ICAO

Doc 10157

PROCEDURES FOR AIR NAVIGATION SERVICES

Meteorology

First Edition, 2025

This first edition of Doc 10157 was approved by the President of the Council on behalf of the Council on 2 April 2025 and becomes applicable on 27 November 2025.

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AMENDMENTS

Amendments are announced in the supplements to the *Products and Services Catalogue;* the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS		
No.	Date	Entered by

CORRIGENDA		
No.	Date	Entered by

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FOREWORD

Historical background

The Meteorology Divisional Meeting, held in 2014, formulated Recommendation 5/2 calling for an appropriate ICAO group, in close coordination with World Meteorological Organization, to undertake a restructuring of Annex 3 – *Meteorological Service for International Air Navigation,* in view of retaining provisions containing "requirements" in Annex 3 and transferring provisions related to "means of compliance" to a new *Procedures for Air Navigations Services – Meteorology* (PANS-MET), to ensure that the evolution of provisions related to meteorological service for international air navigation be in line with the One-Sky concept as described in the *Global Air Navigation Plan* (GANP, Doc 9750). The Air Navigation Commission (ANC) subsequently approved this recommendation at its 197th Session, held in October 2014.

The ANC approved the establishment of the Meteorology Panel (METP) and tasked the panel to develop a new PANS-MET which was completed by the METP in time for its Fifth Meeting (METP/5) held in 2021. The METP/5 subsequently reviewed and endorsed the new PANS-MET (Recommendation 4/1 refers). In this context, the METP/5 identified a number of benefits resulting from the development of the PANS-MET (Recommendation 4/3 refers):

a) *Facilitating transition to the data-centric environment*. Similar to the split of Annex 15 – *Aeronautical Information Services* into a restructured Annex 15 and a new *Procedures for Air Navigations Services – Aeronautical Information Management* (PANS-AIM, Doc 10066), the development of the PANS-MET allows a transition from the product-based environment to the data-centric environment. Since the provision of both aeronautical and meteorological information are integrated into the system-wide information management (SWIM) environment, in line with the One-Sky concept detailed in the GANP (Doc 9750), it is essential that an approach similar to aeronautical information is applied to meteorological information;

b) *Improving responsiveness to evolving future requirements.* The provisions containing "means of compliance" transferred to the PANS-MET are expected to evolve rapidly over the next few years. The PANS status of these provisions renders their future amendment more flexible and less stringent than that of Annex provisions, and ensures the currency of ICAO provisions at all times; and

c) *Clarifying the responsibilities of authorities in States.* The provisions retained in the restructured Annex 3 are all addressed to the meteorological authority (providing regulation and oversight of the meteorological service), while the provisions in the PANS-MET are all the responsibility of the meteorological service provider. Such a clear distinction of the authority to whom each document is targeted facilitates the use of the restructured Annex 3 and the PANS-MET in States, and is likely to improve the level of implementation and compliance.

Accordingly, the restructured Annex 3 only contains (organizational or technical) "requirements", expected to be fairly stable in time, while all the provisions that can be qualified as "means of compliance" (mostly in the form of technical specifications), evolving more rapidly, are located in the PANS-MET. This comprehensive change forms part of Amendment 81 to Annex 3.

Table A shows the origin of subsequent amendments, together with a list of the principal subjects involved and the dates on which the PANS-MET and the amendments were approved by the Council, when they became effective and when they became applicable.

Scope and purpose

The PANS-MET is complementary to the Standards and Recommended Practices (SARPs) contained in Annex 3. It is supplemented when necessary by regional procedures contained in the *Regional Supplementary Procedures* (Doc 7030).

The PANS-MET specifies, in greater detail than the SARPs in Annex 3, the actual procedures to be applied by the meteorological service provider in supplying various meteorological (MET) services to aeronautical users.

Status

The Procedures for Air Navigation Services (PANS) do not have the same status as the Standards and Recommended Practices. While the latter are *adopted* by Council in pursuance of Article 37 of the Convention on International Civil Aviation, and are subject to the full procedure of Article 90, the PANS are *approved* by the Council and recommended to Contracting States for worldwide application.

While PANS may contain material which may eventually become SARPs when it has reached the maturity and stability necessary for adoption as such, they may also comprise material prepared as an amplification of the basic principles in the corresponding SARPs and designed particularly to assist the user in the application of those SARPs.

Implementation

The implementation of procedures is the responsibility of Contracting States; they are applied in actual operations only after, and in so far as, States have enforced them. However, with a view to facilitating their processing towards implementation by States, they have been prepared in language which will permit direct use by the MET personnel.

Publication of differences

The PANS do not carry the status afforded to Standards adopted by the Council as Annexes to the Convention and, therefore, do not come within the obligation imposed by Article 38 of the Convention to notify differences in the event of non-implementation.

However, attention of States is drawn to the provisions of Annex 15 related to the publication in their Aeronautical Information Publications of lists of significant differences between their procedures and the related ICAO procedures.

Promulgation of information

Information relating to the establishment, withdrawal of and changes to facilities, services and procedures affecting aircraft operations provided according to the procedures specified in this document should be notified and take effect in accordance with Annex 15.

Contents of the document

Chapter 1 contains definitions and terms used with a limited meaning.

Chapter 2 contains provisions and procedures regarding the reporting of aerodrome meteorological observational information, in the form of local routine reports and local special reports; METAR and SPECI; and volcanic activity reports. The associated technical specifications are given in Appendix 2.

Chapter 3 contains provisions and procedures applicable to the reporting of aircraft meteorological observational information. The associated technical specifications related to air-reports are given in Appendix 3.

Chapter 4 contains provisions and procedures applicable to the issuance of aerodrome meteorological forecast information, in the form of aerodrome forecasts (TAF), trend forecasts and forecasts for take-off. The associated technical specifications are given in Appendix 2 (trend forecasts) and Appendix 4 (TAF).

Chapter 5 contains provisions and procedures applicable to en-route meteorological forecast information. The associated technical specifications are given in Appendix 5 (forecasts issued by the world area forecast centres), Appendix 6 (area forecasts for low-level flights) and Appendix 9 (forecasts of quantitative volcanic ash concentration information).

Chapter 6 contains provisions and procedures applicable to the issuance of meteorological information containing advisories, alerts, warnings and notices. The associated technical specifications are given principally in Appendix 7, completed by Appendix 1 (model charts for tropical cyclone and volcanic ash advisory information; and SIGMET information) and Appendix 8 (criteria for meteorological phenomena included in SIGMET and AIRMET information; special air-reports (uplink); and aerodrome warnings).

Chapter 7 contains provisions and procedures applicable to the preparation of aeronautical climatological information.

Chapter 8 contains provisions and procedures applicable to the provision of meteorological service for operators and flight crew members. The associated specifications related to flight documentation are given in Appendix 1 (model charts and forms), Appendix 2 (aerodrome routine meteorological report (METAR) and aerodrome special meteorological report (SPECI)), Appendix 4 (TAF), Appendix 5 (forecasts issued by the world area forecast centres), Appendix 6 (area forecast for low-level flights in abbreviated plain language (GAMET)) and Appendix 7 (SIGMET and AIRMET; volcanic ash, tropical cyclone and space weather advisory information).

Chapter 9 contains provisions and procedures applicable to meteorological information to be provided for air traffic services, search and rescue services and aeronautical information services.

Chapter 10 contains provisions and procedures regarding the use of communications to exchange meteorological information.

Relation to corresponding World Meteorological Organization publications

The aeronautical meteorological code forms referred to in the PANS-MET are developed by the World Meteorological Organization (WMO) on the basis of aeronautical requirements contained in this PANS or stated from time to time by the Council. The aeronautical meteorological code forms are promulgated in the *Manual on Codes* (WMO-No. 306), Volume I – *International Codes*.

Table A. Amendments to the PANS-MET

Amendment	*Source(s)*	*Subject(s)*	*Approved* *Applicable*
1st Edition	Fifth meeting of the Meteorology Panel (METP/5)	Introduction of the new *Procedures for Air Navigation Services – Meteorology* (PANS-MET, Doc 10157)	2 April 2025 27 November 2025

Chapter 1

DEFINITIONS

Note.— The designation "RR" in these definitions indicates a definition which has been extracted from the Radio Regulations of the International Telecommunication Union (ITU) (see Handbook on Radio Frequency Spectrum Requirements for Civil Aviation *(Doc 9718), Volume I* – ICAO spectrum strategy, policy statements and related information*).*

1.1 DEFINITIONS

When the following terms are used in the Standards and Recommended Practices for Meteorological Service for International Air Navigation, they have the following meanings:

Aerodrome. A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aerodrome climatological summary. Concise summary of specified meteorological elements at an aerodrome, based on statistical data.

Aerodrome climatological table. Table providing statistical data on the observed occurrence of one or more meteorological elements at an aerodrome.

Aerodrome control tower. A unit established to provide air traffic control service to aerodrome traffic.

Aerodrome elevation. The elevation of the highest point of the landing area.

Aerodrome meteorological office. An office designated to provide meteorological service for aerodromes serving international air navigation.

Aerodrome reference point. The designated geographical location of an aerodrome.

Aeronautical fixed service (AFS). A telecommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air services.

Aeronautical meteorological station. A station designated to make observations and meteorological reports for use in international air navigation.

Aeronautical mobile service (RR S1.32). A mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate; emergency position-indicating radio beacon stations may also participate in this service on designated distress and emergency frequencies.

Aeronautical telecommunication station. A station in the aeronautical telecommunication service.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the Earth's surface.

Aircraft observation. The evaluation of one or more meteorological elements made from an aircraft in flight.

AIRMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of low-level aircraft operations and which was not already included in the forecast issued for low-level flights in the flight information region concerned or sub-area thereof.

Air-report. A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting.

Note.— Details of the AIREP form are given in the Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM, Doc 4444).

Air traffic services unit. A generic term meaning, variously, air traffic control unit, flight information centre or air traffic services reporting office.

Alternate aerodrome. An aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing where the necessary services and facilities are available, where aircraft performance requirements can be met and which is operational at the expected time of use. Alternate aerodromes include the following:

Take-off alternate. An alternate aerodrome at which an aircraft would be able to land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure.

En-route alternate. An alternate aerodrome at which an aircraft would be able to land in the event that a diversion becomes necessary while en route.

Destination alternate. An alternate aerodrome at which an aircraft would be able to land should it become either impossible or inadvisable to land at the aerodrome of intended landing.

Note.— The aerodrome from which a flight departs may also be an en-route or a destination alternate aerodrome for that flight.

Altitude. The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).

Approach control unit. A unit established to provide air traffic control service to controlled flights arriving at, or departing from, one or more aerodromes.

Appropriate ATS authority. The relevant authority designated by the State responsible for providing air traffic services in the airspace concerned.

Area control centre (ACC). A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Automatic dependent surveillance – contract (ADS-C). A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports.

Note.— The abbreviated term "ADS contract" is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract or an emergency mode.

Briefing. Oral commentary on existing and/or expected meteorological conditions.

Cloud of operational significance. A cloud with the height of cloud base below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, or a cumulonimbus cloud or a towering cumulus cloud at any height.

Consultation. Discussion with a meteorologist or another qualified person of existing and/or expected meteorological conditions relating to flight operations; a discussion includes answers to questions.

Control area (CTA). A controlled airspace extending upwards from a specified limit above the Earth.

Cruising level. A level maintained during a significant portion of a flight.

Elevation. The vertical distance of a point or a level, on or affixed to the surface of the Earth, measured from mean sea level.

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Flight documentation. Written or printed documents, including charts or forms, containing meteorological information for a flight.

Flight information centre (FIC). A unit established to provide flight information service and alerting service.

Flight information region (FIR). An airspace of defined dimensions within which flight information service and alerting service are provided.

Flight level. A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

Note 1.— A pressure type altimeter calibrated in accordance with the Standard Atmosphere:

a) when set to a QNH altimeter setting, will indicate altitude;

b) when set to a QFE altimeter setting, will indicate height above the QFE reference datum;

c) when set to a pressure of 1 013.2 hPa, may be used to indicate flight levels.

Note 2.— The terms "height" and "altitude", used in Note 1, indicate altimetric rather than geometric heights and altitudes.

Forecast. A statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace.

GAMET area forecast. An area forecast in abbreviated plain language for low-level flights for a flight information region or sub-area thereof, prepared by the meteorological office designated by the meteorological authority concerned and exchanged with meteorological offices in adjacent flight information regions, as agreed between the meteorological authorities concerned.

Grid point data in digital form. Computer processed meteorological data for a set of regularly spaced points on a chart, for transmission from a meteorological computer to another computer in a code form suitable for automated use.

Note.— In most cases, such data are transmitted on medium- or high-speed telecommunications channels.

Height. The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

ICAO meteorological information exchange model (IWXXM). A data model for representing aeronautical meteorological information.

International airways volcano watch (IAVW). International arrangements for monitoring volcanic activity and providing notices, forecasts and warnings to aircraft of volcanic ash in the atmosphere.

Note.— The IAVW is based on the cooperation of aviation and non-aviation operational units using information derived from observing sources and networks that are provided by States. The watch is coordinated by ICAO with the cooperation of other concerned international organizations.

Level. A generic term relating to the vertical position of an aircraft in flight and meaning variously height, altitude or flight level.

Meteorological authority. The entity arranging for the provision of meteorological service for international air navigation on behalf of a Contracting State, and providing regulation and oversight of the meteorological service.

Meteorological bulletin. A text comprising meteorological information preceded by an appropriate heading.

Meteorological information. Meteorological report, analysis, forecast and any other statement relating to existing or expected meteorological conditions.

Meteorological office. An office designated to provide meteorological service for international air navigation.

Meteorological report. A statement of observed meteorological conditions related to a specified time and location.

Meteorological service provider. The relevant entity designated to provide meteorological service for international air navigation on behalf of a Contracting State.

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.

Minimum sector altitude (MSA). The lowest altitude which may be used which will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centred on a significant point, the aerodrome reference point (ARP) or the heliport reference point (HRP)

Observation (meteorological). The evaluation of one or more meteorological elements.

Operational planning. The planning of flight operations by an operator.

Operator. The person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Pilot-in-command. The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Prevailing visibility. The greatest visibility value, observed in accordance with the definition of "visibility", which is reached within at least half the horizon circle or within at least half of the surface of the aerodrome. These areas could comprise contiguous or non-contiguous sectors.

Note.— This value may be assessed by human observation and/or instrumented systems. When instruments are installed, they are used to obtain the best estimate of the prevailing visibility.

Prognostic chart. A forecast of a specified meteorological element(s) for a specified time or period and a specified surface or portion of airspace, depicted graphically on a chart.

Regional air navigation agreement. Agreement approved by the Council of ICAO normally on the advice of a regional air navigation meeting.

Rescue coordination centre. A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

Runway. A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

Runway visual range (RVR). The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

Search and rescue services unit. A generic term meaning, as the case may be, rescue coordination centre, rescue subcentre or alerting post.

SIGMET information. Information issued by a meteorological watch office 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.

Space weather centre (SWXC). A global or regional centre designated by ICAO to monitor and provide advisory information on space weather phenomena expected to affect high-frequency radio communications, communications via satellite, GNSS-based navigation and surveillance systems and/or pose a radiation risk to aircraft occupants, under the framework of space weather information service.

Note.— A regional centre designated by ICAO supports global centres in the fulfilment of its responsibilities.

Space weather information service. A globally coordinated service where space weather centres provide information on space weather phenomena that may affect communications, navigation and surveillance systems and/or pose a radiation risk to aircraft occupants.

Standard isobaric surface. An isobaric surface used on a worldwide basis for representing and analysing the conditions in the atmosphere.

State volcano observatory. A volcano observatory, designated by regional air navigation agreement, to monitor active or potentially active volcanoes within a State and to provide information on volcanic activity and/or volcanic ash in the atmosphere.

Threshold. The beginning of that portion of the runway usable for landing.

Touchdown zone. The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

Tropical cyclone. Generic term for a non-frontal synoptic-scale cyclone originating over tropical or sub-tropical waters with organized convection and definite cyclonic surface wind circulation.

Tropical cyclone advisory centre (TCAC). A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, world area forecast centres and international OPMET databanks regarding the position, forecast direction and speed of movement, central pressure and maximum surface wind of tropical cyclones.

Visibility. Visibility for aeronautical purposes is the greater of:

a) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognized when observed against a bright background;

b) the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background.

Note.— The two distances have different values in air of a given extinction coefficient, and the latter b) varies with the background illumination. The former a) is represented by the meteorological optical range (MOR).

Volcanic ash advisory centre (VAAC). A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, area control centres, flight information centres, world area forecast centres and international OPMET databanks regarding the lateral and vertical extent and forecast movement of volcanic ash in the atmosphere.

VOLMET. Meteorological information for aircraft in flight.

Data link-VOLMET (D-VOLMET). Provision of current aerodrome routine meteorological reports (METAR) and aerodrome special meteorological reports (SPECI), aerodrome forecasts (TAF), SIGMET, special air-reports not covered by a SIGMET and, where available, AIRMET via data link.

VOLMET broadcast. Provision, as appropriate, of current METAR, SPECI, TAF and SIGMET by means of continuous and repetitive voice broadcasts.

World area forecast centre (WAFC). A meteorological centre designated to prepare and issue significant weather forecasts and upper-air forecasts in digital form on a global basis direct to States using the aeronautical fixed service Internet-based services.

World area forecast system (WAFS). A worldwide system by which world area forecast centres provide aeronautical meteorological en-route forecasts in uniform standardized formats.

1.2 TERMS USED WITH A LIMITED MEANING

For the purpose of this PANS, the following terms are used with a limited meaning as indicated below:

a) "provide" is used solely in connection with the provision of service;

b) "issue" is used solely in connection with cases where the obligation specifically extends to sending out the information to a user;

c) "make available" is used solely in connection with cases where the obligation ends with making the information accessible to a user; and

d) "supply" is used solely in connection with cases where either b) or c) applies.

———————————

Chapter 2

AERODROME METEOROLOGICAL OBSERVATIONAL INFORMATION

2.1 ISSUANCE OF METEOROLOGICAL REPORTS (LOCAL ROUTINE REPORTS, LOCAL SPECIAL REPORTS, AERODROME ROUTINE METEOROLOGICAL REPORTS AND AERODROME SPECIAL METEOROLOGICAL REPORTS)

2.1.1 Characteristics of meteorological reports

2.1.1.1 Local routine report and local special report shall be issued in abbreviated plain language, in accordance with the template shown in Appendix 2, Table A2-1, following the content and order of elements indicated therein.

Note.— In addition to the meteorological elements listed in Annex 3, 4.5.1, the reports also contain: a) identification of the type of report; b) location indicator; c) time of the observation; and d) identification of an automated or missing report, when applicable, as indicated in the template shown in Appendix 2, Table A2-1.

2.1.1.2 Aerodrome routine meteorological report (METAR) and aerodrome special meteorological report (SPECI) shall be issued and disseminated in the METAR and SPECI code forms prescribed by the World Meteorological Organization (WMO), in accordance with the template shown in Appendix 2, Table A2-2, following the content and order of elements indicated therein.

Note 1.— The METAR and SPECI code forms are contained in the Manual on Codes *(WMO-No. 306), Volume I.1, Part A –* Alphanumeric Codes.

Note 2.— In addition to the meteorological elements listed in Annex 3, 4.5.1, the reports also contain: a) identification of the type of report; b) location indicator; c) time of the observation; and d) identification of an automated or missing report, when applicable, as indicated in the template shown in Appendix 2, Table A2-2.

2.1.1.3 METAR and SPECI shall be disseminated in ICAO meteorological information exchange model (IWXXM) form in addition to the dissemination of the METAR and SPECI in accordance with 2.1.1.2.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D –* Representations Derived from Data Models. *Guidance on the implementation of IWXXM is provided in the* Manual on the ICAO Meteorological Information Exchange Model *(Doc 10003).*

2.1.1.4 Use of CAVOK

When the following conditions occur simultaneously at the time of observation:

a) visibility, 10 km or more, and the lowest visibility is not reported;

Note 1.— In local routine report and local special report, visibility refers to the value(s) to be reported in accordance with 2.2.2.4.2 and 2.2.2.4.3; in METAR and SPECI, visibility refers to the value(s) to be reported in accordance with 2.2.2.4.4.

Note 2.— The lowest visibility is reported in accordance with 2.2.2.4.4 a) and b).

b) no cloud of operational significance; and

c) no weather of significance to aviation as given in 2.2.4.2.3, 2.2.4.2.5 and 2.2.4.2.6;

information on visibility, runway visual range, present weather and cloud amount, cloud type and height of cloud base shall be replaced in all meteorological reports by the term “CAVOK”.

2.1.2 Special observations and reports

2.1.2.1 Criteria for issuance of local special reports

The list of criteria for the issuance of local special reports shall include the following:

a) those values which most closely correspond with the operating minima of the operators using the aerodrome;

b) those values which satisfy other local requirements of the air traffic services units and of the operators;

c) an increase in air temperature of 2°C or more from that given in the latest report, or an alternative threshold value as agreed between the meteorological service provider, the appropriate air traffic service (ATS) authority and the operators concerned;

d) the available supplementary information concerning the occurrence of significant meteorological conditions in the approach and climb-out areas as given in Appendix 2, Table A2-1;

e) when noise abatement procedures are applied in accordance with the PANS-ATM (Doc 4444) and the variation from the mean surface wind speed (gusts) has changed by 2.5 m/s (5 kt) or more from that at the time of the latest report, the mean speed before and/or after the change being 7.5 m/s (15 kt) or more; and

f) those values which constitute criteria for SPECI.

2.1.2.2 Criteria for issuance of SPECI

2.1.2.2.1 Where required in accordance with Annex 3, 4.4.2 b), SPECI shall be issued whenever changes in accordance with the following criteria occur:

a) when the mean surface wind direction has changed by 60° or more from that given in the latest report, the mean speed before and/or after the change being 5 m/s (10 kt) or more;

b) when the mean surface wind speed has changed by 5 m/s (10 kt) or more from that given in the latest report;

c) when the variation from the mean surface wind speed (gusts) has changed by 5 m/s (10 kt) or more from that at the time of the latest report, the mean speed before and/or after the change being 7.5 m/s (15 kt) or more;

d) when the onset, cessation or change in intensity of any of the following weather phenomena occurs:

   1) freezing precipitation;

   2) moderate or heavy precipitation (including showers thereof);

   3) thunderstorm (with precipitation);

e) when the onset or cessation of any of the following weather phenomena occurs:

   1) freezing fog;

   2) thunderstorm (without precipitation);

f) when the amount of a cloud layer below 450 m (1 500 ft) changes:

   1) from SCT or less to BKN or OVC; or

   2) from BKN or OVC to SCT or less.

