



International Civil Aviation Organization

ICAO

Fourteenth Meeting of the Air Traffic Management Sub-Group (ATM/SG/14) of APANPIRG

Bangkok, Thailand, 3 – 7 August 2026

Agenda Item 6: ATM Coordination and Implementation

6.3: ATM Contingency Planning

COLLABORATIVE ATM CONTINGENCY RESPONSE TO VOLCANIC ERUPTION EVENTS: INDONESIA'S EXPERIENCE

(Presented by Indonesia)

This paper presents Indonesia's collaborative Air Traffic Management (ATM) contingency arrangements for managing the impact of volcanic ash on flight operations, covering the regulatory framework, the Integrated Web-based Aeronautical Information System Handling (I-WISH) platform, and the operational coordination mechanisms applied by the Directorate General of Civil Aviation (DGCA) and AirNav Indonesia. It outlines the early detection, impact analysis, information dissemination and operational handling processes used during volcanic eruption events, together with lessons learned and continuing operational challenges, for the information of the meeting.

1. INTRODUCTION

1.1 Indonesia lies along the Pacific “Ring of Fire” and is home to 127 officially classified active volcanoes, several of which erupt every year and generate ash clouds that pose a serious hazard to aircraft operations.

1.2 This paper presents an overview of Indonesia's collaborative ATM contingency arrangements for managing the impact of volcanic ash on flight operations, including the regulatory framework, the I-WISH platform, and the operational coordination mechanisms applied by the DGCA and AirNav Indonesia.

2. DISCUSSION

Regulatory Framework

2.1 Indonesia's arrangements for managing the impact of volcanic ash on flight operations are underpinned by an established legal and regulatory framework, comprising Law Number 1 of 2009 on Aviation; Minister of Transportation Regulation Number 10 of 2022 (CASR Part 170 – Air Traffic Rules); Minister of Transportation Regulation Number 29 of 2021 (CASR Part 172 – Air Traffic Service Provider); Minister of Transportation Regulation Number 95 of 2018 (CASR Part 174 – Aeronautical Meteorological Information Services); and Director General of Civil Aviation Decree Number 565 of 2015 and Number 47 of 2021 (AC Part 170-03 – Indonesia Air Traffic Management Contingency Plan).

2.2 The use of the I-WISH platform for Collaborative Decision Making (CDM) in mitigating the impact of volcanic ash on flight operations is further regulated under Director General of Civil Aviation Decree Number KP 153 of 2019.

Volcanic Activity in Indonesia

2.3 The Center for Volcanology and Geological Hazard Mitigation (CVGHM), Geological Agency, Ministry of Energy and Mineral Resources, officially classifies Indonesia's 127 active volcanoes into three types:

- a) Type A (76 volcanoes that have erupted since 1600 AD);
- b) Type B (30 volcanoes with no recorded eruption since 1600 AD but still exhibiting volcanic activity); and
- c) Type C (21 volcanoes with no known historical eruption but exhibiting fumarolic or solfataric activity).

2.4 Volcanic activity is closely monitored, as illustrated by 2025 eruption statistics for Mount Semeru (1,419 eruptive events), Mount Ibu (579 events) and Mount Lewotobi Laki-laki (166 events), underscoring the frequency and scale of the hazard that the ATM system must manage.

I-WISH Platform

2.5 I-WISH (Integrated Web-based Aeronautical Information System Handling) is Indonesia's national platform, established by the Ministry of Transportation, for managing the impact of volcanic ash on flight operations. It provides an information and coordination mechanism through its Volcano and CDM modules, and defines the authority of stakeholders, their respective responsibilities in disseminating information, and the types of volcanic ash information to be provided.

2.6 The CDM Group is automatically activated within I-WISH upon receipt of a Volcano Observatory Notice for Aviation (VONA) with a yellow, orange or red alert level, and is automatically deactivated upon receipt of a VONA with a green alert level. Information disseminated through I-WISH includes VONA, SIGMET, ASHTAM, NOTAM, Air-report (AIREP), METAR, SPECI, Aerodrome Warning, Modelled Ash Concentration Chart, Volcanic Activity Report (VAR), ATS Route Contingency information, and paper test results.

