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SIGMET Information in the ATM-MET-AIM Coordination

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Definition

SIGNificant METeorological conditions - SIGMET information:

“Information issued by a Meteorological Watch Office (MWO) concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations.”

“a concise description in abbreviated plain language concerning the occurrence and/or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations, and of the development of those phenomena in time and space.”



Annex 3, Chapter 3

A3 Ch3.1

• The objective: to supply meteorological authorities and other users with global aeronautical meteorological en-route forecasts in digital form.

A3 Ch3.1

• a comprehensive, integrated, worldwide and, as far as practicable, uniform system, and in a cost-effective manner, taking full advantage of evolving technologies

A3 Ch3.2

• World Area Forecast Centre - WAFC

A3 Ch3.3

• Aerodrome Meteorological Offices - AMO

A3 Ch3.4

• Meteorological Watch Offices - MWO

A3 Ch3.5

• Volcanic Ash Advisory Centres - VAAC

A3 Ch3.6

• State Volcano Observatories - VO

A3 Ch3.7

• Tropical Cyclone Advisory Centres - TCAC



eANP Doc 8733

VOL I PART V:

- General requirements WAFS - WAFC Washington
- VAAC - Buenos Aires, Washington and Wellington
- TCAC - Miami

TABLE MET I-1 - STATE VOLCANO OBSERVATORIES

VOL II PART V: (08-Jul-16)

- **TABLE MET II-1 - MWO**
- **TABLE MET II-2 - AMO**
- **TABLE MET II-3 - VOLMET Broadcast**



SIGMET Service

Meteorological Watch Office – MWO:

- An office designated to provide information concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations within its specified area of responsibility
- Each Contracting State designates one or more MWO; possibility to delegate the service to another State

Annex 3 Chapter1/ Chapter 3



SIGMET Service

MWO shall:

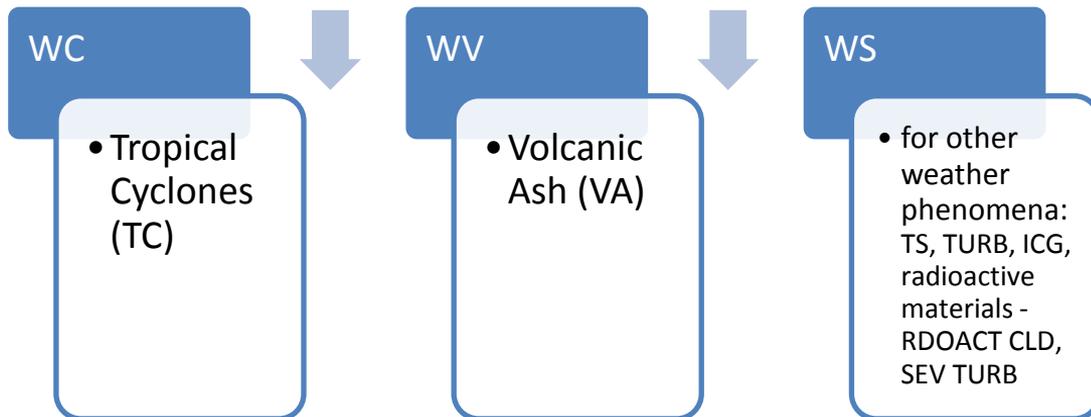
- maintain **continuous watch** over meteorological conditions affecting flight operations within its area of responsibility
- prepare SIGMET and other information relating its area of responsibility
- **supply** SIGMET information and, as required, other meteorological information to associated Air Traffic Services (ATS) units
- **disseminate** SIGMET



Types of SIGMET

- Annex 3: Provides one general SIGMET format, which encompasses all of the specified weather phenomena,
- Suitable to distinguish between three types:

WMO Publication No. 386 Manual on the Global Telecommunication System.



