International Civil Aviation Organization

MIDANPIRG Meteorology Sub-Group
Thirteenth Meeting (MET SG/13)

(Cairo, Egypt, 16 – 17 December 2025)

Agenda Item 4: MET planning and implementation

VOLCANIC ASH SIGMET ISSUANCE

(Presented by the SADIS Provider on behalf of the MOG IAVW)

SUMMARY

With the eruption of the Hayli Gubbi volcano in Ethiopia that occurred on the 23rd November 2025 volcanic ash advisories (VAA) were issued by the Toulouse Volcanic Ash Advisory Centre. Met Watch offices are expected to issue Volcanic Ash SIGMETs in response to the VAA when the ash is (or is expected to) move into its flight information region.

This paper looks at the SIGMET's that were issued during this event.

1. DISCUSSION

1.1 At 08:30 UTC on Sunday 23 November 2025 the Hayli Gubbi volcano erupted in Ethiopia for the first time in more than 10,000 years. The first volcanic ash advisory (VAA) message and volcanic ash graphic (VAG) was issued by VAAC Toulouse at 14:55UTC, with the ash plume crossing the southern Red Sea heading towards Yemen. This is shown in figure 1.

1.2 As the eruption progressed, the ash moved across the Sana'a and Muscat FIR's, and just into the very south eastern edge of the Jeddah FIR. This is shown in figure 2 and 3. By 18:00 UTC on 24th November the ash had moved away to the east, out of the Middle Eastern FIR's, as illustrated by figure 4.

1.3 A full set of issued VAA's from Toulouse is available here: https://vaac.meteo.fr/volcanoes/hayli-gubbi/

1.4 ICAO Annex 3 states that a Met Watch Office should prepare and disseminate SIGMETs when a VAA has been received, and that the information within the VAA should be used. In the future the new Quantitiative Volcanic Ash (QVA) data can also be used in VA SIGMET preparation.

1.5 No SIGMETs were received from Yemen.

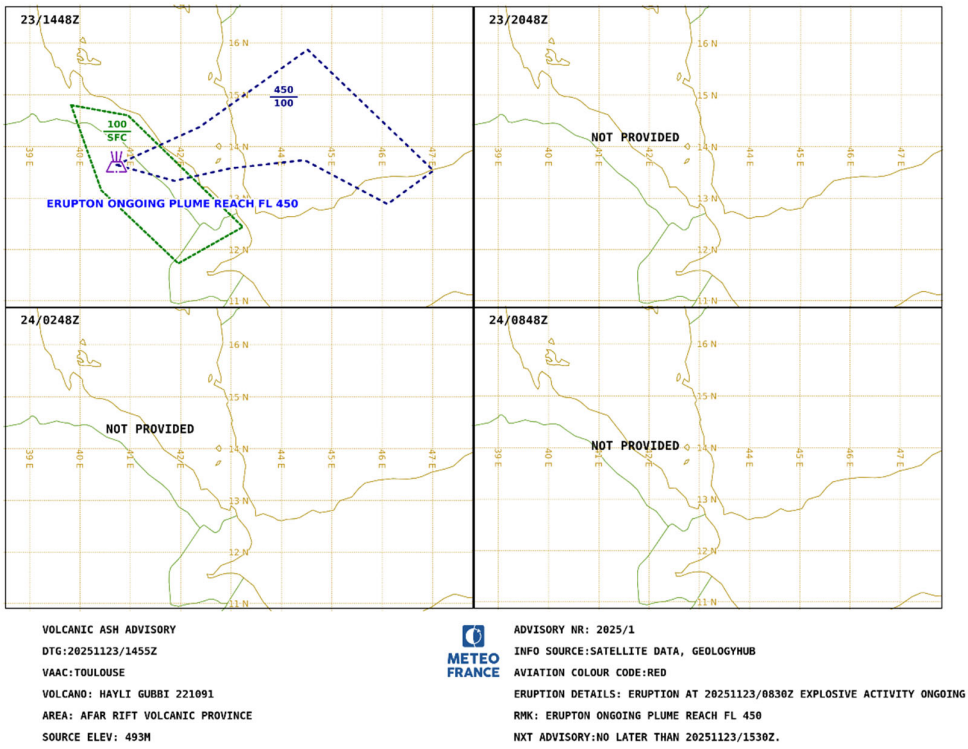


Figure 1 – initial VAG issued by VAAC Toulouse. Issued at 1455UTC on 23 November.