2.1.2.2.2 Where required in accordance with Annex 3, 4.4.2 b), SPECI should be issued whenever changes in accordance with the following criteria occur:

a) when the wind changes through values of operational significance. The threshold values should be established by the meteorological service provider in consultation with the appropriate ATS authority and the operators concerned, taking into account changes in the wind which would:

   1) require a change in runway(s) in use; and

   2) indicate that the runway tailwind and crosswind components have changed through values representing the main operating limits for typical aircraft operating at the aerodrome;

b) when the visibility is improving and changes to or passes through one or more of the following values, or when the visibility is deteriorating and passes through one or more of the following values:

   1) 800, 1 500 or 3 000 m; and

   2) 5 000 m, in cases where significant numbers of flights are operated in accordance with the visual flight rules;

Note 1.— In local special reports, visibility refers to the value(s) to be reported in accordance with 2.2.2.4.2 and 2.2.2.4.3; in SPECI, visibility refers to the value(s) to be reported in accordance with 2.2.2.4.4.

Note 2.— Visibility refers to "prevailing visibility" except in the case where only the lowest visibility is reported in accordance with 2.2.2.4.4 b).

c) when the runway visual range is improving and changes to or passes through one or more of the following values, or when the runway visual range is deteriorating and passes through one or more of the following values: 50, 175, 300, 550 or 800 m;

d) when the onset, cessation or change in intensity of any of the following weather phenomena occurs:

1) duststorm;

2) sandstorm;

3) funnel cloud (tornado or waterspout);

e) when the onset or cessation of any of the following weather phenomena occurs:

1) low drifting dust, sand or snow;

2) blowing dust, sand or snow;

3) squall;

f) when the height of base of the lowest cloud layer of BKN or OVC extent is lifting and changes to or passes through one or more of the following values, or when the height of base of the lowest cloud layer of BKN or OVC extent is lowering and passes through one or more of the following values:

1) 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and

2) 450 m (1 500 ft), in cases where significant numbers of flights are operated in accordance with the visual flight rules;

g) when the sky is obscured and the vertical visibility is improving and changes to or passes through one or more of the following values, or when the vertical visibility is deteriorating and passes through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and

h) any other criteria based on local aerodrome operating minima, as agreed between the meteorological service provider and the operators concerned.

Note.— Other criteria based on local aerodrome operating minima are to be considered in parallel with similar criteria for the inclusion of change groups and for the amendment of aerodrome forecasts (TAF) developed in response to 4.1.3.2 j).

2.1.2.2.3 When a deterioration of one weather element is accompanied by an improvement in another element, a single SPECI shall be issued; it shall then be treated as a deterioration report.

2.2 OBSERVING AND REPORTING METEOROLOGICAL ELEMENTS

Note 1.— Guidance on operationally desirable accuracy of measurement or observation is given in Attachment A.

Note 2.— Selected criteria applicable to meteorological information referred to under 2.2.1 to 2.2.8 for inclusion in aerodrome reports are given in tabular form in Attachment C .

2.2.1 Surface wind

2.2.1.1 Siting

2.2.1.1.1 Surface wind should be observed at a height of 10 ± 1 m (30 ± 3 ft) above the ground.

2.2.1.1.2 Representative surface wind observations should be obtained by the use of sensors appropriately sited. Sensors for surface wind observations for local routine report and local special report should be sited to give the best practicable indication of conditions along the runway and touchdown zones. At aerodromes where topography or prevalent weather conditions cause significant differences in surface wind at various sections of the runway, additional sensors should be provided.

Note.— Since, in practice, the surface wind cannot be measured directly on the runway, surface wind observations for take-off and landing are expected to be the best practicable indication of the winds which an aircraft will encounter during take-off and landing.

2.2.1.2 Displays

2.2.1.2.1 Surface wind displays relating to each sensor shall be located in the meteorological station with corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units shall relate to the same sensors, and where separate sensors are required as specified in 2.2.1.1.2, the displays shall be clearly marked to identify the runway and section of runway monitored by each sensor.

2.2.1.2.2 The mean values of, and significant variations in, the surface wind direction and speed for each sensor should be derived and displayed by automated equipment.

2.2.1.3 Averaging

2.2.1.3.1 The averaging period for surface wind observations shall be:

a) 2 minutes for local routine report and local special report and for wind displays in air traffic services units; and

b) 10 minutes for METAR and SPECI, except that when the 10-minute period includes a marked discontinuity in the wind direction and/or speed, only data occurring after the discontinuity shall be used for obtaining mean values; hence, the time interval in these circumstances shall be correspondingly reduced.

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in wind direction of 30° or more, with a wind speed of 5 m/s (10 kt) before or after the change, or a change in wind speed of 5 m/s (10 kt) or more, lasting at least 2 minutes.

2.2.1.3.2 The averaging period for measuring variations from the mean wind speed (gusts) reported in accordance with 2.2.1.5.2 c) should be 3 seconds for local routine reports, local special reports, METAR, SPECI and wind displays used for depicting variations from the mean wind speed (gusts) in air traffic services units.

2.2.1.4 Accuracy of measurement

The reported direction and speed of the mean surface wind, as well as variations from the mean surface wind, should meet the operationally desirable accuracy of measurement as given in Attachment A.

2.2.1.5 Reporting

2.2.1.5.1 In local routine reports, local special reports, METAR and SPECI, the surface wind direction and speed shall be reported in steps of 10 degrees true and 1 metre per second (or 1 knot), respectively. Any observed value which does not fit the reporting scale in use shall be rounded to the nearest step in the scale.

2.2.1.5.2 In local routine reports, local special reports, METAR and SPECI:

a) the units of measurement used for the wind speed shall be indicated;

b) variations from the mean wind direction during the past 10 minutes shall be reported as follows, if the total variation is 60° or more:

   1) when the total variation is 60° or more and less than 180° and the wind speed is 1.5 m/s (3 kt) or more, such directional variations shall be reported as the two extreme directions between which the surface wind has varied;

   2) when the total variation is 60° or more and less than 180° and the wind speed is less than 1.5 m/s (3 kt), the wind direction shall be reported as variable with no mean wind direction; or

   3) when the total variation is 180° or more, the wind direction shall be reported as variable with no mean wind direction;

c) variations from the mean wind speed (gusts) during the past 10 minutes shall be reported when the maximum wind speed exceeds the mean speed by:

   1) 2.5 m/s (5 kt) or more in local routine report and local special report when noise abatement procedures are applied in accordance with the PANS-ATM (Doc 4444); or

   2) 5 m/s (10 kt) or more otherwise;

d) when a wind speed of less than 0.5 m/s (1 kt) is reported, it shall be indicated as calm;

e) when a wind speed of 50 m/s (100 kt) or more is reported, it shall be indicated to be more than 49 m/s (99 kt); and

f) when the 10-minute period includes a marked discontinuity in the wind direction and/or speed, only variations from the mean wind direction and mean wind speed occurring since the discontinuity shall be reported.

Note.— See note under 2.2.1.3.1.

2.2.1.5.3 In local routine report and local special report:

a) if the surface wind is observed from more than one location along the runway, the locations for which these values are representative shall be indicated;

b) when there is more than one runway in use and the surface wind related to these runways is observed, the available wind values for each runway shall be given, and the runways to which the values refer shall be reported;

c) when variations from the mean wind direction are reported in accordance with 2.2.1.5.2 b) 2), the two extreme directions between which the surface wind has varied shall be reported; and

d) when variations from the mean wind speed (gusts) are reported in accordance with 2.2.1.5.2 c), they shall be reported as the maximum and minimum values of the wind speed attained.

2.2.1.5.4 In METAR and SPECI, when variations from the mean wind speed (gusts) are reported in accordance with 2.2.1.5.2 c), the maximum value of the wind speed attained shall be reported.

2.2.2 Visibility

Note.— Guidance on the conversion of instrument readings into visibility is given in Attachment D.

2.2.2.1 Siting

2.2.2.1.1 When instrumented systems are used for the measurement of visibility, the visibility should be measured at a height of approximately 2.5 m (7.5 ft) above the runway.

2.2.2.1.2 When instrumented systems are used for the measurement of visibility, representative visibility observations should be obtained by the use of sensors appropriately sited. Sensors for visibility observations for local routine report and local special report should be sited to give the best practicable indications of visibility along the runway and touchdown zone.

2.2.2.2 Displays

When instrumented systems are used for the measurement of visibility, visibility displays relating to each sensor should be located in the meteorological station with corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units should relate to the same sensors, and where separate sensors are required as specified in 2.2.2.1, the displays should be clearly marked to identify the area, such as runway and section of runway, monitored by each sensor.

2.2.2.3 Averaging

When instrumented systems are used for the measurement of visibility, their output should be updated at least every 60 seconds to permit provision of current representative values. The averaging period should be:

a) 1 minute for local routine report and local special report and for visibility displays in air traffic services units; and

b) 10 minutes for METAR and SPECI, except that when the 10-minute period immediately preceding the observation includes a marked discontinuity in the visibility, only those values occurring after the discontinuity should be used for obtaining mean values.

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in visibility, lasting at least 2 minutes, which reaches or passes through criteria for the issuance of SPECI given in 2.1.2.2.

2.2.2.4 Reporting

2.2.2.4.1 In local routine reports, local special reports, METAR and SPECI, the visibility shall be reported in steps of 50 m when the visibility is less than 800 m; in steps of 100 m when it is 800 m or more but less than 5 km; in kilometre steps when it is 5 km or more but less than 10 km; and as 10 km when it is 10 km or more except when the conditions for the use of CAVOK apply. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

Note.— Specifications concerning the use of CAVOK are given in 2.1.1.4.

2.2.2.4.2 In local routine report and local special report, visibility along the runway(s) shall be reported together with the units of measurement used to indicate visibility.

2.2.2.4.3 In local routine report and local special report, when instrumented systems are used for the measurement of visibility:

a) if the visibility is observed from more than one location along the runway as specified in Annex 3, 4.6.2.2, the values representative of the touchdown zone should be reported first, followed, as necessary, by the values representative of the mid-point and stop-end of the runway, and the locations for which these values are representative should be indicated; and

b) when there is more than one runway in use and the visibility is observed related to these runways, the available visibility values for each runway should be reported, and the runways to which the values refer should be indicated.

2.2.2.4.4 In METAR and SPECI, visibility should be reported as prevailing visibility, as defined in Chapter 1. When the visibility is not the same in different directions and:

a) when the lowest visibility is different from the prevailing visibility, and 1) less than 1 500 m or 2) less than 50 per cent of the prevailing visibility and less than 5 000 m; the lowest visibility observed should also be reported and, when possible, its general direction in relation to the aerodrome reference point indicated by reference to one of the eight points of the compass. If the lowest visibility is observed in more than one direction, then the most operationally significant direction should be reported; and

b) when the visibility is fluctuating rapidly, and the prevailing visibility cannot be determined, only the lowest visibility should be reported, with no indication of direction.

2.2.3 Runway visual range

2.2.3.1 Siting

2.2.3.1.1 Runway visual range should be assessed at a height of approximately 2.5 m (7.5 ft) above the runway for instrumented systems or assessed at a height of approximately 5 m (15 ft) above the runway by a human observer.

2.2.3.1.2 Runway visual range should be assessed at a lateral distance from the runway centre line of not more than 120 m. The site for observations to be representative of the touchdown zone should be located about 300 m along the runway from the threshold. The sites for observations to be representative of the mid-point and stop-end of the runway should be located at a distance of 1 000 to 1 500 m along the runway from the threshold and at a distance of about 300 m from the other end of the runway. The exact position of these sites and, if necessary, additional sites should be decided after considering aeronautical, meteorological and climatological factors such as long runways, swamps and other fog-prone areas.

2.2.3.2 Instrumented systems

Note.— Since accuracy can vary from one instrument design to another, performance characteristics are to be checked before selecting an instrument for assessing runway visual range. The calibration of a forward-scatter meter has to be traceable and verifiable to a transmissometer standard, the accuracy of which has been verified over the intended operational range. Guidance on the use of transmissometers and forward-scatter meters in instrumented runway visual range systems is given in the Manual of Runway Visual Range Observing and Reporting Practices *(Doc 9328).*

2.2.3.2.1 Instrumented systems based on transmissometers or forward-scatter meters shall be used to assess runway visual range on runways intended for Category II and III instrument approach and landing operations.

2.2.3.2.2 Instrumented systems based on transmissometers or forward-scatter meters should be used to assess runway visual range on runways intended for Category I instrument approach and landing operations.

2.2.3.3 Display

2.2.3.3.1 Where runway visual range is determined by instrumented systems, one display or more, if required, shall be located in the meteorological station with corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units shall be related to the same sensors, and where separate sensors are required as specified in 2.2.3.1.2, the displays shall be clearly marked to identify the runway and section of runway monitored by each sensor.

2.2.3.3.2 Where runway visual range is determined by human observers, runway visual range should be reported to the appropriate local air traffic services units, whenever there is a change in the value to be reported in accordance with the reporting scale (except where the provisions of Annex 3, 4.9.2.2 a) or b) apply). The transmission of such reports should normally be completed within 15 seconds after the termination of the observation.

2.2.3.4 Averaging

Where instrumented systems are used for the assessment of runway visual range, their output shall be updated at least every 60 seconds to permit the provision of current, representative values. The averaging period for runway visual range values shall be:

a) 1 minute for local routine report and local special report and for runway visual range displays in air traffic services units; and

b) 10 minutes for METAR and SPECI, except that when the 10-minute period immediately preceding the observation includes a marked discontinuity in runway visual range values, only those values occurring after the discontinuity shall be used for obtaining mean values.

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in runway visual range, lasting at least 2 minutes, which reaches or passes through the values 800, 550, 300 and 175 m.

2.2.3.5 Runway light intensity

When instrumented systems are used for the assessment of runway visual range, computations should be made separately for each available runway. For local routine report and local special report, the light intensity to be used for the computation should be:

a) for a runway with the lights switched on and a light intensity of more than 3 per cent of the maximum light intensity available, the light intensity actually in use on that runway;

b) for a runway with the lights switched on and a light intensity of 3 per cent or less of the maximum light intensity available, the optimum light intensity that would be appropriate for operational use in the prevailing conditions; and

c) for a runway with lights switched off (or at the lowest setting pending the resumption of operations), the optimum light intensity that would be appropriate for operational use in the prevailing conditions.

In METAR and SPECI, the runway visual range should be based on the maximum light intensity available on the runway.

Note.— Guidance on the conversion of instrumented readings into runway visual range is given in Attachment D.

2.2.3.6 Reporting

2.2.3.6.1 In local routine reports, local special reports, METAR and SPECI, the runway visual range shall be reported in steps of 25 m when it is less than 400 m; in steps of 50 m when it is between 400 m and 800 m; and in steps of 100 m when it is more than 800 m. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

2.2.3.6.2 Fifty metres should be considered the lower limit and 2 000 m the upper limit for runway visual range. Outside of these limits, local routine reports, local special reports, METAR and SPECI should merely indicate that the runway visual range is less than 50 m or more than 2 000 m.

2.2.3.6.3 In local routine reports, local special reports, METAR and SPECI:

a) when runway visual range is above the maximum value that can be determined by the system in use, it shall be reported using the abbreviation "ABV" in local routine report and local special report and the abbreviation "P" in METAR and SPECI, followed by the maximum value that can be determined by the system; and

b) when the runway visual range is below the minimum value that can be determined by the system in use, it shall be reported using the abbreviation "BLW" in local routine report and local special report and the abbreviation "M" in METAR and SPECI, followed by the minimum value that can be determined by the system.

2.2.3.6.4 In local routine report and local special report:

a) the units of measurement used shall be included;

b) if runway visual range is observed from only one location along the runway, that is, the touchdown zone, it shall be included without any indication of location;

c) if the runway visual range is observed from more than one location along the runway, the value representative of the touchdown zone shall be reported first, followed by the values representative of the mid-point and stop-end and the locations for which these values are representative shall be indicated; and

d) when there is more than one runway in use, the available runway visual range values for each runway shall be reported and the runways to which the values refer shall be indicated.

2.2.3.6.5 In METAR and SPECI:

a) only the value representative of the touchdown zone should be reported and no indication of location on the runway should be included; and

b) where there is more than one runway available for landing, touchdown zone runway visual range values should be included for:

   1) up to a maximum of four such runways when disseminated in code form in accordance with 2.1.1.2;

   2) all such runways when disseminated in IWXXM form in accordance with 2.1.1.3; and

   3) the runways to which the values refer should be indicated.

2.2.3.6.6 In METAR and SPECI, when instrumented systems are used for the assessment of runway visual range, the variations in runway visual range during the 10-minute period immediately preceding the observation should be included if the runway visual range values during the 10-minute period have shown a distinct tendency, such that the mean during the first 5 minutes varies by 100 m or more from the mean during the second 5 minutes of the period. When the variation of the runway visual range values shows an upward or downward tendency, this should be indicated by the abbreviation "U" or "D", respectively. In circumstances when actual fluctuations during the 10-minute period show no distinct tendency, this should be indicated using the abbreviation "N". When indications of tendency are not available, no abbreviations should be included.

2.2.4 Present weather

2.2.4.1 Siting

When instrumented systems are used for observing present weather phenomena listed under 2.2.4.2.3 and 2.2.4.2.4, representative information should be obtained by the use of sensors appropriately sited.

2.2.4.2 Reporting

2.2.4.2.1 In local routine report and local special report, observed present weather phenomena shall be reported in terms of type and characteristics and qualified with respect to intensity, as appropriate.

2.2.4.2.2 In METAR and SPECI, observed present weather phenomena shall be reported in terms of type and characteristics and qualified with respect to intensity or proximity to the aerodrome, as appropriate.

2.2.4.2.3 In local routine reports, local special reports, METAR and SPECI, the following types of present weather phenomena should be reported, using their respective abbreviations and relevant criteria, as appropriate:

a) Precipitation

Drizzle	DZ
Rain	RA
Snow	SN
Snow grains	SG
Ice pellets	PL
Hail	GR

– Reported when diameter of largest hailstones is 5 mm or more.

Small hail and/or snow pellets	GS

– Reported when diameter of largest hailstones is less than 5 mm.

b) Obscurations (hydrometeors)

Fog	FG

– Reported when visibility is less than 1 000 m, except when qualified by “MI”, “BC”, “PR” or “VC” (see 2.2.4.2.6 and 2.2.4.2.8).

Mist	BR

– Reported when visibility is at least 1 000 m but not more than 5 000 m.

c) Obscurations (lithometeors)

– The following should be used only when the obscuration consists predominantly of lithometeors and the visibility is 5 000 m or less except "SA" when qualified by "DR" (see 2.2.4.2.6) and volcanic ash.

Sand	SA
Dust (widespread)	DU
Haze	HZ
Smoke	FU
Volcanic ash	VA

d) Other phenomena

Dust/sand whirls (dust devils)	PO
Squall	SQ
Funnel cloud (tornado or waterspout)	FC
Duststorm	DS
Sandstorm	SS

2.2.4.2.4 In automated local routine reports, local special reports, METAR and SPECI, in addition to the precipitation types listed under 2.2.4.2.3 a), the abbreviation UP should be used for unidentified precipitation when the type of precipitation cannot be identified by the automatic observing system.

2.2.4.2.5 In local routine reports, local special reports, METAR and SPECI, the following characteristics of present weather phenomena, as necessary, shall be reported, using their respective abbreviations and relevant criteria, as appropriate:

Thunderstorm TS

– Used to report a thunderstorm with precipitation in accordance with the templates shown in Tables A2-1 and A2-2. When thunder is heard or lightning is detected at the aerodrome during the 10-minute period preceding the time of observation but no precipitation is observed at the aerodrome, the abbreviation "TS" shall be used without qualification.

Freezing FZ

– Supercooled water droplets or precipitation, used with types of present weather phenomena in accordance with the templates shown in Tables A2-1 and A2-2.

Note.— At aerodromes with human observers, lightning detection equipment may supplement human observations. For aerodromes with automatic observing systems, guidance on the use of lightning detection equipment intended for thunderstorm reporting is given in the Manual on Automatic Meteorological Observing Systems at Aerodromes *(Doc 9837).*

2.2.4.2.6 In local routine reports, local special reports, METAR and SPECI, the following characteristics of present weather phenomena, as necessary, should be reported, using their respective abbreviations and relevant criteria, as appropriate:

Shower SH

– Used to report showers in accordance with the templates shown in Tables A2-1 and A2-2. Showers observed in the vicinity of the aerodrome (see 2.2.4.2.8) should be reported as "VCSH" without qualification regarding type or intensity of precipitation.

Blowing BL

– Used in accordance with the templates shown in Tables A2-1 and A2-2 with types of present weather phenomena raised by the wind to a height of 2 m (6 ft) or more above the ground.

Low drifting DR

– Used in accordance with the templates shown in Tables A2-1 and A2-2 with types of present weather phenomena raised by the wind to less than 2 m (6 ft) above ground level.

Shallow MI

– Less than 2 m (6 ft) above ground level.

Patches BC

– Fog patches randomly covering the aerodrome.

Partial PR

– A substantial part of the aerodrome covered by fog while the remainder is clear.

2.2.4.2.7 In automated local routine reports, local special reports, METAR and SPECI, when showers (SH) referred to in 2.2.4.2.6 cannot be determined based upon a method that takes account of the presence of convective cloud, the precipitation should not be characterized by SH.

2.2.4.2.8 In local routine reports, local special reports, METAR and SPECI, the relevant intensity or, as appropriate, the proximity to the aerodrome of the reported present weather phenomena should be indicated as follows:

	(local routine report and local special report)	(METAR and SPECI)
Light	FBL	–
Moderate	MOD	(no indication)
Heavy	HVY	+

Used with types of present weather phenomena in accordance with the templates shown in Tables A2-1 and A2-2. Light intensity should be indicated only for precipitation.

Vicinity VC

– Between approximately 8 and 16 km of the aerodrome reference point and used only in METAR and SPECI with present weather in accordance with the template shown in Appendix 2, Table A2-2 when not reported under 2.2.4.2.5 and 2.2.4.2.6.

