

Volcanic Ash Advisory

Tokyo Volcanic Ash Advisory Center
Japan Meteorological Agency
28 June 2016





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

International Framework

What is a VAAC?



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.

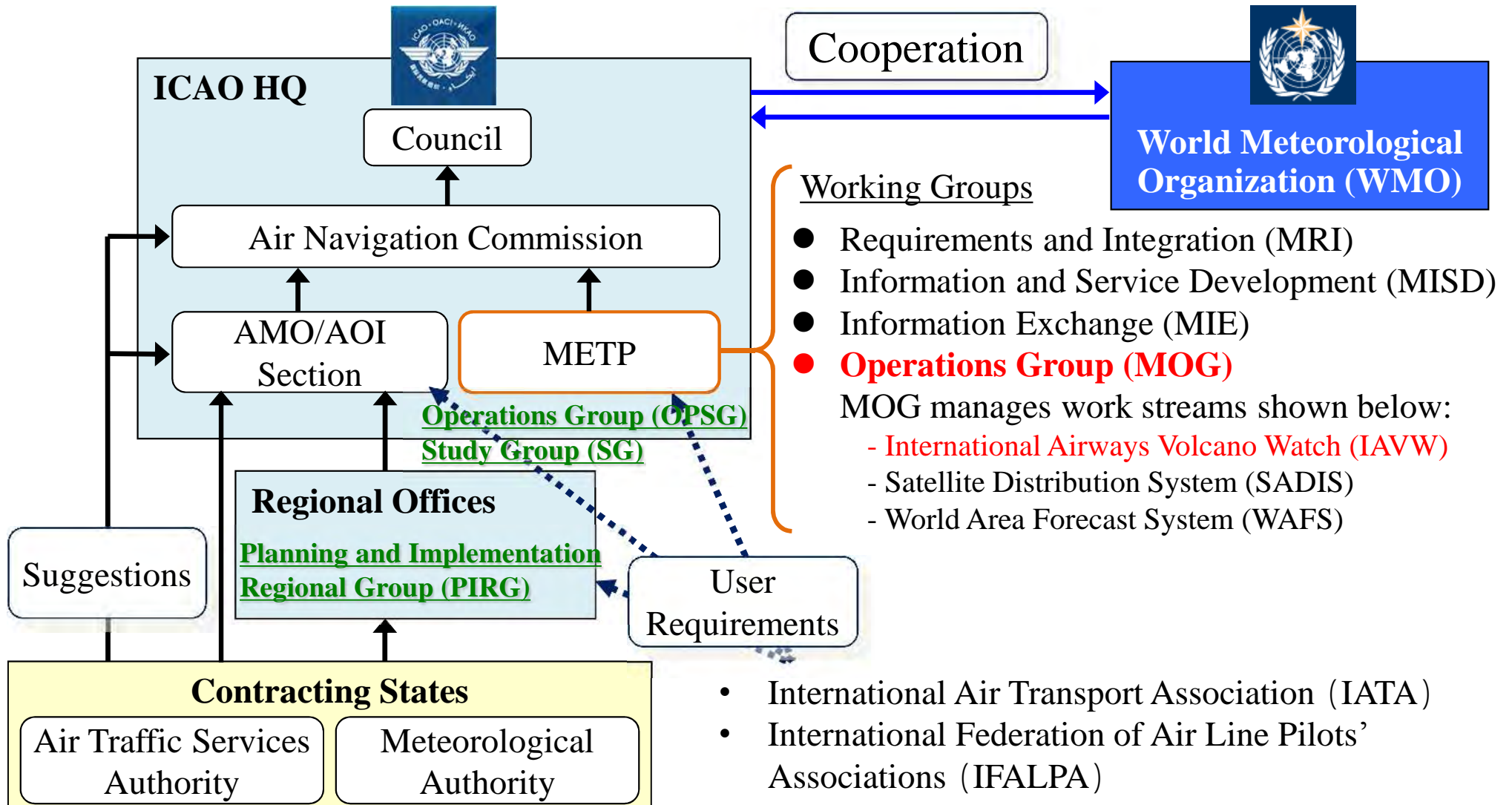
Within this framework, nine **V**olcanic **A**sh **A**dvisory **C**enters (VAACs) monitor volcanic eruptions and provide information on the locations and movement of volcanic ash in their areas of responsibility.

International Framework

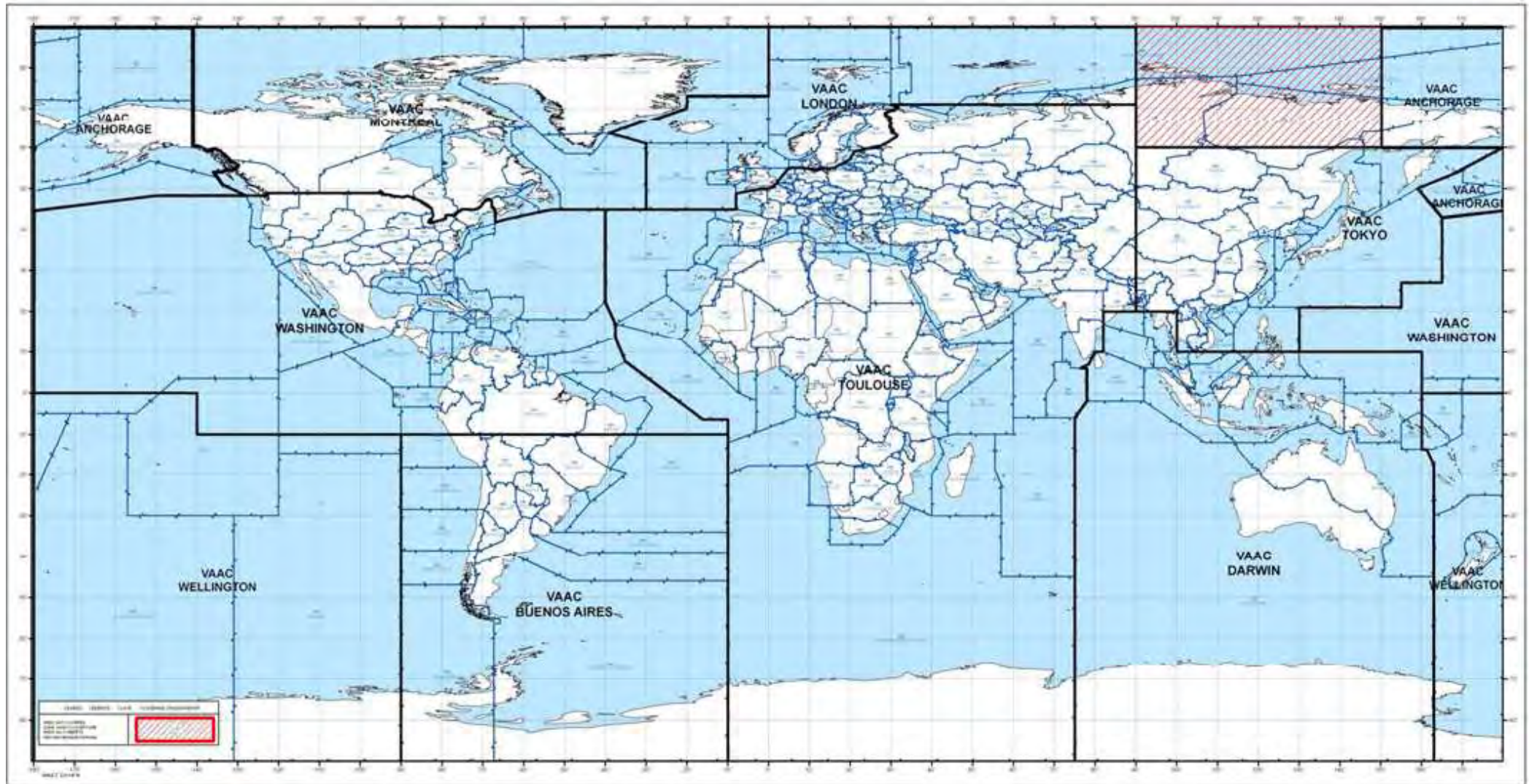
What is a VAAC?



