ICAO

INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY

Workshop on the provision of information on volcanic eruptions and ash clouds

(Yaoundé, Cameroon, 16 – 20 June 2025)

Framework for the Provision of Volcanic Ash Information

ICAO WACAF Office

By the Secretariat

Outline

1. Introduction
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3. Volcano Observatories, Role and Responsibilities
4. Conclusion

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Introduction

- Several serious incidents in the 1980s and 1990s, such as **British Airways Flight 9 in 1982**, revealed the dangers of volcanic ash, **forcing aircraft to descend from 37,000 to 12,000 feet without engine power**.
- Weeks later, a **Singapore Airways B747 also lost power in two engines** and was diverted safely to Jakarta.
- To meet this newly recognized threat (e.g. volcanic ash), the ICAO Air Navigation Commission moved to develop a set of interim **guidelines** to assist States in the **dissemination of information on volcanic ash to pilots** and the development of **contingency arrangements** for the diversion of aircraft around affected areas.
- The Organization also undertook development of **necessary formal amendments to the relevant Annexes to the Chicago Convention** and **Procedures for Air Navigation Services** (PANS) relating to the volcanic ash in the atmosphere.

International Airways Volcano Watch (IAVW)

- Initial ICAO Annex and PANS amendments set **Standards and Procedures** for **observing, reporting, and warning** about volcanic activity, **managing airspace closures**, and **requiring pilot reports** on volcanic ash encounters.
- These provisions laid the **foundation for the International Airways Volcano Watch (IAVW),** enabled through cooperation between ICAO, States, and international organizations.
- The IAVW, established by ICAO, is a **global system** for monitoring volcanic ash and warning aircraft of its presence in the atmosphere.

Key reasons for establishing the IAWV 1/2

1. Volcanic ash poses a serious threat to aviation safety

- Volcanic ash can cause **engine failure**, **damage to aircraft systems and structures**, **abrasion of cockpit windows**, and **loss of visibility**.
- **Several incidents**, including near-disasters in the 1980s and 1990s (e.g., British Airways Flight 9 in 1982), highlighted the dangers of flying through volcanic ash clouds.

2. Need for a coordinated global system

- Before the IAWV, there was **no standardized, global mechanism** for detecting, tracking, and warning aircraft about volcanic ash clouds.
- ICAO recognized the need for a **global watch system** integrated with meteorological and aviation authorities.

Key reasons for establishing the IAWV 2/2

3. To support ICAO's mandate under the Chicago Convention

- Under **Annex 3 (Meteorological Service for International Air Navigation)**, ICAO established a regulatory framework for the provision to aircraft with timely and accurate information on hazardous weather, including volcanic ash.

4. Enhancing early warning and situational awareness

- The IAWV system includes :
  - **Volcanic Ash Advisory Centres (VAACs)**, which monitor volcanic activity and issue **Volcanic Ash Advisories** to aircraft operators, air traffic control, and meteorological offices.
  - Reporting from **Volcano Observatories**, **aircrew observations**, and **satellite-based detection systems**

Structure of The IAVW

The IAVW consists of two parts, an **observing part** comprising observation sources and an **advisory warning** part comprising advisory/ warning messages

IAVW Observing Part

- Observations from existing **ground-based stations;**
- **Special air-reports**; and
- Observations from **meteorological and non-meteorological satellites**

IAVW Advisory Warning Part

An advisory warning part comprising :

- NOTAM or ASHTAM issued by **AIS units**;
- SIGMETs issued by **MWO**s; and
- Volcanic ash advisory messages issued by **VAACs**.

Observing Part of the IAVW (1/3)

World Organization of Volcano Observatories (WOVO):

- Volcano Observatories
- Vulcanologists' Internet
- Seismological Stations

World Meteorological Organization (WMO):

- Meteorological Observatories
- Climatological Stations
- Hydrological And Rainfall Stations
- Agricultural Stations
- Merchant Ships

ICAO Contracting States:

- General Aviation
- Police/Military Posts
- Border Customs/Immigration Posts
- Forestry Stations
- National Park Stations
- Geological Agencies
- Inshore Fishing Fleets
- Search And Rescue Centres

Observing Part of the IAVW (2/3)

Airborne observations

- **Pilots** are **often the first to observe a volcanic eruption or volcanic ash cloud**, and therefore, may well be the **first line of defence**.