2.7 I-WISH defines five user roles:

- a) Super Administrator (Directorate of Air Navigation), which provides overall supervision;
- b) Administrator (Airport Authority Office), which leads the CDM process;
- c) Contributors, including the Indonesia Network Management Centre (INMC), the Geological Agency, the Meteorological Watch Office (MWO), the Area Control Center (ACC), the Flow Control Unit, Cartography, the NOTAM Office and airline/airport business entities;
- d) Observers, including MWO personnel, airlines, the Regional Disaster Management Agency (BPBD) and the Fire Department; and
- e) General Users.

Mechanism of Information and Coordination

2.8 When volcanic activity is detected, the Directorate General of Civil Aviation, in coordination with Airport Authority, validates and analyses the situation through airspace and aerodrome observation. Airspace observation draws on AirNav Indonesia air reports, visual reports and local area observation, while aerodrome observation draws on paper tests, wind charts and METAR, and volcano parameter data.

2.9 Where the airspace is found to be affected, the NOTAM Office issues a NOTAM establishing airspace limitations or aerodrome closure; where volcanic ash is confirmed at the aerodrome, a recommendation is made to close the aerodrome by NOTAM, with observations repeated hourly until volcanic ash is no longer observed and forecasts updated at least every two hours. Where the airspace or aerodrome is confirmed unaffected, normal operations will continue.

Operational Framework

2.10 Indonesia's operational framework for managing volcanic ash impacts comprises three stages: early detection, impact analysis, and information dissemination.

2.11 Early detection is achieved through the “Volcanic Ash Indonesia” WhatsApp group, whose members include the DGCA, AirNav Indonesia, airport operators, CVGHM, the Australian Volcanic Ash Advisory Centre (VAAC Darwin), meteorological watch offices and airlines; the I-WISH and MAGMA Indonesia platforms; pilot report (PIREP) coordination by Operations Managers; and the INMC. WhatsApp group linking the Indonesia Network Management Center (INMC) with AirNav Indonesia's 28 branch Operations Managers.

2.12 Impact analysis draws on ASHTAM, Volcanic Ash Advisory (VAA), MWO, I-WISH and PIREP information to formulate suggested alternate routes in accordance with the ATS contingency route manual.

2.13 Information is disseminated via AFTN and e-mail (ASHTAM, NOTAM, I-WISH updates, suggested alternate routes) and through the “INMC Daily Ops Coordination” WhatsApp group. Twice-daily INMC teleconferences are held at 08:00 and 14:15 local time with Operations Managers from AirNav's 28 branches, the NOTAM Office and the Flight Plan Centre, with meteorological, airport and airline representatives joining the morning session, supplemented by additional teleconferences whenever urgent operational coordination is required.

2.14 Operational handling measures include the provision of ASHTAM and NOTAM (for affected routes, and for aerodrome closure and resumption of normal operations), the suggestion of alternate routes, vectoring, and the use of User Preferred Routes (UPR). These measures are supported by surveillance coverage of approximately 95 per cent of Indonesian airspace, Air Traffic Flow Management (ATFM) tools for sector traffic forecasting and Ground Delay Programmes (GDP).

Institutional Coordination – INMC

2.15 The Indonesia Network Management Center (INMC), supported by 28 AirNav branch Operations Managers, coordinates four functional areas: Air Traffic Service (management and monitoring, disruption management and contingency management); Air Traffic Flow Management (multi-nodal coordination, Indonesia ATFM and A-CDM coordination); Airspace Management (airspace management, drone operations and UPR management); and Aeronautical Information Management (the AIM Centre, NOTAM Office and Flight Plan Centre).

Case Study

2.16 The eruption of Mount Kelud on 13-14 February 2014 illustrates the scale of disruption that volcanic eruption events can cause. A phreatic eruption with a Volcanic Explosivity Index of 2 produced an ash column of approximately 8 km, prompting evacuation of surrounding communities and the closure of seven airports, with an ash cloud tracked at up to 55,000 feet and moving as far as 500 km/270 NM from the volcano, disrupting flight operations across Java and demonstrating the importance of rapid detection, coordination and information dissemination.