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



Areas of Responsibility of the Nine VAACs



Responsibility of the Tokyo VAAC



- Area of responsibility

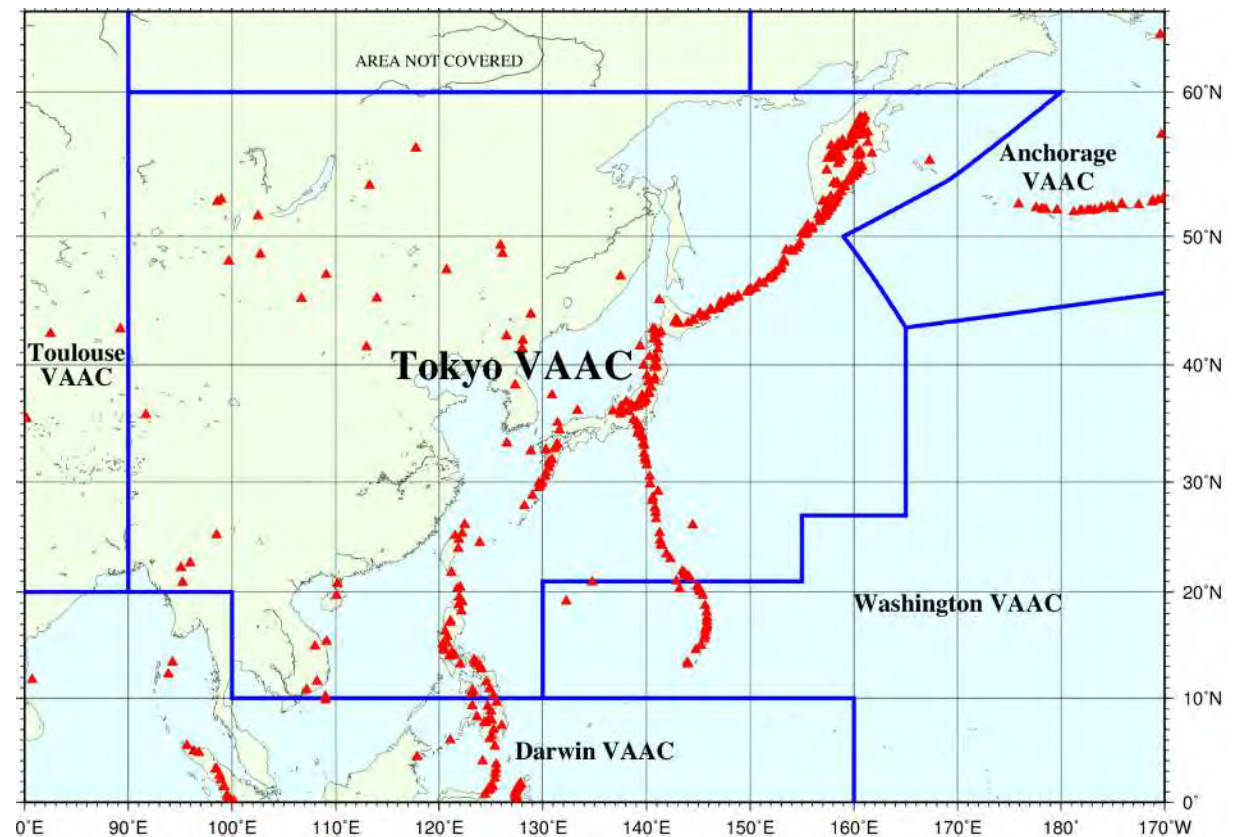
Encompasses active volcanic regions such as the Japanese archipelago, the Philippines, and the Kamchatka Peninsula.

— : Boundary of area of responsibility
▲ : Active volcano

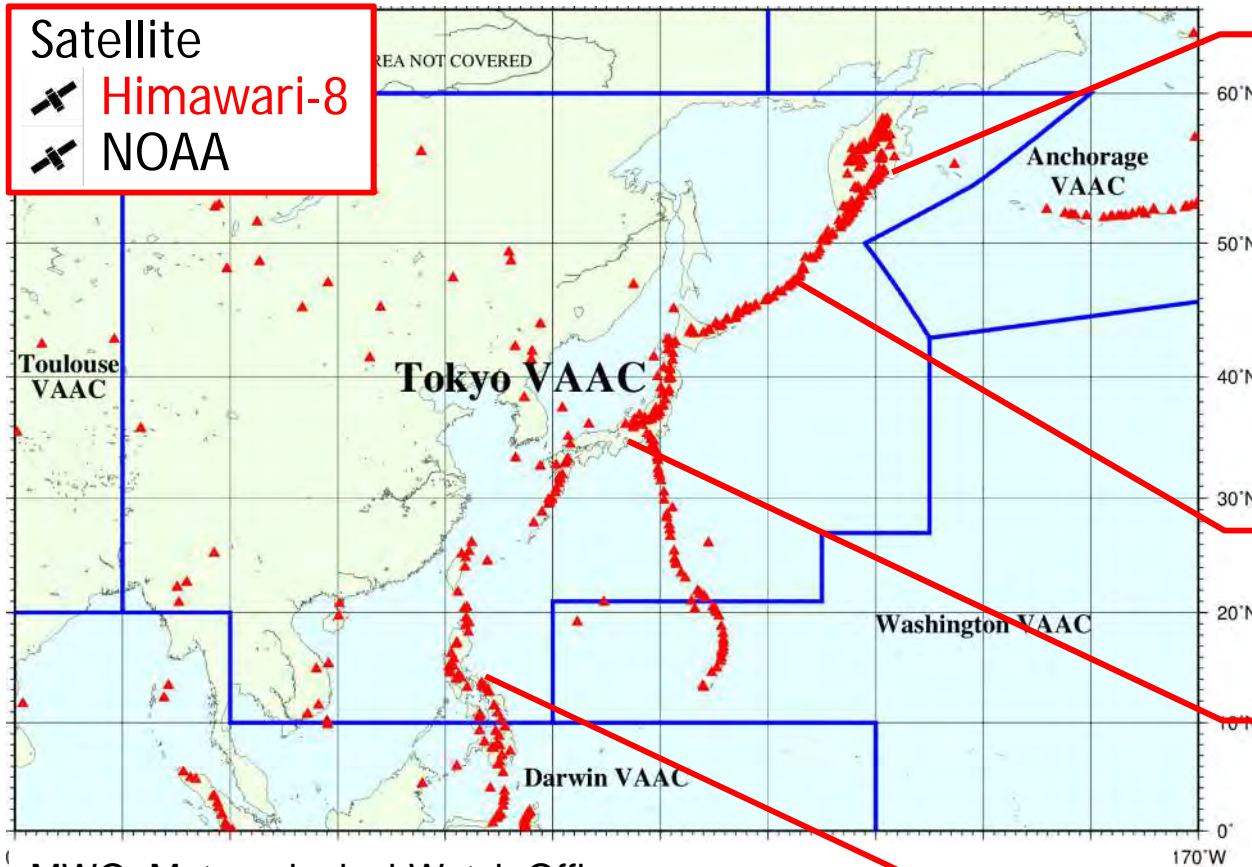
- Duties

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).