**Example A6-2. SIGMET message for tropical cyclone**

YUCC SIGMET 3 VALID 251600/252200 YUDO –
YUCC AMSWELL FIR TC GLORIA PSN N2706 W07306 CB OBS AT 1600Z N2706 W07306 CB WI
250NM OF TC CENTRE TOP FL500 WI 150NM OF CENTRE MOV NW 10KT NC FCST AT 2200Z TC
CENTRE PSN N2740 W07345

Meaning:

The third SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amwell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1600 UTC to 2200 UTC on the 25th of the month; tropical cyclone Gloria at 27 degrees 6 minutes north and 73 degrees 6 minutes west; cumulonimbus was observed at 1600 UTC at 27 degrees 6 minutes north and 73 degrees 6 minutes west with within 250 nautical miles of the centre of the tropical cyclone cumulonimbus with top at flight level 500; within 150 nautical miles of the centre; the tropical cyclone is expected to move northwestwards at 10 knots and not to undergo any no changes in intensity are expected; at 2200 UTC the forecast position of the centre of the tropical cyclone at 2200 UTC is expected forecast to be located at 27 degrees 40 minutes north and 73 degrees 45 minutes west.

* Fictitious location

**Example A6-4. SIGMET message for radioactive cloud**

YUCC SIGMET 2 VALID 201200/201600 YUDO –
YUCC AMSWELL FIR RDOACT CLD OBS AT 1155Z WI S5000 W14000 – S5000 W13800 – S5200
W13800 – S5200 W14000 – S5000 W14000 SFC/FL100 ~~STNR~~ WKN FCST AT 1600Z WI S5200 W14000
– S5200 W13800 – S5300 W13800 – S5300 W14000 – S5200 W14000

Meaning:

The second SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amwell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1200 UTC to 1600 UTC on the 20th of the month; radioactive cloud was observed at 1155 UTC within an area bounded by 50 degrees 0 minutes south 140 degrees 0 minutes west to 50 degrees 0 minutes south 138 degrees 0 minutes west to 52 degrees 0 minutes south 138 degrees 0 minutes west to 52 degrees 0 minutes south 140 degrees 0 minutes west to 50 degrees 0 minutes south 140 degrees 0 minutes west and between the surface and flight level 100; the radioactive cloud is expected to ~~remain stationary and~~ to weaken in intensity; at 1600 UTC the radioactive cloud is forecast to be located within an area bounded by 52 degrees 0 minutes south 140 degrees 0 minutes west to 52 degrees 0 minutes south 138 degrees 0 minutes west to 53 degrees 0 minutes south 138 degrees 0 minutes west to 53 degrees 0 minutes south 140 degrees 0 minutes west to 52 degrees 0 minutes south 140 degrees 0 minutes west.

* Fictitious location



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SIGMET

AVIATION WEATHER CENTER
NOAA NATIONAL WEATHER SERVICE

Local forecast GO HOME ADVISORIES FORECASTS OBSERVATIONS TOOLS NEWS SEARCH ABOUT USER

ADDS AIRMETS/SIGMETS INFO

SIGMETs valid 1920 UTC 21 Jul 2016

<https://www.aviationweather.gov/sigmet>

ONAMET
Oficina Nacional de Meteorología

PORTADA INSTITUCION NOTICIAS IMAGENES TSUNAMI BOLETINES Y ALERTAS HISTORIAL CONTACTOS

- Pronósticos
- Pronósticos Regionales
- Aviación
- Climatología
- Hidrometeorología
- Agrometeorología
- EMA
- Transparencia
- OMM WMO