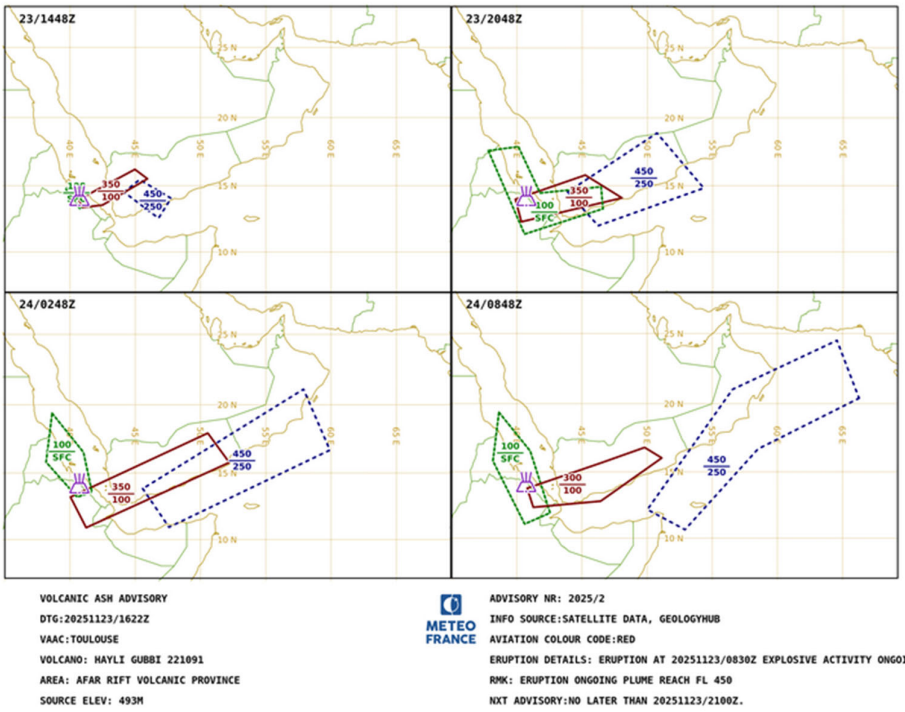
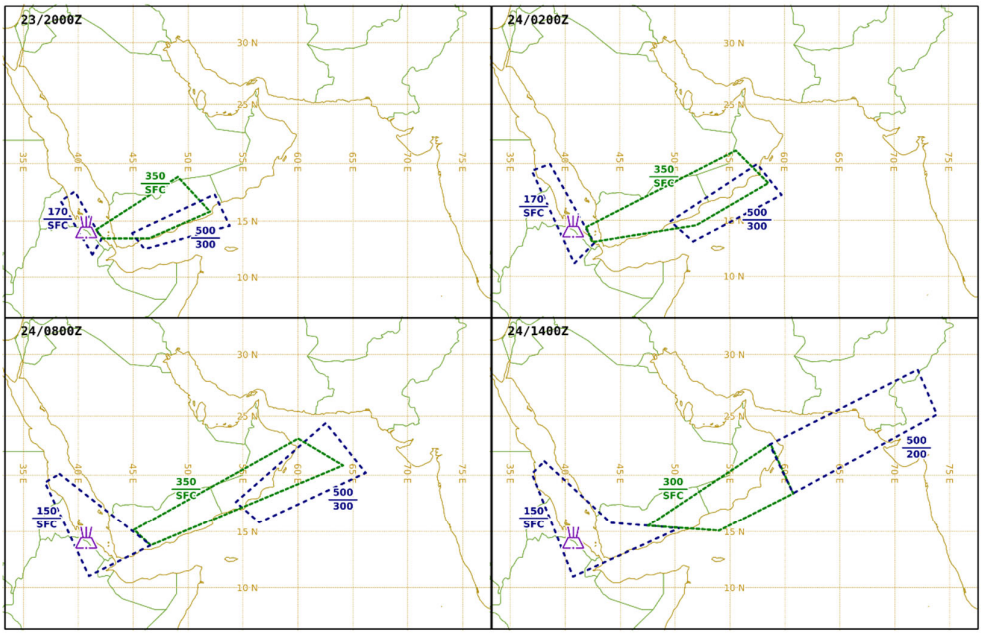


