



# AFI Volcanic Ash Exercise Workshop

*(Virtual, 06-08 April 2021)*

## AFI Volcanic Ash Exercise Directive (AFI VAED)

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## Introduction (1/5)

- Selected Volcano on which the Exercise will be based
- A simulated eruption of a volcano should be done as follows :

A volcano in Cape Verde called **[volcano name]** will produce volcanic ash to **[FLxxx]** where it will be transported by **[wind direction]** wind of **[wind speed]** km/hr (xx kt) in order to impact **[nn]** routes from **[0045 UTC 13 September 2021 to 0645 UTC 14 September 2021]**.



- Official name of the volcano is: **Vulcão do Fogo.**
- Location: Long: 24.36° W; Lat: 14.95° N.
- Volcano number is: **384010**
- The highest elevation: **2829 m**

## Introduction (2/5)

The Exercise Leader will be **[Ms./Mr.] [full name]**,  
**[Job Title]**, **[State]**.

The duties of the Exercise Leader are specified in the AFI VOLCEX OPINS. There will be no operational impact in this exercise (dedicated staff is expected to be available for the test).



Exercise Leader

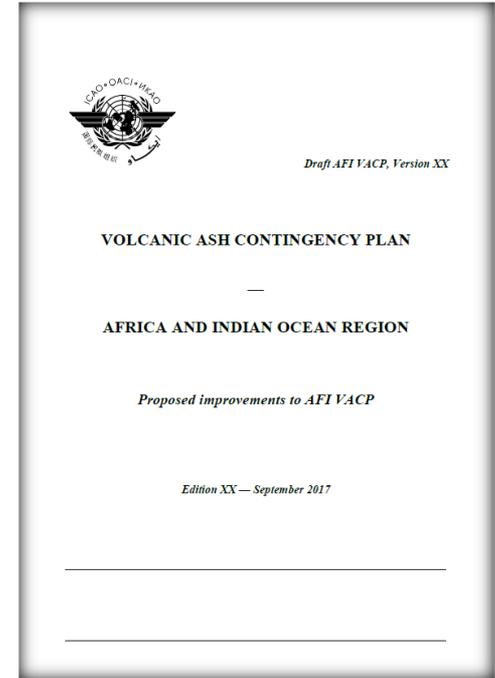


## Introduction (3/5)

The AFI Volcanic Ash Contingency Plan (AFI VCAP) Edition 2017 : will be the contingency plan to be tested in this exercise.

*Note: If one or more participants consider it difficult to continue this exercise due to severe events such as volcanic eruption or low pressure, they may advise the Exercise Leader to cancel the exercise. In response, the Exercise Leader will announce the cancellation where appropriate.*

Exercise date and time (UTC): **[13 or 14 September, 0045 to 0645]**



## Introduction (4/5)



### Pre-exercise Coordination Meeting

- Series of pre-exercise coordination meetings will be scheduled.
- Notices for the meetings will be relayed through email.
- Details of the pre-exercise coordination meetings are detailed under 10.3



### Debrief Meeting

The Debrief Meeting  
will be held from : **[4  
to 5 October 2021]**



## Introduction (5/5)

### Host /Chair:

- MWO of the Volcano State of the Exercises will host the Debrief Meeting
- Exercise Leader will chair the Debrief.

### Coordination:

- ICAO EASF Office Nairobi, Kenya;
- ICAO WACAF Dakar, Senegal

### Exercise webpage:

- Dedicated webpage for the exercise is available at [www.xxxxxxx](http://www.xxxxxxx).
- Other useful websites include : <https://www.wovodat.org/doc/database/1.1/index.php>



## Participating Agencies

- Volcano Observatory
- VAAC Toulouse
- Operators
- Airports
- ANSPs
- Regulatory /national Authority
- NOFs

- MWOs
- Airlines (IATA)
- Experts Advisors
- ICAO
- ...



