International Civil Aviation Organization

WORKING PAPER

MEETING OF THE METEOROLOGY PANEL (METP) METEOROLOGICAL INFORMATION AND SERVICE DEVELOPMENT WORKING GROUP (WG-MISD)

FIRST MEETING

Agenda Item 6: Matters Relating to WG-MISD Volcanic Ash Work Stream
6.2: Development of a ConOps for Volcanic Contamination Information Services

Washington DC, United States, 16 to 19 November 2015

CHANGES TO THE ROADMAP FOR INTERNATIONAL AIRWAYS VOLCANO WATCH (IAVW) IN SUPPORT OF INTERNATIONAL AIR NAVIGATION

(Presented by Klaus Sievers)

SUMMARY

During the WMO Best Practice workshop, a number of recommendations were made. Some of them need to be reflected in updates to the Roadmap for Volcanic Ash. In addition, IFALPA believes that safety could be improved and economic impact of volcanic eruptions could be minimzed by consideration of further changes to volcanic ash information products.

Action by the METP-WG/MISD Volcanic Ash Work Stream is in paragraph 3.

1. INTRODUCTION

1.1 At the recent WMO VAAC Best Practices Meeting, IFALPA was given the opportunity to present suggestions for improvements and new service concepts with regards to volcanic ash. They are presented here in the context of proposed amendments to the International Airways Volcano Watch (IAVW) in Support of International Air Navigation.

2. DISCUSSION

2.1 Concern over SO2 influence on engines as well as human health and possible public order disturbances in airplanes has risen. On the other hand, detection of SO2 clouds, including determination of amount and height, is well established in science, using earth sensing satellites. Given these circumstances,

IFALPA proposes that the research and development of SO2 products be intensified in line with Outcome VW09 of the WMO best practices workshop, 2015. In order to seamlessly develop operational products, IFALPA suggests that the proposals made in 3.4.1 Develop other volcanic derived contaminant forecasts, specifically Sulphur dioxide, be moved forward to the 2018 to 2023 timeframe.

2.2 With regards to the use of the aviation colour-code alert system, the present Roadmap suggests increased use and provision of VONA by State Volcano Observatories in point 3.1 Changes intended through 2018, and also in 3.1.2. IFALPA notes that at present, ash advisories from VAACs may or may not contain information about the colour code. It is suggested that the increased use of the the aviation colour-code should lead to more uniform application and information-provision in the ash advisories from the VAACs. Furthermore, consideration should be given to graphical provision of all volcanos activity-levels (example: http://en.vedur.is/weather/aviation/volcanic-hazards/).

2.3 ICAO Annex 15, Appendix 3 contains a table of colour codes that volcanological authorities shall assign in case of volcanic activity. The codes shall be used in the ASHTAM format and may be used by volcano observatories in the Volcano Observatory Notice for Aviation (Annex 3, Appendix 2 refers; VONA is described in detail in ICAO Doc 9766 IAVW Handbook).

2.4 From the perspective of flight operations, the current classification system does however not follow a logic that easily translates into operational usefulness. Consequently, air traffic services units (ACCs), which are the other addressee of the VONA should also have interest in an improved version of the colour codes as described below, because they have to be prepared for the respective reactions of the airspace users. While GREEN and YELLOW are welcome information for pilots (no change to the current classification necessary), meaning that there is no hazard to be expected, the elements of ORANGE and RED should trigger specific action. The following improvements to the colour code table is therefore suggested:

2.4.1 The first element in ("increased likelihood of eruption") could be called ORANGE 1 and should lead to increased vigilance. Similarly, the first part of the second element in the current ORANGE classification ("eruption with no ash emission") is useful for situational awareness; pilots should watch for signs of an ash eruption.

2.4.2 The second part of the current ORANGE classification (ORANGE 2 – "minor ash emission") might be significant for flight operation in the vicinity of the eruption site. Visible ash has to be avoided.

2.4.3 Significant SO2 emissions might occur in connection with an ORANGE 2 or higher alert; these should also be covered in the colour codes.