Figure 2 –second VAG issued by VAAC Toulouse. Issued at 16:22UTC on 23 November.

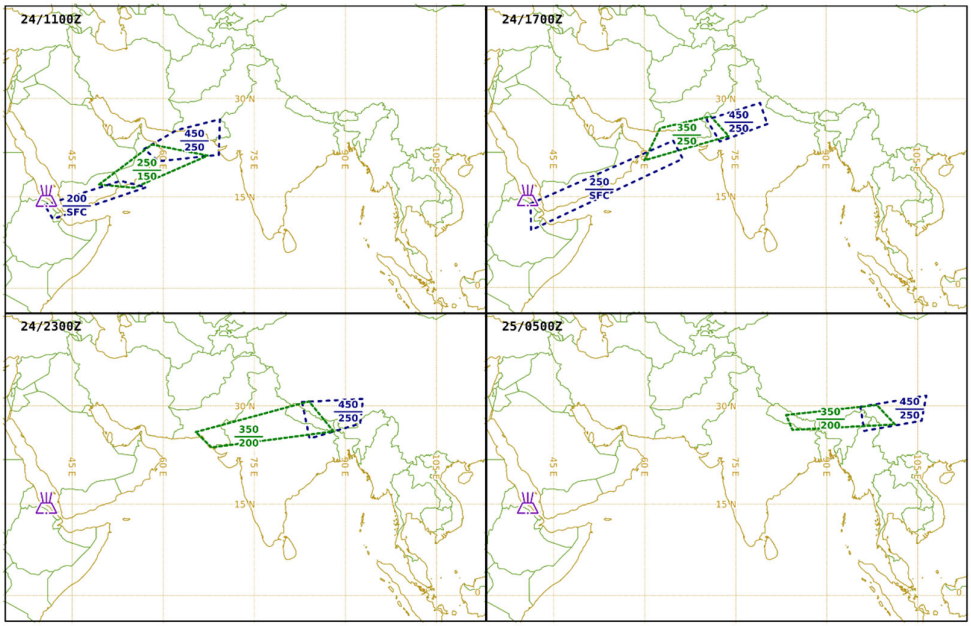


VOLCANIC ASH ADVISORY
DTG:20251123/2000Z
VAAC:TOULOUSE
VOLCANO: HAYLI GUBBI 221091
AREA: AFAR RIFT VOLCANIC PROVINCE
SOURCE ELEV: 493M

METEO FRANCE

ADVISORY NR: 2025/3
INFO SOURCE:SAT IMAGERY, GEOLOGYHUB
AVIATION COLOUR CODE:UNKNOWN
ERUPTION DETAILS: ERUPTION AT 20251123/0830Z ERUPTION HAS STOPPED
RMK: LARGE ASH PLUME AND SO2 UP TO FL500 CURRENTLY OVER YEMEN. LOWER PLUME STILL VISIBLE OVER ETHIOPIA. QVA CONCENTRATIONS MAY BE OVERESTIMATED IN THE LOWER LEVELS.
NXT ADVISORY:NO LATER THAN 20251123/2300Z.

Figure 3 – third VAG issued by VAAC Toulouse. Issued at 20:00UTC on 23 November.