## Objectives

- a) To maintain enhanced safety, regularity and efficiency of aviation in the event of a volcanic eruption by demonstrating the provision and exchange of volcanic ash information in support of flexible airspace management, improved situational awareness and collaborative decision making, and dynamically-optimized flight trajectory planning.
- b) To demonstrate the practice of applicable global and regional procedures related to volcanic activity and volcanic ash, including:
  - Distribution of alerts (e.g., VONA)
  - Distribution of AIS and MET messages (e.g., VAA/VAG, SIGMET, NOTAM, AIREP)
  - Responses by ATC, ATFM and aircraft operators (e.g., safety risk assessments, tactical re-routes)
  - Enhanced situational awareness and CDM (e.g., via a teleconference/webex)]



## Exercise duration

1. The exercise shall be conducted over a period of approximately four (4) hours commencing at xxxx UTC xx September 2021.
2. The first VONA is expected to be issued within 10 minutes of the exercise start. The second VONA, is to be issued nearing the exercise end time

## Exercise Volcano

- **Official name of the volcano is: Vulcão do Fogo.**
- **Location: Long: 24.36° W; Lat: 14.95° N.**
- **Volcano number is: 384010**
- **The highest elevation: 2829 m**
- **Area : Cape Verde Islands**





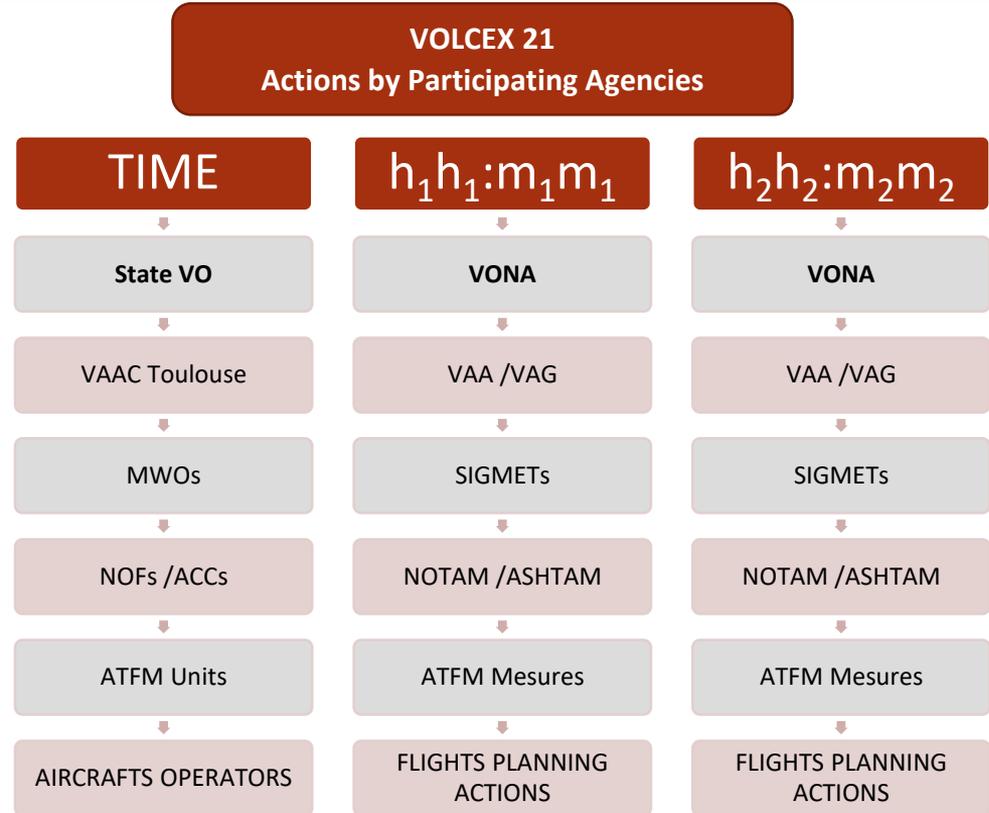
## Exercise Scenario

1. Simulated eruption with volcanic ash cloud up to FLxxx moving [direction] at x-x knots to impact ATS routes and airspace within XXX FIR (CODE) and XXXX FIR (CODE).
2. Volcanic ash deposition at xxxx (CODE) and xxxx aerodromes (CODE) in [State], will impact operations and airport closure.



## Exercise Scenario

Schematics of the information flow between operational units in a volcanic ash exercise according to ICAO Doc 9766 Handbook on the International Airways Volcano Watch.