Information Sources



Satellite
 Himawari-8
 NOAA

Kamchatka Peninsula

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

Chishima/Kurile Islands

- SVERT

Japan

- JMA (VOWCs)
- Pilot Report

Philippines

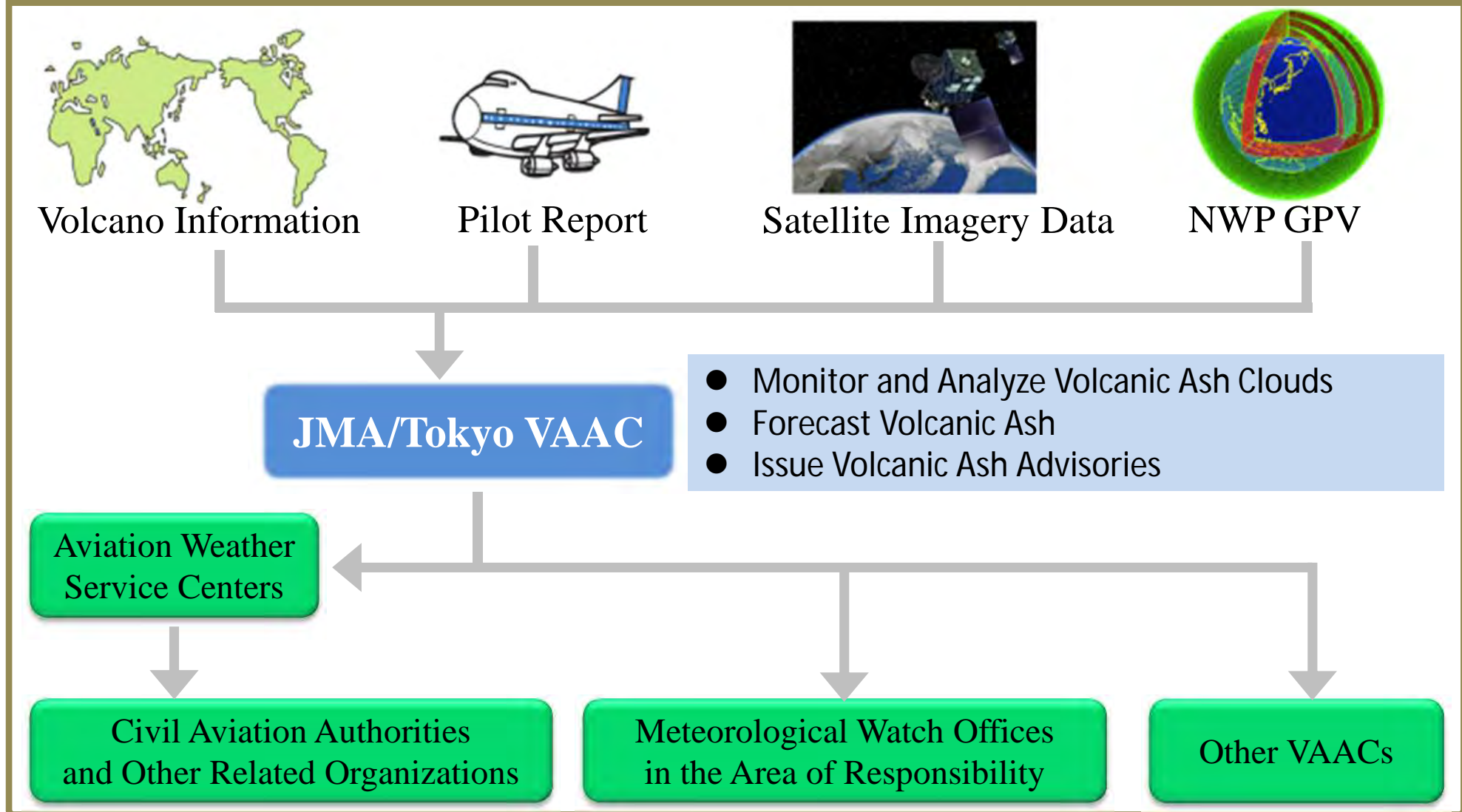
- PHIVOLCS
- MWO (Manila)
- MWO (Legaspi)
- VAAC Darwin

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

Information Issued by Tokyo VAAC



Flow of Information for Volcanic Ash Advisories



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

Band of MTSAT-2	Band	Central Wavelength [μm]	Spatial Resolution
VIS	1	0.47	1 km
	2	0.51	1 km
	3	0.64	0.5 km
	4	0.86	1 km
	5	1.6	2 km
	6	2.3	2 km
IR4	7	3.9	2 km
IR3	8	6.2	2 km
	9	6.9	2 km
	10	7.3	2 km
	11	8.6	2 km
	12	9.6	2 km
	IR1	13	10.4
14		11.2	2 km
15		12.4	2 km
IR2	16	13.3	2 km