VOLCANIC ASH ADVISORY
DTG:20251124/1100Z
VAAC:TOULOUSE
VOLCANO: HAYLI GUBBI 221091
AREA: AFAR RIFT VOLCANIC PROVINCE
SOURCE ELEV: 493M

METEO FRANCE

ADVISORY NR: 2025/8
INFO SOURCE:SAT IMAGERY
AVIATION COLOUR CODE:UNKNOWN
ERUPTION DETAILS: ERUPTION AT 20251123/0830Z ERUPTION HAS STOPPED
RMK: LARGE ASH CLOUD BETWEEN FL250 AND FL450 SITUATED BETWEEN OMAN AND PAKISTAN MOVING ENE 70KT. VERY LOW ASH CONCENTRATION IS EXPECTED BELOW FL250 ALONG YEMEN COAST.
NXT ADVISORY:NO LATER THAN 20251124/1400Z.

Figure 4 – eighth VAG issued by VAAC Toulouse. Issued at 11:00UTC on 24 November

1.6 The first SIGMET for volcanic ash was issued for the Muscat FIR at 20:22 UTC on the 23rd November. This corresponds to the time the VAA/VAG first indicated that ash would reach the Muscat FIR. There were issues with the SIGMET coding, and initial messages were sent with a "WS" identifier instead of a "WV" one. There was also a mismatch in the height of the ash being indicated within the SIGMET and what was written in the VAA/VAG.

1.7 Table 1 shows the SIGMETs that were issued as the plume crossed the Middle East, along with comments on how well the SIGMET adhered to the SIGMET coding rules defined in Doc 10157 (PANS-MET).

Received SIGMET	**Comments**
WSOM31 OOMS 232022 OOMM SIGMET A1 VALID 232026/240226 OOMS- OOMM MUSCAT FIR WA VOLCANIC ERUPTION OBS E OF LINE 1455N 4830E ABV FL140 MOV E NC=	This should have been WV as it is a Volcanic Ash SIGMET. This is not one of the permitted options defined in the SIGMET coding rules. The coordinate pairs should have the N and E before the coordinate
WSOM31 OOMS 232045 OOMM SIGMET A1 VALID 232045/240245 OOMS- OOMM MUSCAT FIR WA VOLCANIC ERUPTION OBS E OF LINE 1358 N 4258E - 1455N 4830E ABV FL140 MOV E NC=	This should have been WV as it is a Volcanic Ash SIGMET. This is not one of the permitted options defined in the SIGMET coding rules. The coordinate pairs should have the N and E before the coordinate
WSOM31 OOMS 240256 OOMM SIGMET A1 VALID 240256/240856 OOMS- OOMM MUSCAT FIR WA VOLCANIC ERUPTION OBS WI 2211N 5540E 2042N 6102E 1903N 5159E 1545N 5330E ABV FL240 MOV NE WKN=	This should have been WV as it is a Volcanic Ash SIGMET. This is not one of the permitted options defined in the SIGMET coding rules. The coordinate pairs should have the N and E before the coordinates, and have a dash between them. For example "- N2211 E5540 – N2042 E6102 –"
WVOM31 OOMS 240256 COR OOMM SIGMET A1 VALID 240256/240856 OOMS- OOMM MUSCAT FIR WA VOLCANIC ERUPTION OBS WI 2211N 5540E 2042N 6102E 1903N 5159E 1545N 5330E ABV FL240 MOV NE WKN=	This is not one of the permitted options defined in the SIGMET coding rules. The coordinate pairs should have the N and E before the coordinates, and have a dash between them. For example "- N2211 E5540 – N2042 E6102 –"
WVSD20 OEJD 240545 OEJD SIGMET 01 VALID 240600/241200 OEJN - OEJD JEDDAH FIR VA CLD FCST S OF LINE N1725 E04433 - N2237 E05510 TOP ABV FL240 MOV NE WKN=	This is permitted, but it is supposed to be used when the source of the eruption is not known TOP ABV is only supposed to be use for Tropical Cyclone SIGMETS
	No record of "OOM SIGMET A2"
WVOM31 OOMS 240917 OOMM SIGMET A3 VALID 240920/241520 OOMS-	This is not one of the permitted options defined in

