



ASSEMBLY — 41ST SESSION

TECHNICAL COMMISSION

Agenda Item 33: Other issues to be considered by the Technical Commission

THE VALUE OF VOLCANIC ASH CONTINGENCY EXERCISES IN IMPROVING SYSTEM READINESS FOR REAL-WORLD VOLCANIC ASH EVENTS

(Presented by New Zealand)

REVISION NO. 1

EXECUTIVE SUMMARY

In 2020, New Zealand conducted a volcanic ash exercise (VOLCEX 20/02) simulating a high-level eruption of a Tongan volcano. The exercise demonstrated that an effective system for sharing information on volcanic activity was in place and operational. Recommendations to further improve the speed of the response were also agreed and are being implemented.

The importance of conducting such simulated exercises regularly was highlighted during the response to the January 2022 eruptive period of Hunga Tonga-Hunga Ha’apai. This eruption also confirmed some of the recommendations regarding opportunities for improvement identified during the 2020 simulation exercise. It is important for States to conduct regularly simulated exercises for low probability, high impact events to ensure maximum preparedness for real life events when they occur – and ensuring recommendations coming from such exercises are addressed in a timely manner.

Action: The Assembly is invited to:

- a) recognize the value of, and to take part in, volcanic ash exercises to better prepare and respond to volcanic events;
- b) continue collaboration with ICAO to organize and conduct volcanic ash exercises and follow-up on the lessons learnt, including lessons from actual volcanic eruptions, and disseminate recommendations to States;
- c) work in collaboration with ICAO to incorporate the learnings of volcanic ash exercises into guidance material, and Standards and Recommended Practices (SARPs) where appropriate; and
- d) implement appropriate communications infrastructure at appropriate operational units to support dissemination of the Volcano Observatory Notice for Aviation (VONA) format.

<i>Strategic Objectives:</i>	This working paper relates to the Air Navigation Capacity and Efficiency Strategic Objectives.
<i>Financial implications:</i>	None
<i>References:</i>	Annex 3 — <i>Meteorological Service for International Air Navigation</i>

1. INTRODUCTION

1.1 In July 2020, the ICAO Asia Pacific (APAC) volcanic ash exercise VOLCEX 20/02 was conducted as a desktop exercise, simulating the high-level eruption of the South Pacific volcano Tofua, located in the central part of the Tonga Islands group. The purpose of this exercise was to give an opportunity for Tonga to demonstrate the sharing of volcanic activity information.

1.2 VOLCEX 20/02 also provided a scenario that would allow for greater collaboration and coordination across a wider section of the South Pacific and for participants involved in volcanic ash alerting procedures. These exercises are an output of the ICAO APAC Volcanic Ash Exercises Steering Group (ICAO APAC VOLCEX SG), which has the Civil Aviation Authority of New Zealand (CAA) and the Australian Civil Aviation Safety Authority (CASA) as protagonists.

1.3 The use of VOLCEX 20/02, followed by the subsequent eruption of Hunga Tonga-Hunga Ha'apai in 2021/2022 has highlighted the benefit of using exercises to identify opportunities to improve the response to volcanic activity. This includes ensuring that all States in are adequately prepared and have the appropriate infrastructure required to quickly disseminate information when a volcanic eruption occurs.

2. THE APAC VOLCEX 20/02 EXERCISE SIMULATED A SIGNIFICANT VOLCANIC ERUPTION IN TONGA

2.1 VOLCEX 20/02 simulated the Tofua high-level ash cloud moving from the Auckland Oceanic Flight Information Region (FIR), across to the Nadi FIR and then moving north towards the Oakland Oceanic FIR. Exercise participants included the Tonga volcano observatory, the Wellington, Darwin and Washington Volcanic Ash Advisory Centres (VAACs); the aviation meteorological service providers and air navigation service providers (ANSPs) of Tonga, New Zealand, Fiji and the United States; the NOTAM offices of Tonga, New Zealand and Fiji; and five airlines who routinely operate flights into the wider Pacific airspace. The exercise was led by the CAA. CASA represented the APAC VOLCEX SG in observing the exercise.

