUP (MOG)
VOLCANIC ASH (VA)**

SECOND MEETING

Buenos Aires, Argentina, 27 to 28 April 2016

Agenda Item 6 VAAC Management Reports

VAAC Montreal, IAVW Management Report, December 2013 – April 2016

(Presented by Canada)

SUMMARY

This paper presents the VAAC Montreal
IAVW Management Report.

1. Introduction

- 1.1. The VAAC Montreal area of responsibility includes the following Flight Information Regions (FIRs): all Canadian FIRs, Sondrestrom (Greenland, below FL195), Gander Oceanic (including the southern tip of Greenland above FL195) and Reykjavik (Greenland, above FL195). It operates from the 24/7 operations at the Canadian Meteorological Centre (CMC) of Environment and Climate Change Canada.
- 1.2. The eruption of Pavlof on 28 March 2016 led to one of the most significant responses in the history of VAAC Montreal. Otherwise, few eruptions of importance took place near the area of responsibility of VAAC Montreal during the period December 2013 – April 2016. Only eruptions of Sheveluch and Zhupanovsky (both in Kamchatka) necessitated the issuance of retransmission Volcanic Ash Advisories (VAAs). A standard advisory was also issued in response to a report of volcanic ash over British Columbia that turned out to be smoke from a forest fire. Staff were kept busy, as usual, by participating in a series of weekly production and dissemination tests.

2. Operations of the VAAC

2.1. Issuance of volcanic ash advisory: The eruption of Pavlof on 28 March 2016 led to VAAC Montreal issuing a total of 26 advisories over a period of 5 days, which represents one of the most significant responses in the history of this VAAC. Eruptions of Sheveluch (in February and March 2015) and Zhupanovsky (July 2015) necessitated the issuance of retransmission Volcanic Ash Advisories (VAAs). A standard advisory was also issued on 12 May 2015 in response to a report of volcanic ash over British Columbia that turned out to be smoke from a forest fire. A total of 52 advisories were sent out during the period December 2013 – April 2016.

2.2. Significant eruptions in the VAAC area:

VAAC Montreal has no active volcanoes in its area of responsibility. However, the following volcanoes erupted or showed signs of possible activity and were closely monitored:

- Sheveluch: February and March 2015
- Zhupanovsky: 25 November 2014 and July 2015
- Pavlof: 28 March to 1 April 2016.
- Several volcanoes in Alaska and Kamchatka throughout the period.

2.3. Significant operation or technical changes:

2.3.1. Weekly testing of the operational response of VAAC Montreal to volcanic events continues as it has since February 2007. A second weekly test was added in January 2009. Each Tuesday (on both day and night shifts), the supervisor tests the operational Lagrangian transport and dispersion model (called MLDPn), the trajectory model, issuance of VAAs or detection of ash in split-window imagery from satellites. These tests have allowed:

- 2.3.1.1. Real-time detection of problems related to software, models, networks, transmissions of products, etc.;
- 2.3.1.2. Individual staff members to become more familiar and comfortable with procedures which they would be required to follow during an actual event.

2.3.2. A total of 4 upgrades to the software used for operational responses in VAAC Montreal were implemented during the period from December 2013 – April 2016.

2.3.3. A new Lagrangian atmospheric transport and dispersion model called MLDPn (French acronym meaning “Modèle lagrangien de dispersion de particules d’ordre n”) has been developed and implemented into operations in 2015. It presents the following advantages:

- It unifies the three operational models currently in use at CMC (namely MLDP0, MLDP1 and MLGI).
- It combines the advantages and strengths of each model into a single one.
- It simplifies code maintenance.
- It improves some algorithms.
- It adds several new features for operational use, including allowing for backwards modelling capacity.

- 2.3.4. In addition to images received from the NOAA suite of polar satellites, and MODIS images from Aqua and Terra, VAAC Montreal is looking into SEVIRI data from Meteosat Second Generation (MSG). VAAC Montreal also now accesses satellite imagery from polar-orbiting satellites over Kamchatka and Iceland to help improve its observational coverage over these areas.

2.4. VAAC backup:

VAAC Washington is the backup for VAAC Montreal. VAAC Montreal is the backup centre for the Canadian Meteorological Aviation Centre in Edmonton (CMAC West; MWO Edmonton) that issues volcanic ash SIGMET over Canadian airspace and the North Atlantic.