2.4.4 RED 1 ("forecasted significant emission of ash likely") should lead to maximum vigilance and/or precautionary avoidance of the vicinity of the volcano (at least 30 NM radius in good visibility conditions during the day; much larger areas when a volcanic cloud cannot be seen due to clouds or darkness).

2.4.5 RED 2 (actual “significant emission of ash”) needs definitive avoidance of the affected airspace, in particular when visual detection of volcanic clouds is not possible.

2.4.6 Volcanic Ash Contingency Plans clearly differentiate between “pre-eruption procedures” and procedures when an eruption has affected the airspace. RED 2 should therefore have a clear distinction with an own colour. BLACK is suggested.

2.5 It is therefore suggested that the colour-code system be modified to provide an operationally useful classification.

2.6 The Roadmap describes the information flow following a volcanic eruption in para. 2.1.4, Communicate volcanic ash information to users. This paragraph should be developed to clearly describe information products for electronic display systems pilots use, like the electronic flight bags. The products shall display the information on volcanic ash in easy to understand, graphical form, using colour to highlight important aspects of ash reports and forecasts. It should have the same information content as that available in ground systems, and the information should be capable of being updated in flight.

2.7 As noted in the Outcome of the VAAC Best Practice meeting, work on Charts displaying volcanic ash contamination levels based on quantitative ash mass column loading will begin. These charts should have a global standard, and should be available globally.

2.8 In addition to the charts / products described above, recent satellite ash pictures, retrievals and analysis of ash clouds should be developed to a level of maturity that allows for inclusion in the standard briefing-packages pilots get for a flight.

2.9 The developments considered above should take place in the 2018 – 2023 timeframe, as a vast majority of aircraft and pilots engaged in international air transportation will be equipped with electronic tools, eFBs. While it will be necessary to have the ash information available in formats that can be used for printing on paper, for exceptional or backup cases, the electronic provision of ash information is required by key systems of the GANP, like SWIM.

2.10 It is noted that the Roadmap already contains a paragraph on the transition to an all-digital format for volcanic ash information, however, a more detailed description and the inclusion of satellite information needs to be placed in paragraph 3.2.2, and urgency of developments needs to be emphasized.

2.11 Paragraph 3.2.6 contains proposals that include airborne sampling. IFALPA would like to suggest that sensors carried by commercial aircraft should be networked, by AMDAR or similar systems. Note that according to recent thinking, engine damage levels due to volcanic ash are dependent, inter alia, on the dosage an engine is exposed to (contamination level and exposure time). In order to determine this dosage, ash sensors will likely be carried whose data should be made available to all. It is also suggested that other sensors in development and testing, like the ´AVOID´ or ´ZEUS´ sensors, will be installed in aircraft, and could then be networked to improve information-gathering about ash clouds in the air. Development and

deployment of such sensors should be encouraged.

2.12 Many VAACs calculate the ash-distribution of hypothetical eruptions for volcanos of interest. It is suggested to standardize this process, and provide for generation of such forecasts for all volcanos with an aviation colour code of orange or red. The forecasts should be in a standard format, available at 6-hourly intervals, and be valid for 24 hours. The hypothetical forecasts are envisaged to be used for flight planning.

2.13 As shown by the ash-encounter when Mt. Kelut erupted in 2014, the present system of notification of eruptions does not ensure that eruption-information reaches pilots in time. It is suggested that the concept of dissimilar redundancy could be followed, where a second, different path of information flow is employed to ensure transmission of eruption information. This dissimilar redundancy should be introduced, as a minimum, for the transmission-chain from VAAC to the cockpit, and might take the form of a SWIM-message that will be broadcast to all potentially affected aircraft. The dissimilar redundancy could also take the form of transmitting automated eruption alerts directly to pilots´s cell-phones or the airline operation centers. Note that several automated eruption alert systems exist at VAACs today, in addition to the European SACS.

3. ACTION BY THE METP-WG/MISD VOLCANIC ASH WORK STREAM

3.1 The METP-WG/MISD Volcanic Ash Work Stream is invited to:

a) note and review the contents of this working paper, and

b) consider and propose changes to the Roadmap as suggested.

— END —