## Exercise schedule <sup>(1/3)</sup>

Date /Time (UTC)	Players	Event /Action
[1 month prior to the exercise]	<ul style="list-style-type: none"><li>• Exercise leader</li><li>• ICAO Secretariat</li></ul>	Publish final version of exercise directive
[1 week prior to the exercise]	NOF/s [name/s]	Issue preparatory NOTAMs to inform the aviation community of the exercise
[Exercise date, 0100]	Exercise leader	Send email message to all players to announce commencement of the exercise
<b>[Exercise date, 0100]</b>	<b>VO [name]</b>	<b>Issue 1<sup>st</sup> exercise VONA (initial eruption details)</b>
[Exercise date, 0100+]	VAAC <b>Toulouse</b>	Issue 1 <sup>st</sup> exercise VAA[/VAG] based on VONA
[Exercise date, 0100+]	MWO <b>Antananarivo</b>	Issue 1 <sup>st</sup> exercise SIGMET based on VONA
[Exercise date, 0100+]	ACC/NOF [name/s]	Issue 1 <sup>st</sup> exercise NOTAM based on SIGMET
[Exercise date, 0200]	VAAC <b>Toulouse</b>	Issue 2 <sup>nd</sup> exercise VAA/VAG based on observations/reports
[Exercise date, 0200+]	MWO <b>Antananarivo</b>	Issue 2 <sup>nd</sup> exercise SIGMET based on VAA/VAG



## Exercise schedule (2/3)

Date /Time (UTC)	Players	Event /Action
[Exercise date, 0200+]	Exercise leader	Send email message inviting [selected players] to join [teleconference/web conference] at [time]
[Exercise date, 0200+]	ACC/NOF [name/s]	Issue 2 <sup>nd</sup> exercise NOTAM based on SIGMET
[Exercise date, 0200+]	ACC/ATM Centre/s [names]	Apply ATFM measures based on SIGMET
[Exercise date, 0200+]	AOs [name/s]	Take appropriate flight planning actions: e.g. reroute or cancel flights
[Exercise date, 0215]	AO [name]	Report aircraft observation [volcanic ash/no volcanic ash] as special air-report
[Exercise date, 0215+]	ATS unit/s [name/s]	Relay and record special air-report
<b>[Exercise date, 0230]</b>	<b>VO [name]</b>	<b>Issue 2<sup>nd</sup> exercise VONA (updated eruption details)</b>
[Exercise date, 0245]	Exercise leader, [list selected players]	Exercise [teleconference/web conference] to discuss the latest situation
[Exercise date, 0300]	VAAC <b>Toulouse</b>	Issue 3rd exercise VAA/VAG based on observations/reports
[Exercise date, 0300+]	MWO <b>Antananarivo</b>	Issue 3rd exercise SIGMET based on VAA/VAG
[Exercise date, 0300+]	ACC/NOF [name/s]	Issue 3rd exercise NOTAM based on SIGMET
[Exercise date, 0300+]	ACC/ATM Centre/s [names]	Apply ATFM measures based on SIGMET



## Exercise schedule (3/3)

Date /Time (UTC)	Players	Event /Action
[Exercise date, 0300+]	AOs [name/s]	Take appropriate flight planning actions: e.g. reroute or cancel flights
[Exercise date, 0600]	VAAC <b>Toulouse</b>	Issue 4 <sup>th</sup> exercise VAA and VAG based on observations/reports
[Exercise date, 0600+]	MWO <b>Antananarivo</b>	Issue 4 <sup>th</sup> exercise SIGMET based on VAA/VAG
[Exercise date, 0600+]	ACC/NOF [name/s]	Issue 4 <sup>th</sup> exercise NOTAM based on SIGMET
[Exercise date, 0600+]	ACC/ATM Centre/s [names]	Apply ATFM measures based on SIGMET
[Exercise date, 0600+]	AOs [name/s]	Take appropriate flight planning actions: e.g. reroute or cancel flights
<b>[Exercise date, 0645]</b>	<b>Exercise leader</b>	<b>Send email message to all players to announce cessation of the exercise</b>
[Exercise date, 0645]	VO [name]	Cancel exercise VONA
[Exercise date, 0645]	VAAC <b>Toulouse</b>	Cancel exercise VAA/VAG
[Exercise date, 0645]	MWO <b>Antananarivo</b>	Cancel exercise SIGMET
[Exercise date, 0645]	ACC/NOF [name/s]	Cancel exercise NOTAM



## Exercise Scenario Messages : **VONA**

- VONA messages related to the exercise: Exercise messages comprising VONA start with “VA EXERCISE **AFI VOLCEX 21/01**” and end with “EXERCISE EXERCISE EXERCISE”.
- They should be based on the agreed exercise scenario.
- Template for VONA exercise message (see ICAO Doc 9766 – Handbook on IAWV App. E).
- The distribution lists should be also established.