OOMM MUSCAT FIR WA VOLCANIC ERUPTION OBS WI N1756 E05721 - N1539 E05332 - N1750 E05239 - N2328 E06124 - N2329 E06427 - N1756 E05721 ABV FL200 MOV NE WKN=	the SIGMET coding rules. The problem with the coordinate pairs has been fixed.
WVOM31 OOMS 241525 OOMM SIGMET A4 VALID 241530/242130 OOMS-OOMM MUSCAT FIR VA CLD OBS AT 1520Z WI N1656 E05254 - N1915 E05640 - N2047 E05832 - N2237 E06006 - N2202 E06239 - N2028 E06047 - N1740 E05702 - N1542 E05335 - N1605 E05323 - N1656 E05254 FL350/550 MOV NE WKN=	This is permitted, but it is supposed to be used when the source of the eruption is not known

Table 1 – SIGMET Analysis

1.8 The screenshot in figure 3 shows the VA SIGMETS that the Aviation Weather Centre (WAFC Washington) were able to display in their visualization system at 11:00UTC on 24th November. VA SIGMETS issue by the Karachi, Mumbai and Delhi FIR's are also showing (note they also contained coding errors). It is not known why the SIGMET for the south eastern edge of the Jeddah FIR is not shown, and there should have been a valid SIGMET for the Sana'a FIR.

1.9 There is good cross-border alignment between the Muscat and Karachi SIGMET areas, however the one further out into the Arabian Sea could have been better aligned to prevent the thin gap.

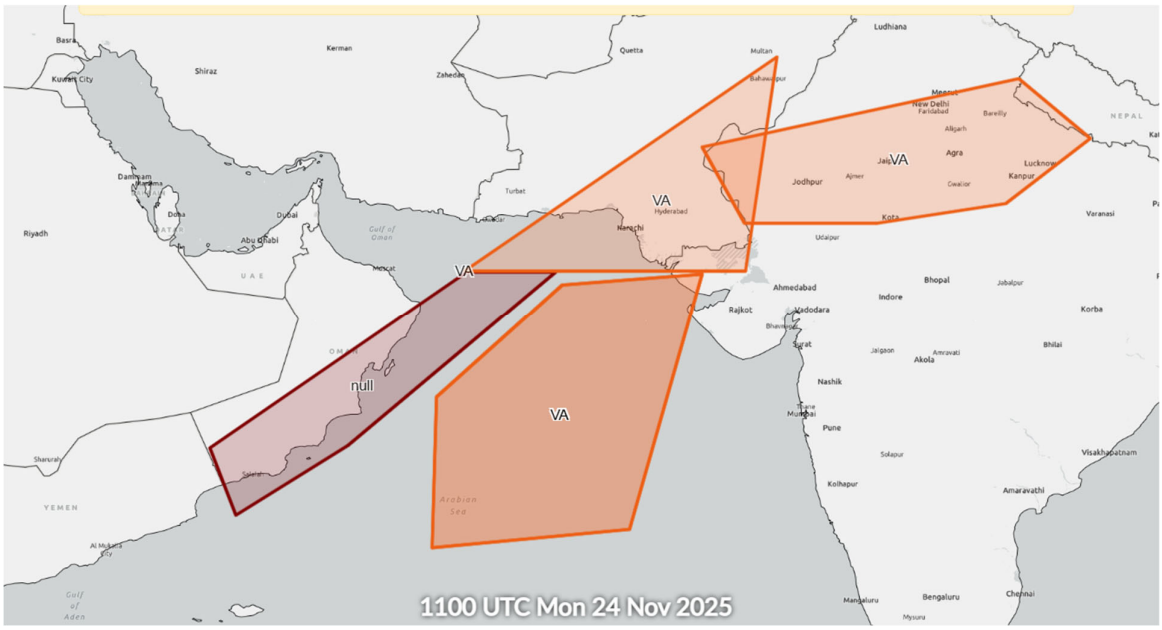


Figure 3 – display of SIGMETs valid at 11:00 UTC on 24 November taken from the Aviation Weather Centre (WAFC Washington) website.

