

INTERNATIONAL CIVIL AVIATION ORGANIZATION

**Fourth Meeting of the AFI Volcanic Ash Exercises Steering Group
(AFI VOLCEX/SG4)***(Virtual, 1 April 2025)***Agenda Item 2: AFI Exercise VOLCEX 23/01 Lessons learned, Conclusions and Recommendations****WP2.1 Lessons learned, Conclusions and Recommendations***(Presented by the Secretariat)*

SUMMARY
<p>This paper provides an update on key lessons learned from the second exercise conducted under the leadership of the Democratic Republic of Congo, and recommendations for enhancing future exercises.</p> <p>Action by the meeting in paragraph 3</p>
<p>REFERENCE(S):</p> <ul style="list-style-type: none">▪ APIRG/27 Report▪ AFI VOLCEX 23/01 Report
<p>Related ICAO Strategic Objective(s):</p> <ul style="list-style-type: none">• A – Safety, B – Air Navigation Capacity and Efficiency

1. INTRODUCTION

- 1.1 The meeting may note that, the APIRG/26 meeting, after taking note of the outcomes of the first volcanic ash exercise conducted by Cabo Verde in 2021, approved the proposal of the Democratic Republic of Congo (DRC) to lead the second volcanic ash exercise (VOLCEX 23/01), which was successfully conducted in December 2023.
- 1.2 The second exercise provided valuable insights, leading to key lessons learned and recommendations for enhancing future exercises.

2. DISCUSSION*Simulated ash and impacted regions/airspace*

- 2.1. The simulated high level volcanic ash cloud contaminated eleven FIRs ; affecting major air traffic routes in Kinshasa ; Brazzaville ; Libreville ; Douala ; Bangui ; Dar ES Salam ; Entebbe ; Kigali ; Luanda ; Bujumbura and Nairobi FIRS.
- 2.2. The exercise involved participants from some agencies in Democratic Republic of Congo; Republic of Congo; Gabon; Cameroon; Central African Republic; Tanzania; Uganda;

Rwanda; Burundi and Kenya. The Bulletin Compiling Centre (Kenya); the Dakar and Pretoria Regional OPMET Data Bank (RODB Dakar and RODB Pretoria); Senegal; Cabo Verde; IATA and the ICAO WACAF and ESAF Regional Offices participated in the exercise.

2.3. Volcanic ash information was disseminated, including VONA messages, Ground Observation reports, SIGMET, NOTAM, VAA/VAG, special air-report through the AFTN/AMHS network.

2.4. This second exercise of volcanic ash in the AFI Region was based on the simulation of message exchanges and coordination between the entities involved in the exercise.

Exercise preparation

2.5. Preparation for the AFI VOLCEX23/01 was initiated by the Secretariat and the Democratic Republic of Congo as the Exercise Team Leader. This was in line with the scenario which had been determined in September 15, 2023.

2.6. The Directive was drafted and communicated to the exercise participants through e-mail. Prior to the exercise, several web-teleconference meetings were held to prepare and communicate the initial requirements and needs of the Exercise. Various virtual meetings to review the Directive were held and attended by the Participating Agencies with the support of the ICAO ESAF and WACAF Offices.

2.7. During the online preparation meetings, exercise messages templates and indicators were shared with the exercise players. The importance of the indicators was to distinguish the exercise messages from the real operational messages.

The following webinars and meetings were conducted:

- 2.8. AFI Volcanic Ash Exercise- Preparatory workshop, 7 to 11 November 2022.
- 2.9. Designation of the Leader of the AFI VOLCEX 23/01, 5 September 2023.
- 2.10. Development of the draft VOLCEX 23/01 Directives, 15 September to 4 December 2023.
- 2.11. Send the final version of the exercise directive for publication by ICAO, 4 December 2023.
- 2.12. Presentation of the final version of the AFI Volcanic Exercise Directive, 5 December 2023.
- 2.13. A NOTAM dated 5 December 2023 was sent to the Exercise and webinars participants.
- 2.14. Pre-Exercise Meeting, 6 December 2023.

The exercise GO/NO (in full) decision:

2.15. It was agreed that in case of unforeseen circumstances, such as a real volcanic eruption or other significant events affecting the air transport system, the Exercise Leader may decide to either postpone the exercise to a later date or cancel it. A decision not to proceed, i.e., to postpone or cancel the exercise, shall be communicated to all participants and observers as early as possible before the exercise is due to commence.

2.16. A new provision of the GO/NO decision was later added following inputs from the participants: *In the case of real volcanic eruption or other unforeseen circumstances that occur within the exercise period, if the exercise is considered to potentially affect the operation of air*

navigation system, the Exercise Leader must consult all participating agencies and postpone or abort the exercise. -. (According to ICAO Doc 9766 Handbook on the IAVW, Appendix F, paragraph 2.3).

