Volcanic Ash Advisory

Tokyo Volcanic Ash Advisory Center
Japan Meteorological Agency
28 June 2016
Outline

Volcanic Ash Advisory Center
  • International Framework

Tokyo Volcanic Ash Advisory Center
  • Roles and Operations
  • Volcanic Ash Advisories

Initiative for Cooperation and Coordination
  • Handover Operation
  • Backup Operation
  • Volcanic Ash Exercise
Volcanic ash clouds pose a significant hazard in aviation operations.

Information on volcanic ash clouds plays an important role in helping meteorological watch offices, civil aviation authorities, airlines and other organizations to avoid aircraft-related disasters caused by volcanic ash clouds.

ICAO in cooperation with WMO established a framework for the International Airways Volcano Watch (IAVW) in 1993.

Within this framework, nine Volcanic Ash Advisory Centers (VAACs) monitor volcanic eruptions and provide information on the locations and movement of volcanic ash in their areas of responsibility.
VAAC’s operations are stipulated in Annex 3 of the Convention on International Civil Aviation.

**International Framework**

**What is a VAAC?**

VAAC’s operations are stipulated in Annex 3 of the Convention on International Civil Aviation.

**Cooperation**

ICAO HQ

- Council

Air Navigation Commission

- AMO/AOI Section

- METP

**World Meteorological Organization (WMO)**

- Working Groups
  - Requirements and Integration (MRI)
  - Information and Service Development (MISD)
  - Information Exchange (MIE)
  - **Operations Group (MOG)**

MOG manages work streams shown below:
- International Airways Volcano Watch (IAVW)
- Satellite Distribution System (SADIS)
- World Area Forecast System (WAFS)

**Regional Offices**

- Planning and Implementation Regional Group (PIRG)

**Suggestions**

- User Requirements

**Contracting States**

- Air Traffic Services Authority
- Meteorological Authority

**International Air Transport Association (IATA)**

**International Federation of Air Line Pilots’ Associations (IFALPA)**
Areas of Responsibility of the Nine VAACs

[Map showing the areas of responsibility for the Nine VAACs around the world]
Responsibility of the Tokyo VAAC

- Area of responsibility
  Encompasses active volcanic regions such as the Japanese archipelago, the Philippines, and the Kamchatka Peninsula.

- Duties
  For the area of responsibility:
  - Collect information on eruption/volcanic activity.
  - Monitor volcanic ash using satellite imagery.
  - Forecast ranges of ash spread.
  - Issue Volcanic Ash Advisories (VAAs).
MWO: Meteorological Watch Office
AVO: Alaska Volcano Observatory
KVERT: Kamchatka Volcanic Eruption Response Team
KBGS: Kamchatka Branch of Geophysical Survey
SVERT: Sakhalin Volcanic Eruption Response Team
VOWC: Volcanic Observation and Warning Center
PHIVOLCS: Philippine Institute of Volcanology and Seismology

Kamchatka Peninsula
- AVO
- KVERT
- KBGS
- MWO (Petropavlovsk-Kamchatsky)
- VAAC Anchorage
- VAAC Washington

Chishima/Kurile Islands
- SVERT

Japan
- JMA (VOWCs)
- Pilot Report

Philippines
- PHIVOLCS
- MWO (Manila)
- MWO (Legaspi)
- VAAC Darwin
Flow of Information for Volcanic Ash Advisories

1. Volcano Information
2. Pilot Report
3. Satellite Imagery Data
4. NWP GPV

JMA/Tokyo VAAC
- Monitor and Analyze Volcanic Ash Clouds
- Forecast Volcanic Ash
- Issue Volcanic Ash Advisories

Aviation Weather Service Centers

Civil Aviation Authorities and Other Related Organizations

Meteorological Watch Offices in the Area of Responsibility

Other VAACs
New Himawari-8 Satellite

Himawari-8 data for improved advisory provision

- **Color images**
- **Higher resolution**
- **High-frequency observation** → More timely advisory provision
- **SO₂ detection** → Easier identification of volcanic ash

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<td>13.3</td>
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Facilitation of ash tracking with imagery from Himawari-8

MTSAT-2 IR1 – IR2
30 min. intervals

Himawari-8 Band 13 – Band 15
2.5 min. intervals
New Himawari-8 Satellite
Sample Footage: Volcanic Ash from Kuchinoerabujima

Volcanic Ash: red
SO₂ gas: green
Ash + SO₂: yellow
Example of a VAA in Text Form

FVFE01 RJTD 192333
VA ADVISORY
DTG: 20150919/2333Z
VAAC: TOKYO
VOLCANO: ASOSAN 282110
PSN: N3253 E13106
AREA: JAPAN
SUMMIT ELEV: 1592M
ADVISORY NR: 2015/553
INFO SOURCE: HIMAWARI-8 JMA
AVIATION COLOUR CODE: NIL
ERUPTION DETAILS: ACTIVITY CONT. VA AT 20150919/1800Z FL050 EXTD SW