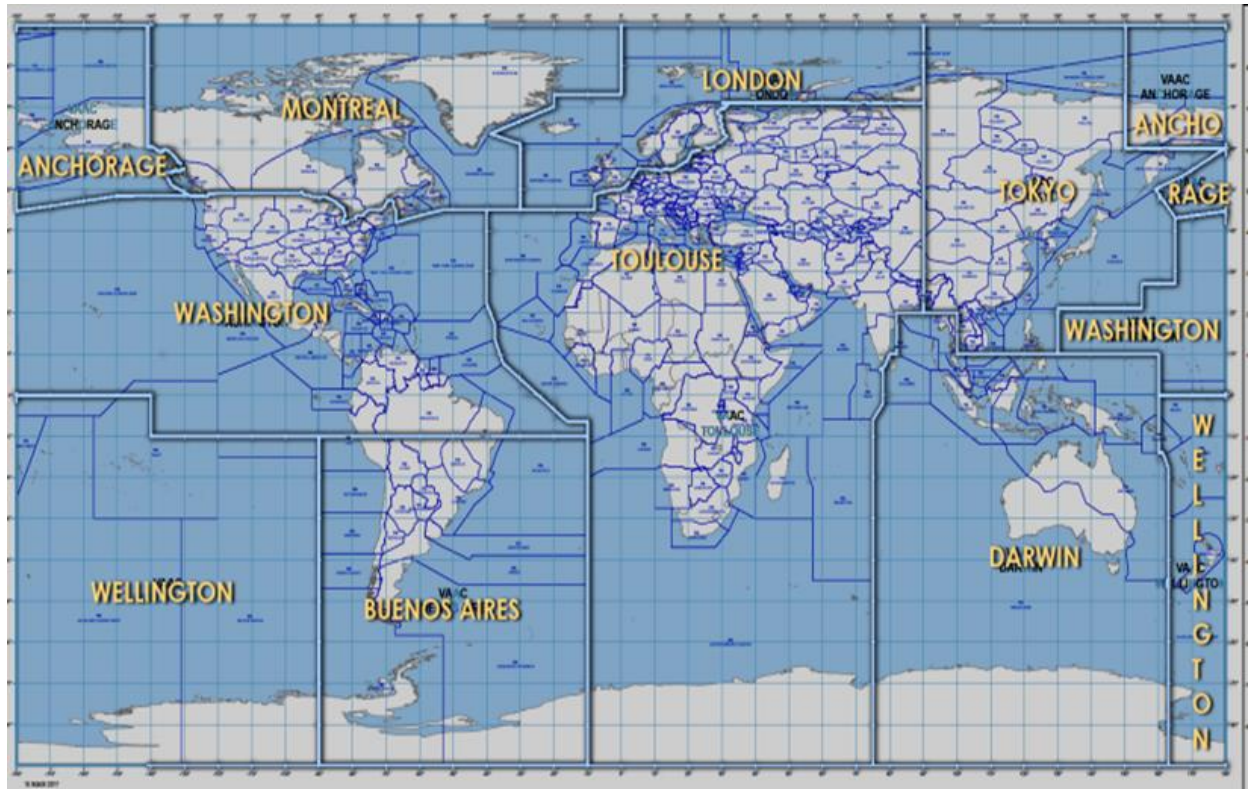
Space-based observation

- **Polar-orbiting and geostationary meteorological satellites** are currently used for observing volcanic eruptions and volcanic ash cloud.
- These satellites form an integral part of the **Global Observing System of the World Weather Watch** which is coordinated and administered by WMO.

Observing Part of the IAVW (3/3)

Volcanic Ash Advisory Centres (VAAC)

- The role of a VAAC is **to provide advice on a 24-hour watch to ACCs/FICs/MWOs** in its **area of responsibility** regarding the **extent** and **forecast movement** of a volcanic ash cloud.
- **VAAC Toulouse** is one of the **9 VAAC** designated by ICAO to contribute to the International Airways Volcano Watch
- Large aera of responsibility
- Hosted by Meteo-France
- **Mutual back-up arrangement with London VAAC** (periodic exercises)



Advisory and Warning Part of the IAVW

Area Control Centres and Flight Information Centres

The advisory and warning part of the IAVW is made up of (but not limited to) :

- Aeronautical Information Services (**AIS**)
- **MWOs** /Aerodrome Meteorological Offices /Aerodrome Meteorological Stations
- Vulcanological Agencies (**VOs**)
- Volcanic Ash Advisory Centre (**VAAC**)
- Other sources of VA Information in multiple formats, including :
    - **National MET service**;
    - **Aircraft in flight** as a special air-report of volcanic activity; and
    - National service, such **as police/military** or **forestry stations**, etc.