1.10 A common problem with all the issued VA SIGMETs that are in table 1 has been in the way the volcanic eruption itself is being described. According to the PANS-MET, Appendix 7, Table A7-5 the following methods are permitted:

[VA ERUPTION] [MT nnnnnnnnnn] [PSN Nnn[nn] *or* Snn[nn] Ennn[nn] *or* Wnnn[nn]] VA CLD

"VA CLD" on its own should only be used when a region of volcanic ash cloud is known to exist, but the precise origin of its source is unknown. This was not the case for this eruption.

Therefore the correct description to use within the SIGMET would be

VA ERUPTION MT HAYLI GUBBI PSN N1330 E04043 VA CLD

1.11 It is also important to note that the VA SIGMETs should also use the height information contained within the issued VAA/VAG to indicate the level at which the volcanic ash is expected.

2. CONCLUSION

2.1 Now that volcanic activity has re-commenced at the Hayli Gubbi volcano, it is quite possible that there will be further volcanic eruptions which could bring ash across the Middle East.

2.2 The Met Watch Offices should review the guidance material for issuing VA SIGMETS contained within the PANS-MET and other documentation, and consider refresher training for staff. If the wind is more south westerly at the time of the next eruption ash from Hayli Gubbi could be carried across a larger part of the Middle East.

2.3 Cross border SIGMET coordination with neighbouring FIR's is also encouraged to prevent gaps between SIGMET polygons.

2.4 Correct coding of SIGMETs is essential as it also helps to ensure that flight planning and visualization systems are able to decode and then display them for the end users to use.

2.5 Improved issuance of SIGMETs will help airlines to make more informed decisions about where it is safe for them to fly. With this eruption there were flight disruptions/cancellations from some airlines while other airlines.

2.6 Flight Radar 24 aircraft tracks at the time of the eruption suggest that there were still airlines crossing the area where ash was forecast, and if they had seen/encountered volcanic ash a PIREP and then a Special AIREP for volcanic ash should have been issued.

2.7 The MID-MET SG is invited to agree on the following action:

MID-MET SG13 Action XX – Strengthening SIGMET and VA SIGMET Issuance in the MID Region

That MID States, in coordination with the ICAO MID Office and ROC Jeddah:

a) review and update national regulatory frameworks, operational procedures, and guidance material related to the issuance, coding, and dissemination of SIGMETs, ensuring alignment with Amendment 82 to Annex 3 and PANS-MET (Doc 10157),

including correct use of descriptors, polygon formats, and integration of VAA/VAG and future QVA information;

b) conduct refresher training for Met Watch Office personnel on SIGMET preparation and coding, with specific modules tailored for VA SIGMET issuance;

c) initiate and formalize cross-border coordination among adjacent MWOs to ensure consistency and avoid gaps or overlaps between SIGMET areas during volcanic ash events;

d) establish a VA SIGMET ad-hoc group, composed of interested MID States, ICAO MID Office, and ROC Jeddah, to coordinate refresher training, conduct post-event reviews, support regional harmonization and preparedness for QVA implementation, and report to MET SG/14;

e) initiate regional SIGMET test exercises, in coordination with VAAC Toulouse, WAFC London, and ROC Jeddah, covering WS, TC, and VA SIGMET types, to validate timely issuance, cross-border coordination, and compliance with Annex 3 and PANS-MET, and compile a quality monitoring report for review by MID-MET SG.

3. ACTION BY THE MEETING

3.1 The meeting is invited to review the information presented in this paper, and assist with formulating the action.

- END -