OBS VA DTG: 19/2250Z
OBS VA CLD: SFC/FL070 N3253 E13108 - N3239 E13114 - N3236 E13107 - N3254 E13102 MOV S 5KT

FCST VA CLD +6 HR: 20/0450Z SFC/FL070 N3229 E13103 - N3202 E13130 - N3201 E13111
FCST VA CLD +12 HR: 20/1050Z SFC/FL060 N3221 E13106 - N3110 E13152 - N3115 E13127 - N3200 E13103
FCST VA CLD +18 HR: 20/1650Z SFC/FL060 N3214 E13044 - N3208 E13103 - N3055 E13138 - N3016 E13138 - N3045 E13106 - N3134 E13104
RMK: NIL
NXT ADVISORY: 20150920/0300Z=

Volcanic data, information source, eruption information
Volcanic ash observation time based on satellite imagery and observed volcanic ash extent
Forecast of volcanic ash extent at T+6, 12 and 18
Example of a VAA in Graphic (VAG) Form

Volcano location

Volcanic ash height (bottom/top)

Volcanic ash extent

VAG information shows the extent and forecast movement of volcanic ash clouds as described in the corresponding VAA text.
VAGI information shows the latest extent of volcanic ash clouds as determined from satellite imagery to help clarify current impacts on air routes.
Information Acquisition

- VAAs are sent to the AFTN addresses of relevant organizations.
- VAGs are available at WAFC (and via GTS).
- A range of information is uploaded to the Tokyo VAAC website.

## Volcanic Ash Advisories

As of 24 July, 2014, information of volcanoes in VAAs such as names, locations, volcano numbers and others are those in the database for VAA which is maintained by ICAO. The database does not represent any formal position by ICAO.

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<th>Area</th>
<th>Advisory Number</th>
<th>VAA Text (FYFEO1)</th>
<th>VA Graphic (VAG)</th>
<th>VA Initial (VAG1)</th>
<th>VA Forecast (VAGFN)</th>
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http://ds.data.jma.go.jp/svd/vaac/data/vaac_list.html
Handover of operational responsibility shall be discussed/coordinated by primary VAAC with adjacent affected VAACs when the ash cloud is expected to be not less than 300NM from a VAAC and/or FIR boundary.
Guidelines for handover procedures
JMA develops standardized handover procedures and discusses possible handover scenarios with neighboring VAACs in advance.

Chat system provided NOAA/NWS for communication among Anchorage, Washington and Tokyo VAACs
Forecasters can use this system for simple, efficient communication on handovers.

Handover Request Sheets (HRSs) and Answer Sheets (ASs)
JMA has developed HRSs in conjunction with neighboring VAACs for the specification of information relating to handover operations. This supports forecasters in conveying the details of situations and making requests pertaining to handover operations.
Coordination with Neighboring VAACs
Development of Handover Tools and Procedures

Chat system

HRS & AS

- Check-sheet style in both languages
- Necessary information
  - Volcano
  - VAA number
  - Issuance time
- Supplementary information
2016/02/13
Zhupanovsky in the Kamchatka Peninsula

06:00  Tokyo Issues VAA.
06:30  Tokyo requests handover.
       (HRS and confirmation call)
06:50  Anchorage accepts the request.
       (AS)
07:00  Tokyo issues VAA.
07:40  Anchorage issues VAA.

Anchorage continues with VAA issuance.
The Tokyo VAAC’s transfer of responsibility is specified in a remark note.
The Anchorage VAAC’s assumption of responsibility is also specified in a remark note.
Based on a mutual-backup operation agreement, the Darwin and Tokyo VAACs began backup operation in March 2014.

During backup operation, the covering VAAC:
- commences satellite monitoring in the backup area;
- issues VAAs for related notification;
- e-mails volcanic observatories in the area and gathers information from them; and
- issues and disseminates VAAs in the area.

The Tokyo VAAC is responsible for the area north of 20 degrees south in the Darwin VAAC’s area of responsibility (shaded in red). The Darwin VAAC provides back-up for the Tokyo VAAC’s area of responsibility.
To support prompt response, relevant organizations must be ready to:
- issue/obtain/use information;
- conduct air traffic flow control for re-routing; and
- facilitate smooth and appropriate communication/coordination.
MWOs, civil aviation authorities, airlines, VAACs and other relevant organizations participate in VOLCEXs.

VOLPHIN history

2015.5.27-29  1st exercise steering meeting in Manila
2015.8.11    1st exercise: assumed eruption of Mt. Taal in the Philippines
2015.9.14-16 1st exercise debriefing & 2nd steering meeting in Bangkok
2016.2.16-17 2nd exercise: assumed eruption of Mt. Merapi in Indonesia
2016.8.18    3rd exercise: assumed eruption of Mt. Taal in the Philippines
Thank you