Operational Challenges

2.17 Recent eruptions of Mount Sinabung and Anak Krakatau have highlighted continuing operational challenges, including early volcanic ash detection; rapid dissemination of VAA, SIGMET and NOTAM information; coordinated ATFM measures; dynamic rerouting across adjoining Flight Information Regions (e.g. Jakarta, Singapore and Kuala Lumpur); continuous collaboration among other ANSPs, VAAC Darwin, meteorological agencies, airports and airlines; managing diversions and fuel planning; and ground congestion at alternate airports.

2.18 Indonesia's experience demonstrates that effective volcanic ash contingency management relies on timely information exchange, collaborative decision making, and close coordination among aviation stakeholders. Continued regional cooperation will further enhance operational resilience across the Asia/Pacific region.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note Indonesia's collaborative ATM contingency arrangements for managing the impact of volcanic eruption events, including the regulatory framework, the I-WISH platform and the associated operational coordination mechanisms; and
- b) discuss any relevant matters as appropriate, including opportunities to share best practices and strengthen regional coordination on volcanic ash contingency management.

APPENDIX A

**REGULATORY FRAMEWORK GOVERNING VOLCANIC ASH MANAGEMENT IN
INDONESIA**

Regulatory Instrument	Subject
Law Number 1 of 2009 on Aviation	Aviation Law (primary legislation)
Minister of Transportation Regulation Number 10 of 2022 (CASR Part 170)	Air Traffic Rules
Minister of Transportation Regulation Number 29 of 2021 (CASR Part 172)	Air Traffic Service Provider
Minister of Transportation Regulation Number 95 of 2018 (CASR Part 174)	Aeronautical Meteorological Information Services
Director General of Civil Aviation Decree Number 565 of 2015 and Number 47 of 2021 (AC Part 170-03)	Indonesia Air Traffic Management Contingency Plan
Director General of Civil Aviation Decree Number KP 153 of 2019	Procedures and guidelines for Collaborative Decision Making (CDM) in mitigating the impact of volcanic ash on flight operations using the I-WISH platform

OFFICIAL CLASSIFICATION OF INDONESIA'S ACTIVE VOLCANOES (PVMBG)

The Center for Volcanology and Geological Hazard Mitigation (PVMBG/CVGHM), Geological Agency, Ministry of Energy and Mineral Resources, classifies Indonesia's 127 active volcanoes as follows:

Type	Description	Number
A	Erupted since 1600 AD	76
B	No eruption since 1600 AD but still shows volcanic activity	30
C	No known historical eruption but exhibits fumarolic/solfataric activity	21
Total	Active volcanoes	127

Source: PVMBG/CVGHM, Geological Agency, Ministry of Energy and Mineral Resources of the Republic of Indonesia (magma.vsi.esdm.go.id).