2.2.4.2.9 In local routine reports, local special reports, METAR and SPECI:

a) one or more, up to a maximum of three, of the present weather abbreviations given in 2.2.4.2.3 and 2.2.4.2.4 shall be used, as necessary, together with an indication, where appropriate, of the characteristics given in 2.2.4.2.5 and 2.2.4.2.6 and intensity or proximity to the aerodrome given in 2.2.4.2.8, so as to convey a complete description of the present weather of significance to flight operations;

b) the indication of intensity or proximity, as appropriate, shall be reported first followed respectively by the characteristics and the type of weather phenomena; and

c) where two different types of weather are observed, they shall be reported in two separate groups, where the intensity or proximity indicator refers to the weather phenomenon which follows the indicator. However, different types of precipitation occurring at the time of observation shall be reported as one single group with the dominant type of precipitation reported first and preceded by only one intensity qualifier which refers to the intensity of the total precipitation.

2.2.4.2.10 In automated local routine reports, local special reports, METAR and SPECI, the present weather should be replaced by "//" when the present weather cannot be observed by the automatic observing system due to a temporary failure of the system or sensor.

2.2.5 Clouds

2.2.5.1 Siting

When instrumented systems are used for the measurement of the cloud amount and the height of cloud base, representative observations should be obtained by the use of sensors appropriately sited. For local routine report and local special report, in the case of aerodromes with precision approach runways, sensors for cloud amount and height of cloud base should be sited to give the best practicable indications of the cloud amount and height of cloud base at the threshold of the runway in use. For that purpose, a sensor should be installed at a distance of less than 1 200 m (4 000 ft) before the landing threshold.

2.2.5.2 Display

When automated equipment is used for the measurement of the height of cloud base, height of cloud base display(s) should be located in the meteorological station with corresponding display(s) in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units should relate to the same sensor, and where separate sensors are required as specified in 2.2.5.1, the displays should clearly identify the area monitored by each sensor.

2.2.5.3 Reference level

The height of cloud base shall be reported above aerodrome elevation. When a precision approach runway is in use which has a threshold elevation 15 m (50 ft) or more below the aerodrome elevation, local arrangements shall be made in order that the height of cloud bases reported to arriving aircraft shall refer to the threshold elevation. In the case of reports from offshore structures, the height of cloud base shall be given above mean sea level.

2.2.5.4 Reporting

2.2.5.4.1 In local routine reports, local special reports, METAR and SPECI, the height of cloud base shall be reported in steps of 30 m (100 ft) up to 3 000 m (10 000 ft).

2.2.5.4.2 At aerodromes where low-visibility procedures are established for approach and landing, as agreed between the meteorological service provider and the appropriate ATS authority, in local routine report and local special report the height of cloud base should be reported in steps of 15 m (50 ft) up to and including 90 m (300 ft) and in steps of 30 m (100 ft) between 90 m (300 ft) and 3 000 m (10 000 ft), and the vertical visibility in steps of 15 m (50 ft) up to and including 90 m (300 ft) and in steps of 30 m (100 ft) between 90 m (300 ft) and 600 m (2 000 ft).

2.2.5.4.3 In local routine reports, local special reports, METAR and SPECI:

a) cloud amount should be reported using the abbreviations “FEW” (1 to 2 oktas), “SCT” (3 to 4 oktas), “BKN” (5 to 7 oktas) or “OVC” (8 oktas);

b) cumulonimbus clouds and towering cumulus clouds should be indicated as “CB” and “TCU”, respectively;

c) the vertical visibility should be reported in steps of 30 m (100 ft) up to 600 m (2 000 ft);

d) if there are no clouds of operational significance and no restriction on vertical visibility and the abbreviation “CAVOK” is not appropriate, the abbreviation “NSC” should be used;

e) when several layers or masses of cloud of operational significance are observed, their amount and height of cloud base should be reported in increasing order of the height of cloud base, and in accordance with the following criteria:

   1) the lowest layer or mass, regardless of amount to be reported as FEW, SCT, BKN or OVC as appropriate;

   2) the next layer or mass, covering more than 2/8 to be reported as SCT, BKN or OVC as appropriate;

   3) the next higher layer or mass, covering more than 4/8 to be reported as BKN or OVC as appropriate; and

   4) cumulonimbus and/or towering cumulus clouds, whenever observed and not reported in 1) to 3);

f) when the cloud base is diffuse or ragged or fluctuating rapidly, the minimum height of cloud base, or cloud fragments, should be reported; and

g) when an individual layer (mass) of cloud is composed of cumulonimbus and towering cumulus clouds with a common cloud base, the type of cloud should be reported as cumulonimbus only.

Note.— Towering cumulus indicates cumulus congestus clouds of great vertical extent.

2.2.5.4.4 Any observed value in 2.2.5.4.1, 2.2.5.4.2 and 2.2.5.4.3 c) which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

2.2.5.4.5 In local routine report and local special report:

a) the units of measurement used for the height of cloud base and vertical visibility shall be indicated; and

b) when there is more than one runway in use and the heights of cloud bases are observed by instruments for these runways, the available heights of cloud bases for each runway shall be reported and the runways to which the values refer shall be indicated.

2.2.5.4.6 In automated local routine reports, local special reports, METAR and SPECI:

a) when the cloud type cannot be observed by the automatic observing system, the cloud type in each cloud group should be replaced by "///";

b) when no clouds are detected by the automatic observing system, it should be indicated by using the abbreviation "NCD";

c) when cumulonimbus clouds or towering cumulus clouds are detected by the automatic observing system and the cloud amount and/or the height of cloud base cannot be observed, the cloud amount and/or the height of cloud base should be replaced by "///"; and

d) the vertical visibility should be replaced by "///" when the sky is obscured and the value of the vertical visibility cannot be determined by the automatic observing system due to a temporary failure of the system or sensor.

2.2.6 Air temperature and dew-point temperature

2.2.6.1 Display

When automated equipment is used for the measurement of air temperature and dew-point temperature, air temperature and dew-point temperature displays should be located in the meteorological station with corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units should relate to the same sensors.

2.2.6.2 Reporting

2.2.6.2.1 In local routine reports, local special reports, METAR and SPECI when disseminated in code form in accordance with 2.1.1.2, the air temperature and the dew-point temperature shall be reported in steps of whole degrees Celsius. Any observed value which does not fit the reporting scale in use shall be rounded to the nearest whole degree Celsius, with observed values involving 0.5° rounded up to the next higher whole degree Celsius.

2.2.6.2.2 For METAR and SPECI disseminated in IWXXM form in accordance with 2.1.1.3, the air temperature and the dew-point temperature should be reported in tenths of degrees Celsius.

2.2.6.2.3 When temperature and dew-point temperature are provided in steps of tenths of a degree Celsius in METAR and SPECI disseminated in IWXXM form in accordance with 2.1.1.3, the reporting should be to the nearest tenth of a degree Celsius.

2.2.6.2.4 In local routine reports, local special reports, METAR and SPECI, a temperature below 0°C shall be identified.

2.2.7 Atmospheric pressure

2.2.7.1 Display

When automated equipment is used for the measurement of atmospheric pressure, QNH and, if required in accordance with 2.2.7.3.2 b), QFE displays relating to the barometer shall be located in the meteorological station with corresponding displays in the appropriate air traffic services units. When QFE values are displayed for more than one runway, as specified in 2.2.7.3.2 d), the displays shall be clearly marked to identify the runway to which the QFE value displayed refers.

2.2.7.2 Reference level

The reference level for the computation of QFE should be the aerodrome elevation. For non-precision approach runways, the thresholds of which are 2 m (7 ft) or more below the aerodrome elevation, and for precision approach runways, the QFE, if required, should refer to the relevant threshold elevation.

2.2.7.3 Reporting

2.2.7.3.1 For local routine reports, local special reports, METAR and SPECI, QNH and QFE shall be computed in tenths of hectopascals and reported therein in steps of whole hectopascals, using four digits. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower whole hectopascal.

2.2.7.3.2 In local routine report and local special report:

a) QNH shall be included;

b) QFE shall be included if required by users or as agreed between the meteorological service provider, the appropriate ATS authority and the operators concerned, on a regular basis;

c) the units of measurement used for QNH and QFE values shall be included; and

d) if QFE values are required for more than one runway, the required QFE values for each runway shall be reported and the runways to which the values refer shall be indicated.

2.2.7.3.3 In METAR and SPECI, only QNH values shall be included.

2.2.8 Supplementary information

2.2.8.1 Reporting

2.2.8.1.1 In local routine reports, local special reports, METAR and SPECI, the following recent weather phenomena, that is, weather phenomena observed at the aerodrome during the period since the last issued routine report or last hour, whichever is shorter, but not at the time of observation, should be reported, up to a maximum of three groups, in accordance with the templates shown in Tables A2-1 and A2-2, in the supplementary information:

a) freezing precipitation;

b) moderate or heavy precipitation (including showers thereof);

c) blowing snow;

d) duststorm, sandstorm;

e) thunderstorm;

f) funnel cloud (tornado or waterspout); and

g) volcanic ash.

Note.— The meteorological service provider, in consultation with users, may agree not to provide recent weather information where SPECI are issued.

2.2.8.1.2 In local routine report and local special report, the following significant meteorological conditions, or combinations thereof, should be reported in supplementary information:

– cumulonimbus clouds	CB
– thunderstorm	TS
– moderate or severe turbulence	MOD TURB, SEV TURB
– wind shear	WS
– hail	GR
– severe squall line	SEV SQL
– moderate or severe icing	MOD ICE, SEV ICE
– freezing precipitation	FZDZ, FZRA
– severe mountain waves	SEV MTW
– duststorm, sandstorm	DS, SS
– blowing snow	BLSN
– funnel cloud (tornado or waterspout)	FC

The location of the condition should be indicated. Where necessary, additional information should be included using abbreviated plain language.

Note.— Guidance on the use of terms "TURB", "GR", "SQL", "MTW", "DS" and "SS" is given in Appendix 8.

2.2.8.1.3 In automated local routine reports, local special reports, METAR and SPECI, in addition to the recent weather phenomena listed under 2.2.8.1.1, recent unknown precipitation should be reported in accordance with the template shown in Appendix 2, Tables A2-1 and A2-2 when the type of precipitation cannot be identified by the automatic observing system.

Note.— The meteorological service provider, in consultation with users, may agree not to provide recent weather information where SPECI are issued.

2.2.8.1.4 In METAR and SPECI, where local circumstances so warrant, information on wind shear should be added.

Note.— Local circumstances include, but are not necessarily limited to, wind shear of a non-transitory nature such as might be associated with low-level temperature inversions or local topography.

2.2.8.1.5 In METAR and SPECI, information on sea-surface temperature and the state of the sea or the significant wave height from aeronautical meteorological stations established on offshore structures in support of helicopter operations should be included in the supplementary information, in accordance with regional air navigation agreement.

Note.— The state of the sea is specified in the Manual on Codes *(WMO-No. 306), Volume I.1, Part A* – Alphanumeric Codes, *Code Table 3700.*

2.3 OBSERVING AND REPORTING VOLCANIC ACTIVITY

The volcanic activity report should comprise the following information in the order indicated:

a) message type, VOLCANIC ACTIVITY REPORT;

b) station identifier, location indicator or name of station;

c) date and time of message;

d) location of volcano and name if known; and

e) concise description of event including, as appropriate, level of intensity of volcanic activity, occurrence of an eruption and its date and time, and the existence of a volcanic ash cloud in the area together with direction of ash cloud movement and height.

Note.— Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

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Chapter 3

AIRCRAFT METEOROLOGICAL OBSERVATIONAL INFORMATION

3.1. REPORTING OF AIRCRAFT OBSERVATIONS

Note.— Icing, turbulence and, to a large extent, wind shear are elements which, for the time being, cannot be satisfactorily observed from the ground and for which in most cases aircraft observations represent the only available evidence.

3.1.1 Routine air-reports by air-ground data link

3.1.1.1 When air-ground data link is used and automatic dependent surveillance – contract (ADS-C) or secondary surveillance radar (SSR) Mode S is being applied, the elements contained in routine air-reports shall be:

Message type designator
Aircraft identification

Data block 1
- Latitude
- Longitude
- Level
- Time

Data block 2
- Wind direction
- Wind speed
- Wind quality flag
- Air temperature
- Turbulence (if available)
- Humidity (if available)

Note.— When ADS-C or SSR Mode S is being applied, the requirements of routine air-reports may be met by the combination of the basic ADS-C/SSR Mode S data block (data block 1) and the meteorological information data block (data block 2), available from ADS-C or SSR Mode S reports. The ADS-C message format is specified in the PANS-ATM (Doc 4444), 4.11.4 and Chapter 13 and the SSR Mode S message format is specified in Annex 10 – Aeronautical Telecommunications*, Volume III –* Communication Systems*, Part I, Chapter 5.*

3.1.1.2 When air-ground data link is used while ADS-C and SSR Mode S are not being applied, the elements contained in routine reports shall be:

Message type designator

Section 1 (Position information)
- Aircraft identification
- Position or latitude and longitude
- Time
- Flight level or altitude
- Next position and time over
- Ensuing significant point

Section 2 (Operational information)
- Estimated time of arrival
- Endurance

Section 3 (Meteorological information)
- Air temperature
- Wind direction
- Wind speed
- Turbulence
- Aircraft icing
- Humidity (if available)

Note.— When air-ground data link is used while ADS-C and SSR Mode S are not being applied, the requirements of routine air-reports may be met by the controller-pilot data link communications (CPDLC) application entitled "Position report". The details of this data link application are specified in the Manual of Air Traffic Services Data Link Applications *(Doc 9694) and in Annex 10, Volume III, Part I.*

3.1.2 Special air-reports by air-ground data link

When air-ground data link is used, the elements contained in special air-reports shall be:

Message type designator
Aircraft identification

Data block 1
- Latitude
- Longitude
- Level
- Time

Data block 2
- Wind direction
- Wind speed
- Wind quality flag
- Air temperature
- Turbulence (if available)
- Humidity (if available)

Data block 3

Condition prompting the issuance of a special air-report (one condition to be selected from the list presented in Appendix 3, Table A3-1).

Note 1.— The requirements of special air-reports may be met by the data link flight information services (D-FIS) application entitled "Special air-report service". The details of this data link application are specified in Doc 9694.

Note 2.— In the case of a special air-report of pre-eruption volcanic activity, volcanic eruption or volcanic ash cloud, additional requirements are indicated in 3.1.5.

3.1.3 Special air-reports by voice communications

When voice communications are used, the elements contained in special air-reports shall be:

Message type designator

Section 1 (Position information)

Aircraft identification
Position or latitude and longitude
Time
Level or range of levels

Section 3 (Meteorological information)

Condition prompting the issuance of a special air-report, to be selected from the list presented in Appendix 3, Table A3-1.

Note 1.— Air-reports are considered routine by default. The message type designator for special air-reports is specified in the PANS-ATM (Doc 4444), Appendix 1.

Note 2.— In the case of a special air-report of pre-eruption volcanic activity, volcanic eruption or volcanic ash cloud, additional requirements are indicated in 3.1.5.

3.1.4 Criteria for reporting

3.1.4.1 When air-ground data link is used, the wind direction, wind speed, wind quality flag, air temperature, turbulence and humidity included in air-reports shall be reported in accordance with the following criteria.

3.1.4.2 Wind direction

The wind direction shall be reported in terms of degrees true, rounded to the nearest whole degree.

3.1.4.3 Wind speed

The wind speed shall be reported in metres per second or knots, rounded to the nearest 1 m/s (1 knot). The units of measurement used for the wind speed shall be indicated.

3.1.4.4 Wind quality flag

The wind quality flag shall be reported as 0 when the roll angle is less than 5 degrees and as 1 when the roll angle is 5 degrees or more.

3.1.4.5 Air temperature

The air temperature shall be reported to the nearest tenth of a degree Celsius.

3.1.4.6 Turbulence

The turbulence shall be reported in terms of the eddy dissipation rate (EDR).

Note.— The EDR is an aircraft-independent measure of turbulence. However, the relationship between the EDR value and the perception of turbulence is a function of aircraft type and the mass, altitude, configuration and airspeed of the aircraft. The EDR values given below describe the severity levels for a medium-sized transport aircraft under typical en-route conditions (that is, altitude, airspeed and weight).

3.1.4.6.1 Routine air-reports

The turbulence shall be reported during the en-route phase of the flight and shall refer to the 15-minute period immediately preceding the observation. Both the average and peak value of turbulence, together with the time of occurrence of the peak value to the nearest minute, shall be observed. The average and peak values shall be reported in terms of EDR. The time of occurrence of the peak value shall be reported as indicated in Appendix 3, Table A3-3. The turbulence shall be reported during the climb-out phase for the first 10 minutes of the flight and shall refer to the 30-second period immediately preceding the observation. The peak value of turbulence shall be observed.

3.1.4.6.2 Interpretation of the turbulence report

Turbulence shall be considered:

a) severe when the peak value of EDR is equal to or above 0.45;

b) moderate when the peak value of EDR is equal to or above 0.20 and below 0.45;

c) light when the peak value of EDR is above 0.10 and below 0.20; and

d) nil when the peak value of EDR is below or equal to 0.10.

3.1.4.6.3 Special air-reports

Special air-reports on turbulence shall be made during any phase of the flight whenever the peak value of EDR equals or exceeds 0.20. The special air-report on turbulence shall be made with reference to the 1-minute period immediately preceding the observation. Both the average and peak value of turbulence shall be observed. The average and peak values shall be reported in terms of EDR. Special air-reports shall be issued every minute until such time as the peak values of EDR fall below 0.20.

3.1.4.7 Humidity

The humidity shall be reported as the relative humidity, rounded to the nearest whole per cent.

Note.— The ranges and resolutions for the meteorological elements included in air-reports are shown in Appendix 3, Table A3-4.

3.1.5 Specific procedures for post-flight reporting of volcanic activity

3.1.5.1 Special aircraft observations of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud shall be recorded on the special air-report of volcanic activity form. A copy of the form shall be included with the flight documentation provided to flights operating on routes which, in the opinion of the meteorological service provider concerned, could be affected by volcanic ash clouds.

Note.— The detailed instructions for recording and reporting volcanic activity observations are given in the PANS-ATM (Doc 4444), Appendix 1.

3.1.5.2 On arrival of a flight at an aerodrome, the completed report of volcanic activity shall be delivered by the operator or a flight crew member, without delay, to the aerodrome meteorological office, or if such office is not easily accessible to arriving flight crew members, the completed form shall be dealt with in accordance with local arrangements made by the meteorological service provider and the operator.

3.1.5.3 The completed report of volcanic activity received by an aerodrome meteorological office shall be transmitted without delay to the meteorological watch office responsible for the provision of meteorological watch for the flight information region in which the volcanic activity was observed.

3.2 OTHER NON-ROUTINE AIRCRAFT OBSERVATIONS AND REPORTS

3.2.1 Reporting of wind shear

3.2.1.1 When reporting aircraft observations of wind shear encountered during the climb-out and approach phases of flight, the aircraft type should be included.

3.2.1.2 Where wind shear conditions in the climb-out or approach phases of flight were reported or forecast but not encountered, the pilot-in-command should advise the appropriate air traffic services unit as soon as practicable unless the pilot-in-command is aware that the appropriate air traffic services unit has already been so advised by a preceding aircraft.

Chapter 4

AERODROME METEOROLOGICAL FORECAST INFORMATION

Note.— Guidance on operationally desirable accuracy of forecasts is given in Attachment B.

4.1 AERODROME FORECASTS

4.1.1 Format, issuance and period of validity

4.1.1.1 Aerodrome forecasts (TAF) shall be issued and disseminated in the TAF code form prescribed by the World Meteorological Organization (WMO), in accordance with the template shown in Appendix 4, Table A4-1, following the content and order of elements indicated therein.

Note 1.— The TAF code form is contained in the Manual on Codes *(WMO-No. 306), Volume I.1, Part A –* Alphanumeric Codes*.*

Note 2.— In addition to the meteorological information listed in Annex 3, 6.2.1.3, TAF also contains: a) identification of the type of forecast; b) location indicator; c) time of issue of forecast; d) identification of a missing forecast, when applicable; e) date and period of validity of forecast; and f) identification of a cancelled forecast, when applicable, as indicated in the template shown in Appendix 4, Table A4-1.

4.1.1.2 TAF shall be disseminated in ICAO meteorological information exchange model (IWXXM) form in addition to the dissemination of the TAF in accordance with 4.1.1.1.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D –* Representations Derived from Data Models*. Guidance on the implementation of IWXXM is provided in the* Manual on the ICAO Meteorological Information Exchange Model *(Doc 10003).*

4.1.2 Inclusion of meteorological elements in aerodrome forecasts

4.1.2.1 Surface wind

In forecasting surface wind, the expected prevailing direction shall be given. When it is not possible to forecast a prevailing surface wind direction due to its expected variability, for example, during light wind conditions (less than 1.5 m/s (3 kt)) or thunderstorms, the forecast wind direction shall be indicated as variable using “VRB”. When the wind is forecast to be less than 0.5 m/s (1 kt), the forecast wind speed shall be indicated as calm. When the forecast maximum speed (gust) exceeds the forecast mean wind speed by 5 m/s (10 kt) or more, the forecast maximum wind speed shall be indicated. When a wind speed of 50 m/s (100 kt) or more is forecast, it shall be indicated to be more than 49 m/s (99 kt).

4.1.2.2 Visibility

When the visibility is forecast to be less than 800 m, it should be expressed in steps of 50 m; when it is forecast to be 800 m or more but less than 5 km, in steps of 100 m; 5 km or more but less than 10 km, in kilometre steps; and when it is forecast to be 10 km or more, it should be expressed as 10 km, except when conditions of CAVOK are forecast to apply. The prevailing visibility should be forecast. When visibility is forecast to vary in different directions and the prevailing visibility cannot be forecast, the lowest forecast visibility should be given.

4.1.2.3 Weather phenomena

One or more, up to a maximum of three, of the following weather phenomena or combinations thereof, together with their characteristics and, where appropriate, intensity, shall be forecast if they are expected to occur at the aerodrome:

- freezing precipitation;
- freezing fog;
- moderate or heavy precipitation (including showers thereof);
- low drifting dust, sand or snow;
- blowing dust, sand or snow;
- duststorm;
- sandstorm;
- thunderstorm (with or without precipitation);
- squall;
- funnel cloud (tornado or waterspout); and
- other weather phenomena given in 2.2.4.2.3, as agreed between the meteorological service provider, the appropriate ATS authority and the operators concerned.