International Airways Volcano Watch (IAWV) Global Network

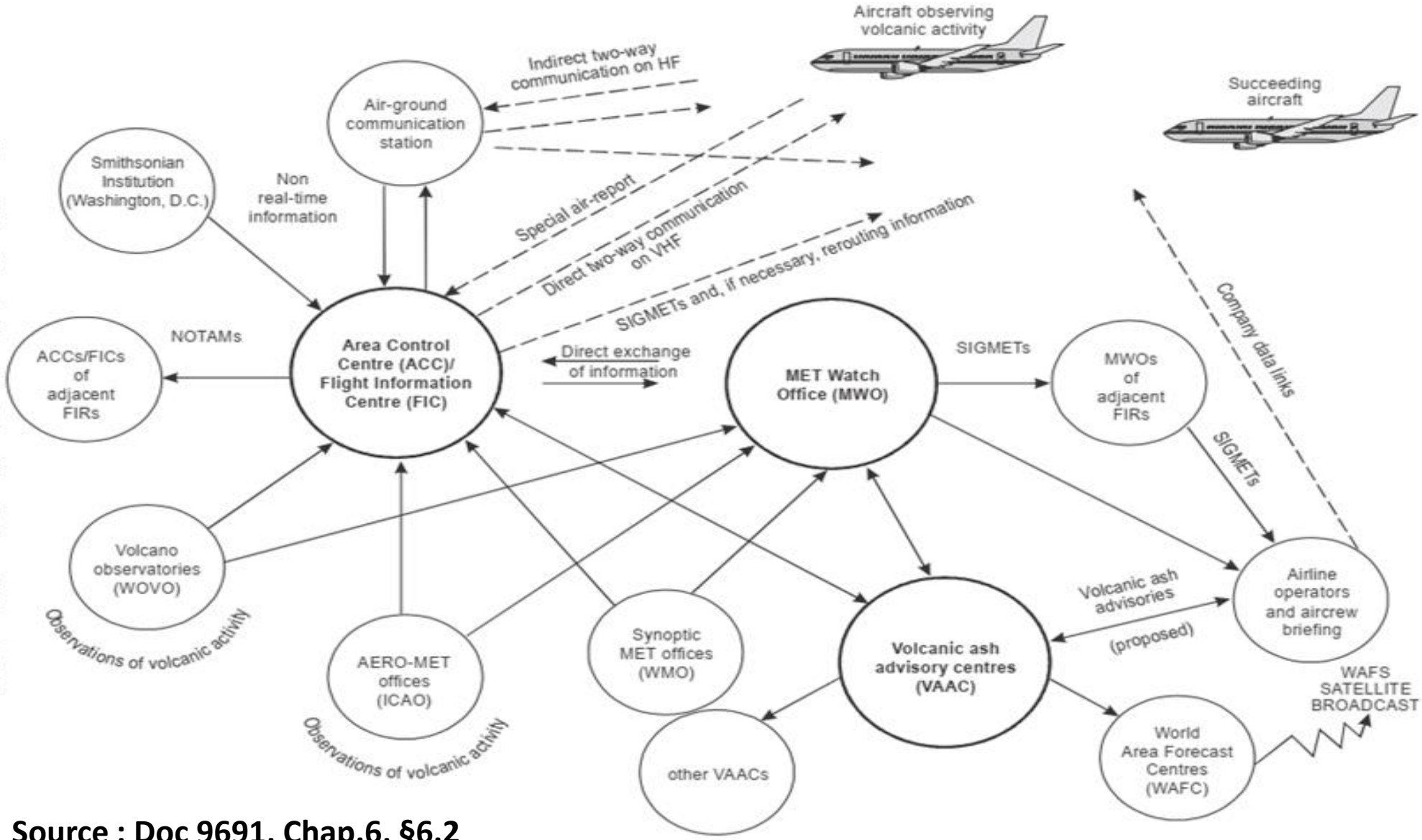


Figure I-6-1. Organization of the International Airways Volcano Watch

Source : Doc 9691, Chap.6, §6.2

International Airways Volcano Watch regulatory provisions (ICAO SARPs)

