International Civil Aviation Organization

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WORKING PAPER

INTERNATIONAL VOLCANIC ASH TASK FORCE (IVATF)

FIRST MEETING

Montréal, 27 to 30 July 2010

Agenda Item 7: Improvement and harmonization of dispersion models and their visual presentation (IAVW Coordination Group)
7.1: Need for additional work on dispersion models
7.2: Need for further refinement of current visual VAAC products

IMPROVEMENT AND HARMONIZATION OF DISPERSION MODELS AND THEIR VISUAL PRESENTATION (IAVW COORDINATION GROUP)

(Presented by the Secretariat)

SUMMARY

This paper presents a report on progress made by VAACs on dispersion models (including eruption source parameters), and their visual presentation. The paper proposes the identification, by the TF, of any additional work required to be undertaken by its IAVW coordination group with the aim of online availability of centralized and harmonized VAAC forecasts. The paper also intends to prompt discussion on the need for additional work to refine volcanic ash advisories in graphical format.

1. INTRODUCTION

1.1 The task force (TF) is invited to note that, Annex 3 — *Meteorological Service for International Air Navigation* requires that, in order to forecast the movement of volcanic ash (VA), the volcanic ash advisory centres (VAAC), shall activate the VA numerical trajectory/dispersion model. It may be noted that the model may be its own or that of another VAAC. Since the establishment of the international airways volcano watch (IAVW) in November 1987, the dispersion models used to forecast the movement and dispersion of VA in the atmosphere have evolved substantially. Together with verification studies on their models to assess accuracy, the VAACs have performed model inter-comparisons to ensure that there would not be significant changes in the forecasts if the VA drifts into the area of responsibility of another VAAC.

1.2 The different model outputs are used by VAACs to issue advisory information in abbreviated plain language, in accordance with Annex 3 Table A2-1, using approved ICAO abbreviations and numerical values (of self-explanatory nature) or using the VA advisory information in graphical format (Model VAG). Such information shall be issued using the portable networks graphic (PNG) format (as from Amendment 75 of Annex 3, in November 2010) or the WMO BUFR code form.

1.3 The TF will be aware that each VAAC performs model verification against observations, as part of a standard operating procedure, not only to assess the accuracy of forecasted trajectories of ash clouds but also in view of constantly improving the performance of the model.

2. NEED FOR ADDITIONAL WORK ON DISPERSION MODELS

2.1 The TF may be aware that the work of the ICAO focal body for matters related to VA, i.e. the International Airways Volcano Watch Operations Group (IAVWOPSG) is guided by a work programme (formed by tasks together with their "deliverables"). The work programme is updated regularly and endorsed by the ICAO Air Navigation Commission (ANC) after every meeting of the IAVWOPSG. One of the IAVWOPSG tasks relates to the improved tools for detecting and forecasting volcanic ash with the associated deliverable being "the improved models used for forecasting the movement of volcanic ash" (IAVWOPSG, Deliverable 06 refers). The main achievement over the last few years has been the completion of the establishment of a table which can be used for assigning eruption source parameters (ESP) to dispersion models during eruptions, when real-time observations are unavailable.

2.2 The TF will note that the IAVWOPSG considers that the main limitation of the dispersion models is that they do not consider uncertainty. Therefore, the WMO Scientific Steering Group was tasked to examine the use/provision of uncertainty forecasting and probabilistic information. Model uncertainty is starting to be addressed through ensemble modelling techniques within the IAVW. Other approaches to improve dispersion are also underway within the IAVW, e.g. under the European Space Agency project "Support to Aviation for Volcanic Ash Avoidance (SAVAA)" and the United States Jet Propulsion Laboratory project "Plume tracker".

2.3 The TF may wish to note that the application of new techniques for tracking VA will require training of staff and users but will also offer significant improvements. However, it should be emphasized that the VAACs must share between them best practices in support of consistency of operational model output.

2.4 The TF may wish to agree that with the advent of new technologies, there is a need for collaboration in moving the science and new technologies on VA into the operational sphere and that the management of this transfer needs harmonization between the VAACs. In particular, based on the lessons learned during the recent eruption, the TF may wish to agree that its IAVW coordination group should be tasked to address the harmonization of dispersion models to facilitate their use, the final goal being the online availability of centralized and harmonized VAAC forecasts.

3. NEED FOR FURTHER REFINEMENT OF CURRENT VISUAL VAAC PRODUCTS

3.1 With regard to visual presentation of model output, the TF is invited to note that Annex 3, 3.5 requires that VAACs issue advisory information regarding the extent and forecast movement of the VA cloud to the different users (MWOs, ACCs, FICs VAACs WAFCs OPMET databanks, NOTAM offices, etc). The provision of this information is done using an alphanumerical format (Annex 3 Table A2-1 refers), which has been refined over the years based on the views expressed by users (IATA, IFALPA, States, etc). As part of these improvements, the volcanic ash advisory information in graphical format (Model VAG) was introduced in Appendix 1 to Annex 3. In the light of the recent experience from the EUR/NAT Regions, the TF may wish to task its IAVW coordination group to consider the need for additional work to refine the VA advisory information and in particular the desirability to map areas of ash concentration according to levels of ash concentration.

4. CONCLUSION

4.1 In view of the foregoing the TF may wish to formulate the following action agreed:

Action agreed 1/... — Harmonization of dispersion models and their visual presentation

That, the IAVW coordination group be tasked to consider the need to:

a) harmonize dispersion models run by the volcanic ash advisory centres (VAAC) in view of the online availability of centralized and harmonized VAAC forecasts to aviation users;

b) refine the existing VA advisory information in graphical format with the view of mapping areas of ash contamination according to levels of ash concentration and, if necessary, propose updated model charts; and,

c) present a progress report at the IVATF/2 Meeting.

5. ACTION BY THE IVATF

5.1 The IVATF is invited to:

a) note the information in this working paper: and

b) endorse the draft “Action agreed” contained therein.

— END —