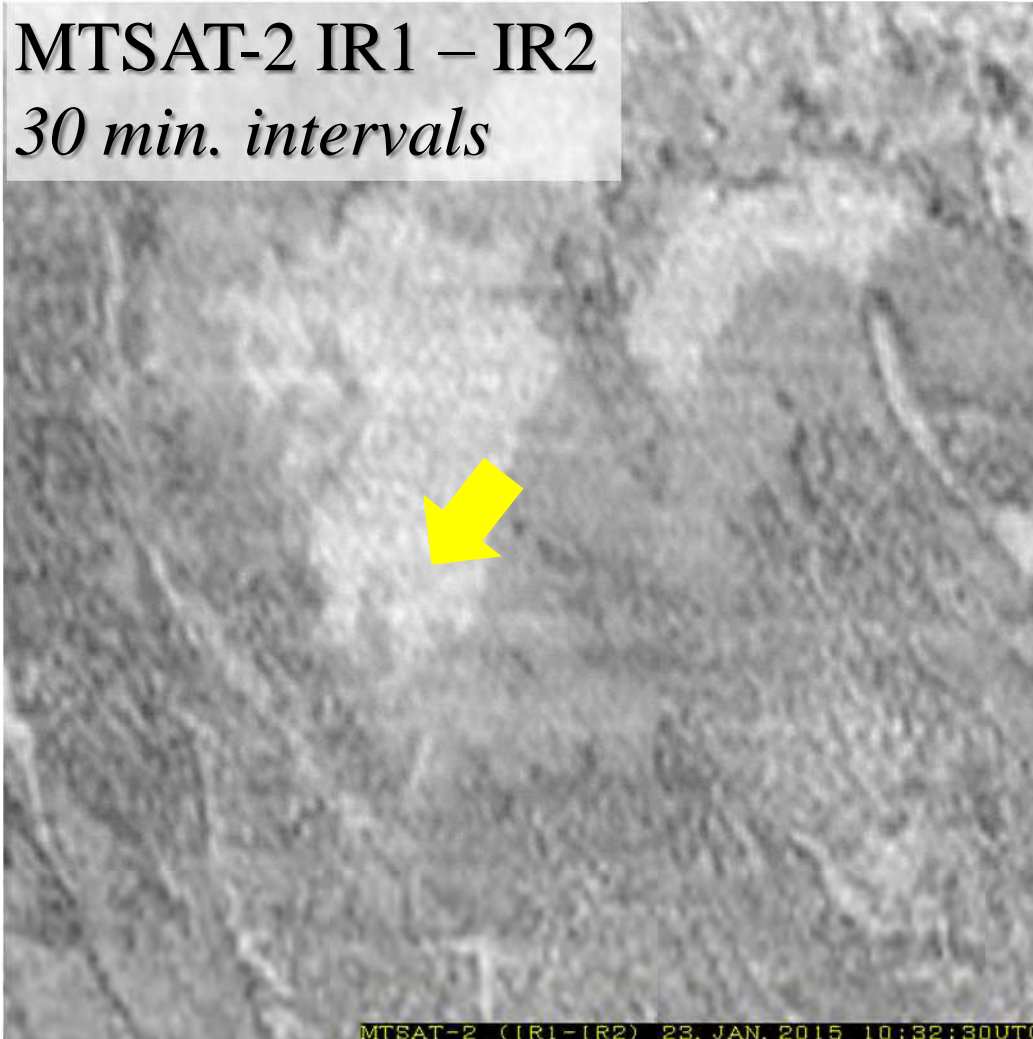
New Himawari-8 Satellite

Sample Footage: Volcanic Ash from Sakurajima ~



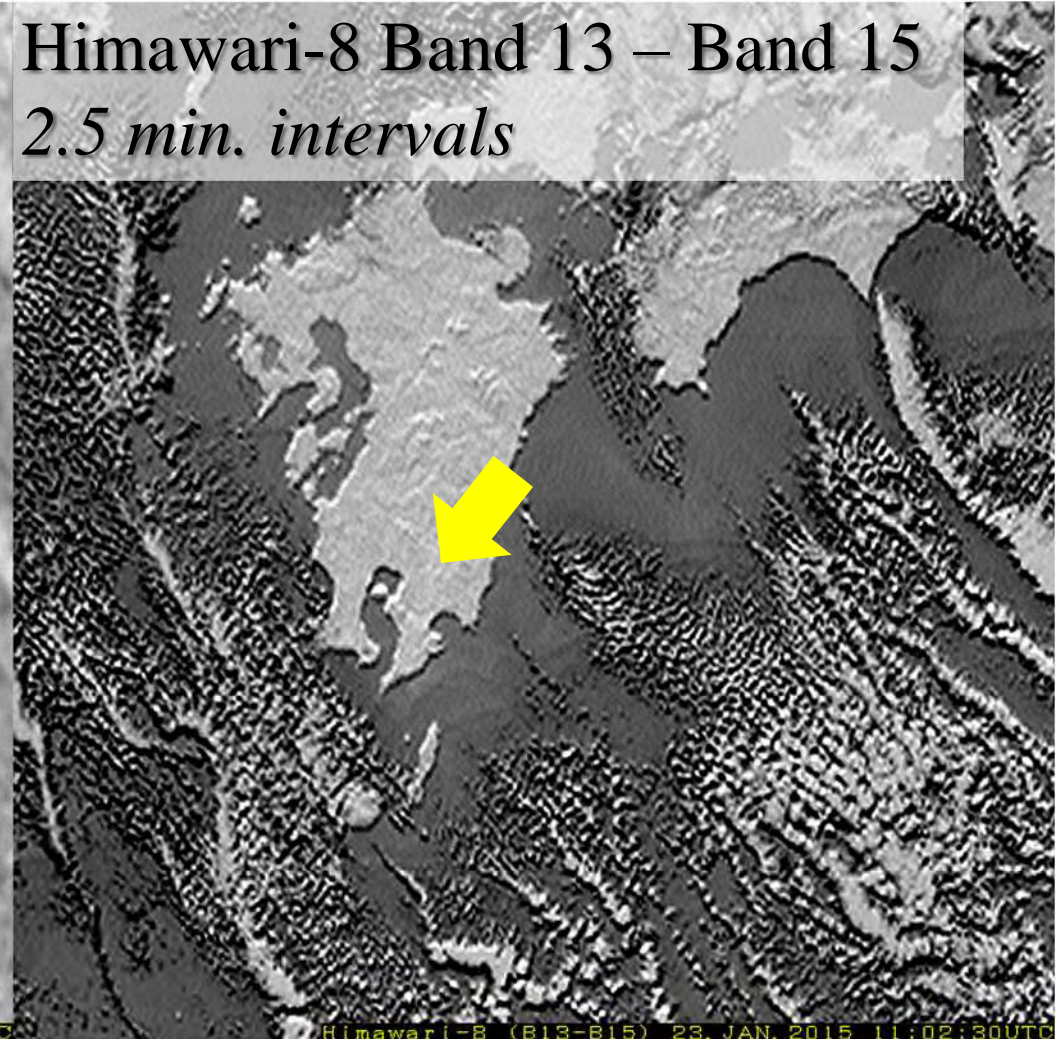
Facilitation of ash tracking with imagery from Himawari-8

MTSAT-2 IR1 – IR2
30 min. intervals



MTSAT-2 (IR1-IR2) 23. JAN. 2015 10:32:30UTC

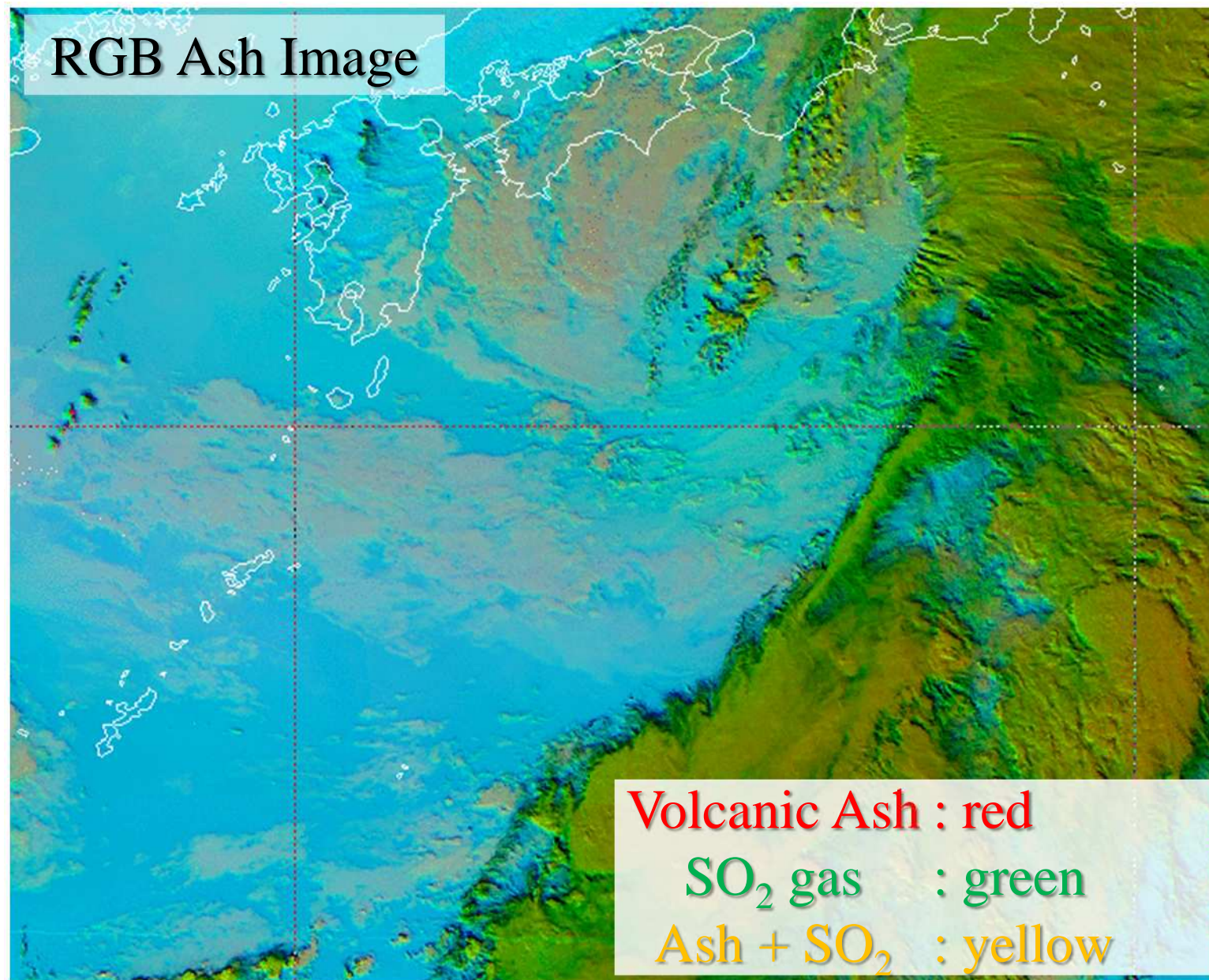
Himawari-8 Band 13 – Band 15
2.5 min. intervals



Himawari-8 (B13-B15) 23. JAN. 2015 11:02:30UTC

New Himawari-8 Satellite

Sample Footage: Volcanic Ash from Kuchinoerabujima



Example of a VAA in Text Form



FVFE01 RJTD 192333

VA ADVISORY

DTG: 20150919/2333Z

Volcanic data, information source, eruption information

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

Volcanic ash observation time based on satellite imagery and observed volcanic ash extent