I-WISH PLATFORM – USER ROLES AND VOLCANIC ASH INFORMATION TYPES

1. User roles

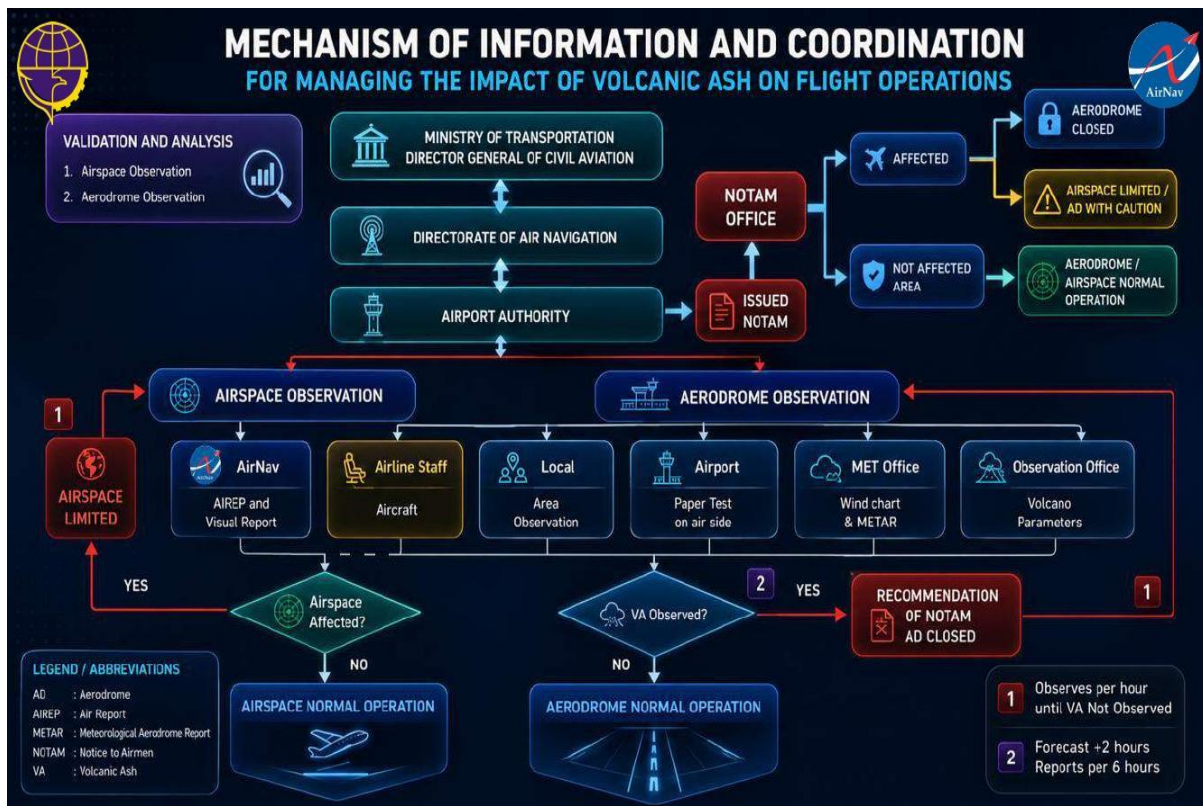
Role	Organization	Function
Super Administrator	Directorate of Air Navigation	Overall supervision; oversees information dissemination and ensures stakeholders perform their roles throughout the CDM process
Administrator	Airport Authority Office	Leads the CDM process; manages participants; validates information; communicates decisions; activates/terminates CDM activities
Contributors	INMC, Geological Agency, MWO, ACC, ATFM Unit, Cartography, NOTAM Office, Airport Authority Office, Airlines, Airport Business Entities	Provide volcanic, meteorological, operational and aeronautical information required for decision making
Observers	MWO personnel, airlines, BPBD (Regional Disaster Management Agency), Fire Department	Provide observations and analysis
General User	—	General access to published information

2. Types of volcanic ash information submitted through I-WISH

- a) Volcano Observatory Notice for Aviation (VONA)
- b) Significant Meteorological Information (SIGMET)
- c) ASHTAM (Special NOTAM for Volcanic Activity)
- d) NOTAM (Notice to Airmen)
- e) Air Report Special (AIREP/AIRS)
- f) METAR (Meteorological Aerodrome Report)
- g) SPECI (Special Meteorological Aerodrome Report)
- h) Aerodrome Warning
- i) Modelled Ash Concentration Chart
- j) Volcanic Activity Report (VAR)
- k) ATS Route Contingency
- l) Paper Test (aerodrome ash-contamination check)

Source: Director General of Civil Aviation Decree Number KP 153 of 2019.