The expected end of occurrence of those phenomena shall be indicated by the abbreviation “NSW”.

4.1.2.4 Cloud

Cloud amount should be forecast using the abbreviations “FEW”, “SCT”, “BKN” or “OVC” as necessary. When it is expected that the sky will remain or become obscured and clouds cannot be forecast and information on vertical visibility is available at the aerodrome, the vertical visibility should be forecast in the form “VV” followed by the forecast value of the vertical visibility. When several layers or masses of cloud are forecast, their amount and height of base should be included in the following order:

a) the lowest layer or mass regardless of amount, to be forecast as FEW, SCT, BKN or OVC as appropriate;

b) the next layer or mass covering more than 2/8, to be forecast as SCT, BKN or OVC as appropriate;

c) the next higher layer or mass covering more than 4/8, to be forecast as BKN or OVC as appropriate; and

d) cumulonimbus clouds and/or towering cumulus clouds, whenever forecast and not already included under a) to c).

Cloud information should be limited to cloud of operational significance; when no cloud of operational significance is forecast, and “CAVOK” is not appropriate, the abbreviation “NSC” should be used.

4.1.2.5 Temperature

When forecast temperatures are included in accordance with regional air navigation agreement, the maximum and minimum temperatures expected to occur during the period of validity of the TAF should be given, together with their corresponding times of occurrence.

4.1.3 Use of change groups

Note.— Guidance on the use of change and time indicators in TAF is given in Appendix 4, Table A4-2.

4.1.3.1 The criteria used for the inclusion of change groups in TAF or for the amendment of TAF shall be based on any of the following weather phenomena or combinations thereof being forecast to begin or end or change in intensity:

– freezing fog;
– freezing precipitation;
– moderate or heavy precipitation (including showers);
– thunderstorm;
– duststorm; and
– sandstorm.

4.1.3.2 The criteria used for the inclusion of change groups in TAF or for the amendment of TAF should be based on the following:

a) when the mean surface wind direction is forecast to change by 60º or more, the mean speed before and/or after the change being 5 m/s (10 kt) or more;

b) when the mean surface wind speed is forecast to change by 5 m/s (10 kt) or more;

c) when the variation from the mean surface wind speed (gusts) is forecast to change by 5 m/s (10 kt) or more, the mean speed before and/or after the change being 7.5 m/s (15 kt) or more;

d) when the surface wind is forecast to change through values of operational significance. The threshold values should be established by the meteorological service provider in consultation with the appropriate ATS authority and the operators concerned, taking into account changes in the wind which would:

   1) require a change in runway(s) in use; and

   2) indicate that the runway tailwind and crosswind components will change through values representing the main operating limits for typical aircraft operating at the aerodrome;

e) when the visibility is forecast to improve and change to or pass through one or more of the following values, or when the visibility is forecast to deteriorate and pass through one or more of the following values:

   1) 150, 350, 600, 800, 1 500 or 3 000 m; or

   2) 5 000 m in cases where significant numbers of flights are operated in accordance with the visual flight rules;

f) when any of the following weather phenomena or combinations thereof are forecast to begin or end:

1) low drifting dust, sand or snow; or

2) blowing dust, sand or snow; or

3) squall; or

4) funnel cloud (tornado or waterspout);

g) when the height of base of the lowest layer or mass of cloud of BKN or OVC extent is forecast to lift and change to or pass through one or more of the following values, or when the height of the lowest layer or mass of cloud of BKN or OVC extent is forecast to lower and pass through one or more of the following values:

1) 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); or

2) 450 m (1 500 ft) in cases where significant numbers of flights are operated in accordance with the visual flight rules;

h) when the amount of a layer or mass of cloud below 450 m (1 500 ft) is forecast to change:

1) from NSC, FEW or SCT to BKN or OVC; or

2) from BKN or OVC to NSC, FEW or SCT;

i) when the vertical visibility is forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and

j) any other criteria based on local aerodrome operating minima, as agreed between the meteorological service provider and the operators concerned.

Note.— Other criteria based on local aerodrome operating minima are to be considered in parallel with similar criteria for the issuance of SPECI developed in response to 2.1.2.2.2 h).

4.1.3.3 When a change in any of the elements given in Annex 3, 6.2.1.3 is required to be indicated in accordance with the criteria given in 4.1.3.2, the change indicators “BECMG” or “TEMPO” should be used followed by the time period during which the change is expected to occur. The time period should be indicated as the beginning and end of the period in whole hours UTC. Only those elements for which a significant change is expected should be included following a change indicator. However, in the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change, should be indicated.

4.1.3.4 The change indicator “BECMG” and the associated time group should be used to describe changes where the meteorological conditions are expected to reach or pass through specified threshold values at a regular or irregular rate and at an unspecified time during the time period. The time period should normally not exceed 2 hours but in any case, should not exceed 4 hours.

4.1.3.5 The change indicator “TEMPO” and the associated time group should be used to describe expected frequent or infrequent temporary fluctuations in the meteorological conditions which reach or pass specified threshold values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one-half of the forecast period during which the fluctuations are expected to occur. If the temporary fluctuation is expected to last one hour or longer, the change group “BECMG” should be used in accordance with 4.1.3.4 or the validity period should be subdivided in accordance with 4.1.3.6.

4.1.3.6 Where one set of prevailing weather conditions is expected to change significantly and more or less completely to a different set of conditions, the period of validity should be subdivided into self-contained periods using the abbreviation "FM" followed immediately by a six-figure time group in days, hours and minutes UTC indicating the time the change is expected to occur. The subdivided period following the abbreviation "FM" should be self-contained and all forecast conditions given before the abbreviation should be superseded by those following the abbreviation.

4.1.4 Use of probability groups

The probability of occurrence of an alternative value of a forecast element or elements should be indicated, as necessary, by use of the abbreviation "PROB" followed by the probability in tens of per cent and the time period during which the alternative value(s) is (are) expected to apply. The probability information should be placed after the element or elements forecast and be followed by the alternative value of the element or elements. The probability of a forecast of temporary fluctuations in meteorological conditions should be indicated, as necessary, by use of the abbreviation "PROB" followed by the probability in tens of per cent, placed before the change indicator "TEMPO" and associated time group. A probability of an alternative value or change of less than 30 per cent should not be considered sufficiently significant to be indicated. A probability of an alternative value or change of 50 per cent or more, for aviation purposes, should not be considered a probability but instead should be indicated, as necessary, by use of the change indicators "BECMG" or "TEMPO" or by subdivision of the validity period using the abbreviation "FM". The probability group should not be used to qualify the change indicator "BECMG" nor the time indicator "FM".

4.1.5 Numbers of change and probability groups

The number of change and probability groups should be kept to a minimum and should not normally exceed five groups.

4.2 LANDING FORECASTS (TREND FORECASTS)

4.2.1 Trend forecasts: format and period of validity

4.2.1.1 Trend forecasts shall be issued in

a) abbreviated plain language, in accordance with the template shown in Appendix 2, Table A2-1; or

b) the METAR and SPECI code forms prescribed by WMO, in accordance with the template shown in Appendix 2, Table A2-2.

Note.— Examples of trend forecasts are given in Appendix 2.

4.2.1.2 Trend forecasts shall be disseminated in IWXXM form in addition to the dissemination of the trend forecasts in accordance with 4.2.1.1 b).

4.2.2 Inclusion of meteorological elements in trend forecasts

4.2.2.1 General provisions

The trend forecast shall indicate significant changes in respect of one or more of the elements: surface wind, visibility, weather and clouds. Only those elements shall be included for which a significant change is expected. However, in the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change, shall be indicated. In the case of a significant change in visibility, the phenomenon causing the reduction of visibility shall also be indicated. When no change is expected to occur, this shall be indicated by the term “NOSIG”.

4.2.2.2 Surface wind

The trend forecast shall indicate changes in the surface wind which involve:

a) a change in the mean wind direction of 60° or more, the mean speed before and/or after the change being 5 m/s (10 kt) or more;

b) a change in mean wind speed of 5 m/s (10 kt) or more; and

c) changes in the wind through values of operational significance. The threshold values shall be established by the meteorological service provider in consultation with the appropriate ATS authority and the operators concerned, taking into account changes in the wind which would:

   1) require a change in runway(s) in use; and

   2) indicate that the runway tailwind and crosswind components will change through values representing the main operating limits of typical aircraft operating at the aerodrome.

4.2.2.3 Visibility

When the visibility is expected to improve and change to or pass through one or more of the following values, or when the visibility is expected to deteriorate and pass through one or more of the following values: 150, 350, 600, 800, 1 500 or 3 000 m, the trend forecast shall indicate the change. When significant numbers of flights are conducted in accordance with the visual flight rules, the forecast shall additionally indicate changes to or passing through 5 000 m.

Note.— In trend forecasts appended to local routine report and local special report, visibility refers to the forecast visibility along the runway(s); in trend forecasts appended to METAR and SPECI, visibility refers to the forecast prevailing visibility.

4.2.2.4 Weather phenomena

4.2.2.4.1 The trend forecast shall indicate the expected onset, cessation or change in intensity of one or more of the following weather phenomena or combinations thereof:

a) freezing precipitation;

b) moderate or heavy precipitation (including showers);

c) thunderstorm (with precipitation);

d) duststorm;

e) sandstorm; and

f) other weather phenomena given in 2.2.4.2.3, as agreed between the meteorological service provider, the appropriate ATS authority and the operators concerned.

4.2.2.4.2 The trend forecast shall indicate the expected onset or cessation of one or more of the following weather phenomena or combinations thereof:

a) freezing fog;

b) low drifting dust, sand or snow;

c) blowing dust, sand or snow;

d) thunderstorm (without precipitation);

e) squall; and

f) funnel cloud (tornado or waterspout).

4.2.2.4.3 The total number of phenomena reported in 4.2.2.4.1 and 4.2.2.4.2 shall not exceed three.

4.2.2.4.4 The expected end of occurrence of the weather phenomena shall be indicated by the abbreviation “NSW”.

4.2.2.5 Clouds

When the height of the base of a cloud layer of BKN or OVC extent is expected to lift and change to or pass through one or more of the following values, or when the height of the base of a cloud layer of BKN or OVC extent is expected to lower and pass through one or more of the following values: 30, 60, 150, 300 and 450 m (100, 200, 500, 1 000 and 1 500 ft), the trend forecast shall indicate the change. When the height of the base of a cloud layer is below or is expected to fall below or rise above 450 m (1 500 ft), the trend forecast shall also indicate changes in cloud amount from FEW, or SCT increasing to BKN or OVC, or changes from BKN or OVC decreasing to FEW or SCT. When no clouds of operational significance are forecast and “CAVOK” is not appropriate, the abbreviation “NSC” shall be used.

4.2.2.6 Vertical visibility

When the sky is expected to remain or become obscured and vertical visibility observations are available at the aerodrome, and the vertical visibility is forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft), the trend forecast shall indicate the change.

4.2.2.7 Additional criteria

Criteria for the indication of changes based on local aerodrome operating minima, additional to those specified in 4.2.2.2 to 4.2.2.6, shall be used as agreed between the meteorological service provider and the operator concerned.

4.2.3 Use of change groups

Note.— Guidance on the use of change indicators in trend forecasts is given in Appendix 2, Table A2-3.

4.2.3.1 When a change is expected to occur, the trend forecast shall begin with one of the change indicators "BECMG" or "TEMPO".

4.2.3.2 The change indicator "BECMG" shall be used to describe forecast changes where the meteorological conditions are expected to reach or pass through specified values at a regular or irregular rate. The period during which, or the time at which, the change is forecast to occur shall be indicated, using the abbreviations "FM", "TL" or "AT", as appropriate, each followed by a time group in hours and minutes. When the change is forecast to begin and end wholly within the trend forecast period, the beginning and end of the change shall be indicated by using the abbreviations "FM" and "TL", respectively, with their associated time groups. When the change is forecast to commence at the beginning of the trend forecast period but be completed before the end of that period, the abbreviation "FM" and its associated time group shall be omitted and only "TL" and its associated time group shall be used. When the change is forecast to begin during the trend forecast period and be completed at the end of that period, the abbreviation "TL" and its associated time group shall be omitted and only "FM" and its associated time group shall be used. When the change is forecast to occur at a specified time during the trend forecast period, the abbreviation "AT" followed by its associated time group shall be used. When the change is forecast to commence at the beginning of the trend forecast period and be completed by the end of that period or when the change is forecast to occur within the trend forecast period but the time is uncertain, the abbreviations "FM", "TL" or "AT" and their associated time groups shall be omitted and the change indicator "BECMG" shall be used alone.

4.2.3.3 The change indicator "TEMPO" shall be used to describe forecast temporary fluctuations in the meteorological conditions which reach or pass specified values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one-half of the period during which the fluctuations are forecast to occur. The period during which the temporary fluctuations are forecast to occur shall be indicated, using the abbreviations "FM" and/or "TL", as appropriate, each followed by a time group in hours and minutes. When the period of temporary fluctuations in the meteorological conditions is forecast to begin and end wholly within the trend forecast period, the beginning and end of the period of temporary fluctuations shall be indicated by using the abbreviations "FM" and "TL", respectively, with their associated time groups. When the period of temporary fluctuations is forecast to commence at the beginning of the trend forecast period but cease before the end of that period, the abbreviation "FM" and its associated time group shall be omitted and only "TL" and its associated time group shall be used. When the period of temporary fluctuations is forecast to begin during the trend forecast period and cease by the end of that period, the abbreviation "TL" and its associated time group shall be omitted and only "FM" and its associated time group shall be used. When the period of temporary fluctuations is forecast to commence at the beginning of the trend forecast period and cease by the end of that period, both abbreviations "FM" and "TL" and their associated time groups shall be omitted and the change indicator "TEMPO" shall be used alone.

4.2.4 Use of the probability indicator

The indicator "PROB" shall not be used in trend forecasts.

4.3 FORECASTS FOR TAKE-OFF

4.3.1 Format of forecasts for take-off

The format of the forecast should be as agreed between the meteorological service provider and the operators concerned. The order of the elements and the terminology, units of measurement and scales used in forecasts for take-off should be the same as those used in reports for the same aerodrome.

4.3.2 Amendments to forecasts for take-off

The criteria for the issuance of amendments to forecasts for take-off for surface wind direction and speed, temperature and pressure and any other elements agreed locally should be agreed between the meteorological service provider and the operators concerned. The criteria should be consistent with the corresponding criteria for special reports established for the aerodrome in accordance with 2.1.2.1.

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Chapter 5

EN-ROUTE METEOROLOGICAL FORECAST INFORMATION

5.1 FORECASTS ISSUED BY THE WORLD AREA FORECAST CENTRES

5.1.1 Upper-air gridded forecasts

5.1.1.1 The forecasts of upper winds; upper-air temperature; and humidity; direction, speed and flight level of maximum wind; flight level and temperature of tropopause, areas of cumulonimbus clouds, icing, turbulence and geopotential altitude of flight levels shall be prepared four times a day by the world area forecast centres (WAFCs) and shall be valid for fixed valid times as specified in Appendix 5, Tables A5-1 and A5-2. Each forecast shall be made available as soon as technically feasible but not later than 5 hours after standard time of observation for the forecasts with a validity up to 36 hours.

5.1.1.2 The grid point forecasts prepared by the WAFCs shall comprise:

a) wind and temperature;

b) flight level and temperature of tropopause;

c) direction, speed and flight level of maximum wind;

d) humidity data for flight levels 50 (850 hPa), 80 (750 hPa), 100 (700 hPa), 140 (600 hPa) and 180 (500 hPa);

e) horizontal extent and flight levels of base and top of cumulonimbus clouds;

f) icing;

g) turbulence; and

Note.— Turbulence encompasses all types of turbulence, including clear-air and in-cloud turbulence.

h) geopotential altitude.

Note.— Flight levels and exact pressure levels (hPa) for grid point forecasts listed in a), d), f), g) and h) are specified in Appendix 5, Tables A5-3 and A5-4.

5.1.1.3 The foregoing grid point forecasts shall be issued by the WAFCs in an appropriate gridded code form prescribed by the World Meteorological Organization (WMO).

Note.— Appropriate gridded code forms prescribed by the WMO are contained in the volumes of the Manual on Codes *(WMO-No. 306).*

5.1.1.4 Grid point forecasts shall be prepared by the WAFCs in a regular grid with a horizontal resolution of 0.25° of latitude and longitude as specified in Appendix 5, Table A5-3.

5.1.1.5 A subset of the grid point forecasts in 5.1.1.4 shall be prepared by the WAFCs in a regular grid with horizontal resolution of 1.25° of latitude and longitude as specified in Appendix 5, Table A5-4.

5.1.2 Significant weather forecasts

5.1.2.1 General provisions

5.1.2.1.1 Forecasts of significant en-route weather phenomena shall be prepared as significant weather (SIGWX) forecasts four times a day by the WAFCs and shall be valid for fixed valid times as specified in Appendix 5, Table A5-5. Each forecast shall be made available as soon as technically feasible but not later than 7 hours after standard time of observation.

5.1.2.1.2 SIGWX forecasts shall be issued by the WAFCs for flight levels 100 to 600 inclusive.

5.1.2.1.3 SIGWX forecasts shall be disseminated by the WAFCs in IWXXM form in accordance with Appendix 5, Table A5-5.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D* – Representations Derived from Data Models*. Guidance on the implementation of IWXXM is provided in the* Manual on the ICAO Meteorological Information Exchange Model *(Doc 10003).*

5.1.2.1.4 Until 25 November 2026, a subset of SIGWX forecasts in 5.1.2.1.3, as specified in Appendix 5, Table A5-5, shall be issued in binary code form using the BUFR code form prescribed by WMO.

Note.— The BUFR code form is contained in the Manual on Codes *(WMO-No. 306)*, *Volume I.2, Part B* – Binary Codes.

5.1.2.1.5 A subset of SIGWX forecasts in 5.1.2.1.3 shall be issued by the WAFCs in portable network graphics (PNG) format as specified in Appendix 5, Table A5-5.

5.1.2.2 Items included in significant weather forecasts

SIGWX forecasts shall include the following items:

a) tropical cyclone provided that the maximum of the 10-minute mean surface wind speed is expected to reach or exceed 17 m/s (34 kt);

Note.— Tropical cyclone is included in SIGWX forecasts based on tropical cyclone advisory information provided by a tropical cyclone advisory centre (TCAC).

b) moderate or severe turbulence not associated with convective cloud;

c) moderate or severe icing;

Note.— Icing is included in SIGWX forecasts made available in IWXXM form but not in SIGWX forecasts made available in BUFR and PNG format.

d) widespread sandstorm/duststorm;

e) cumulonimbus clouds associated with thunderstorms;

f) flight level of tropopause;

g) jet streams;

h) information on the location of volcanic eruptions that are producing ash clouds of significance to aircraft operations, comprising: volcanic eruption symbol at the location of the volcano and, in a separate text box on the chart, the volcanic eruption symbol, the name of the volcano (if known) and the latitude/longitude of the eruption. In addition, the legend of SIGWX charts should indicate "CHECK SIGMET, ADVISORIES FOR TC AND VA, AND ASHTAM AND NOTAM FOR VA"; and

i) information on the location of a release of radioactive materials into the atmosphere of significance to aircraft operations, comprising: the radioactive materials in the atmosphere symbol at the location of the release and, in a separate text box on the chart, the radioactive materials in the atmosphere symbol, latitude/longitude of the site of the release, and (if known) the name of site of the radioactive source. In addition, the legend of SIGWX charts on which a release of radiation is indicated should contain "CHECK SIGMET AND NOTAM FOR RDOACT CLD".

Note.— Items to be included in low-level SIGWX forecasts (that is, flight levels below 100) are included in 5.2.

5.1.2.3 Criteria for including items in significant weather forecasts

The following criteria shall be applied for SIGWX forecasts:

a) the abbreviation "CB" shall only be included when it refers to the occurrence or expected occurrence of cumulonimbus clouds affecting an area with a spatial coverage of 50 per cent or more of the area concerned;

b) the inclusion of "CB" shall be understood to include all weather phenomena normally associated with cumulonimbus clouds, that is, thunderstorm, moderate or severe icing, moderate or severe turbulence and hail;

c) where a volcanic eruption or a release of radioactive materials into the atmosphere warrants the inclusion of the volcanic eruption symbol or the radioactive materials in the atmosphere symbol in SIGWX forecasts, the symbols shall be included on SIGWX forecasts irrespective of the height to which the ash column or radioactive material is reported or expected to reach; and

d) in the case of co-incident or the partial overlapping of items a), h) and i) in 5.1.2.2, the highest priority shall be given to item h), followed by items i) and a). The item with the highest priority shall be placed at the location of the event, and an arrow shall be used to link the location of the other item(s) to its associated symbol or text box.

5.1.3 Use of forecasts issued by the world area forecast centres

5.1.3.1 Aerodrome meteorological offices shall use forecasts issued by the WAFCs in the preparation of flight documentation, whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological service provider and the operator concerned.

5.1.3.2 In order to ensure uniformity and standardization of flight documentation, the world area forecast system (WAFS) gridded code form and IWXXM form received from the WAFCs shall be decoded into standard WAFS charts in accordance with relevant provisions in this PANS and Annex 3, and the meteorological content and identification of the originator of the forecasts provided by the WAFCs shall not be amended.

Note.— The word "chart" refers to the visualisation of WAFS gridded forecasts and IWXXM data.

5.1.4 Notification of world area forecast centre concerning significant discrepancies

Aerodrome meteorological offices using SIGWX data issued by the WAFCs shall notify the WAFC concerned if significant discrepancies are detected between the SIGWX forecast and conditions reported by aircraft.

Note.— Guidance on reporting significant discrepancies is provided in the Manual of Aeronautical Meteorological Practice *(Doc 8896).*

5.2 AREA FORECASTS FOR LOW-LEVEL FLIGHTS IN ABBREVIATED PLAIN LANGUAGE (GAMET) AND IN CHART FORM

5.2.1 Area forecasts for low-level flights in abbreviated plain language (GAMET): format and content

When area forecasts for low-level flights are prepared in abbreviated plain language, the GAMET format shall be used. It shall contain two sections: Section I related to information on en-route weather phenomena hazardous to low-level flights, prepared in support of the issuance of AIRMET information, and Section II related to additional information required by low-level flights. GAMET area forecasts shall be issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, in accordance with the template shown in Appendix 6, Table A6-1, following the content and order of elements indicated therein. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, shall be used to describe elements for which the template allows the use of free text. Additional elements in Section II shall be included in accordance with regional air navigation agreement. Elements which are already covered by SIGMET information shall be omitted from GAMET area forecasts.