### EXERCISE AFI VOLCEX 21/01

(1) VOLCANO OBSERVATORY NOTICE FOR AVIATION — VONA

(2) Issued: Universal (Z) date and time (YYYYMMDD/HHMMZ).

(3) Volcano: Name and number (per Smithsonian database at <http://www.volcano.si.edu/>)

(4) Current aviation colour code: GREEN, YELLOW, ORANGE OR RED in upper-case bold font

(5) Previous aviation colour code: Lower-case font, not bold

(6) Source: Name of volcano observatory (volcanological agency)

(7) Notice number: Create unique number for each VONA that includes year

(8) Volcano location: Latitude, longitude in NOTAM format (N or S deg min W or E deg min)

(9) Area: Regional descriptor

(10) Summit elevation: nnnnn FT (nnnn M)

(11) Volcanic activity summary: Concise statement that describes activity at the volcano. If known, specify time of onset and duration (local and UTC) of eruptive activity. If the eruption is ongoing at the time of VONA release, indicate “eruption and ash emission is continuing”.

(12) Volcanic cloud height: Best estimate of ash-cloud top in nnnnn FT (nnnn M) above summit or AMSL (specify which). Give source of height data (ground observer, pilot report, radar, etc.). “UNKNOWN” if no data available or “NO ASH CLOUD PRODUCED” if applicable.

(13) Other volcanic cloud information: Brief summary of relevant cloud characteristics (colour of cloud, shape of cloud, direction of movement, etc.) Specify if cloud height is obscured or suspected to be higher than what can be observed clearly. “UNKNOWN” if no data available or “NO ASH CLOUD PRODUCED” if applicable.

(14) Remarks: Optional. Brief comments on related topics (monitoring data, observatory actions, volcano’s previous activity, etc.)

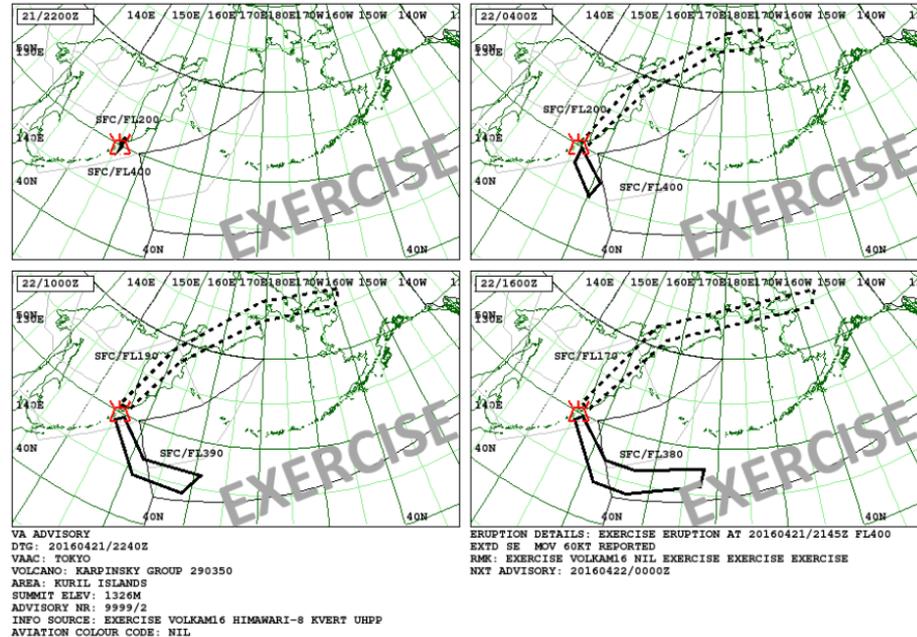
(15) Contacts: Names, telephone and fax numbers, e-mail addresses.