MECHANISM OF INFORMATION AND COORDINATION FOR MANAGING THE IMPACT OF VOLCANIC ASH ON FLIGHT OPERATIONS



DGCA Indonesia, Director General Decree No. KP 153 of 2019

*Mechanism of information and coordination for managing the impact of volcanic ash on flight operations
(DGCA Indonesia, Director General of Aviation Decree No. KP 153 of 2019).*

INDONESIA NETWORK MANAGEMENT CENTER (INMC) – FUNCTIONAL STRUCTURE

The Indonesia Network Management Center (INMC), supported by 28 AirNav branch Operations Managers, coordinates four functional areas:

Functional Area	Scope
Air Traffic Service (ATS)	Manage and monitor; disruption management; contingency management
Air Traffic Flow Management (ATFM)	Multi-nodal coordination; Indonesia ATFM; A-CDM Coordinator
Airspace Management (ASM)	Airspace management; drone operation; UPR management
Aeronautical Information Management (AIM)	AIM Centre; NOTAM Office; Flight Plan Centre

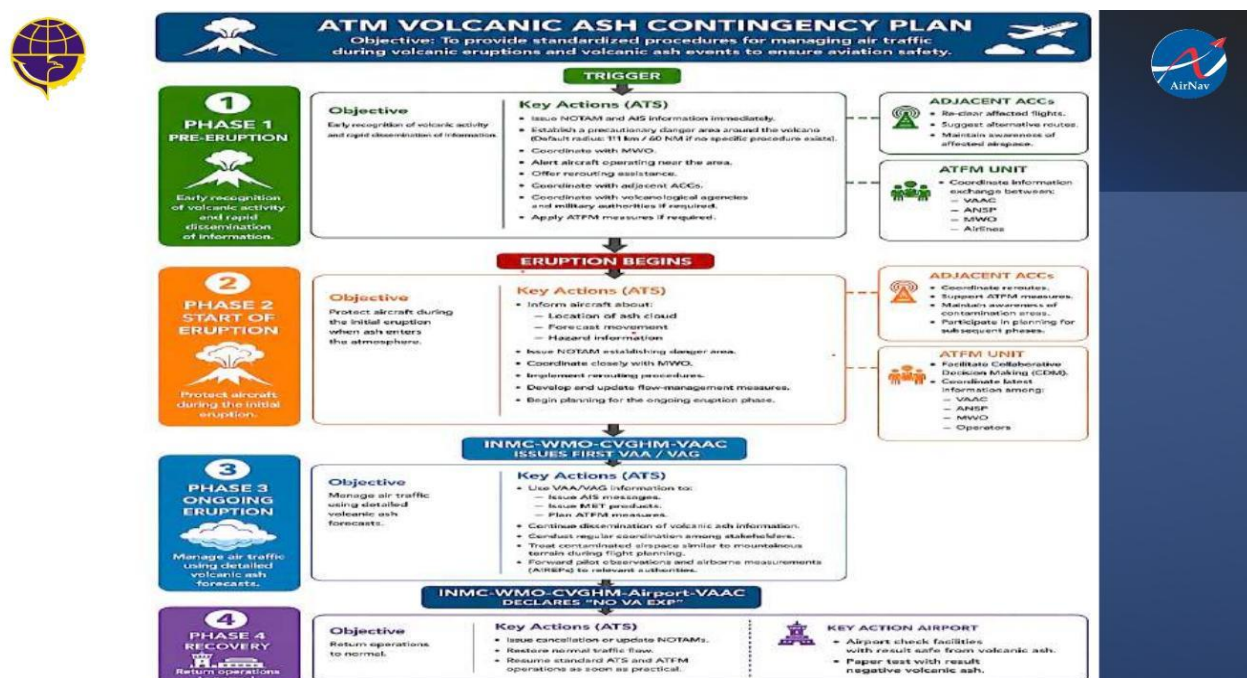


. INMC organizational structure and functional areas.

ATM VOLCANIC ASH CONTINGENCY PLAN – PHASED RESPONSE

Objective: to provide standardized procedures for managing air traffic during volcanic eruptions and volcanic ash events to ensure aviation safety.