SANTO DOMINGO 21 DE JUNIO 2016
AEROP. INT. DE LAS AMERICAS JFPG.-

WSCA31 MDSD 211100Z
MDCS SIGMET 2 VALID 211100/211100 MDSD-

MDCS SANTO DOMINGO FIR: SIGMET 2 CNL SIGMET 1VALID 210730/211130 MDSD-

http://www.metoffice.gov.tt/watches_warnings



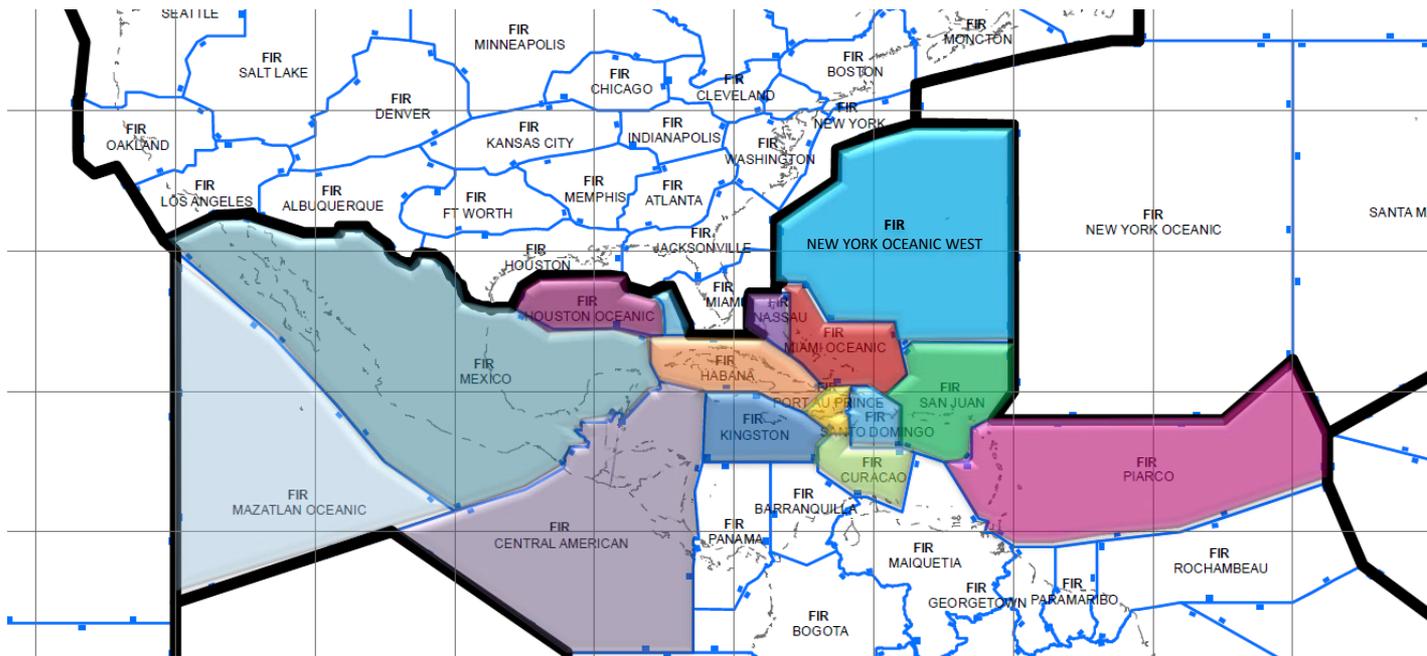
Importance for Users

High impact:

- Pre-flight
- In-flight decision-making
- Risk assessment for hazard avoidance
- Flight routes could be blocked
- Increase of fuel consumption



15 CAR FIRs



Central American

Curaçao

Habana

Houston Oceanic

Kingston

Mazatlan Oceanic

Mexico

Miami

Miami Oceanic

Nassau

New York Oceanic West

Piarco

Port-au-Prince

San Juan

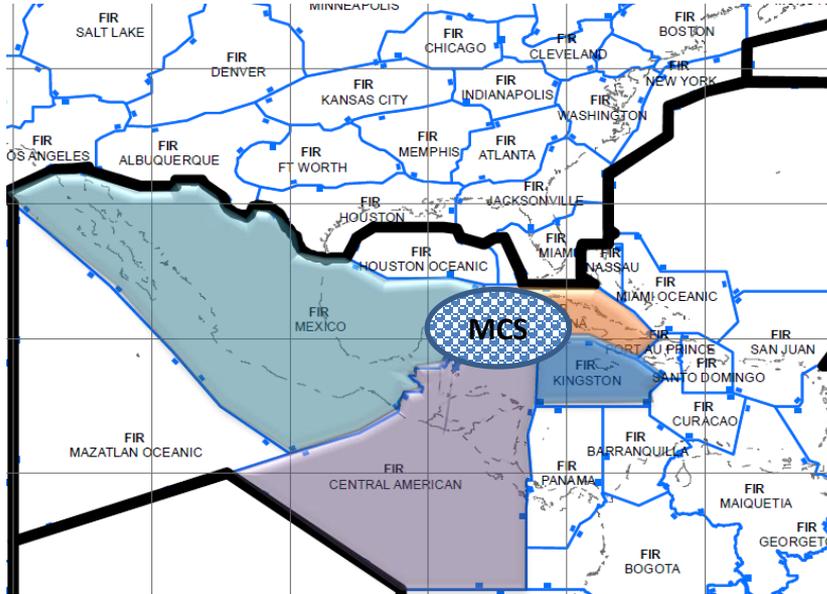
Santo Domingo



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SIGMET



- 🌱 4 SIGMET required
- 🌱 coordination across FIR boundaries
- 🌱 MWO need to work collaboratively