(16) Next notice: “A new VONA will be issued if conditions change significantly or the colour code is changed.” Include URL of website where latest volcanic information is posted.

### EXERCISE EXERCISE EXERCISE

## Exercise Scenario Messages : VAA /VAG

- **VAA/ VAG message/s** related the exercise: Exercise messages comprising VAA and VAG should include the use of “VA EXERCISE” and “AFI VOLCEX 21/01” (in accordance with ICAO Doc 9766, Part 4, 4.8) to highlight and emphasize that the advisory information refers to the volcanic ash exercise
- VAAC concerned should issue a volcanic ash advisory test message highlighting that the advisory refers to a test message by using “VA TEST” or “VA EXERCISE” (followed by the name of the exercise if wished) in elements 9, 11 and 17 of the volcanic ash advisory message (Annex 3, Table A2-1 refers) as part of the element description.
- The volcanic ash advisory message will emphasize that the message refers to a test/exercise by repeating “VA TEST” or “VA EXERCISE” as many as practicable in element 17.





## Exercise Scenario Messages : VA Exercise SIGMET

**VA Exercises SIGMET Messages:** Exercise messages comprising SIGMET should include the use of “VA EXERCISE” and “AFI VOLCEX 21/01” (in accordance with ICAO Doc 9766, Part 4, 4.8) to highlight and emphasize that the SIGMET information refers to the volcanic ash exercise. They should be based on the preceding exercise VAA messages.

Template of SIGMET exercise messages. Distribution lists are provided in **Appendixes H and I of the AFI VOLCEX Directive**.

**MWO concerned should issue a volcanic ash SIGMET** highlighting that the SIGMET refers to a test message by including “VA TEST” or “VA EXERCISE” (followed by the name of the exercise, if wished) in element “Phenomenon” of SIGMET message (Annex 3, Table A6-1A refers).

Table 1. SIGMET based on VONA

```
WVPH31 GVAC nnnnnn
GVSC SIGMET nn VALID nnnnnn/nnnnnn GVAC-
GVSC SAL FIR VA EXERCISE AFI VOLCEX 21/01 VA ERUPTION MT Vulcão do Fogo PSN
N1495 W2436 VA CLD OBS AT nnnnZ SFC/FL350 MOV S INTSF EXERCISE EXERCISE EXERCISE=
```

Table 2. SIGMET based on VAA when VA is not identifiable from satellite but with wind speed at significant FL xxx

```
WVPH31 GVAC nnnnnn
GVSC SIGMET nn VALID nnnnnn/nnnnnn GVAC-
GVSC SAL FIR VA EXERCISE AFI VOLCEX 21/01 VA ERUPTION MT Vulcão do Fogo PSN
N1495 W2436 CLD OBS AT nnnnZ SFC/FL350 MOV S nnKT INTSF EXERCISE EXERCISE EXERCIS
```

Table 3. SIGMET based on 1<sup>st</sup> VAA when VA is identifiable from satellite :

```
WVPH31 GVAC nnnnnn
GVSC SIGMET nn VALID nnnnnn/nnnnnn GVAC-
GVSC SAL FIR VA EXERCISE AFI VOLCEX 21/01 VA ERUPTION MT Vulcão do Fogo PSN
N1495 W2436 VA CLD OBS AT nnnnZ WI Nnnnn Ennnnn - Nnnnn Ennnnn - Nnnnn Ennnnn - Nnn
Ennnnn SFC/FL350 MOV S nnKT NC FCST nnnnZ VA CLD WI Nnnnn Ennnnn - Nnnnn Ennnnn -
Nnnnn Ennnnn - Nnnnn Ennnnn - Nnnnn Ennnnn SFC/FL350 MOV S nnKT INTSF EXERCISE
EXERCISE EXERCISE=
```



## Exercise Scenario Messages : **VA Exercise NOTAM**

Exercise messages comprising NOTAM start with “**VA EXERCISE AFI VOLCEX 21/01**” and end with “**EXERCISE EXERCISE EXERCISE**” (in Item E of NOTAM).

Template of NOTAM/ASHTAM Exercise messages provided.