Participating agencies:

- 2.17. **The Volcano Observatory (VO)** - (Goma VO) started the exercise by issuing a VONA at 09:40 UTC informing the participants of the eruption of Nyiragongo Volcano with Aviation Color Code reported as red, volcanic ash cloud height 34449 FT and ash moving to West.
- 2.18. The VONA was disseminated through e-mail and integrated in the VAAC system. A second VONA was issued at 12:00 UTC to update the evolution of the volcanic eruption. Finally, another VONA was issued at 13:40 UTC informing that the volcanic activity had ceased, which then triggered the cessation of Exercise.
- 2.19. **VAAC Toulouse** issued the first volcanic ash advisories (VAA) and volcanic ash charts (VAG) at 09:45 UTC. VAAC issued normal volcanic ash advisories sequentially. Additional quantitative products (concentration graphs) were provided before the exercise and published on the VAAC Toulouse web portal. The second advisory was issued at 12:05 UTC in response to the second VONA and the final advisory was issued at 13:45 UTC in response to the VONA ceasing the exercise.
- 2.20. **MWO Kinshasa** issued 2 SIGMETs including appropriate information from the VA Advisories. A cancelation SIGMET was issued at 13:50 UTC.
- 2.21. **NOF Kinshasa** issued 2 NOTAMs and 1 cancelation NOTAM for volcanic ash in compliance with SIGMETs issued by MWO Kinshasa.
- 2.22. **ACC Kinshasa** applied measures based on SIGMETs and NOTAMs in accordance with the AFI Volcanic Ash Contingency Plan.
- 2.23. **AO Busy Bee DR Congo** broadcast a special air report (ARS) to ACC Kinshasa at 10:05 UTC. The ARS reported the pilot's observations, confirming the presence of ash in the area. The ARS was transmitted vocally to the ACC, then transmitted to the MWO Kinshasa.
- 2.24. The exercise was a valuable opportunity to simulate the ARS transmission which could be effectively implemented in the real operational, as the simulated method has been discussed among the teleconferences. The airline simulated the risk assessment and flights planning were conducted in the teleconference by the exercise leader on behalf of airlines participating in the exercise.
- 2.25. **ACC Kinshasa** as planned, coordinated with the relevant entities, and managed the airspace, informing the aircraft of the presence of volcanic ash on the different routes and altitudes.
- 2.26. **MWO Brazzaville** issued 2 SIGMETs and a cancelation SIGMET in coordination with informations from the VA Advisories.
- 2.27. **NOF Brazzaville** issued 2 NOTAMs and 1 cancelation NOTAM for volcanic ash in compliance with SIGMETs issued by MWO Brazzaville.
- 2.28. **ACC Brazzaville** applied measures based on SIGMETs and NOTAMs in accordance with the AFI Volcanic Ash Contingency Plan.
- 2.29. **AMO Libreville** presented the situation in their area through teleconference at 10:30 UTC.
- 2.30. **AMO Douala** presented the situation in their area through teleconference at 10:40 UTC.
- 2.31. **MWO Kigali** issued a SIGMET at 10:50 UTC and a cancelation SIGMET in coordination with information from the VA Advisories.

- 2.32. **NOF Kigali** issued a NOTAM and 1 cancelation NOTAM for volcanic ash in compliance with SIGMET issued by MWO Kigali.
- 2.33. **ACC Kigali** applied measures based on SIGMETs and NOTAMs in accordance with the AFI Volcanic Ash Contingency Plan.
- 2.34. **MWO Entebbe** issued a SIGMET at 11:05 UTC in coordination with information from the VA Advisories and, a cancelation SIGMET.
- 2.35. **MWO Dar es Salam** issued a SIGMET at 13:00 UTC and a cancelation SIGMET in coordination with information from the VA Advisories.
- 2.36. **NOF Dar es Salam** issued a NOTAM and 1 cancelation NOTAM for volcanic ash in compliance with SIGMET issued by MWO Dar Es Salam.
- 2.37. **ACC Dar es Salam** applied measures based on SIGMETs and NOTAMs in accordance with the AFI Volcanic Ash Contingency Plan.
- 2.38. **Web Conferences:** The First Exercise web conference to discuss the exercise took place from 11:40 to 11:59 UTC while the second took place at the end of the Exercise, i.e. from 2:00 p.m. to 3:00 p.m. UTC.