2.2 The VOLCEX 20/02 exercise report highlighted the usefulness of the exercise, in allowing participants to test their volcanic eruption processes in a coordinated way with other local and international organisations, and a series of recommendations to improve practices across the system were made. The value of these recommendations and their implementation are examined in light of the recent Hunga Tonga-Hunga Ha'apai eruptions.

3. THE ERUPTION OF HUNGA TONGA-HUNGA HA'APAI PUT VOLCEX 20/02 INTO PRACTICE

3.1 During December 2021 and January 2022, the submarine volcano Hunga Tonga-Hunga Ha'apai had a series of eruptions, with the most significant taking place on 15 January 2022 when the volcanic ash emission reached mesospheric levels.

3.2 Tonga Geological Services are the Tongan volcano observatory, who provide information on volcanic activity to aviation in coordination with Tonga Meteorological Services. Tonga Meteorological Services ensure information on the volcanic activity is well communicated to the

Wellington VAAC, and to Tonga Airports Limited, who provide the Aeronautical Information Service and Air Traffic Control services for the Tonga Sector of the Auckland Oceanic FIR.

3.3 Through the relationships both formed and strengthened during various volcanic ash exercises, Tonga Geological and Meteorological Services were able to ensure the Wellington VAAC was well informed of the volcanic activity during the entire eruptive episode, including via satellite phone when communications were limited.

3.4 Many of the participants of VOLCEX 20/02 were involved in the response to Hunga Tonga-Hunga Ha’apai. The overall response to the eruption was generally effective and incorporated many of the recommendations that were made during VOLCEX 20/02, but there remains room for improvement in some areas.

4. **POST-EVENT ANALYSIS SHOWS THAT IMPROVEMENTS CAN BE MADE TO STRENGTHEN STATE RESPONSES**

4.1 Following the eruption of Hunga Tonga-Hunga Ha’apai, a series of opportunities to improve the overall coordinated response were identified in post-event analysis. States can learn from these analyses to improve responses to future eruptions. A significant challenge in improving future responses is ensuring that developing States receive appropriate support from ICAO and other States to assist with dissemination of information, and technical support to implement any required infrastructure changes.

4.2 States need to ensure that information about an eruption is disseminated promptly – even if that information is only partially complete or not presently known. From a safety perspective, it is better for airlines to have an initial notification that an event has occurred, with an understanding that further detailed information will be provided as it becomes available, rather than receive nothing at all.

4.3 The response to Hunga Tonga-Hunga Ha’apai eruption on 14 January 2022 saw delays in coordinating between the Tonga and New Zealand NOTAM office. For the 15 January 2022 eruption, the Volcanic Ash Advisory had been issued within 20 minutes of the eruption, but the SIGMET detailing the volcanic ash cloud was issued over an hour later. The delays in SIGMET and NOTAM had been identified in the VOLCEX 20/02 exercise and recommendations were made to address them which had not been implemented.

4.4 The proposed escalation of the Volcano Observatory Notice to Aviation (VONA) to a recommended practice in Annex 3 — *Meteorological Service for International Air Navigation* will ensure that all aviation users and organisations will be aware of a new volcanic eruption in a more direct and timely manner. However, this will rely on volcano observatories having access to the communication infrastructure to disseminate the VONA message – either directly, or via partnership with another aviation organisation. This is seen as a significant barrier for many developing States where the volcano observatory may not be well resourced to meet the proposed Annex 3 provisions.

5. **STATES SHOULD CONTINUE TO TAKE ADVANTAGE OF VOLCANIC ASH EXERCISES TO BETTER PREPARE FOR FUTURE ERUPTIONS, AS WELL AS SUPPORT DEVELOPING STATES**

5.1 The use of VOLCEX in the Pacific region demonstrates that volcanic ash exercises provide great value and can better prepare States to respond and recover from future eruptions. Specifically, they allow States to identify opportunities for improvement in areas of response where they may be underprepared.

5.2 The eruption of Hunga Tonga-Hunga Ha'apai reinforced where the opportunities for improvement in response lie and the need for volcanic ash exercises to be conducted in order to best prepare States. Further, these opportunities highlight where additional assistance is required for developing States across the globe for them to effectively respond to volcanic activity.

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