Distribution lists are provided in Appendix J and K of AFI VOLCEX Directive.

Table 1: Preparatory NOTAM (issued 1 week prior to exercise)

```
(Bxxxx/19 NOTAMN Q) RPHI/QWWWXX/IV/NBO/W/000/999/1025N12308E999
A) GVAC
B) 1909120000
C) 1909120400
D)
E) VA EXERCISE AFI VOLCEX 21/01 VOLCANIC ASH EXERCISE TAKES PLACE dd
SEPTEMBER FROM [00:00 TO APPROX. 4:00 UTC]. EXERCISE NAME: AFI VOLCEX 21/01.
EXERCISE VOLCANO: MT Vulcão do Fogo PSN N1495 W2436. FREE TEXT OF PROMULGATED
EXERCISE MESSAGES START WITH: VA EXERCISE AFI VOLCEX 21/01 FREE TEXT OF EXERCISE
MESSAGES END WITH: EXERCISE EXERCISE EXERCISE.
F) SFC
G) UNL)
```

Table 2: 1<sup>ST</sup> exercise NOTAM

```
(Bxxxx/19 NOTAMN Q) RPHI/QWWWXX/IV/NBO/W/000/999/1025N12308E999
A) GVAC
B) 190912XXXX
C) 190912XXXXEST (24hr)
D)
E) VA EXERCISE AFI VOLCEX 21/01 ERUPTION OF VOLCANO ERUPTION MT Vulcão do Fogo
PSN N1495 W2436 CAPE VERED ISLANDS AS REPORTED BY VOLCANO OBSERVATORY AT
0000 UTC. VOLCANO ASH CLOUD REPORTED BY GROUND OBSERVER. EXERCISE EXERCISE
EXERCISE.
F) SFC
G) 35000FT AMSL)
```



## Exercise Scenario Messages : VA Exercise NOTAM

### AFI VOLCEX Final NOTAM Template

Table xx: Final Exercise NOTAM

(Bxxxx/19 NOTAMC Q) RPHI/QWWWXX/IV/NBO/W/000/999/1025N12308E999  
A) GVAC  
B) 190912XXXX C)  
D)  
E) VA EXERCISE AFI VOLCEX 21/01. ERUPTION OF VOLCANO [MT Vulcão do Fogo  
PSN N1495 W2436 CAPE VERDE ISLANDS] HAS CEASED AS REPORTED BY  
VOLCANO OBSERVATORY AT [0400 UTC]. VOLCANIC ASH CLOUD HAS DISSIPATED.  
VOLCANIC ASH CLOUD NO LONGER VISIBLE. EXERCISE EXERCISE EXERCISE.  
F)  
G)



## Exercise Scenario Messages : **Exercise ASHTAM**

### Example of AFI VOLCEX ASHTAM

(Bxxxx/19 NOTAMN Q) RPHI/QWWWXX/IV/NBO/W/000/999/1025N12308E999

A) GVAC

B) (date/time of eruption)

C) MT Vulcão do Fogo

D) PSN N1495 W2436

E) (volcano level of alert color code)

F) VA EXERCISE AFI VOLCEX 21/01 (existence and horizontal/vertical extent of volcanic ash cloud)

G) (direction of movement of ash cloud)

H) (air routes or portions of air routes and flight levels affected)

I) (closure of airspace and/or air routes or portions of air routes, and alternative air routes available)

J) VA EXERCISE AFI VOLCEX 21/01 (source of information)

K) VA EXERCISE AFI VOLCEX 21/01 (plain language remarks) EXERCISE EXERCISE EXERCISE



# Exercise Scenario Messages : VA Exercise AIREP

Exercise messages comprising special air-reports end with “VA EXERCISE **AFI VOLCEX 21/01** EXERCISE EXERCISE EXERCISE”.