5.2.2 Amendments to area forecasts for low-level flights in abbreviated plain language (GAMET)

When a weather phenomenon hazardous to low-level flights has been included in the GAMET area forecast and the phenomenon forecast does not occur, or is no longer forecast, a GAMET AMD shall be issued, amending only the weather element concerned.

Note.— Specifications regarding the issuance of AIRMET information amending the area forecast in respect of weather phenomena hazardous for low-level flights are given in Chapter 6.

5.2.3 Area forecasts for low-level flights in chart form: content

5.2.3.1 When chart form is used for area forecasts for low-level flights, the forecast of upper wind and upper-air temperature shall be issued for points separated by no more than 500 km (300 NM) and for at least the following altitudes: 600, 1 500 and 3 000 m (2 000, 5 000 and 10 000 ft), and 4 500 m (15 000 ft) in mountainous areas.

5.2.3.2 When chart form is used for area forecasts for low-level flights, the forecast of SIGWX phenomena shall be issued as low-level SIGWX forecast for flight levels up to 100 (or up to flight level 150 in mountainous areas, or higher, where necessary). Low-level SIGWX forecasts shall include the following items:

a) the phenomena prompting the issuance of a SIGMET as given in Chapter 6 and which are expected to affect low-level flights; and

b) the elements in area forecasts for low-level flights as given in Appendix 6, Table A6-1 except elements concerning:

   1) upper wind and upper-air temperature; and

   2) forecast QNH.

Note.— Guidance on the use of terms "ISOL", "OCNL" and "FRQ" referring to cumulonimbus and towering cumulus clouds and thunderstorms is given in Appendix 8.

5.3 FORECASTS OF QUANTITATIVE VOLCANIC ASH CONCENTRATION INFORMATION

5.3.1 Grid point forecasts of quantitative volcanic ash concentration shall be prepared by a volcanic ash advisory centre (VAAC) in a regular grid with a horizontal resolution of 0.25° of latitude and longitude and vertical height ranges, in accordance with Appendix 9, Table A9-1.

5.3.2 In addition to 5.3.1, a VAAC shall prepare relative frequency of exceedance probabilities for the volcanic ash concentration thresholds of 10, 5, 2 and 0.2 mg/m^3.

5.3.3 Forecasts of quantitative volcanic ash concentration information shall be valid for fixed times of 0, 3, 6, 9, 12, 15, 18, 21 and 24 hours after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based.

5.3.4 Updated forecasts of quantitative volcanic ash concentration information shall be issued as necessary but at least every six hours until the volcanic ash "cloud" is no longer considered to be significant.

Note.— Significant volcanic ash "clouds" in this context means an ash "cloud" that poses a widespread impact to aircraft operations and air navigation. Guidance on the criteria is provided in the Handbook on the International Airways Volcano Watch (IAVW) – Operational Procedures and Contact List *(Doc 9766).*

5.3.5 Forecasts of quantitative volcanic ash concentration information shall be disseminated in an appropriate gridded code form prescribed by the WMO.

Note.— Appropriate gridded code forms prescribed by the WMO are contained in the Manual on Codes *(WMO-No. 306).*

5.3.6 In addition to 5.3.5, quantitative volcanic ash concentration information shall be made available as objects in IWXXM form for the very high, high, medium and low quantitative volcanic ash concentration ranges given in Appendix 9, Table A9-2.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO – No.306), Volume I.3, Part D –* Representations Derived from Data Models*. Guidance on the implementation of IWXXM is provided in the* Manual on the ICAO Meteorological Information Exchange Model *(Doc 10003).*

Chapter 6

METEOROLOGICAL INFORMATION CONTAINING ADVISORIES, ALERTS, WARNINGS AND NOTICES

Note.— Data type designators to be used in abbreviated headings for SIGMET, AIRMET, tropical cyclone and volcanic ash advisory information and the volcano observatory notice for aviation are given in the Manual on the Global Telecommunication System *(WMO-No. 386).*

6.1 VOLCANIC ASH ADVISORY INFORMATION AND INFORMATION FROM STATE VOLCANO OBSERVATORIES

6.1.1 The advisory information on volcanic ash shall be issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, in accordance with the template shown in Appendix 7, Table A7-2. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, shall be used to describe elements for which the template allows the use of free text.

6.1.2 Volcanic ash advisory information shall be disseminated in ICAO meteorological information exchange model (IWXXM) form in addition to the dissemination of this advisory information in abbreviated plain language in accordance with 6.1.1.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D –* Representations Derived from Data Models*. Guidance on the implementation of IWXXM is provided in the* Manual on the ICAO Meteorological Information Exchange Model *(Doc 10003).*

6.1.3 The volcanic ash advisory information listed in Appendix 7, Table A7-2, when prepared in graphical format, shall be as specified in Appendix 1 and issued using the portable network graphics (PNG) format.

6.1.4 State volcano observatories should issue information on volcanic activity and/or volcanic ash in the atmosphere as the volcano observatory notice for aviation (VONA).

6.1.5 VONA shall be in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, and shall be in accordance with the template shown in Appendix 7, Table A7-1. When no approved ICAO abbreviations are available, English plain language text, kept to a minimum, shall be used to describe elements for which the template allows the use of free text.

6.1.6 VONA should be disseminated in IWXXM form in addition to its dissemination of the notice in abbreviated plain language in accordance with 6.1.5.

Note 1.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D –* Representations Derived from Data Models*. Guidance on the implementation of IWXXM is provided in the* Manual on the Digital Exchange of Aeronautical Meteorological Information *(Doc 10003).*

Note 2. — A State volcano observatory may seek the assistance of its associated volcanic ash advisory centre (VAAC) or meteorological office in order to disseminate VONA in IWXXM form.

6.1.7 Only the following aviation colour codes shall be reported in the VONA:

a) GREEN – the volcano is in a normal, non-eruptive state; or, volcanic activity is considered to have ceased, and the volcano has reverted to its normal, non-eruptive state;

b) YELLOW – the volcano is experiencing signs of elevated unrest above known background levels; or volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase;

c) ORANGE – the volcano is exhibiting heightened unrest with increased likelihood of an eruption; or a volcanic eruption is under way but with no or minor volcanic ash emission;

d) RED – a volcanic eruption is expected to be imminent with significant emission of volcanic ash into the atmosphere likely; or a volcanic eruption is under way with significant emission of volcanic ash into the atmosphere; and

e) UNASSIGNED – there is insufficient information available to assess the current status of the volcano or volcanic activity.

Note.— The aviation colour code applies only to current volcanic activity associated with a volcano and does not apply to re-suspended volcanic ash.

6.1.8 VONA shall be updated:

a) whenever there is a change in the aviation colour code; or

b) at least once every 24 hours whenever the aviation colour code is unchanged at red; or

c) at least once every seven days whenever the aviation colour code is unchanged at orange; or

d) at least twice per month whenever the aviation colour code is unchanged at yellow.

Note.— Further information on the VONA is included in the Handbook on the International Airways Volcano Watch (IAVW) – Operational Procedures and Contact List *(Doc 9766) which is available on the ICAO Meteorology Panel (METP) public website and on the World Organization of Volcano Observatories (WOVO) website.*

6.2 TROPICAL CYCLONE ADVISORY INFORMATION

6.2.1 The advisory information on tropical cyclones shall be issued for tropical cyclones when the maximum of the 10-minute mean surface wind speed is expected to reach or exceed 17 m/s (34 kt) during the period covered by the advisory.

6.2.2 The advisory information on tropical cyclones shall be issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, in accordance with the template shown in Appendix 7, Table A7-3. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, shall be used to describe elements for which the template allows the use of free text.

6.2.3 Tropical cyclone advisory centres shall disseminate tropical cyclone advisory information in IWXXM form in addition to the dissemination of this advisory information in abbreviated plain language in accordance with 6.2.2.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D –* Representations Derived from Data Models*. Guidance on the implementation of IWXXM is provided in the* Manual on the ICAO Meteorological Information Exchange Model *(Doc 10003).*

6.2.4 The tropical cyclone advisory information listed in Appendix 7, Table A7-3, when prepared in graphical format, shall be as specified in Appendix 1 and issued using the PNG format.

6.3 SPACE WEATHER ADVISORY INFORMATION

Note.— Guidance on the provision of space weather advisory information, including the ICAO-designated provider(s) of space weather advisory information, is provided in the Manual on Space Weather Information in Support of International Air Navigation *(Doc 10100)*.

6.3.1 Advisory information on space weather shall be issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, and shall be in accordance with the templates shown in Appendix 7, Table A7-4. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, shall be used to describe elements for which the template allows the use of free text.

6.3.2 Space weather advisory information shall be disseminated in IWXXM form, in addition to the dissemination of this advisory information in abbreviated plain language in accordance with 6.3.1.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO–No. 306), Volume I.3, Part D –* Representations Derived from Data Models*. Guidance on the implementation of IWXXM is provided in the* Manual on the ICAO Meteorological Information Exchange Model *(Doc 10003).*

6.3.3 One of the following space weather effects shall be included in the space weather advisory information, using their respective abbreviations as indicated below:

HF communication (propagation, absorption)	HF COM
communication via satellite (propagation, absorption)	SATCOM
GNSS-based navigation and surveillance (degradation)	GNSS
radiation at flight levels (increased exposure)	RADIATION

6.3.4 One or both of the following intensities as appropriate shall be included in space weather advisory information whenever they are observed or expected to occur, using their respective abbreviations as indicated below:

moderate	MOD
severe	SEV

Note.— Guidance on the use of these intensities is provided in the Manual on Space Weather Information in Support of International Air Navigation *(Doc 10100).*

6.4 SIGMET INFORMATION

6.4.1 SIGMET information shall be issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, in accordance with the template shown in Appendix 7, Table A7-5, following the content and order of elements indicated therein.

6.4.2 SIGMET information shall be identified as: “SIGMET”.

6.4.3 The sequence number referred to in the template in Appendix 7, Table A7-5 shall correspond with the number of SIGMET information issued for the flight information region (FIR) since 0001 UTC on the day concerned. The meteorological watch offices whose area of responsibility encompasses more than one FIR and/or control area (CTA) shall issue separate SIGMET information for each FIR and/or CTA within their area of responsibility.

6.4.4 In accordance with the template in Appendix 7, Table A7-5, only one of the following phenomena shall be included in SIGMET information, using the abbreviations as indicated below:

At cruising levels (irrespective of altitude):

thunderstorm	
– obscured	OBSC TS
– embedded	EMBD TS
– frequent	FRQ TS
– squall line	SQL TS
– obscured with hail	OBSC TSGR
– embedded with hail	EMBD TSGR
– frequent with hail	FRQ TSGR
– squall line with hail	SQL TSGR
tropical cyclone	
– tropical cyclone with 10-minute mean surface wind speed of 17 m/s (34 kt) or more	TC (+ cyclone name)
turbulence	
– severe turbulence	SEV TURB
icing	
– severe icing	SEV ICE
– severe icing due to freezing rain	SEV ICE (FZRA)
mountain wave	
– severe mountain wave	SEV MTW
duststorm	
– heavy duststorm	HVY DS
sandstorm	
– heavy sandstorm	HVY SS

volcanic ash – volcanic ash	VA (+ volcano name, if known)
radioactive cloud	RDOACT CLD

Note.— Guidance on the use of terms "OBSC", "EMBD", "FRQ", "SQL", "GR", "TURB", "MTW", "DS" and "SS" is given in Appendix 8.

6.4.5 SIGMET information shall not contain unnecessary descriptive material. In describing the weather phenomena for which the SIGMET is issued, no descriptive material additional to that given in 6.4.4 shall be included. SIGMET information concerning thunderstorms or a tropical cyclone shall not include references to associated turbulence and icing.

6.4.6 SIGMET information shall be disseminated in IWXXM form in addition to the dissemination of SIGMET information in accordance with 6.4.1.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D* – Representations Derived from Data Models*. Guidance on the implementation of IWXXM is provided in the* Manual on the ICAO Meteorological Information Exchange Model *(Doc 10003).*

6.4.7 SIGMET information, when issued in graphical format, should be as specified in Appendix 1, including the use of applicable symbols and/or abbreviations.

6.5 AIRMET INFORMATION

6.5.1 AIRMET information shall be issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, in accordance with the template shown in Appendix 7, Table A7-5, following the content and order of elements indicated therein.

6.5.2 The sequence number referred to in the template in Appendix 7, Table A7-5 shall correspond with the number of AIRMET information issued for the FIR since 0001 UTC on the day concerned. The meteorological watch offices whose area of responsibility encompasses more than one FIR and/or CTA shall issue separate AIRMET information for each FIR and/or CTA within their area of responsibility.

6.5.3 The FIR shall be divided in sub-areas, as necessary.

6.5.4 In accordance with the template in Appendix 7, Table A7-5, only one of the following phenomena shall be included in AIRMET information, using the abbreviations as indicated below:

At cruising levels below flight level 100 (or below flight level 150 in mountainous areas, or higher, where necessary):

– surface wind speed – widespread mean surface wind speed above 15 m/s (30 kt)	SFC WIND (+ wind speed, direction and units of measurement)
– surface visibility – widespread areas affected by reduction of visibility to less than 5 000 m, including the weather phenomenon causing the reduction of visibility	SFC VIS (+ visibility) (+ one of the following weather phenomena or combinations thereof: BR, DS, DU, DZ, FC, FG, FU, GR, GS, HZ, PL, PO, RA, SA, SG, SN, SQ, SS or VA)

– thunderstorm	
– isolated thunderstorm without hail	ISOL TS
– occasional thunderstorm without hail	OCNL TS
– isolated thunderstorm with hail	ISOL TSGR
– occasional thunderstorm with hail	OCNL TSGR
– mountain obscuration	
– mountains obscured	MT OBSC
– cloud	
– widespread areas of broken or overcast cloud with height of base less than 300 m (1 000 ft) above ground level:	
– broken	BKN CLD (+ height of the base and top and units of measurement)
– overcast	OVC CLD (+ height of the base and top and units of measurement)
– cumulonimbus cloud:	
– isolated	ISOL CB
– occasional	OCNL CB
– frequent	FRQ CB
– towering cumulus cloud:	
– isolated	ISOL TCU
– occasional	OCNL TCU
– frequent	FRQ TCU
– icing	
– moderate icing (except for icing in convective clouds)	MOD ICE
– turbulence	
– moderate turbulence (except for turbulence in convective clouds)	MOD TURB
– mountain wave	
– moderate mountain wave	MOD MTW

Note.— Guidance on the use of terms "ISOL", "OCNL", "FRQ", "GR", "TURB" and "MTW" is given in Appendix 8.

6.5.5 AIRMET information shall not contain unnecessary descriptive material. In describing the weather phenomena for which the AIRMET is issued, no descriptive material additional to that given in 6.5.4 shall be included. AIRMET information concerning thunderstorms or cumulonimbus clouds shall not include references to associated turbulence and icing.

Note.— The specifications for SIGMET information which is also applicable to low-level flights are given in 6.4.4.

6.5.6 AIRMET information shall be disseminated in IWXXM form in addition to the dissemination of AIRMET information in accordance with 6.5.1.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D –* Representations Derived from Data Models*. Guidance on the implementation of IWXXM is provided in the* Manual on the ICAO Meteorological Information Exchange Model *(Doc 10003).*

6.6 AERODROME WARNINGS

6.6.1 The aerodrome warnings shall be issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, in accordance with the template in Appendix 7, Table A7-6, where required by operators or aerodrome services. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, shall be used to describe elements for which the template allows the use of free text.

6.6.2 The sequence number referred to in the template in Appendix 7, Table A7-6 shall correspond with the number of aerodrome warnings issued for the aerodrome since 0001 UTC on the day concerned.

6.7 WIND SHEAR WARNINGS AND ALERTS

Note.— Guidance on the subject is contained in the Manual on Low-level Wind Shear *(Doc 9817).*

6.7.1 Detection of wind shear

Evidence of the existence of wind shear should be derived from:

a) ground-based, wind shear remote-sensing equipment, for example, a Doppler radar;

b) ground-based, wind shear detection equipment, for example, a system of surface wind and/or pressure sensors located in an array monitoring a specific runway or runways and associated approach and departure paths;

c) aircraft observations during the climb-out or approach phases of flight to be made in accordance with Chapter 3; or

d) other meteorological information, for example, from appropriate sensors located on existing masts or towers in the vicinity of the aerodrome or nearby areas of high ground.

Note 1.— Wind shear conditions are normally associated with the following phenomena:

- *thunderstorms, microbursts, funnel cloud (tornado or waterspout) and gust fronts;*
- *frontal surfaces;*
- *strong surface winds coupled with local topography;*
- *sea breeze fronts;*
- *mountain waves (including low-level rotors in the terminal area); and*
- *low-level temperature inversions.*

Note 2.— Information on wind shear is also to be included as supplementary information in local routine reports, local special reports, METAR and SPECI in accordance with the templates in Appendix 2, Tables A2-1 and A2-2.

6.7.2 Content of wind shear warnings and alerts

6.7.2.1 The wind shear warnings shall be issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, in accordance with the template in Appendix 7, Table A7-7.

6.7.2.2 The sequence number referred to in the template in Appendix 7, Table A7-7 shall correspond with the number of wind shear warnings issued for the aerodrome since 0001 UTC on the day concerned.

6.7.2.3 When an aircraft report is used to prepare a wind shear warning, or to confirm a warning previously issued, the corresponding aircraft report, including the aircraft type, should be disseminated unchanged in accordance with local arrangements to those concerned.

Note 1.— Following reported encounters by both arriving and departing aircraft, two different wind shear warnings may exist: one for arriving aircraft and one for departing aircraft.

Note 2.— Specifications for reporting the intensity of wind shear are still undergoing development. It is recognized, however, that pilots, when reporting wind shear, may use the qualifying terms "moderate", "strong" or "severe", based to a large extent on their subjective assessment of the intensity of the wind shear encountered.

6.7.2.4 Where microbursts are observed, reported by pilots or detected by ground-based, wind shear detection or remote-sensing equipment, the wind shear warning and wind shear alert should include a specific reference to microburst.

6.7.2.5 Where information from ground-based, wind shear detection or remote-sensing equipment is used to prepare a wind shear alert, the alert shall involve a headwind or tailwind change of 7.5 m/s (15 kt) or more and, if practicable, relate to specific sections of the runway and distances along the approach path or take-off path as agreed between the meteorological service provider, the appropriate ATS authority and the operators concerned.

6.7.2.6 Wind shear alerts should be updated at least every minute. The wind shear alert should be cancelled as soon as the headwind or tailwind change falls below 7.5 m/s (15 kt).

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Chapter 7

AERONAUTICAL CLIMATOLOGICAL INFORMATION

7.1 GENERAL PROVISIONS

Meteorological observations for regular and alternate aerodromes should be collected, processed and stored in a form suitable for the preparation of aerodrome climatological information.

Note.— Climatological data required for aerodrome planning purposes are set out in Annex 14 – Aerodromes*, Volume I –* Aerodrome Design and Operations*, 3.1.4 and Attachment A.*

7.2 AERODROME CLIMATOLOGICAL TABLES

7.2.1 An aerodrome climatological table should give, as applicable:

a) mean values and variations therefrom, including maximum and minimum values, of meteorological elements (for example, of air temperature); and/or

b) the frequency of occurrence of present weather phenomena affecting flight operations at the aerodrome (for example, of sandstorms); and/or

c) the frequency of occurrence of specified values of one, or of a combination of two or more, elements (for example, of a combination of low visibility and low cloud).

7.2.2 Aerodrome climatological tables should include information required for the preparation of aerodrome climatological summaries in accordance with 7.3.

7.3 AERODROME CLIMATOLOGICAL SUMMARIES

Aerodrome climatological summaries should cover:

a) frequencies of the occurrence of runway visual range, visibility and/or height of the base of the lowest cloud layer of BKN or OVC extent below specified values at specified times;

b) frequencies of visibility below specified values at specified times;

c) frequencies of the height of the base of the lowest cloud layer of BKN or OVC extent below specified values at specified times;

d) frequencies of occurrence of concurrent wind direction and speed within specified ranges;

e) frequencies of surface temperature in specified ranges of 5°C at specified times; and

f) mean values and variations therefrom, including maximum and minimum values of meteorological elements required for operational planning purposes, including take-off performance calculations.

Note.— Models of climatological summaries related to a) to e) are given in the Technical Regulations *(WMO-No. 49), Volume II –* Meteorological Service for International Air Navigation*, Part III.*

Chapter 8

METEOROLOGICAL SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

Note.— Specifications related to flight documentation (including the model charts and forms) are given in Appendix 1.

8.1 GENERAL PROVISIONS

8.1.1 Supply of meteorological information to operators and flight crew members

8.1.1.1 Meteorological information shall be supplied to operators and flight crew members by one or more of the following, as agreed between the meteorological service provider and the operator concerned, and with the order shown below not implying priorities:

a) written or printed material, including specified charts and forms;

b) data in digital form;

c) briefing;

d) consultation;

e) display; or

f) in lieu of a) to e), by means of an automated pre-flight information system providing self-briefing and flight documentation facilities while retaining access by operators and aircrew members to consultation, as necessary, with the aerodrome meteorological office, in accordance with 8.3.

8.1.1.2 Meteorological information supplied to operators and flight crew members shall include the following information, as agreed between the meteorological service provider and the operators concerned:

a) forecasts of:

1) upper wind and upper-air temperature;

2) upper-air humidity;

3) geopotential altitude of flight levels;

4) flight level and temperature of tropopause;

5) direction, speed and flight level of maximum wind;

6) significant weather (SIGWX) phenomena; and

7) cumulonimbus clouds, icing and turbulence;

Note 1.— Forecasts of upper-air humidity and geopotential altitude of flight levels are used only in automatic flight planning and need not be displayed.

Note 2.— Forecasts of cumulonimbus clouds, icing and turbulence are intended to be processed and, if necessary, visualized according to the specific thresholds relevant to user operations.

b) Aerodrome routine meteorological report (METAR) or aerodrome special meteorological report (SPECI) (including trend forecasts as issued in accordance with regional air navigation agreement) for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;

c) Aerodrome forecast (TAF) or amended TAF for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;

d) forecasts for take-off;

e) SIGMET information and appropriate special air-reports relevant to the whole route;

Note.— Appropriate special air-reports will be those not already used in the preparation of SIGMET.

f) volcanic ash, tropical cyclone and space weather advisory information relevant to the whole route;

g) as determined by regional air navigation agreement, GAMET area forecasts and/or area forecasts for low-level flights in chart form prepared in support of the issuance of AIRMET information, and AIRMET information for low-level flights relevant to the whole route;

h) aerodrome warnings for the local aerodrome;

i) meteorological satellite images;

j) ground-based weather radar information;

k) forecasts of quantitative volcanic ash concentration information; and

l) VONA and volcanic activity reports relevant to the whole route.