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

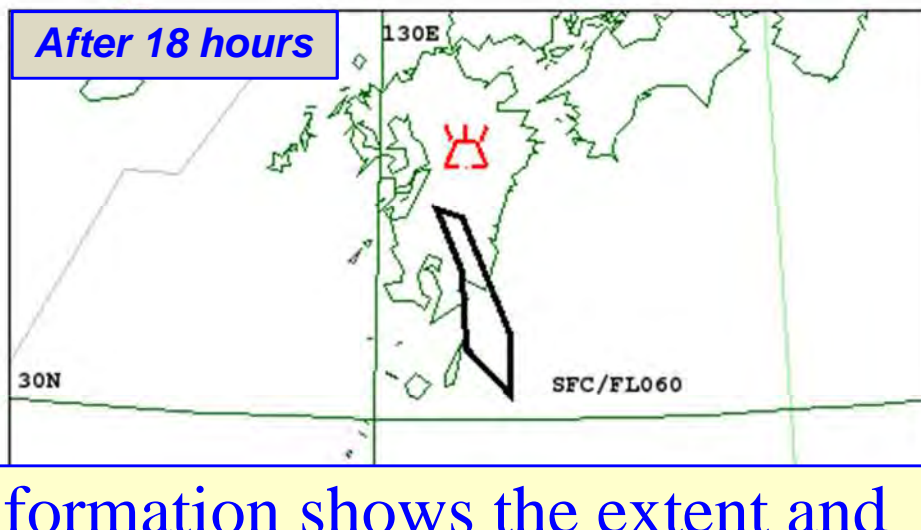
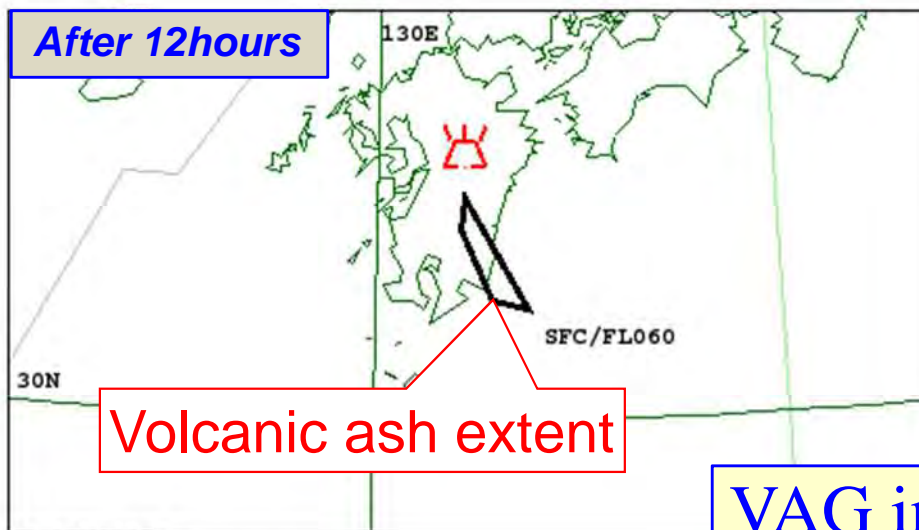
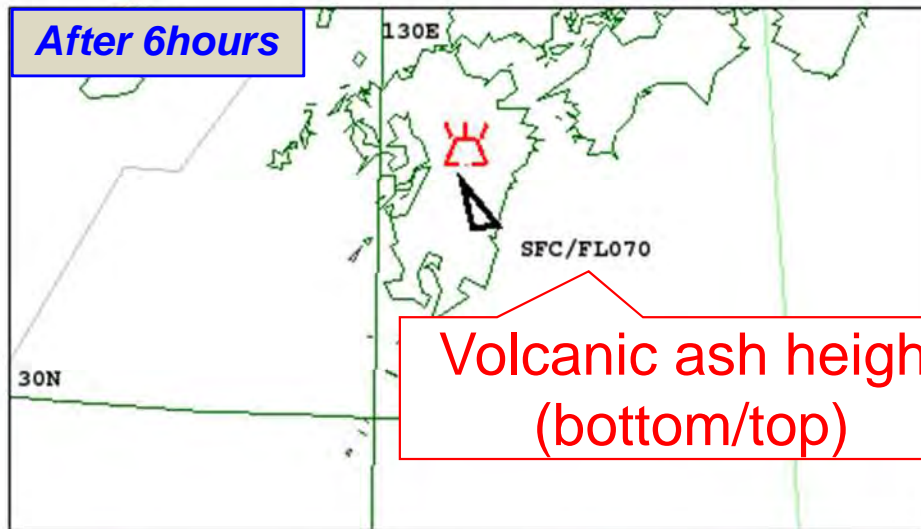
FCST VA CLD +18 HR: 20/1650Z SFC/FL060 N3214 E13044 - N3208 E13103 -
N3055 E13138 - N3016 E13138 - N3045 E13106 - N3134 E13104

RMK: NIL

NXT ADVISORY: 20150920/0300Z=

Forecast of volcanic ash extent at T+6, 12 and 18

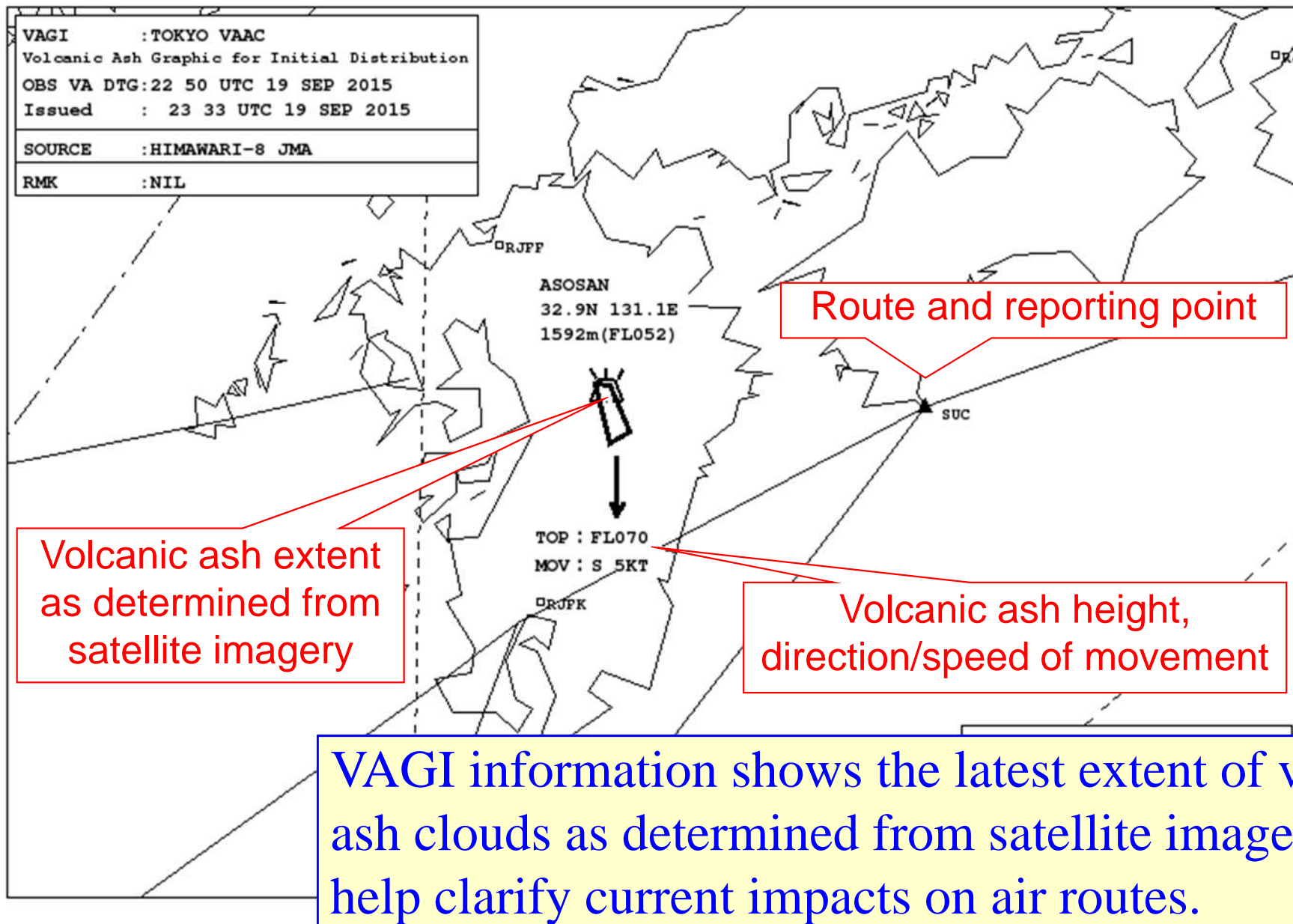
Example of a VAA in Graphic (VAG) Form



VAG information shows the extent and forecast movement of volcanic ash clouds as described in the corresponding VAA text.