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Smithsonian / USGS Weekly Volcanic Activity Report



Smithsonian Institution
National Museum of Natural History
Global Volcanism Program

Home Reports Database Learn Research Info & Contacts

Smithsonian / USGS Weekly Volcanic Activity Report

New Activity Highlights

- Kilauea
- Pacaya
- Manam
- Bristol Island
- Tengger Caldera

Colima, Santa Maria, Fuego, Pacayá, Turrialba
http://volcano.si.edu/learn_products.cfm?p=9



VOLCANIC ASH

VAAC Washington:

- ✈️ Volcanic Ash Advisories text (VAA)
- ✈️ Volcanic Ash Advisories Graphic (VAG)
- ✈️ The ARL Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT)

State volcano observatories – VO:

- ✈️ Time of eruption
- ✈️ Height of the ash plume
- ✈️ Direction and speed of the ash plume
- ✈️ Composition (water vapor, SO₂, etc.)
- ✈️ Additional Information

POPOCATEPETL 18 Abr 16

NOAA Satellite and Information Service
National Environmental Satellite, Data and Information Service (NESDIS)

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Current Volcanic Ash Advisories Washington VAAC



Photograph: Claudia Lopez

FVXXZ0 KNES 180926
VA ADVISORY
DTG: 20160418/0926Z

VAAc: WASHINGTON

VOLCANO: POPOCATEPETL 341090
PSN: N1901 W09837

AREA: MEXICO

SUMMIT ELEV: 17802 FT (5426 M)

ADVISORY NR: 2016/123

INFO SOURCE: GOES-EAST, MEXICO CITY MWO, GFS
WINDS, HYSPLIT, VOLCANO WEB CAMERA.

ERUPTION DETAILS: [CONS VA EV](#)

OBS VA DTG: 18/0845Z

OBS VA CLD: SFC/FL240 N2009 W09743 - N1932 W09731
N1900 W09837 - N1905 W09840 - N2009 W09743 NOV
NE 20-25KT

FCST VA CLD +6HR: 18/1500Z SFC/FL240 N2111 W09635
N2007 W09607 - N1900 W09837 - N1906 W09840 -
N2111 W09635



Office of Satellite
and Product Operations

Example A6-3. SIGMET message for volcanic ash

YUDD SIGMET 2 VALID 211100/211700 YUSO -
YUDD SHANLON FIR/UIR VA ERUPTION MT ASHVAL PSN S1500 E07348 VA CLD OBS AT 1100Z
APRX 220KM BY 35KM 50KM WID LINE BTN S1500 E07348 - S1530 E07642 FL310/450 MOV SE
65KMH INTSF FCST AT 1700Z VA CLD APRX 50KM WID LINE BTN S1506 E07500 - S1518 E08112
- S1712 E08330 - S1824 E07836

Meaning:

The second SIGMET message issued for the SHANLON* flight information region (identified by YUDD Shanlon area control centre/upper flight information region) by the Shanlon/International* meteorological watch office (YUSO) since 0001 UTC; the message is valid from 1100 UTC to 1700 UTC on the 21st of the month; volcanic ash eruption of Mount Ashval* located at 15 degrees south and 73 degrees 48 minutes east; volcanic ash cloud observed at 1100 UTC in an approximate area of 220 km by 35 km approximately 50km wide line between 15 degrees south and 73 degrees 48 minutes east, and 15 degrees 30 minutes south and 76 degrees 42 minutes east, between flight levels 310 and 450; the volcanic ash cloud is expected to move southeastwards at 65 kilometres per hour, intensifying at 1700 UTC the volcanic ash cloud is forecast to be located approximately in an area bounded by the following points: in an approximately 50km wide line between 15 degrees 6 minutes south and 75 degrees east, 15 degrees 18 minutes south and 81 degrees 12 minutes east, and 17 degrees 12 minutes south and 83 degrees 30 minutes east, and 18 degrees 24 minutes south and 78 degrees 36 minutes east.

