Sixth Meeting of the Pacific Meteorological Council (PMC-6)

Sustaining Weather, Climate, Water and Ocean Services for a Resilient Blue Pacific

14-16 August 2023, Sofitel Hotel, Denarau, Fiji

Agenda item 9.4: Volcano Observatory Notice for Aviation (VONA)

Purpose of the paper:

1. To inform the Meeting of the proposed introduction of the Volcano Observatory Notice for Aviation (VONA) as a recommended practice in the International Civil Aviation Organisation (ICAO) Annex 3 *Meteorological Service for International Air Navigation* (referred to as 'Annex 3').
2. To encourage Pacific Islands States with active or potentially active volcanoes to engage with their national Civil Aviation Authorities (CAAs) to make plan to meet the new requirements.
3. To seek the Meeting's guidance and decision to assist Pacific Island States with active or potential active volcanoes to coordinate and address monitoring of volcano activity, provision of information on volcano activity and ash in the atmosphere to meet current and future ICAO Annex 3 requirements.

Background:

1. The current Amendment 80 to Annex 3 obliges any ICAO Contracting States with active or potentially active volcanoes to designate a State Volcano Observatory (SVO), and for that SVO to monitor those volcanoes and provide information on significant pre-eruptive volcanic activity, a volcanic eruption, or volcanic ash in the atmosphere, to their associated Area Control Centre/Flight Information Centre, Meteorological Watch Office (MWO) and Volcanic Ash Advisory Centre (VAAC).
2. There are nine VAACs who each cover a specific area of the globe[1], providing Volcanic Ash Advisories (VAAs) to MWOs and the wider aviation system. The designated MWOs use those VAAs to then issue volcanic ash SIGMETs (meteorological warnings) specifically for the Flight Information Region (FIR) that they serve.
3. There is no current required (or recommended) format for this information to be shared by SVOs – it is often shared via email or a phone call. However, Annex 3 does suggest the use of the VONA, as outlined in the *Handbook on the International Airways Volcano Watch* ICAO Doc 9766[2], and some ICAO Contracting States do utilize this format.
4. Papua New Guinea, Tonga, Vanuatu, Solomon Islands, Samoa, American Samoa, and the Mariana Islands have all had volcanic unrest to some degree in the last century and so have 'active or potentially active' volcanoes. Fiji has volcanoes that have erupted in the last 500 years and so those volcanoes could theoretically also be considered as 'potentially active', but this should be confirmed by appropriate volcanological experts.

[1] In the Pacific region, there are VAACs hosted by the meteorological services of New Zealand (VAAC Wellington), Australia (VAAC Darwin) and United States (VAAC Washington). See ICAO Doc 9766 for more information.

[2] Access ICAO Doc 9766 here – note, a significant review of this document is currently underway.

5. The SVOs designated by regional air navigation agreement for the Asia-Pacific (APAC) region are listed in the APAC Air Navigation Plan Volume I, Table MET I-1. At the time of writing, the only Pacific Island State with an SVO included in this list is Papua New Guinea.
6. National Meteorological and Hydrological Services (NMHSs) of States with active or potentially active volcanoes that *do not* operate as MWOs also have a role to play within the International Airways Volcano Watch (IAVW). The current Amendment 80 to Annex 3, Chapter 4, section 4.8 recommends the use of the Volcanic Activity Report (VAR) for Meteorological Offices (MOs) to share information on the occurrence of pre-eruption volcanic activity, volcanic eruptions and volcanic ash cloud that they may observe (or reported directly to them by pilots, for example). This information is then sent to the associated air traffic services unit, aeronautical information services unit and MWO – and should ideally also be sent to the SVOs and VAACs for investigation and so to prompt (if necessary) the issuance of VONA and VAA.

Elevation of the VONA to a Recommended Practice:

1. The proposed Amendment 81 to Annex 3 (hereafter referred to as 'Amendment 81') includes a new recommended practice for SVOs to provide information on volcanic activity in a revised VONA format.
2. The VONA will be a globally consistent format for volcanic information provided by SVOs to provide information on volcanic activity into the aviation system – where Area Control Centres (ACCs) can inform aircraft in the vicinity of the volcano of any new activity, while the VONA also serves as crucial information to inform VAACs and MWOs to prompt, if require, warnings of airborne volcanic ash.
3. Amendment 81 proposes the additional provision of VONA to international aviation operators, allowing them to incorporate information on volcanic activity along their flight paths into their safety risk management processes. For example, they may choose not to fly directly overhead or immediately downwind of a volcano at heightened unrest.
4. Further the proposed Amendment 81 recommends that the VONA is updated at least daily when at aviation colour code red (significant eruption) or orange (minor eruption), and weekly when at yellow (elevated unrest). A new colour code of 'unassigned' is also introduced to reflect the inability of SVOs to be confident in the activity of volcanoes that cannot be well monitored (e.g. remote or undersea volcanoes) and so a colour code of green cannot be determined to be appropriate.
5. The VONA is to be shared through the Aeronautical Fixed Services (AFS) both in Traditional Alphanumeric Code (TAC) and ICAO Meteorological Information Exchange Model (IWXXM) formats.

Challenges:

1. The ability to generate a VONA in IWXXM format will be a challenge for many SVOs. WMO Task Team on Aviation Data will define the VONA IWXXM schema for the SVOs to utilise, however this will require either significant technical expertise to implement, or significant cost to procure a 3rd party solution for its use.
2. The requirement to share the VONA across the AFS will also prove a challenge for many SVOs around the world, especially those that are not co-located with a NMHS. It will require access to at least an Aeronautical Fixed Telecommunication Network (AFTN) connection (for the TAC format) or more appropriately an Aeronautical Messaging Handling System (AMHS) connection (for the IWXXM format, but will also send the TAC format) – usually limited to air navigation and meteorological service providers.
3. ICAO Contracting States may choose to fund the provision of VONA entirely or enact a cost recovery mechanism for part or all the costs that are attributable to aviation. Many States are already struggling with cost recovery mechanisms for standard meteorological

information required under Annex 3, so the addition of cost recovery mechanisms for volcanological services to aviation may be a difficult task.

4. As discussed at the Fifth Meeting of the Pacific Meteorological Council (PMC-5) in 2019, New Zealand continues to develop a proposal for a 'VONA Portal' that will allow Pacific SVOs to create and issue a VONA, through the AFS connection VAAC Wellington utilises, in coordination with Airways New Zealand (New Zealand's air navigation service provider). It is intended that funding will be sought for this proposal later this year.

Recommendations:

The Meeting is invited to:

1. **Note** the proposed elevation of the VONA to recommended practice.

2. **Request** assistance for Pacific Island States with active or potentially active volcanoes through their NMHSs to reach out and coordinate with their national Civil Aviation Authorities (CAAs) and national volcano observatory agencies to discuss the existing and proposed requirements for SVOs, including ensuring appropriate SVO designation in the regional air navigation plan.

3. **Endorse** the New Zealand proposal for the VONA Portal for use by Pacific SVOs.

==========