8.1.1.3 On request by the operator, the meteorological information supplied for flight planning should include data for the determination of the lowest usable flight level.

8.1.1.4 In meteorological information for pre-flight planning and in-flight replanning by operators of helicopters flying to offshore structures, particular mention should be made of the expected surface visibility, the amount, type (where available), base and tops of cloud below flight level 100, sea state and sea-surface temperature, mean sea-level pressure and the occurrence and expected occurrence of turbulence and icing, as determined by regional air navigation agreement.

8.1.2 Format of meteorological information for pre-flight planning and in-flight replanning

8.1.2.1 Upper-air gridded forecasts supplied by the world area forecast centres (WAFCs) for pre-flight planning and in-flight replanning shall be in a gridded code form.

Note.— Appropriate gridded code forms prescribed by the World Meteorological Organization (WMO) are contained in the volumes of the Manual on Codes *(WMO-No. 306).*

8.1.2.2 Until 25 November 2026, information on significant weather supplied by the WAFCs for pre-flight planning and in-flight replanning shall be in the BUFR code form.

Note.— The BUFR code form is contained in the Manual on Codes *(WMO-No. 306)*, *Volume I.2, Part B* – Binary Codes.

8.1.2.3 SIGWX forecasts supplied by the WAFCs for pre-flight planning and in-flight replanning shall be in ICAO meteorological information exchange model (IWXXM) form, in addition to the supply of this information in accordance with 8.1.2.2, as specified in Appendix 5, Table A5-5.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes *(WMO-No. 306), Volume I.3, Part D* – Representations Derived from Data Models. *Guidance on the implementation of IWXXM is provided in the* Manual on the ICAO Meteorological Information Exchange Model *(Doc 10003).*

8.1.2.4 A subset of SIGWX forecasts supplied by the WAFCs for pre-flight planning and in-flight replanning shall be in portable network graphics (PNG) format as specified in Appendix 5, Table A5-5.

Note.— Details of SIGWX forecasts in IWXXM form and the PNG format supplied by the WAFCs are specified in Appendix 5, Table A5-5.

8.2 FLIGHT DOCUMENTATION

Note.— The word "chart" used hereinafter refers to the visualisation of data in digital form.

8.2.1 General provisions

Flight documentation to be made available shall comprise information listed under 8.1.1.2 a) 1) and 6), b), c), e), f) and, if appropriate, g). However, flight documentation for flights of two hours' duration or less, after a short stop or turnaround, shall be limited to the information operationally needed, as agreed between the meteorological service provider and the operator concerned, but in all cases, it shall at least comprise information on 8.1.1.2 b), c), e), f) and, if appropriate, g).

8.2.2 Presentation of information

8.2.2.1 The flight documentation related to forecasts of upper wind and upper-air temperature and SIGWX phenomena shall be presented in the form of charts. For low-level flights, alternatively, GAMET area forecasts shall be used.

Note.— Models of charts and forms for use in the preparation of flight documentation are given in Appendix 1. These models and methods for their completion are developed by the WMO on the basis of relevant operational requirements stated by ICAO.

8.2.2.2 Charts generated from the digital forecasts provided by the WAFCs shall be made available, as required by operators, for fixed areas of coverage as shown in Appendix 5, Figures A5-1, A5-2 and A5-3.

8.2.2.3 When forecasts of upper wind and upper-air temperature are supplied in chart form, they shall be fixed-time prognostic charts for flight levels as specified in Appendix 5, Tables A5-1 and A5-2. When forecasts of SIGWX phenomena are supplied in chart form, they shall be fixed-time prognostic charts for an atmospheric layer limited by flight levels as specified in 5.1.2.1.2 and 5.2.3.2.

8.2.2.4 METAR and SPECI (including trend forecasts as issued in accordance with regional air navigation agreement), TAF, GAMET, SIGMET and AIRMET, volcanic ash, tropical cyclone and space weather advisory information shall be presented in accordance with the templates in Appendices 1, 2, 4, 6 and 7.

Note.— Examples of the form of presentation of METAR, SPECI and TAF are given in Appendix 1.

8.2.2.5 The location indicators and the abbreviations used should be explained in the flight documentation.

8.2.2.6 The forms and the legend of charts included in flight documentation should be printed in English, French, Russian or Spanish. Where appropriate, approved abbreviations should be used. The units of measurement employed for each element should be indicated and be in accordance with Annex 5 – *Units of Measurement to be Used in Air and Ground Operations*.

8.2.3 Charts in flight documentation

8.2.3.1 Characteristics of charts

8.2.3.1.1 Charts included in flight documentation should have the following physical characteristics:

a) for convenience, the largest size of charts should be about 42 × 30 cm (standard size A3) and the smallest size should be about 21 × 30 cm (standard size A4). The choice between these sizes should depend on the route lengths and the amount of detail that needs to be given in the charts as agreed between the meteorological service provider and the users concerned;

b) major geographical features, such as coastlines, major rivers and lakes should be depicted in a way that makes them easily recognizable;

c) for charts prepared by computer, meteorological data should take preference over basic chart information, the former cancelling the latter wherever they overlap;

d) major aerodromes should be shown as a dot and identified by the first letter of the name of the city the aerodrome serves as given in Table Aerodrome Operational Planning (Table AOP) of the relevant regional air navigation plan;

e) a geographical grid should be shown with meridians and parallels represented by dotted lines at each 10° latitude and longitude; dots should be spaced one degree apart;

f) latitude and longitude values should be indicated at various points throughout the charts (that is, not only at the edges); and

g) labels on the charts for flight documentation should be clear and simple and should present the name of the world area forecast centre or, for non-world area forecast system (WAFS) charts, the originating centre, the type of chart, date and valid time and, if necessary, the types of units of measurement used in an unambiguous way.

Note.— When plotting shapes, particularly polygons, on maps, appropriate corrections are necessary if plotted on projections different to that used in the production of the original forecast area.

8.2.3.1.2 Meteorological information included in flight documentation shall be represented as follows:

a) winds on charts shall be depicted by arrows with feathers and shaded pennants on a sufficiently dense grid;

b) temperatures shall be depicted by figures on a sufficiently dense grid;

c) wind and temperature data selected from the data sets received from a world area forecast centre shall be depicted in a sufficiently dense latitude and longitude grid; and

d) wind arrows shall take precedence over temperatures and either shall take precedence over chart background.

8.2.3.1.3 For short-haul flights, charts should be prepared covering limited areas at a scale of $1{:}15 \times 10^6$ as required.

8.2.3.2 Set of charts to be provided

8.2.3.2.1 The minimum number of charts for flights operating at and above flight level 100 shall include a WAFS SIGWX chart (flight level 100 to flight level 600) and a forecast wind and temperature chart appropriate for the flight level and flight route. The actual charts provided for pre-flight and in-flight planning and for flight documentation shall be as agreed between the meteorological service provider and users concerned.

8.2.3.2.2 Charts to be provided shall be generated from the digital forecasts issued by the WAFCs whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological service provider and the operator concerned.

8.2.3.3 Height indications

In flight documentation, height indications shall be given as follows:

a) all references to en-route meteorological conditions, such as height indications of upper winds, turbulence or bases and tops of clouds, shall preferably be expressed in flight levels; they may also be expressed in pressure, altitude or, for low-level flights, height above ground level; and

b) all references to aerodrome meteorological conditions, such as height indications of the bases of clouds, shall be expressed in height above the aerodrome elevation.

8.2.4 Specific procedures for the supply of flight documentation for low-level flights

8.2.4.1 Where the forecasts are supplied in chart form, flight documentation for low-level flights, including those in accordance with the visual flight rules, operating up to flight level 100 (or up to flight level 150 in mountainous areas or higher, where necessary), should contain the following, as appropriate to the flight:

a) information from relevant SIGMET and AIRMET;

b) upper wind and upper-air temperature charts as given in 5.2.3.1; and

c) significant weather charts as given in 5.2.3.2.

8.2.4.2 Where the forecasts are supplied in abbreviated plain language, flight documentation for low-level flights, including those in accordance with the visual flight rules, operating up to flight level 100 (up to flight level 150 in mountainous areas or higher, where necessary), should contain the following information as appropriate to the flight:

a) SIGMET and AIRMET; and

b) GAMET area forecasts.

Note.— An example of the GAMET area forecast is given in Appendix 6.

8.3 AUTOMATED PRE-FLIGHT INFORMATION SYSTEMS FOR BRIEFING, CONSULTATION, FLIGHT PLANNING AND FLIGHT DOCUMENTATION

Automated pre-flight information systems for the supply of meteorological information for self-briefing, pre-flight planning and flight documentation should:

a) provide for the continuous and timely updating of the system database and monitoring of the validity and integrity of the meteorological information stored;

b) permit access to the system by operators and flight crew members and also by other aeronautical users concerned through suitable telecommunications means;

c) use access and interrogation procedures based on abbreviated plain language and, as appropriate, ICAO location indicators and aeronautical meteorological code data-type designators prescribed by WMO, or based on a menu-driven user interface, or other appropriate mechanisms as agreed between the meteorological service provider and the operators concerned; and

d) provide for rapid response to a user request for information.

Note.— ICAO abbreviations and codes and location indicators are given, respectively, in the Procedures for Air Navigation Services – ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400) and* Location Indicators *(Doc 7910). Aeronautical meteorological code data-type designators are given in the* Manual on the Global Telecommunication System *(WMO-No. 386).*

8.4 METEOROLOGICAL INFORMATION FOR AIRCRAFT IN FLIGHT

Meteorological information for planning by the operator for aircraft in flight should be supplied during the period of the flight and should normally consist of any or all of the following:

a) Aerodrome routine meteorological report (METAR) and aerodrome special meteorological report (SPECI) (including trend forecasts as issued in accordance with regional air navigation agreement);

b) Aerodrome forecasts (TAF) and amended TAF;

c) SIGMET and AIRMET information and special air-reports relevant to the whole route, unless the latter have been the subject of a SIGMET;

d) upper wind and upper-air temperature information;

e) volcanic ash, tropical cyclone and space weather advisory information relevant to the flight;

f) forecasts of quantitative volcanic ash concentration information; and

g) other meteorological information in alphanumeric or graphical form as agreed between the meteorological service provider and the operator concerned.

Note.— Guidance on the display of graphical information in the cockpit is provided in the Manual of Aeronautical Meteorological Practice *(Doc 8896)*.

Chapter 9

METEOROLOGICAL INFORMATION FOR AIR TRAFFIC SERVICES AND SEARCH AND RESCUE SERVICES

9.1 INFORMATION FOR AIR TRAFFIC SERVICES UNITS

9.1.1 List of information for the aerodrome control tower

The following meteorological information shall be supplied, as necessary, to an aerodrome control tower by its associated aerodrome meteorological office:

a) local routine reports, local special reports, aerodrome routine meteorological report (METAR), aerodrome special meteorological report (SPECI), aerodrome forecasts (TAF), trend forecasts and amendments thereto, for the aerodrome concerned;

b) SIGMET and AIRMET information, wind shear warnings and alerts and aerodrome warnings;

c) any additional meteorological information agreed upon locally, such as forecasts of surface wind for the determination of possible runway changes;

d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological service provider and appropriate ATS authority concerned; and

e) volcano observatory notice for aviation (VONA) and volcanic activity reports as agreed between the meteorological service provider and appropriate ATS authority concerned.

9.1.2 List of information for the approach control unit

The following meteorological information shall be supplied, as necessary, to an approach control unit by its associated aerodrome meteorological office:

a) local routine reports, local special reports, METAR, SPECI, TAF, trend forecasts and amendments thereto, for the aerodrome(s) with which the approach control unit is concerned;

b) SIGMET and AIRMET information, wind shear warnings and alerts, aerodrome warnings and appropriate special air-reports for the airspace with which the approach control unit is concerned;

c) any additional meteorological information agreed upon locally;

d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological service provider and appropriate ATS authority concerned; and

e) VONA and volcanic activity reports as agreed between the meteorological service provider and appropriate ATS authority concerned.

9.1.3 List of information for the area control centre and flight information centre

The following meteorological information shall be supplied, as necessary, to an area control centre or a flight information centre by its associated meteorological watch office:

a) METAR and SPECI, including current pressure data for aerodromes and other locations, TAF and trend forecasts and amendments thereto, covering the flight information region (FIR) or the control area (CTA) and, if required by the flight information centre (FIC) or area control centre (ACC), covering aerodromes in neighbouring FIRs, as determined by regional air navigation agreement;

b) forecasts of upper winds, upper-air temperatures and significant en-route weather phenomena and amendments thereto, particularly those which are likely to make operation under visual flight rules impracticable, SIGMET and AIRMET information and appropriate special air-reports for the FIR or CTA and, if determined by regional air navigation agreement and required by the FIC or ACC, for neighbouring FIRs;

c) any other meteorological information required by the FIC or ACC to meet requests from aircraft in flight; if the information requested is not available in the associated meteorological watch office (MWO), that office shall request the assistance of another meteorological office in supplying it;

d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological service provider and appropriate ATS authority concerned;

e) information received concerning the release of radioactive material into the atmosphere, as agreed between the meteorological service provider and appropriate ATS authority concerned;

f) tropical cyclone advisory information issued by a tropical cyclone advisory centre in its area of responsibility;

g) volcanic ash advisory information issued by a volcanic ash advisory centre in its area of responsibility;

h) VONA and volcanic activity reports as agreed between the meteorological service provider and appropriate ATS authority concerned; and

i) forecasts of quantitative volcanic ash concentration information as agreed between the meteorological service provider and appropriate ATS authority concerned.

9.1.4 Format of information

9.1.4.1 Local routine reports, local special reports, METAR, SPECI, TAF, trend forecasts, SIGMET and AIRMET information, upper wind and upper-air temperature forecasts and amendments thereto should be supplied to air traffic services units in the form in which they are prepared.

9.1.4.2 When computer-processed upper-air grid point data in digital form is made available to air traffic services units for use by air traffic services computers, the contents and format should be as agreed between the meteorological service provider and the appropriate ATS authority.

9.2 INFORMATION FOR SEARCH AND RESCUE SERVICES UNITS

9.2.1 Information to be provided on request

9.2.1.1 On request from the rescue coordination centre, the designated aerodrome meteorological office or MWO should arrange to obtain details of the flight documentation which was supplied to the missing aircraft, together with any amendments to the forecast which were transmitted to the aircraft in flight.

9.2.1.2 To facilitate search and rescue operations, the designated aerodrome meteorological office or MWO should, on request, supply:

a) complete and detailed information on the current and forecast meteorological conditions in the search area; and

b) current and forecast conditions en route, covering flights by search aircraft from and returning to the aerodrome from which the search is being conducted.

9.2.1.3 On request from the rescue coordination centre, the designated aerodrome meteorological office or MWO should supply or arrange for the supply of meteorological information required by ships undertaking search and rescue operations.

Chapter 10

USE OF COMMUNICATIONS TO EXCHANGE METEOROLOGICAL INFORMATION

10.1 USE OF AERONAUTICAL FIXED SERVICE COMMUNICATIONS AND THE PUBLIC INTERNET

10.1.1 Meteorological bulletins in alphanumeric format

10.1.1.1 Composition of bulletins

Whenever possible, exchanges of operational meteorological information should be made in consolidated bulletins of the same types of meteorological information.

10.1.1.2 Filing times of bulletins

Meteorological bulletins required for scheduled transmissions should be filed regularly and at the prescribed scheduled times. Aerodrome routine meteorological reports (METAR) should be filed for transmission not later than 5 minutes after the actual time of observation. Aerodrome forecasts (TAF) should be filed for transmission not earlier than one hour prior to the beginning of their validity period.

10.1.1.3 Heading of bulletins

Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service or the public Internet shall contain a heading consisting of:

a) an identifier of four letters and two figures;

b) the ICAO four-letter location indicator corresponding to the geographical location of the meteorological office originating or compiling the meteorological bulletin;

c) a day-time group; and

d) if required, a three-letter indicator.

Note 1.— Detailed specifications on format and contents of the heading are given in the Manual on the Global Telecommunication System *(WMO-No. 386) and are reproduced in the* Manual of Aeronautical Meteorological Practice *(Doc 8896).*

Note 2.— ICAO location indicators are listed in Location Indicators *(Doc 7910).*

10.1.1.4 Transmission of bulletins containing operational meteorological information

Meteorological bulletins containing operational meteorological information shall be transmitted via the aeronautical fixed service (AFS).

10.1.2 Upper-air gridded forecasts

10.1.2.1 Quality requirements for charts

Where upper-air gridded forecasts are disseminated in chart form, the quality of the charts received should be such as to permit reproduction in a sufficiently legible form for flight planning and documentation. Charts should be legible over 95 per cent of their area.

10.1.2.2 Quality requirements for transmissions

Transmissions should be such as to ensure that their interruption should not exceed 10 minutes during any period of 6 hours.

10.1.2.3 Transmission of upper-air gridded forecasts

Upper-air gridded forecasts should be transmitted using the aeronautical fixed service or the public Internet using an appropriate gridded data format.

10.2 USE OF AERONAUTICAL MOBILE SERVICE COMMUNICATIONS

10.2.1 Content and format of meteorological messages

10.2.1.1 The content and format of reports, forecasts and SIGMET information transmitted to aircraft shall be consistent with the provisions of Chapters 4, 6 and 7 of Annex 3, and Chapters 2, 4 and 6 and Appendices 2, 4 and 7 of this PANS.

10.2.1.2 The content and format of air-reports transmitted by aircraft shall be consistent with the provisions of Chapter 5 of Annex 3 and the *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444), Appendix 1.

10.2.2 Content and format of meteorological bulletins

The substance of a meteorological bulletin transmitted via the aeronautical mobile service shall remain unchanged from that contained in the bulletin as originated.

10.3 USE OF AERONAUTICAL DATA LINK SERVICE – D-VOLMET

10.3.1 Detailed content of meteorological information available for D-VOLMET

10.3.1.1 The aerodromes for which METAR, SPECI and TAF are to be available for uplink to aircraft in flight shall be determined by regional air navigation agreement.

10.3.1.2 The flight information regions (FIRs) for which SIGMET and AIRMET information is to be available for uplink to aircraft in flight shall be determined by regional air navigation agreement.

10.3.2 Criteria related to information to be available for D-VOLMET

10.3.2.1 The latest available METAR, SPECI and TAF, and valid SIGMET and AIRMET should be used for uplink to aircraft in flight.

10.3.2.2 TAF included in the D-VOLMET should be amended as necessary to ensure that a forecast, when made available for uplink to aircraft in flight, reflects the latest opinion of the aerodrome meteorological office concerned.

10.3.2.3 If no SIGMET is valid for an FIR, an indication of "NIL SIGMET" should be included in the D-VOLMET.

10.3.3 Format of information to be available for D-VOLMET

The content and format of reports, forecasts and SIGMET and AIRMET information included in D-VOLMET shall be consistent with the provisions of Chapters 4, 6 and 7 of Annex 3.

10.4 USE OF AERONAUTICAL BROADCASTING SERVICE – VOLMET BROADCASTS

10.4.1 Detailed content of meteorological information to be included in VOLMET broadcasts

10.4.1.1 The aerodromes for which METAR, SPECI and TAF are to be included in VOLMET broadcasts, the sequence in which they are to be transmitted and the broadcast time shall be determined by regional air navigation agreement.

10.4.1.2 The FIRs for which SIGMET information is to be included in scheduled VOLMET broadcasts shall be determined by regional air navigation agreement. Where this is done, such SIGMET information shall be transmitted at the beginning of the broadcast or of a five-minute time block.

10.4.2 Criteria related to information to be included in VOLMET broadcasts

10.4.2.1 When a report has not arrived from an aerodrome in time for a broadcast, the latest available report should be included in the broadcast, together with the time of observation.

10.4.2.2 TAF included in scheduled VOLMET broadcasts should be amended as necessary to ensure that a forecast, when transmitted, reflects the latest opinion of the aerodrome meteorological office concerned.

10.4.2.3 Where SIGMET information is included in scheduled VOLMET broadcasts, an indication of "NIL SIGMET" should be transmitted if no SIGMET is valid for the FIRs concerned.

10.4.3 Format of information to be included in VOLMET broadcasts

10.4.3.1 The content and format of reports, forecasts and SIGMET information included in VOLMET broadcasts shall be consistent with the provisions of Chapters 4, 6 and 7 of Annex 3.

10.4.3.2 VOLMET broadcasts should use standard radiotelephony phraseologies.

Note.— Guidance on the standard radiotelephony phraseologies to be used in VOLMET broadcasts is given in the Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services *(Doc 9377), Appendix 1.*

Appendix 1

FLIGHT DOCUMENTATION – MODEL CHARTS AND FORMS

(See Chapter 8 of this PANS)

MODEL A	OPMET information
MODEL IS	Upper wind and upper-air temperature chart for standard isobaric surface Example 1. Arrows, feathers and pennants (Mercator projection) Example 2. Arrows, feathers and pennants (Polar stereographic projection)
MODEL SWH	WAFS significant weather chart Example 1. Polar stereographic projection Example 2. Mercator projection
MODEL SWL	Significant weather chart (low level) Example 1 Example 2
MODEL TCG	Tropical cyclone advisory information in graphical format
MODEL VAG	Volcanic ash advisory information in graphical format Example 1. Mercator projection Example 2. Polar stereographic projection
MODEL STC	SIGMET for tropical cyclone in graphical format
MODEL SVA	SIGMET for volcanic ash in graphical format Example 1. Mercator projection Example 2. Polar stereographic projection
MODEL SGE	SIGMET for phenomena other than tropical cyclone and volcanic ash in graphical format
MODEL SN	Sheet of notations used in flight documentation

OPMET INFORMATION **MODEL A**

ISSUED BY .... METEOROLOGICAL OFFICE (DATE, TIME UTC) ....