* Fictitious location

VO

VAAC

MWO



AMENDMENT 77

<i>Amendment</i>	<i>Source(s)</i>	<i>Subject</i>	<i>Adopted/Approved Effective Applicable</i>
77-A	Meteorology (MET) Divisional Meeting (2014)	Introduction of digital format for volcanic ash and tropical cyclone advisories and AIRMET information and the provision of METAR/SPECI, TAF and SIGMET information in digital format as a recommended practice. Introduction of WAFS forecast information on cumulonimbus clouds, icing and turbulence and additional flight levels for WAFS gridded forecast information. Removal of reference to legacy satellite distribution systems in lieu of Internet-based services. Modification of GAMET forecast requirements and clarification to RVR assessment requirements. Other minor modifications and editorial alignments are incorporated.	22 February 2016 11 July 2016 10 November 2016



FICTITUS

VAAC - Washington upon request of the NACC Office and in coordination with the SAM Office, launched the FICTITUS exercise on 12 and 13 December 2015, obtaining the following results:

- ✈ Participation of eight States
 - Argentina, Chile, Cuba, Honduras, Jamaica, Mexico, United States, and Uruguay;
- ✈ VAAC Buenos Aires involved, as well as the NOTAM and MWO of the States;
- ✈ The units generated volcanic ash advisories, NOTAM-ASHTAM and SIGMET respectively,
- ✈ The most significant findings were:
 - Mistakes in headers and numeration
 - Intermittence in AMHS terminals
 - Omission in coordination procedures.



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HANDBOOK ON THE INTERNATIONAL AIRWAYS VOLCANO WATCH (IAVW) Doc 9766-AN/968

GUIDANCE FOR CONDUCTING VOLCANIC ASH EXERCISES IN ICAO REGIONS

1. OVERVIEW

1.1 Volcanic ash exercises should be conducted by ICAO on a regional basis in order to practice and develop inter-agency response to volcanic activity, in order to maintain safety, regularity and efficiency of aviation in the event of a volcanic eruption. This guidance recognizes that there is significant regional variation in the nature, frequency, observation of and response to volcanic eruptions. The frequency and scope of volcanic ash exercises is the responsibility of the ICAO region concerned. Where frequent volcanic activity results in adequate information about system performance, exercises may be omitted or constrained to infrequent, extraordinary situations or be held only to test revised procedures.

1.2 Volcanic ash exercises should be facilitated via the ICAO Regional Office concerned and support the regular assessment of system performance (in accordance with quality management principles), in particular the assessment of the safety performance which is required by ICAO safety management provisions.

1.3 Reports of the exercises or performance assessments should be reviewed by an appropriate sub-group or sub-groups within the ICAO region concerned. The focus of these reviews should be the development of improved provisions. Recommendations for improvements to global ICAO provisions, based on the regional review of the exercises, should be brought to the attention of the ICAO Planning and Implementation Regional Group (PIRG) concerned and/or to the International Airways Volcano Watch Operations Group (IAVWOPSG).



HANDBOOK ON THE INTERNATIONAL AIRWAYS VOLCANO WATCH (IAVW) Doc 9766-AN/968

3. OBJECTIVES

- 3.1 The exercises should be designed to:
- a) practice the conduct of volcanic activity response in accordance with the regional reference documents;
 - b) verify existing information, AIS and MET message routing via AFTN addresses, relevant e-mail addresses, telephone and fax numbers, and internet addresses (URLs);
 - c) maintain appropriate information and message routing between all involved agencies and organizations;
 - d) provide volcanic activity response training for key personnel involved;
 - e) allow regulators to assess the preparedness and operational response in terms of planning, process and procedures of operators; and
 - f) provide, when appropriate, recommendations for amendment of the reference documents, in accordance with the lessons learned and conclusions contained in the final exercise report.
- 3.2 Exercises may also be designed to test suggested new procedures on a limited scale before regional/global implementation.
- 3.3 Exercise and system performance assessments should be aimed at a critical review of existing provisions and their further improvement.



SIGMET CHALLENGE

- Development of the required SIGMET for each case
- Increase the accuracy for delimiting the affected airspace
- Proper preparation and timely dissemination
- consistent information between airspaces
- Improve coordination procedures between stakeholders:
 - WAFCs, MWOs,, VAACs, VOs, TCACs,
 - Operators, flight crew members, ATS units, search and rescue services units, airport managements, others.
- VO and MWO constant updates
- Communication between stakeholders (phone, fax and e-mail)



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(NACC) Office
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Dakar

European and
North Atlantic
(EUR/NAT) Office
Paris

Middle East
(MID) Office
Cairo

Eastern and
Southern African
(ESAF) Office
Nairobi

Asia and Pacific
(APAC) Sub-office
Beijing

Asia and Pacific
(APAC) Office
Bangkok



THANK YOU