VA ADVISORY
DTG: 20150919/2333Z
VAAC: TOKYO
VOLCANO: ASOSAN 282110
AREA: JAPAN
SUMMIT ELEV: 1592M
ADVISORY NR: 2015/553
INFO SOURCE: HIMAWARI-8 JMA
AVIATION COLOUR CODE: NIL

Example of a VAG Initial (VAGI)



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.

HOME Volcanic Ash Advisories VAGFNR VAGFNR-AF VAAC Operation References

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.

Date Time	Volcano	Area	Advisory Number	VAA Text (FVFE01)	VA Graphic (VAG)	VA Initial (VAGI)	VA Forecast (VAGFN)	Satellite Images
06:22 UTC, 22 Oct. 2015	KARYMSKY	RUSSIA	2015/143	○	○	○	-	○
06:03 UTC, 22 Oct. 2015	ASOSAN	JAPAN	2015/688	○	-	-	○	-
05:26 UTC, 22 Oct. 2015	KARYMSKY	RUSSIA	2015/142	○	-	-	-	-
05:02 UTC, 22 Oct. 2015	KARYMSKY	RUSSIA	2015/141	○	-	-	-	-
00:02 UTC, 22 Oct. 2015	ASOSAN							
23:50 UTC, 21 Oct. 2015	SHEVELUCH							

http://ds.data.jma.go.jp/svd/vaac/data/vaac_list.html

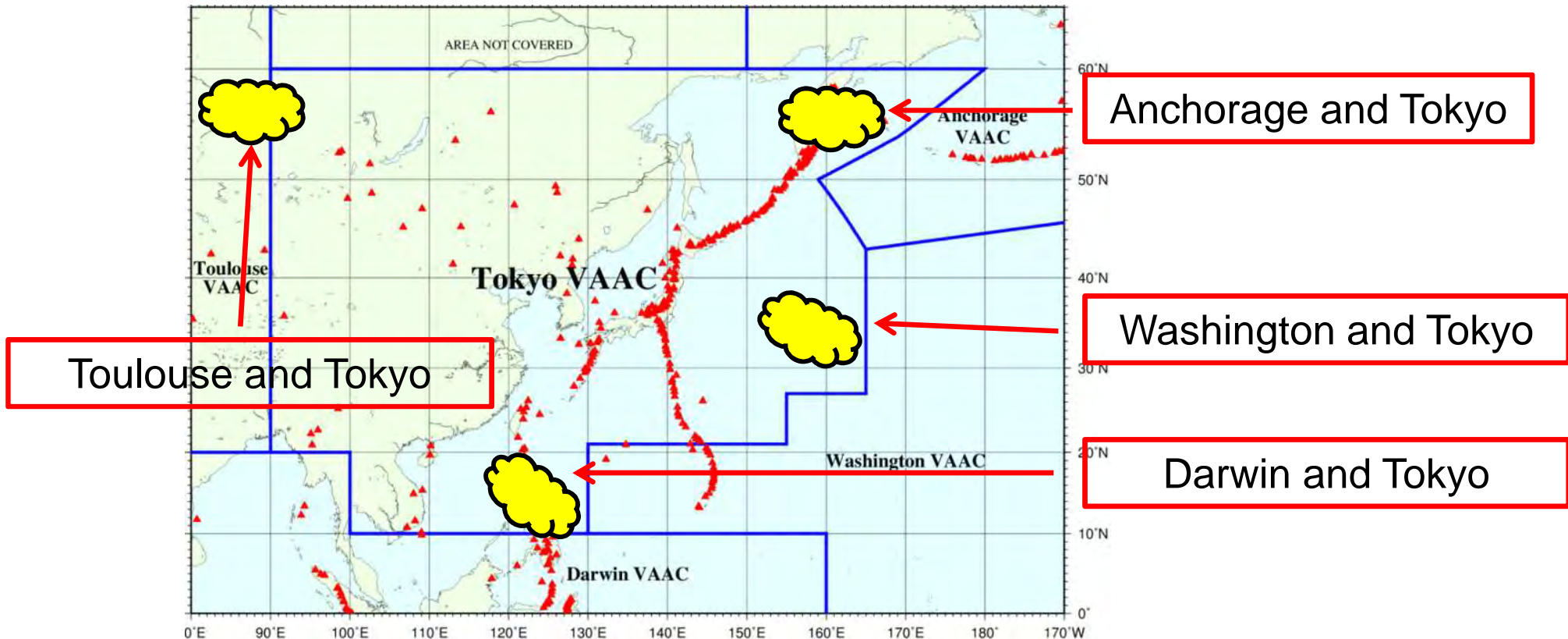
Coordination with Neighboring VAACs

Handover of Operational Responsibility



Handbook on the International Airways Volcano Watch, Appendix C

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



Coordination with Neighboring VAACs

Development of Handover Tools and Procedures



➤ 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)

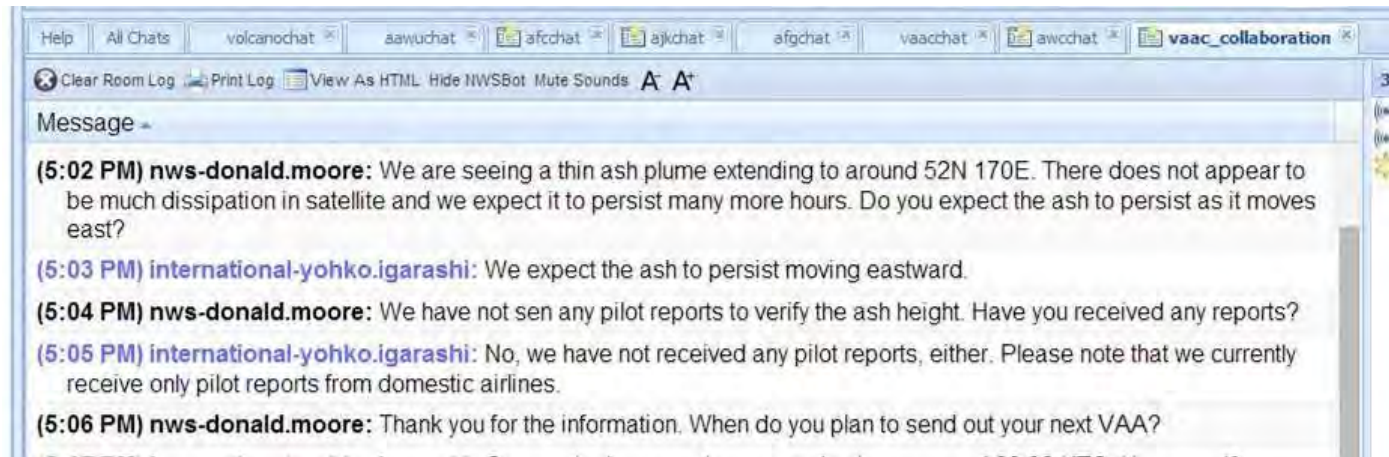
JMA has developed HRSs in conjunction with neighboring VAACs for the specification of information relating to handover operations. This supports forecasters in conveying the details of situations and making requests pertaining to handover operations.