INTENSITY

" – " (light); no indicator (moderate); " + " (heavy, or a tornado/waterspout in the case of funnel cloud(s)) are used to indicate the intensity of certain phenomena

DESCRIPTORS

MI – shallow	PR – partial	BL – blowing	TS – thunderstorm
BC – patches	DR – low drifting	SH – shower(s)	FZ – freezing (supercooled)

PRESENT WEATHER ABBREVIATIONS

DZ – drizzle	BR – mist	PO – dust/sand whirls (dust devils)
RA – rain	FG – fog	SQ – squall
SN – snow	FU – smoke	FC – funnel cloud(s) (tornado or waterspout)
SG – snow grains	VA – volcanic ash	
PL – ice pellets	DU – widespread dust	SS – sandstorm
GR – hail	SA – sand	DS – duststorm
GS – small hail and/or snow pellets	HZ – haze	

EXAMPLES

+SHRA – heavy shower of rain
FZDZ – moderate freezing drizzle
+TSSNGR – thunderstorm with heavy snow and hail
TSSN – thunderstorm with moderate snow
SNRA – moderate snow and rain

SELECTED ICAO LOCATION INDICATORS

CYUL	Montreal Pierre Elliot Trudeau/Intl	HECA	Cairo/Intl	OBBI	Bahrain Intl
		HKJK	Nairobi/Jomo Kenyatta	RJTT	Tokyo Intl
EDDF	Frankfurt/Main	KJFK	New York/John F. Kennedy Intl	SBGL	Rio de Janeiro/Galeão Intl
EGLL	London/Heathrow	LFPG	Paris/Charles de Gaulle	YSSY	Sydney/Kingsford Smith Intl
GMMC	Casablanca/Anfa	NZAA	Auckland Intl	ZBAA	Beijing/Capital

METAR CYUL 240700Z 27018G30KT 5000 SN FEW020 BKN045 M02/M07 Q0995=

METAR EDDF 240950Z 05015KT 9999 FEW025 04/M05 Q1018 NOSIG=

METAR LFPG 241000Z 07010KT 5000 SCT010 BKN040 02/M01 Q1014 NOSIG=

SPECI GMMC 220530Z 24006KT 5000 –TSGR BKN016TCU FEW020CB SCT026 08/07 Q1013=

TAF AMD NZAA 240855Z 2409/2506 24010KT 9999 FEW030 BECMG 2411/2413 VRB02KT 2000 HZ FM 242200 24010KT CAVOK=

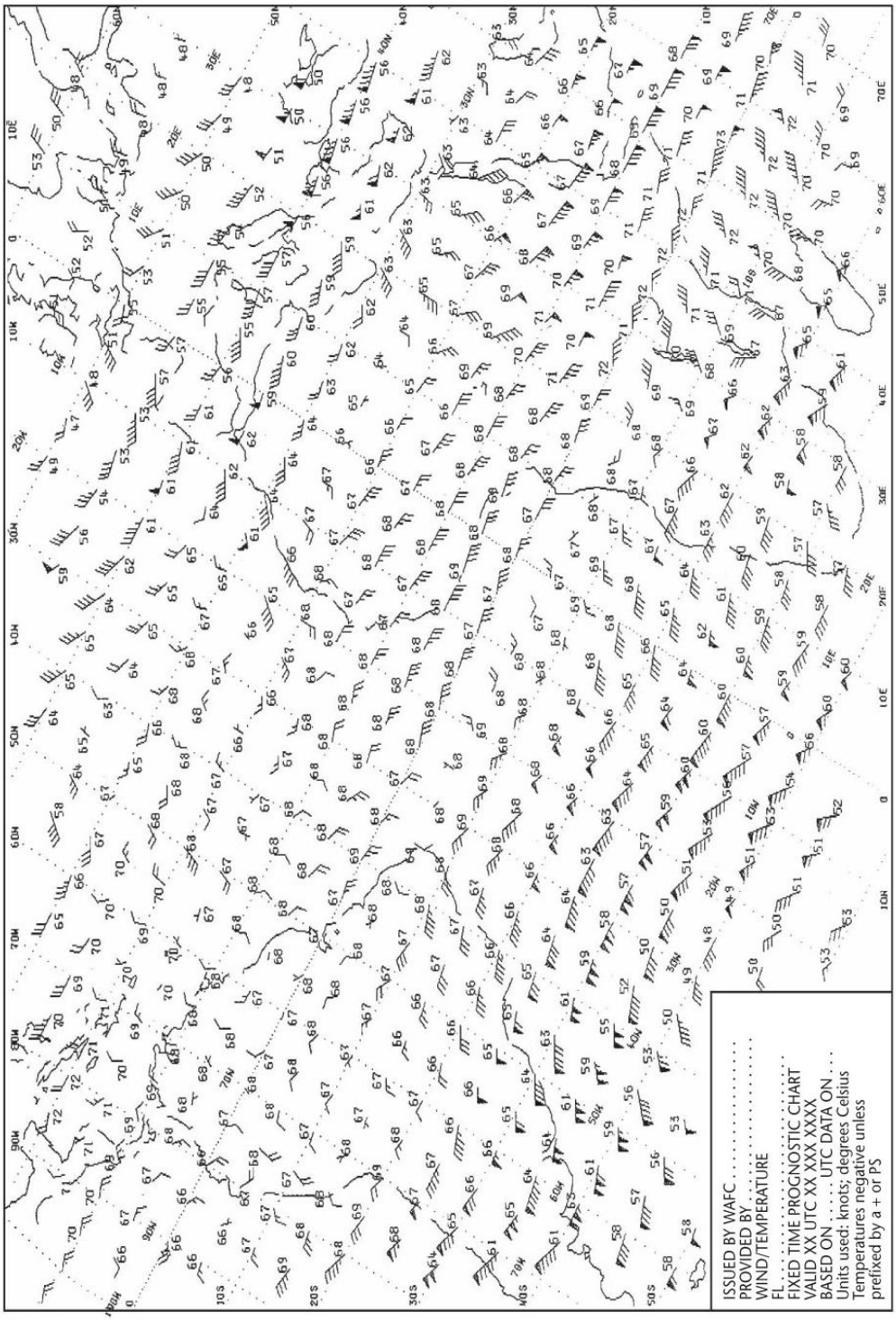
TAF ZBAA 240440Z 2406/2506 13004MPS 6000 NSC BECMG 2415/2416 2000 SN OVC040 TEMPO 2418/24211000 SN BECMG 2500/2501 32004MPS 3500 BR NSC BECMG 2503/2504 32010G20MPS CAVOK=

TAF YSSY 240443Z 2406/2506 05015KT 3000 BR SCT030 BECMG 2414/2416 33008KT FM 2422 04020KT CAVOK=

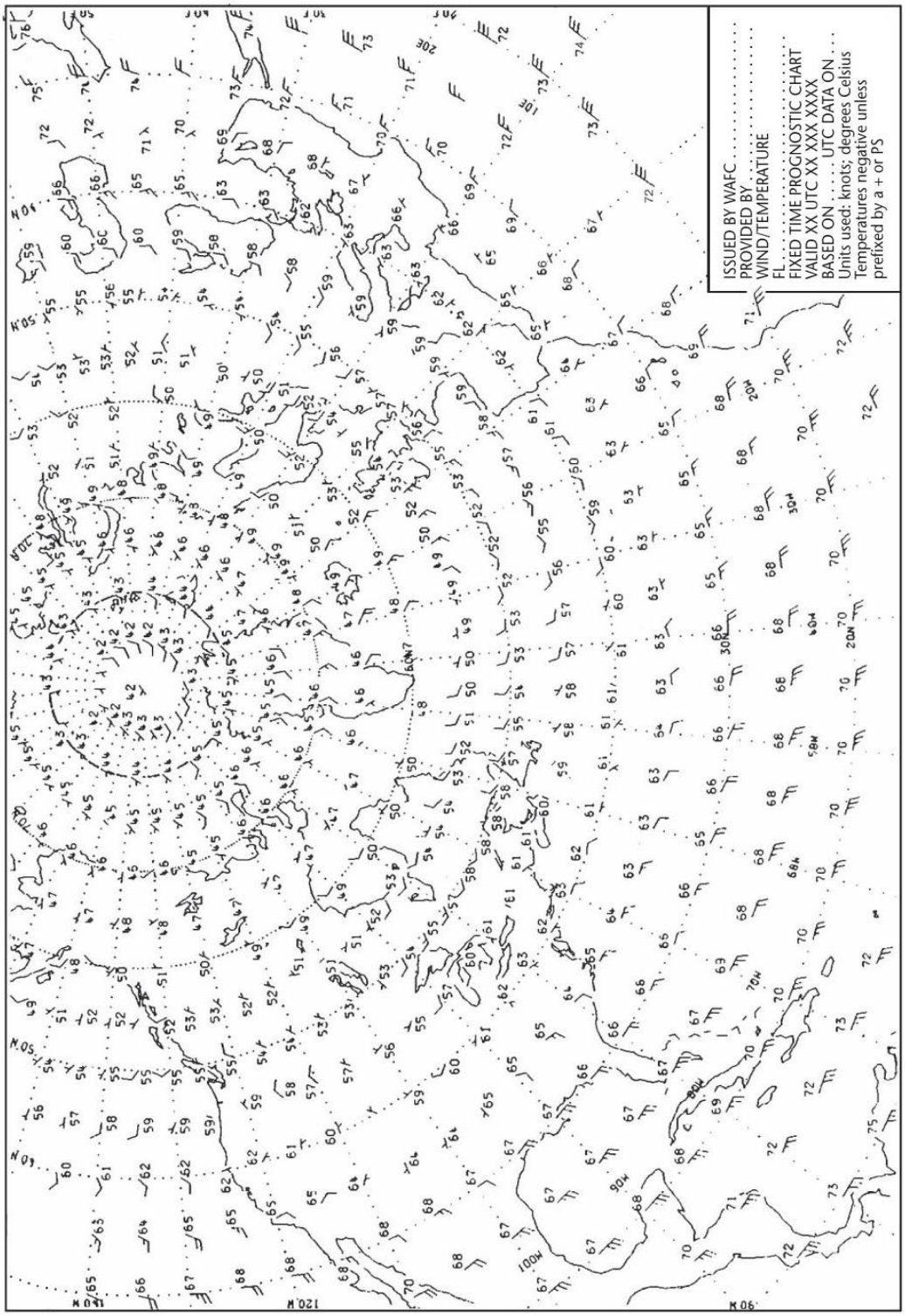
HECC SIGMET 2 VALID 240900/241200 HECA-

HECC CAIRO FIR SEV TURB OBS N OF N27 FL 390/440 MOV E 25KMH NC.

UPPER WIND AND UPPER-AIR TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE MODEL IS
Example 1. Arrows, feathers and pennants (Mercator projection)

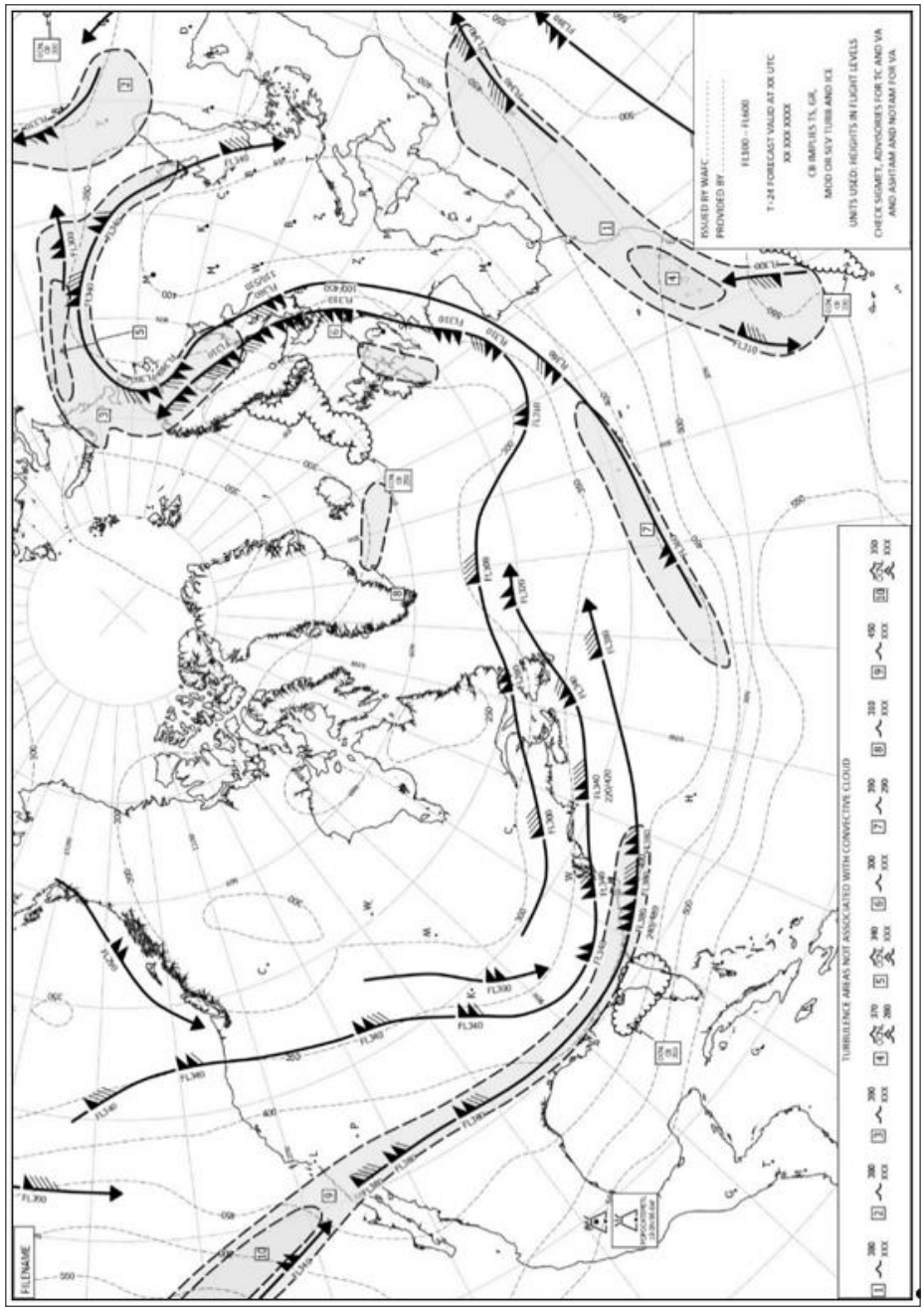


UPPER WIND AND UPPER-AIR TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE MODEL IS
Example 2. Arrows, feathers and pennants (Polar stereographic projection)

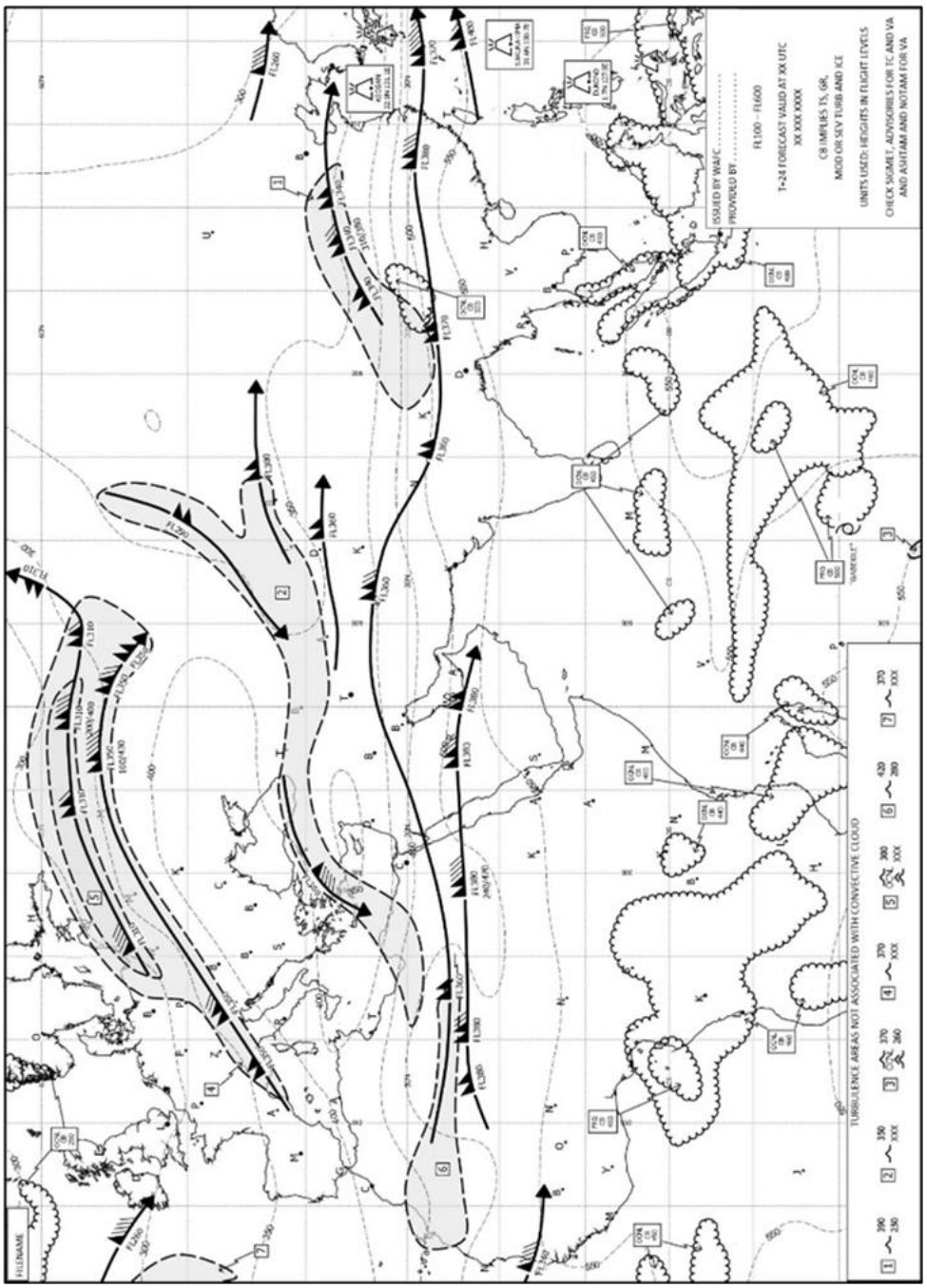


WAFS SIGNIFICANT WEATHER CHART **MODEL SWH**

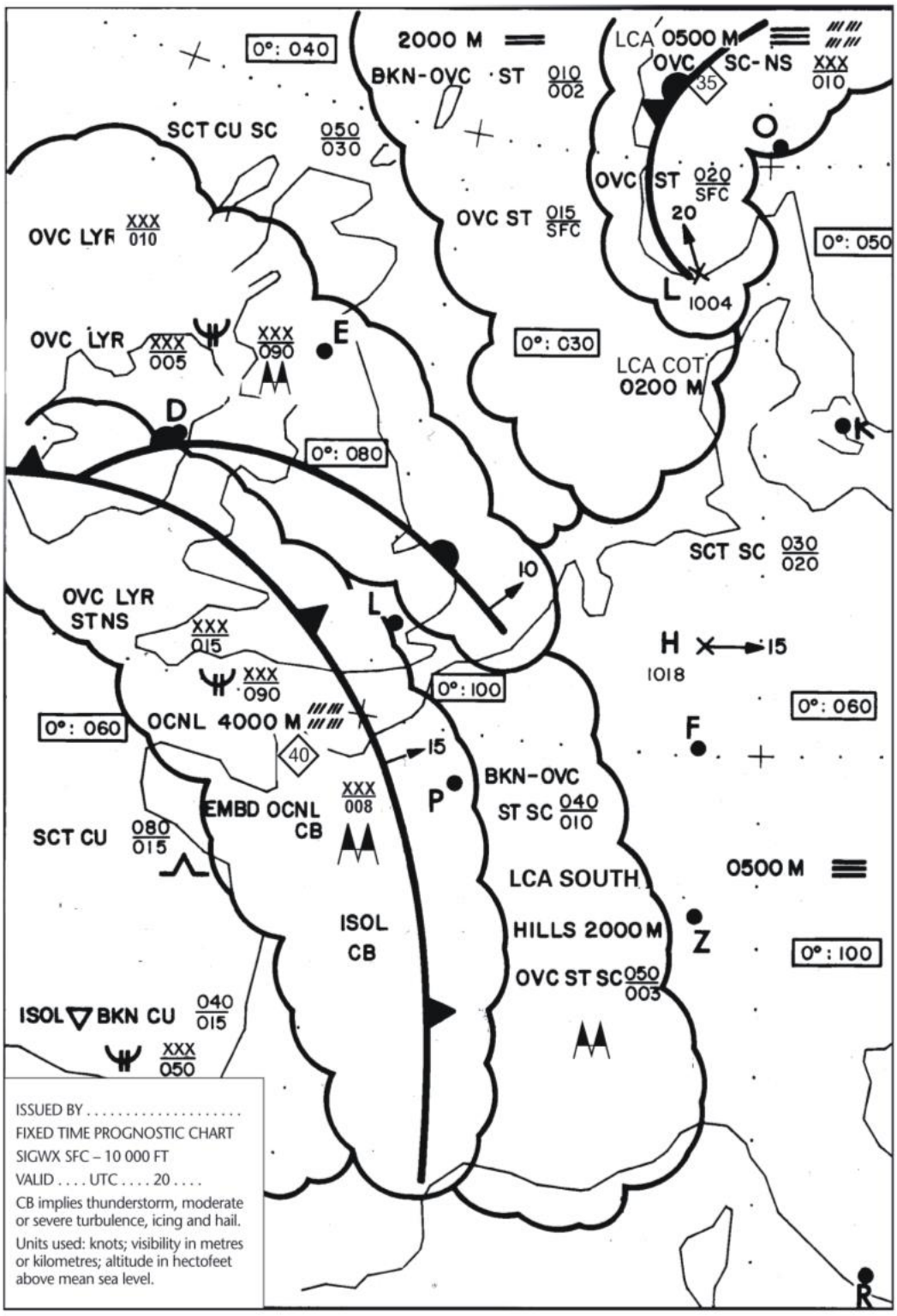
Example 1. Polar stereographic projection