3. IAVW implementation issues:

- 3.1. VAAC Montreal documentation of operational procedures to follow during tests, exercises, and real-time responses is maintained / updated as needed in accordance with the Meteorological Service of Canada's ISO 9001:2008 certification. The last ISO audit of the VAAC was conducted on 19 June 2013.
- 3.2. VAAC Montreal regularly receives email updates on volcanoes from [AVO](#), [CVO](#), [KVERT](#), [SVERT](#) and [SACS](#) notifications of high concentrations of SO₂. VAAC Montreal would like to express its appreciation and thanks to these agencies for the continued support that they provide.
- 3.3. Staff from VAAC Montreal participated in the WMO VAAC "Best Practice" Workshop (May 2015) and the 7th International Workshop on Volcanic Ash (October 2015).
- 3.4. In November 2014, several reports of SO₂ over the Northwest Territories were received by VAAC Montreal. Several simulations backwards in time were performed to try and ascertain the source of this SO₂. Despite these simulations, it was not clear if the source was one of the volcanoes in Kamchatka or Pavlof (in Alaska) or Bardarbunga (in Iceland). As no volcanic ash was observed or reported, no volcanic ash advisories needed to be issued for these events.
- 3.5. Following the eruption of Mount Etna on 3 December 2015, VAAC Montreal ran a number of simulations using its Lagrangian model MLDPn. Results were made available to the VAACs. This provided an opportunity to use both the forward and backward modelling recently implemented into operations. Simulations of the eruption were performed in forward mode and observations of SO₂ were used to start backwards simulations so as to establish a link between these and the eruption.
- 3.6. VAAC Montreal is represented in both the "Meteorology Operations Group" and the "Meteorology Information and Services Development". The former group is the one pursuing most of the work of the defunct International Airways Volcano Watch Operations Group, including topics such as the development of a common web page for the VAACs, the mention of confidence in volcanic ash advisories and the extension of the volcanic ash forecasts provided by the VAACs beyond 18 hours.

- 3.7. Training of staff at VAAC Montreal is ongoing, as new employees have joined operations in the last couple of years and changes to the operational software in place have required new methods of preparing VAAC products.
- 3.8. Dov Bensimon, who has been managing the VAAC Montreal since the fall of 2013, has recently obtained help from his colleague Biljana Bekcic to run the VAAC program in Montreal. This is particularly helpful for the training of operational staff.
- 3.9. VAAC Montreal is coordinating with the Government Operations Centre of Public Safety Canada to play a central role in the Interagency Volcanic Event Notification Plan (IVENP). The IVENP is a protocol that allows many different agencies in Canada involved in the response to volcanic ash to receive an initial notification of this hazard.
- 3.10. VAAC Montreal adopted the standardized international volcano database as provided by the Smithsonian Institution in the first half of 2014.
- 3.11. VAAC Montreal is in discussion with the Alaska Volcano Observatory to try and incorporate some of the polar-orbiting satellite imagery received in Montreal into the [Volview website](#).
- 3.12. Several changes were made to the VAAC Montreal [website](#), including adding sortable tables and pull-down menu options for the hypothetical model simulations.
- 3.13. A coordination test was performed with the Canadian Meteorological Watch Office in Edmonton, Alberta, Canada on 21 January 2015 to ensure that the flow of operational information between both centres works well. Other such tests are planned in the future as well.
- 3.14. A conference call was held between VAAC Montreal and MWO Edmonton on 25 March 2015 to discuss ways to improve our coordinated responses to volcanic ash events. This follows a number of suggestions that were raised following the response to the eruption of Sheveluch on 3 March 2015. A follow-up conference call was held between the VAACs in Anchorage and Montreal as well as MWO Edmonton on 15 July 2015.
- 3.15. VAAC Montreal will eventually have a new email address and efforts to migrate to this new one have already begun. However, a number of issues have arisen during this migration, so that it is not fully functional yet. For now, the address vaac@ec.gc.ca is still the one to use for VAAC Montreal.
- 3.16. Discussions with VAAC Washington are ongoing in order to perform regular tests of their capacity to backup VAAC Montreal.
- 3.17. On March 22 and 23, 2016, representatives of VAAC Montreal participated in the 9th Canadian Aviation Weather Workshop in Montreal, Quebec, Canada. This afforded an opportunity for staff from the VAAC to discuss and interact with representatives from the

aviation industry and get valuable feedback regarding the products and services offered by VAAC Montreal.

- 3.18. The response to the eruption of Pavlof on 28 March 2016 was the first time that VAAC Montreal issued a 24-hour forecast graphic and the mention of confidence for a real eruption. By participating in 4 conference calls a day organized by NavCanada (the corporation that owns and operates Canada's civil air navigation service), the VAAC was able to brief several Canadian airlines as to the expected location of volcanic ash in the coming hours, as well as the VAACs confidence in its advisories. The comments received from users suggest that they appreciated the information and were pleased with the service of the VAAC.

4. Future developments:

- 4.1. Work is ongoing to incorporate satellite imagery in real time into the in-house software used to perform operational responses. Work is ongoing to get full-resolution METEOSAT data and an operational feed of MODIS imagery into VAAC operations.

5. ACTION BY THE METP-WG/MOG:

- 5.1. The METP-WG/MOG is invited to note the information contained in this Study Note.

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