Coordination with Neighboring VAACs

Development of Handover Tools and Procedures



Chat system



Handover Request Sheet (HRS)

To: Anchorage VAAC



From: Tokyo VAAC
 Fax: +81-3-3212-6446
 Phone: +81-3-3212-6203
 Email: vaac@eqvol2.kishou.go.jp



Answer Sheet (AS) for Handover Request

To: Tokyo VAAC



From: Anchorage VAAC
 Fax: +1-907-266-5169
 Phone: +1-907-266-5110
 Email: a-vaac@noaa.gov

HRS & AS

Date/Time that HRS is sent (HRS送付日時): _____ d _____ UTC
 Date/Time of VAA from Anchorage (発表依頼日時): _____ d _____ UTC
 Volcano Name (火山名): _____
 VAA No. (VAA情報番号): _____
 Attachments (添付資料): VAA text VAG VAGI Other:

(Some part of ash clouds (indicated in VAGI) are approaching/intruding to your area of responsibility. (VAGIに示した)火山灰(の一部)が貴方の責任領域に接近・侵入している。
 Keeping issuance (発表を継続する) ※返信不要
 We would like to keep issuance of VAA for these ash clouds. Any reply to this HRS is not needed. 引き続き貴方よりVAA発表を継続する。本返信には返信不要。
 Requesting Handover to you (貴方への引継を依頼する) ※返信希望
 We would like to transfer the responsibility for indicated clouds to you. We are waiting for your reply on approval or refusal. 指定した火山灰雲の責任を貴方に委譲したい。可否につき要返信。

(Some part of ash clouds (indicated in VAGI) are approaching/intruding to our area of responsibility. (VAGIに示した)火山灰(の一部)が当方の責任領域に接近・侵入している。
 Requesting Handover to us (当方への引継を要請する) ※返信希望
 We invite you to transfer the responsibility for indicated clouds to us. We are waiting for your reply on approval or refusal. 指定した火山灰雲の責任を当方に委譲してほしい。可否につき要返信。

Comments (追記事項)

Date/Time of Answer (回答日時): _____ d _____ UTC
 Date/Time of VAA from Anchorage (発表予定日時): _____ d _____ UTC
 Volcano Name (火山名): _____
 VAA No. (VAA情報番号): _____

Acknowledgement of Handover to us (当方への引継の承認)
 We agree to take over the responsibility for the ash clouds. 当方は当該火山灰の責任を負担することに賛成します。
 Refusal of Handover to us (当方への引継の拒否)
 We recognize no significant ash plume in our area of responsibility. We ask your office to continue issuance of VAA. 当方の領域内に火山灰雲は確認できません。引き続き貴方よりVAAを発表願います。

Acknowledgement of Handover to you (貴方への引継の承認)
 We agree to transfer the responsibility for the ash clouds to you. 当方は当該火山灰の責任を移譲することに賛成します。
 Refusal of Handover to you (貴方への引継の拒否)
 Please let us remain responsible for the ash clouds. 当該火山灰について、引き続き当方が担当することを承知願います。

Comments (追記事項)

- ✓ Check-sheet style in both languages
- ✓ Necessary information
 - Volcano
 - VAA number
 - Issuance time
- ✓ Supplementary information

Coordination with Neighboring VAACs

Example of Handover between Anchorage and Tokyo

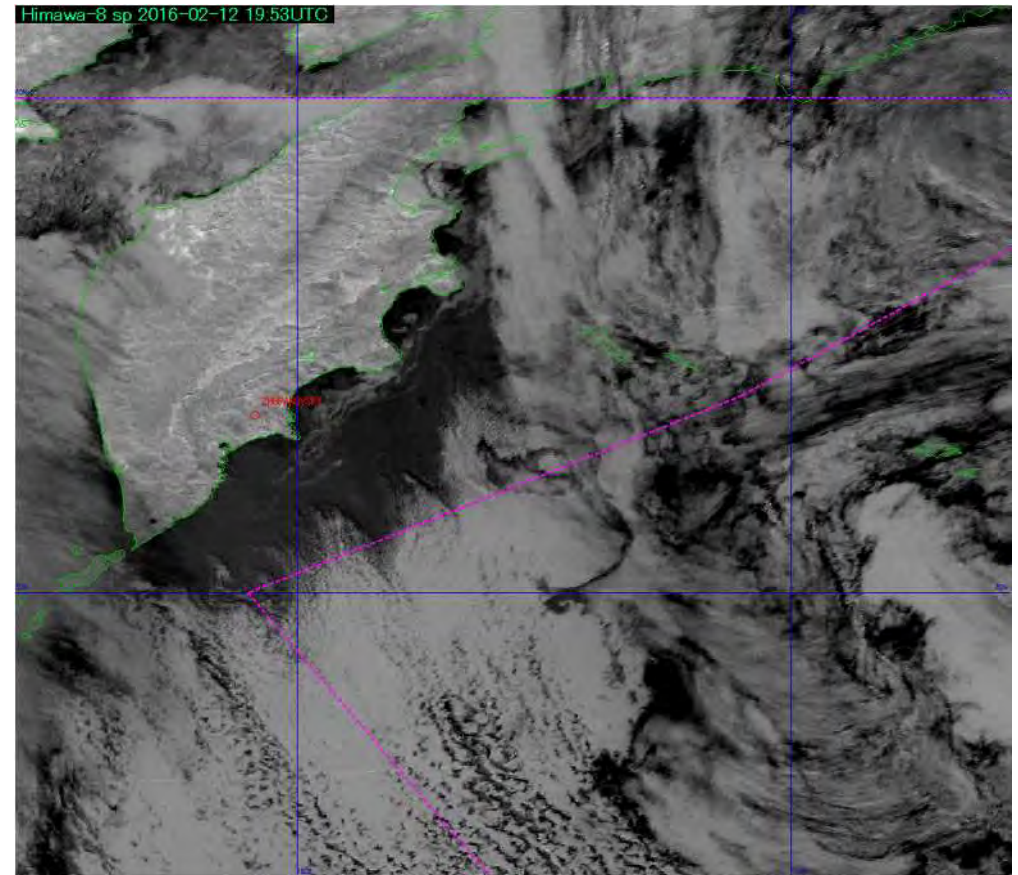


2016/02/13

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.



Coordination with Neighboring VAACs

Example of VAA Handover from the Tokyo VAAC



FVFE01 RJTD 130702
VA ADVISORY
DTG: 20160213/0702Z
VAAC: TOKYO
VOLCANO: ZHUPANOVSKY 300120
PSN: N5335 E15909
AREA: RUSSIA
SUMMIT ELEV: 2899M
ADVISORY NR: 201
INFO SOURCE: HIM
AVIATION COLOUR
ERUPTION DETAILS
OBS VA DTG: 13/0000Z

The Tokyo VAAC's transfer of responsibility is specified in a remark note.

OBS VA CLD: SFC/FL340 N5041 E16605 - N5206 E16608 - N5354 E16526 -
N5435 E16323 - N5254 E16356 - N5230 E16510 MOY E 25KT
FCST VA CLD +6 HR: 13/1200Z SFC/FL340 N5740 E16337 - N5542 E16703 -
N5221 E16932 - N4702 E16932 - N5414 E16509
FCST VA CLD +12 HR: 13/1800Z SFC/FL350 N6247 E15957 - N5134 E17311 -
N4020 E17311 - N4359 E17134 - N4927 E17049 - N5604 E16428
FCST VA CLD +18 HR: 14/0000Z SFC/FL350 N6817 E15630 - N6404 E16218 -
N4945 E17653 - N3702 E17645 - N3355 E17927 - N3501 E17649 - N3929
E17413 - N4842 E17432 - N6108 E15817

RMK: THE RESPONSIBILITY FOR THIS ASH EVENT IS BEING TRANSFERRED TO ANCHORAGE. THE NEXT ADVISORY WILL BE ISSUED BY ANCHORAGE BY 0730UTC UNDER HEADER FVAK21 PAWU.

Coordination with Neighboring VAACs

Example of VAA Handover from the Anchorage VAAC



FVAK21 PAWU 130740
VAAAK1 VA ADVISORY
DTG: 20160213/0740Z
VAAC: ANCHORAGE
VOLCANO: ZHUPANOVSKY 300120
PSN: N5335 E15909
AREA: KAMCHATKA PENINSULA
SUMMIT ELEV: 9705 FT (2958 M)

ADVISORY NR:
INFO SOURCE:
COLOR CODE: O
ERUPTION DETAIL
OBS VA DTG: 13/0710Z

The Anchorage VAAC's assumption of responsibility is also specified in a remark note.