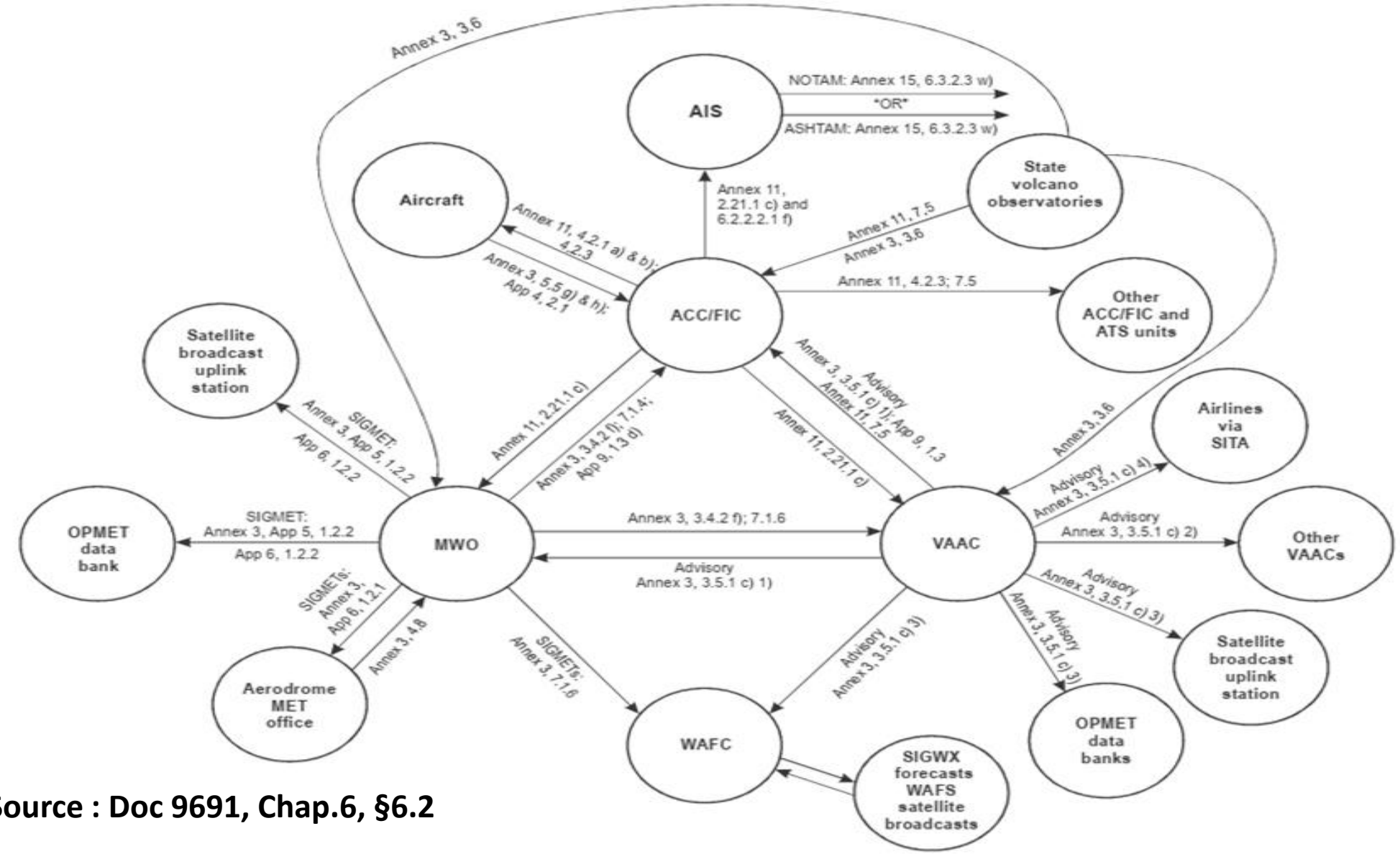


Figure I-6-2. International Airways Volcano Watch regulatory provisions (ICAO SARPs).

Source : Doc 9691, Chap.6, §6.2

Volcano Observatory, Role and Responsibilities

A3: Chap.3 STD 3.5: Contracting States with **active or potentially active volcanoes** shall arrange that State volcano observatories monitor these volcanoes and when observing:

a) **significant pre-eruption volcanic activity**, or a **cessation thereof**;

b) a **volcanic eruption**, or a **cessation thereof**; and/or

c) **volcanic ash** in the atmosphere

shall send this information **as quickly as practicable** to their associated ACC/FIC, MWO and VAAC.

Volcano observatories

AFI Region

In the AFI Region, **Selected State Volcano Observatories** have been designated for notification of significant pre-eruption volcanic activity, a volcanic eruption and/or volcanic ash in the atmosphere for the Africa-Indian Ocean Region to their corresponding ACC/FIC, MWO and VAAC.

State	Volcano Observatory
Cameroon	Institut de recherches géologiques et minières de Yaoundé
Cape Verde	Serviço Nacional de Meteorología e Geofísica, P.O. Box 76, Ilha do Sal
Comoros	Observatoire Volcanologique du Karthala, Moroni
Democratic Republic of Congo/DRC	Centre de Recherches en Sciences Naturelles (CRSN) Lwiro, Bukavu
Eritrea	University of Asmara, Geophysics Section
Ethiopia	Geophysics Observatory, Addis Ababa University
France (La Réunion)	Observatoire volcanologique du Piton de la Fournaise
Kenya	Geology Department, University of Nairobi

Conclusion

ICAO provided a regulatory framework for monitoring and reporting on volcanic ash activities through the **inclusion in the Annexes** to Chicago Convention, the **volcanic ash-related SARPs**, as well as the establishment of the **International Airways Volcano Watch (IAVW)** system, coordinated by ICAO.

The provision of information on volcanic activities/ash is a **collaborative work** involving **several stakeholders**.

ICAO designated **competent VAACs** and **supporting Volcano Observatories** for monitoring and providing information on the volcanic eruptions /ash cloud in **their areas of responsibilities.**

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Thank You!

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