Phase	Objective	Key ATS Actions
1. Pre-eruption	Early recognition of volcanic activity and rapid dissemination of information	Issue NOTAM/AIS information immediately; establish a precautionary danger area (default radius 111 km/60 NM if no specific procedure exists); coordinate with MWO and adjacent ACCs; alert aircraft operating near the area; apply ATFM measures if required
2. Start of eruption	Protect aircraft during the initial eruption when ash enters the atmosphere	Inform aircraft of ash location, forecast movement and hazard information; issue NOTAM establishing the danger area; coordinate closely with MWO; implement rerouting procedures; develop/update flow-management measures
3. Ongoing eruption	Manage air traffic using detailed volcanic ash forecasts	Use VAA/VAG information to issue AIS messages, MET products and ATFM measures; continue coordination among stakeholders; treat contaminated airspace similarly to mountainous terrain in flight planning; forward AIREPs to relevant authorities
4. Recovery	Return operations to normal	Issue cancellation/update of NOTAMs; restore normal traffic flow; resume standard ATS and ATFM operations as soon as practical; airports confirm facilities safe from volcanic ash (negative paper test result)



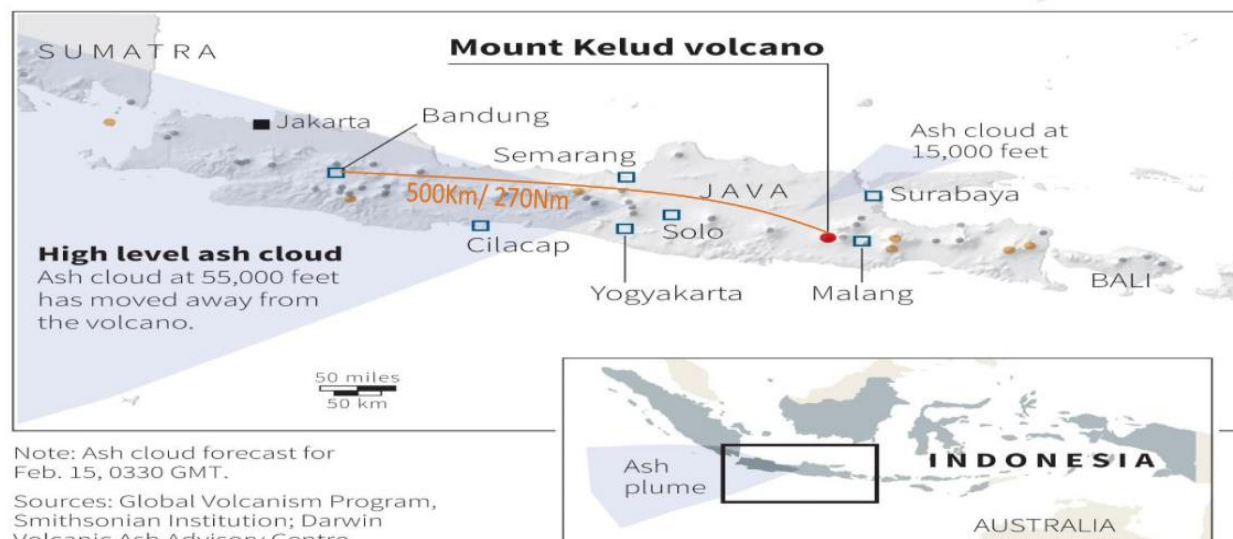
ATM Volcanic Ash Contingency Plan – phased response, showing coordination with adjacent ACCs and the ATFM Unit at each phase.

CASE STUDY – MOUNT KELUD ERUPTION, 13–14 FEBRUARY 2014

Parameter	Detail
Volcano	Gunung Kelud, Kediri, East Java, Indonesia
Date	13–14 February 2014
Eruption type	Phreatic
Volcanic Explosivity Index (VEI)	2
Maximum ash column height	~8 km (ash cloud subsequently tracked up to 55,000 ft)
Ash cloud extent	Moved up to approximately 500 km / 270 NM from the volcano
Impact areas	Kediri, Malang, Blitar, Tulungagung; disruption extended across Java
Consequences	Evacuation of more than 70,000 people; closure of seven airports; widespread flight cancellations and diversions



● Volcano with seismic activity ● Inactive volcanoes □ Airport closed ▲ Ash cloud



Mount Kelud eruption overview, 13–14 February 2014

— END —