OBS VA CLD: SFC/FL340 N5526 E16312 - N5333 E16430 - N5242 E16608 - N4854 E16829 - N4901 E17010 - N5210 E16904 - N5620 E16719 - N5526 E16312 MOV E 20KT.
FCST VA CLD +6HR: 13/1340Z SFC/FL340 N5903 E16231 - N5418 E16747 - N4722 E17024 - N4753 E17304 - N5452 E17009 - N5955 E16432 - N5903 E16231.
FCST VA CLD +12HR: 13/1940Z SFC/FL340 N6423 E15925 - N5948 E16400 - N5503 E16939 - N4946 E17227 - N4729 E17259 - N4750 E17506 - N5423 E17233 - N5852 E16910 - N6423 E15925.
FCST VA CLD +18HR: 14/0140Z SFC/FL340 N6524 E15737 - N6023 E16359 - N5710 E17011 - N5205 E17408 - N4728 E17510 - N4453 E17717 - N4525 E17830 - N5253 E17625 - N5706 E17257 - N6354 E16518 - N6524 E15737 - N6524 E15737

RMK: VAAC TOKYO HAS TRANSFERRED RESPONSIBILITY OF THIS EVENT TO VAAC ANCHORAGE. THIS ADVISORY UPDATES MESSAGE FVFE01 RJTD.

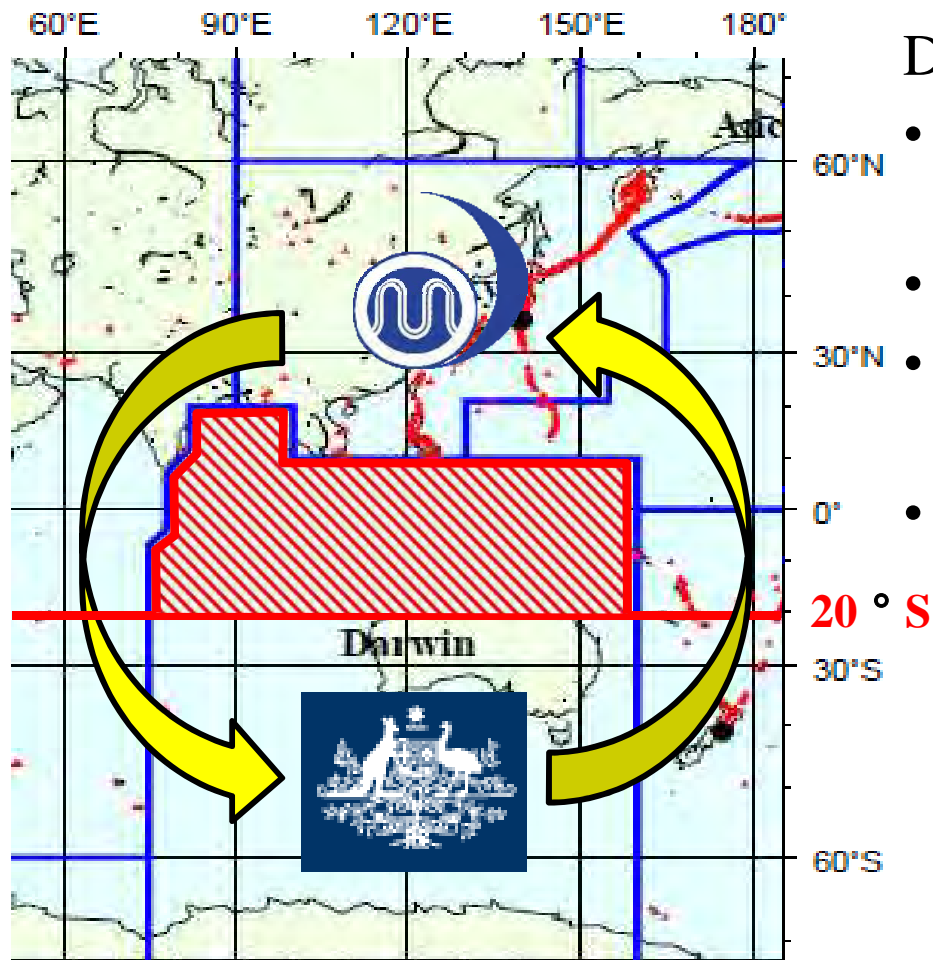
NXT ADVISORY: WILL BE ISSUED BY 20160213/1340Z

International Cooperation/Collaboration in the APAC Region

Backup Cooperation with the Darwin VAAC



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.

International Cooperation/Collaboration in the APAC Region

Volcanic Ash Exercise (VOLCEX)



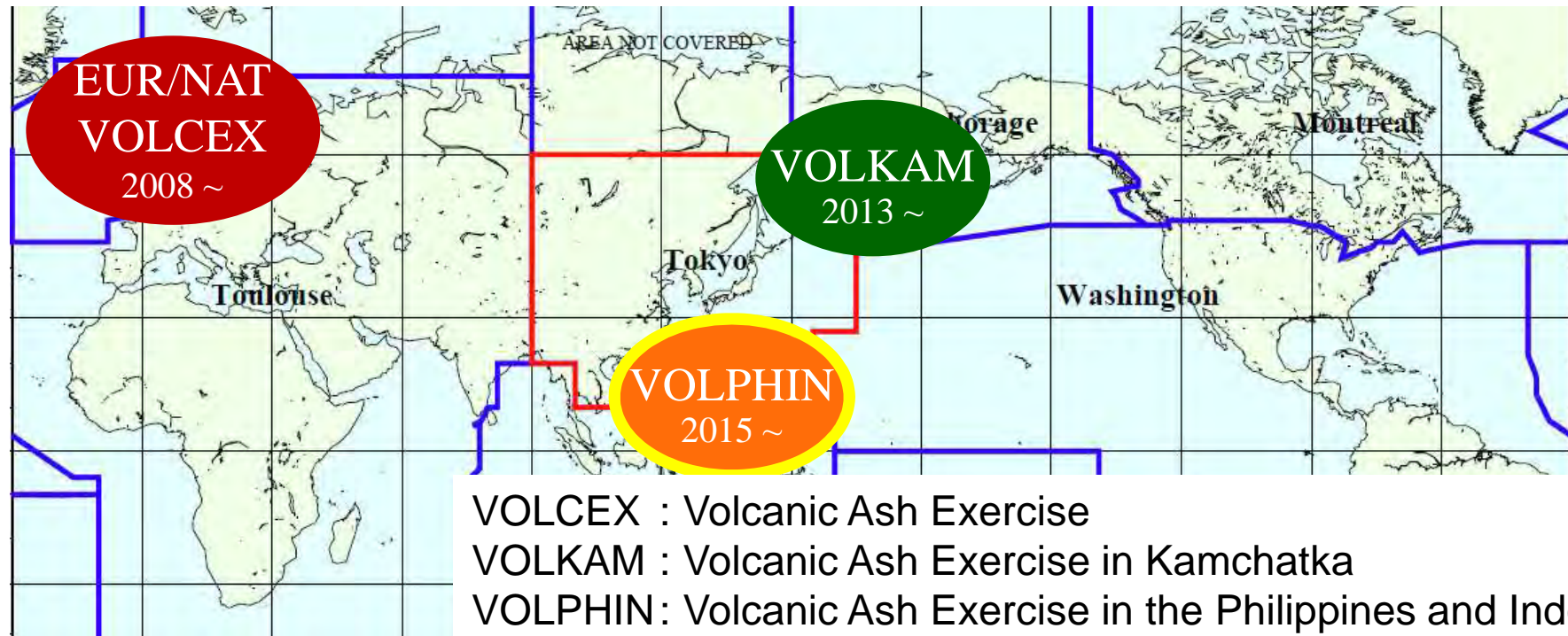
Aviation safety



Avoidance of volcanic ash

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.





Aviation safety



Avoidance of volcanic ash

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