Lessons Learnt

- 2.39. The exercise was conducted on a regional basis, from 09:30 to 15:00 UTC on 7 December 2023. The following were achieved:
 - Representatives from five (5) Volcano Observatory States, MET Watch Offices of four (4) impacted States, Notam Offices from four (4) impacted States, ACCs from four (4) impacted States, representatives from ANSP (ASECNA), Two airlines, IATA and representatives from Civil Aviation Authorities of five (5) impacted States participated in the exercise.
 - Satisfactory coordination procedures between participating parties (ANSPs; ATM; Centres ; AIS ; VO ; VAACs ; MWOs ; SAR).
 - Satisfactory distribution of volcanic ash related messages including VONA; VAA/VAG; SIGMET; NOTAM and AIREPs.
 - Activation of volcanic ash contingency plans in impacted States and good interaction of Rescue Coordination Centres Search and Rescue Centres.
- 2.40. Aspects that need to be improved include:
 - Need to improve the formats of the NOTAM messages;
 - Challenges related to the absence of ARS that should be provided by some participating airlines.
 - Need to ensure that airlines are onboard;
 - System of some MWOs States is set for SIGMET related to Thunderstorm and doesn't allow SIGMET WV;
 - Exercise should focus on the phraseology to ensure the effective application;
 - Need to have official notices to have key stakeholders involved in the exercise;

- Need to provide clarity on the role of all key stakeholders, including SAR entities;
- Delay in receiving some messages, including SIGMET was experienced;
- The list of distribution should be extended to cover all the relevant recipients;
- Failure of some key stakeholders, including RODBs to participate in the exercise/Teleconference.

Summary of Issues /Remarks Raised and Proposed Actions

ISSUES / REMARKS	REFERENCE	CORRECTIVE MEASURES	RESPONSIBILITY	DEADLINE
Testing COM/Network links	Volcex 23-A1	Include in the next edition of the exercise, the verification of COM/Network links	Responsible for the exercise	March 2025
Improve the formats of the NOTAM messages	Volcex 23-A2	Prepare and issue NOTAM messages in right formats	Responsible for the exercise	When preparing the messages templates
Missing of the ARS from airlines	Volcex 23-A3	Ensure there is a mechanism in place to receive and disseminate ARS to identified recipients	Responsible for the exercise	2025
Local Contingency Committee not activated	Volcex 23-A4	Enable local contingency Committee during the exercise	Participating States (under exercise coordination)	During exercise
System of some MWOs States is set for SIGMET related to Thunderstorm and doesn't allow SIGMET WV	Volcex 23-A5	Verify MWOs States telecommunications systems to enable reception and dissemination of SIGMET WV messages	Participating MWO States	Prior to the 2025 exercise

ISSUES / REMARKS	REFERENCE	CORRECTIVE MEASURES	RESPONSIBILITY	DEADLINE
Phraseology to ensure the effective application	Volcex 23-A6	Train ATCO on the application of phraseology rules/procedures	Participating States /ANSPs	2025
Need to provide clarity on the role of all key stakeholders, including SAR entities	Volcex 23-A6	Explain the role of all key stakeholders, including SAR entities	Exercise Lead	2025
Delay in receiving some messages, including SIGMET was experienced	Volcex 23-A7	Train involved staff in the criteria of dissemination of the SIGMET information	States MET Offices /Telecommunication Offices	2025
Insufficient involvement at the highest level	Volcex 23-A8	Formally request the participation of stakeholders, specifying the key individuals	Secretariat	2025
Lack of agreements between stakeholders	Volcex 23-A9	Sign agreements with neighboring States	All Volcano Observatory States	2025
Contact details of the of Volcano Observatory States Point of Contact	Volcex 23-A10	Request Volcano Observatory States that have not yet provided/updated the contact details of their focal points	Secretariat	2025
Low participation of airlines in the Exercise	Volcex 23-A11	Raise awareness among airlines, in collaboration with IATA, to actively participate in the next Exercise	Secretariat	2025

ISSUES / REMARKS	REFERENCE	CORRECTIVE MEASURES	RESPONSIBILITY	DEADLINE
Failure of some key stakeholders, including RODBs to participate in the exercise/Teleconference.	Volcex 23-A12	Encourage participation in the VA exercise	Participating States	2025

12.1. In conclusion, the Exercise was also a useful way to capture what needs to be improved in the volcanic ash handling, including the need to review the messages distribution lists, special air report transmission mechanism, further discussion on SIGMET/NOTAM procedure, as well as the importance of user-engagements.

3. ACTIONS BY THE MEETING

3.1. The meeting is invited to:

- a) Note the information in this paper; and
- b) Provide guidance on actions to address issues and implement recommendations for enhancing the third volcanic ash exercise.

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