Template of **Special air-report exercise messages** and distribution lists are provided in Appendix L of AFI Volcex Directive

Table 1. Special air-report as spoken in radiotelephony

AIREP SPECIAL <i>aircraft identification</i> POSITION <i>latitude and longitude time</i> FLIGHT LEVEL <i>number</i> CLIMBING [DESCENDING] TO FLIGHT LEVEL <i>number</i> ASH CLOUD VA EXERCISE APAC VOLCEX19/ EXERCISE EXERCISE EXERCISE
---

Table 2. Special air-report as recorded by the ATS unit and forwarded to the MET office concerned

ARS nnnnnn nnnnNnnnnnE hhmm Fnnn ASC [DES] Fnnn VA CLD VA EXERCISE AFI VOLCEX 21/0 EXERCISE EXERCISE EXERCISE
--



## Other Communications Matters

Communications such as exercise tele-conferences /web-conferences, e-mail exchanges and instant messaging chats start with **“VA EXERCISE AFI VOLCEX 21/01”**.

Volcanic ash information is disseminated **through e-mail** (e.g. VONA, and Ground Observation report), AFTN (e.g. SIGMET, NOTAM /ASHTAM, VAA/VAG, special air-report, Aerodrome Warning), website (e.g. VAA/VAG, SIGMET) and **phone**.

During the exercise, tele-conference sessions involving all participating and Observing Agencies would be using **“Zoom”** or **“MS Teams”** or **“Other available online platform”**



## Directing Staff & Contacts for Participating Agencies

### AFI VOLCEX 21/01 EXERCISE DIRECTIVE Appendix A – List of Participants

Participants	Areas of responsibilities	Roles and responsibilities
VO Cape Verde	VO	
VAAC Toulouse	VAAC	
ACC SAL/Grant Canary (GVSC)	ACC	
MWO SAL/Grant Canary (GVAC)	MWO	
NOF SAL/Grant Canary (GVAC)	NOF	
National Authority	<b>Regulation</b>	
...	...	...
ESAF RO, ENV/MET	<b>Coordination</b>	
WACAF RO, MET		

### List of contacts for agencies observing the Exercise

<i>Organization</i>	<i>State</i>	<i>Contact name</i>	<i>Contact position</i>	<i>Primary telephone number</i>	<i>Secondary telephone number</i>	<i>Fax number</i>	<i>e-mails address</i>
...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...



## Special instructions

Exercise **GO/NO decision shall be made by the Exercise Leader one day before the planned exercise commencement date and time.**

In case of **unforeseen circumstances**, such as a real volcanic eruption or other significant event affecting the air transport system, the Exercise Leader may decide **either to postpone** the exercise to a later date **or to cancel the exercise.**

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

According to ICAO Doc 9766 Handbook on the IAVW, Appendix F, paragraph 2.3., **“Exercises can only simulate a real event, while operation of the aviation system must continue normally and be unaffected by the exercise.** The planning of the exercise needs to ensure that detrimental effects on the system performance are avoided, but that nevertheless useful experience and information is generated.”



## Exercise teleconference /web-conference guidelines

- The **Volcano State MWO shall be the host** of teleconference meetings and **shall be assisted by the ICAO Secretariat**.
- **Instant messaging and communication applications** may be utilized as a **supplementary means** to share information among participants.
- The use of **English and French languages** is expected among participants during teleconference meetings. **Interpretation services will be provided** by the Secretariat.
- The Exercise Leader **shall instruct the participants on his/her turn to speak** in order to manage the meeting in an orderly manner.



## Exercise teleconference /web-conference: Expected participants and general information expected from each

- **VO** : brief update on eruption status, latest height information, source of height information; duration of event, expected activity
- **VAAC** : brief update on VAA/VAG (are observations such as aircraft reports being used to update products)
- **MWO** : brief update on SIGMET (if different from VAA/VAG, briefly explain why)
- **NOF** : brief update on NOTAM and published reroutes
- **ACC** : brief update on reroutes and coordination with ACCs and ATMCs
- **ATMC** : brief update on overall strategy (coordination with other ATMCs and ACCs)
- **Airlines** : brief update on tactical reroutes, flight plan changes and satisfaction with reroutes
- **ATMC** : response, if necessary, to airlines
- **ACC** : response, , if necessary, to ATMCs and airlines



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UNITING AVIATION

NO COUNTRY LEFT BEHIND



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North Atlantic  
(EUR/NAT) Office  
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Middle East  
(MID) Office  
Cairo

Eastern and  
Southern African  
(ESAF) Office  
Nairobi

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(APAC) Sub-office  
Beijing

Asia and Pacific  
(APAC) Office  
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THANK YOU