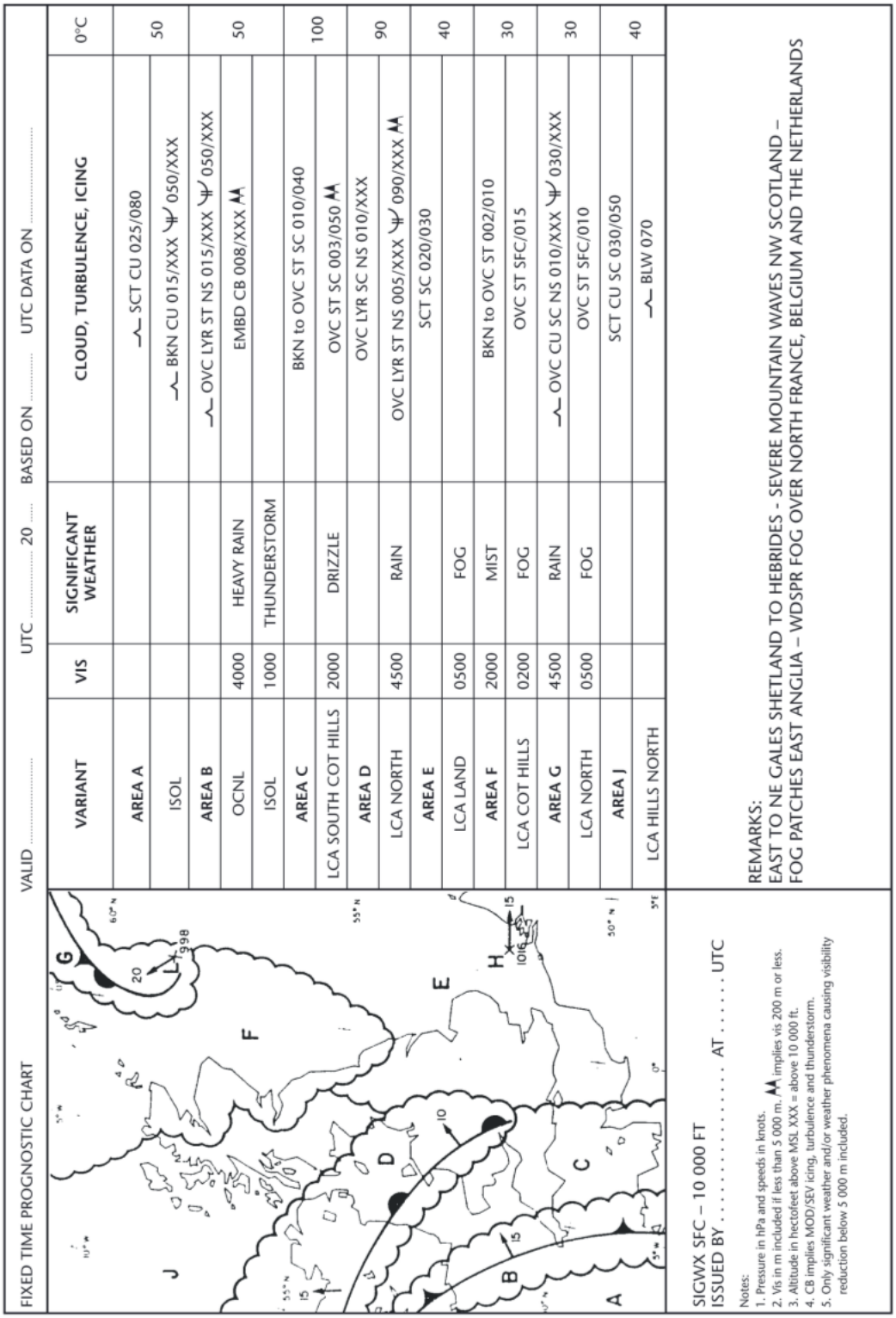
WAFS SIGNIFICANT WEATHER CHART **MODEL SWH**
Example 2. Mercator projection



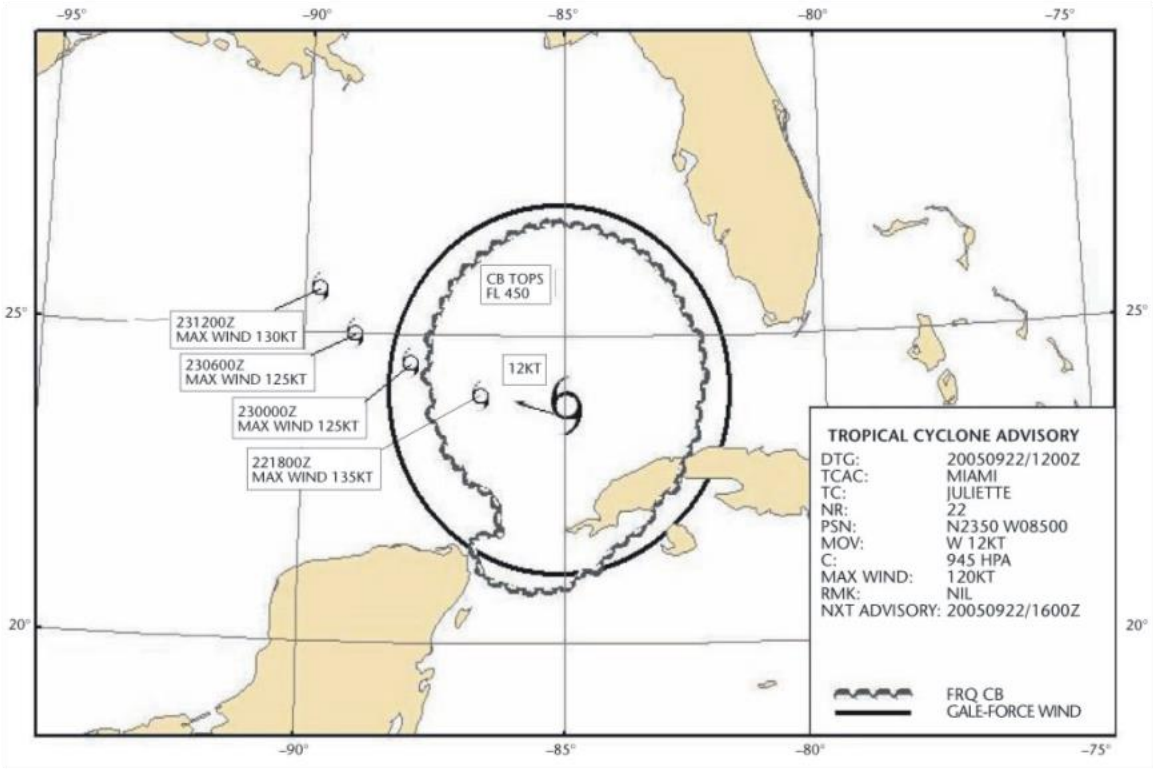
SIGNIFICANT WEATHER CHART (LOW LEVEL) **MODEL SWL**
Example 1



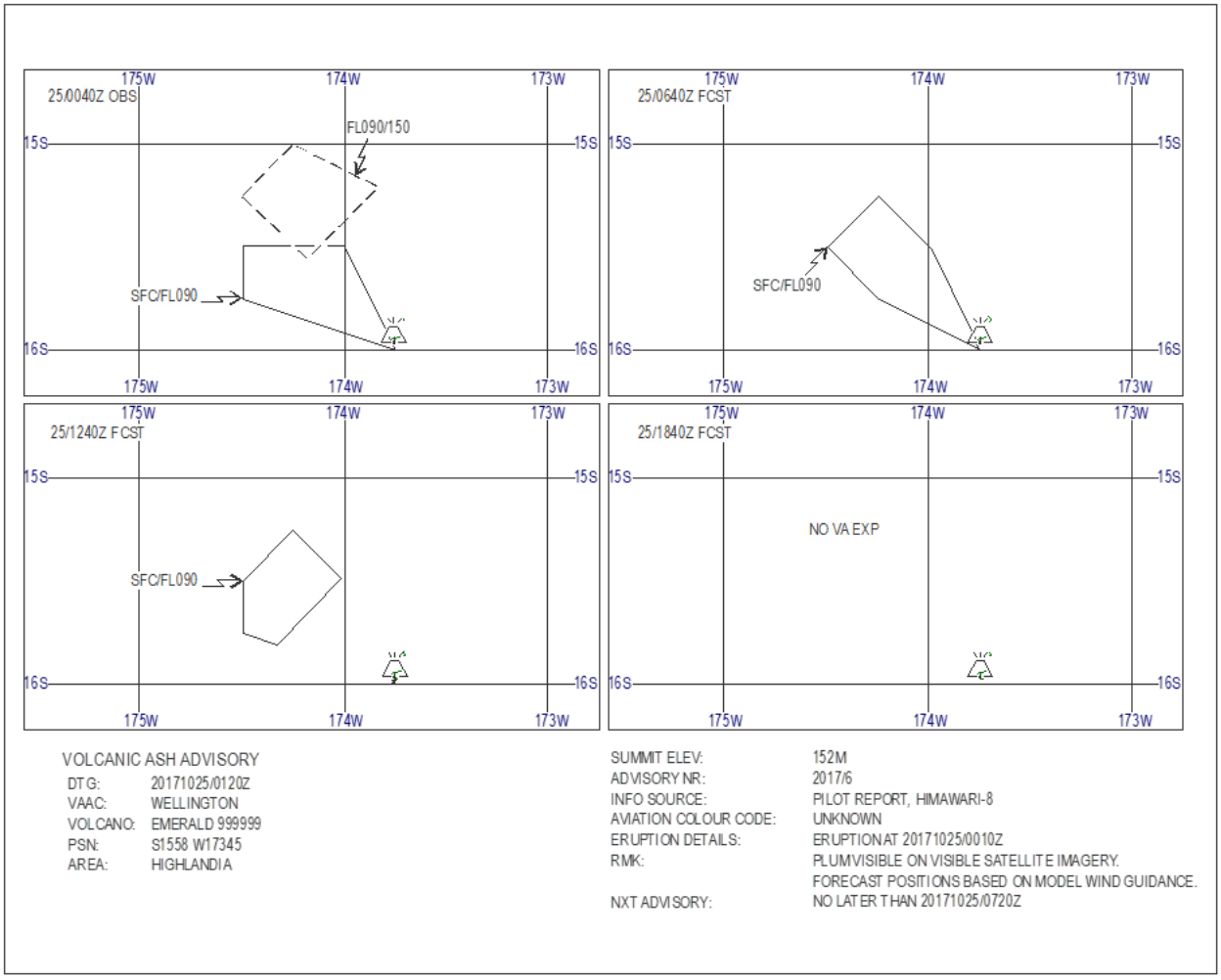
SIGNIFICANT WEATHER CHART (LOW LEVEL) **MODEL SWL**
Example 2



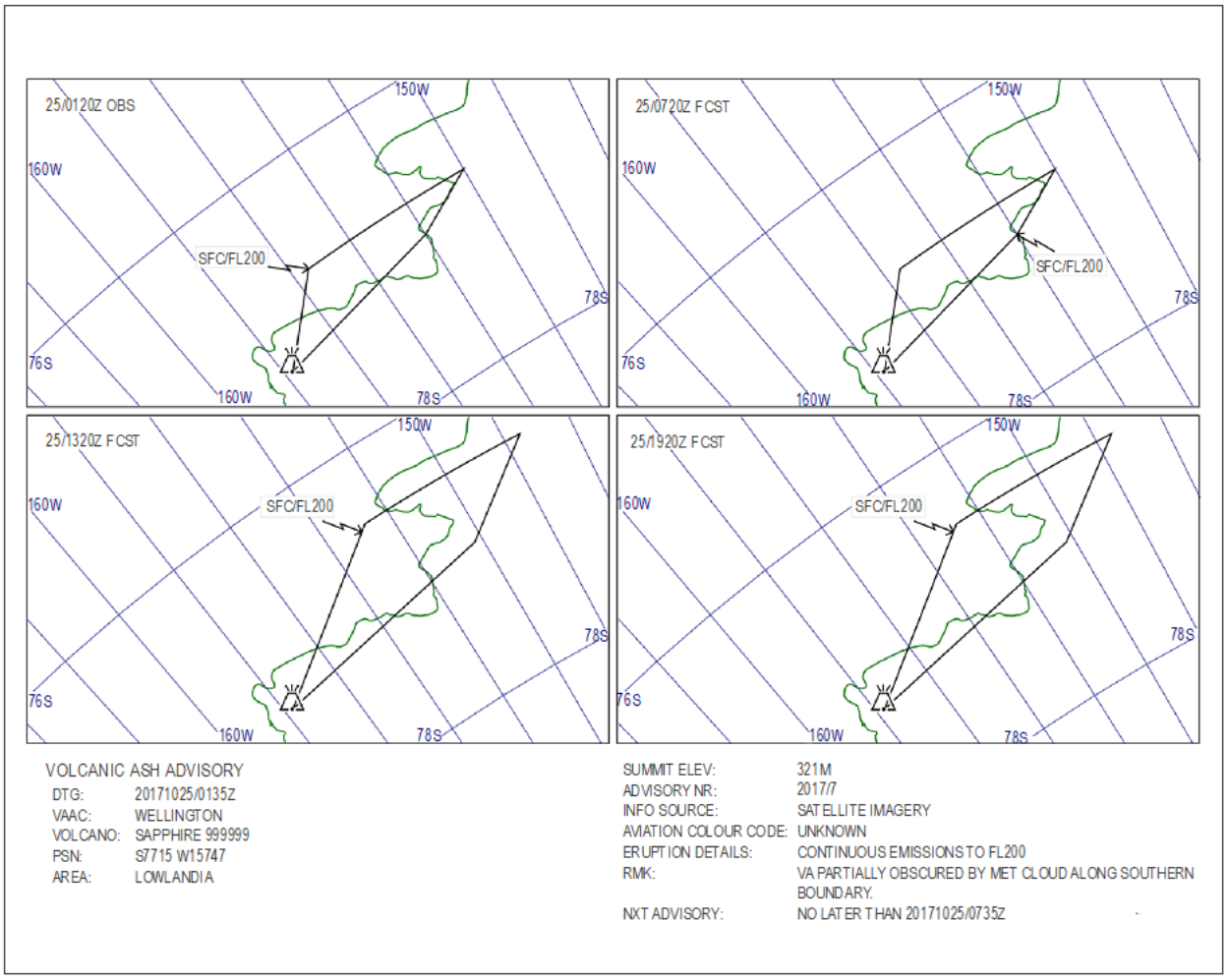
TROPICAL CYCLONE ADVISORY INFORMATION IN GRAPHICAL FORMAT **MODEL TCG**



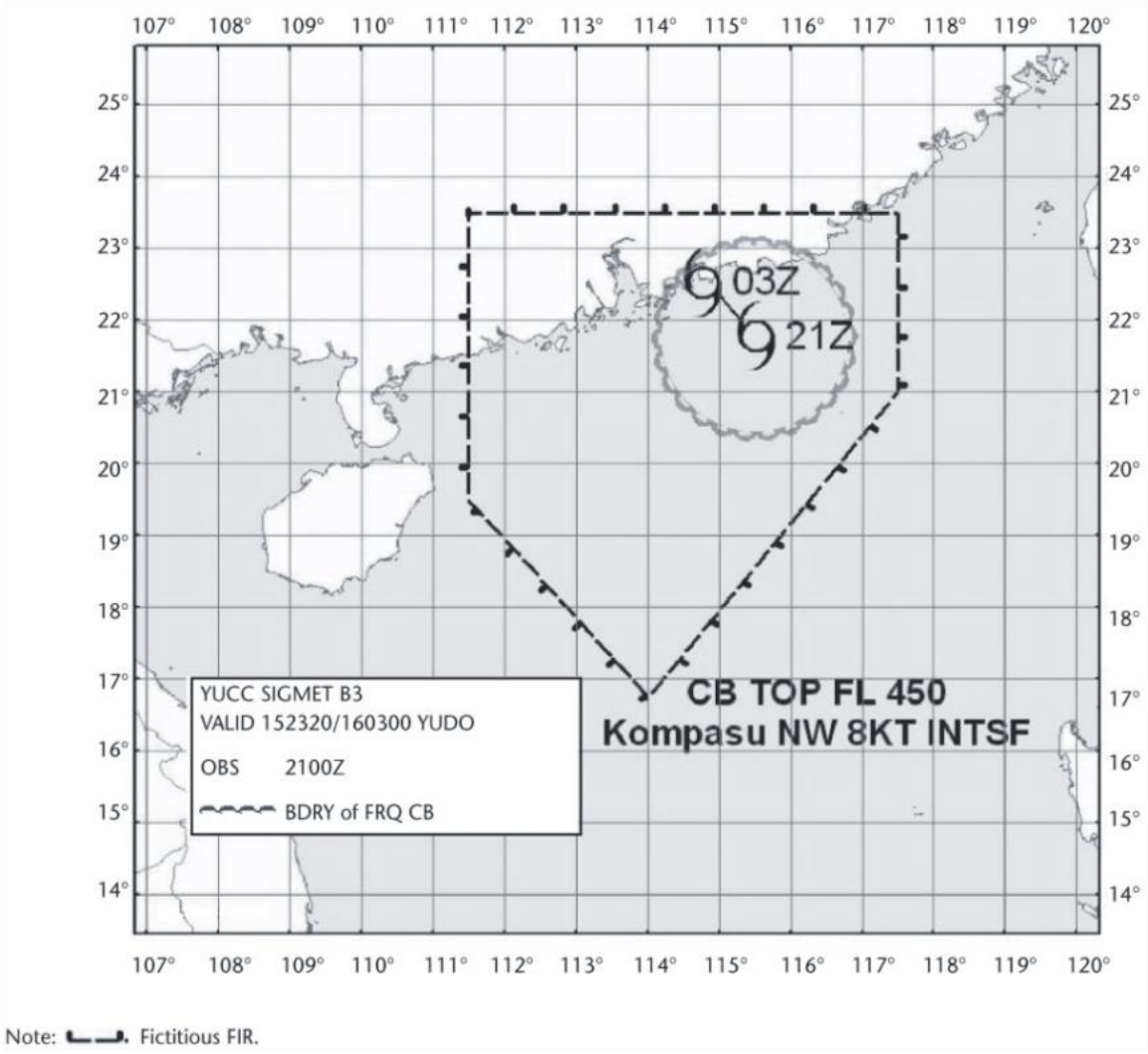
VOLCANIC ASH ADVISORY INFORMATION IN GRAPHICAL FORMAT **MODEL VAG**
Example 1. Mercator projection



VOLCANIC ASH ADVISORY INFORMATION IN GRAPHICAL FORMAT **MODEL VAG**
Example 2. Polar stereographic projection

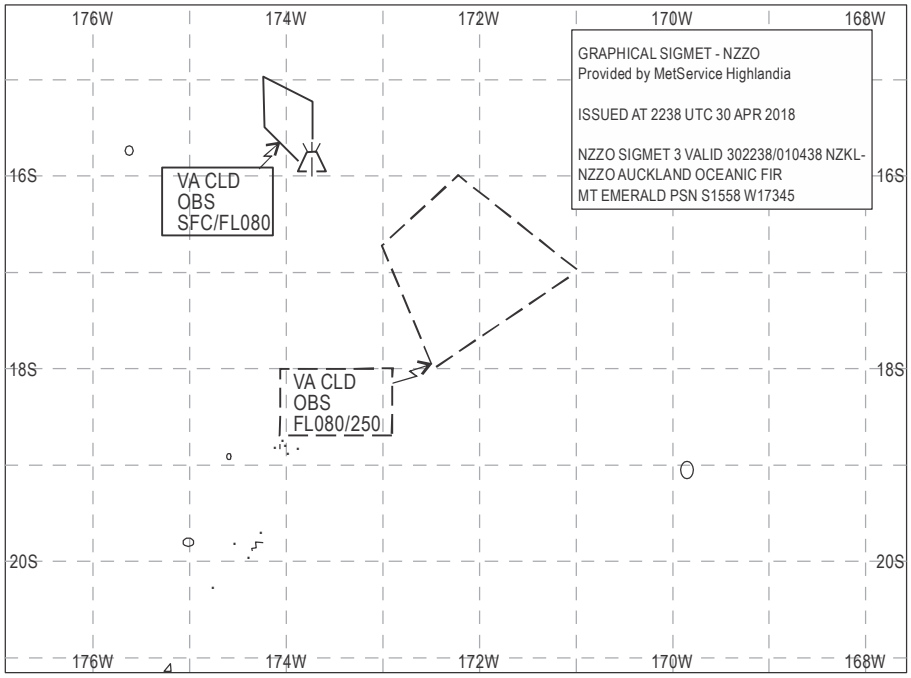


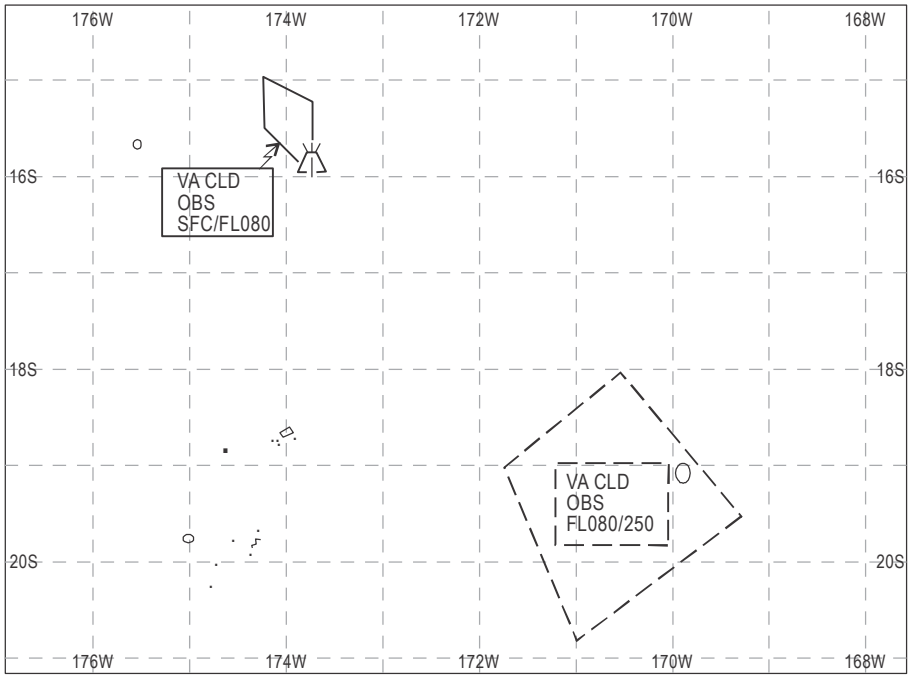
SIGMET FOR TROPICAL CYCLONE IN GRAPHICAL FORMAT **MODEL STC**



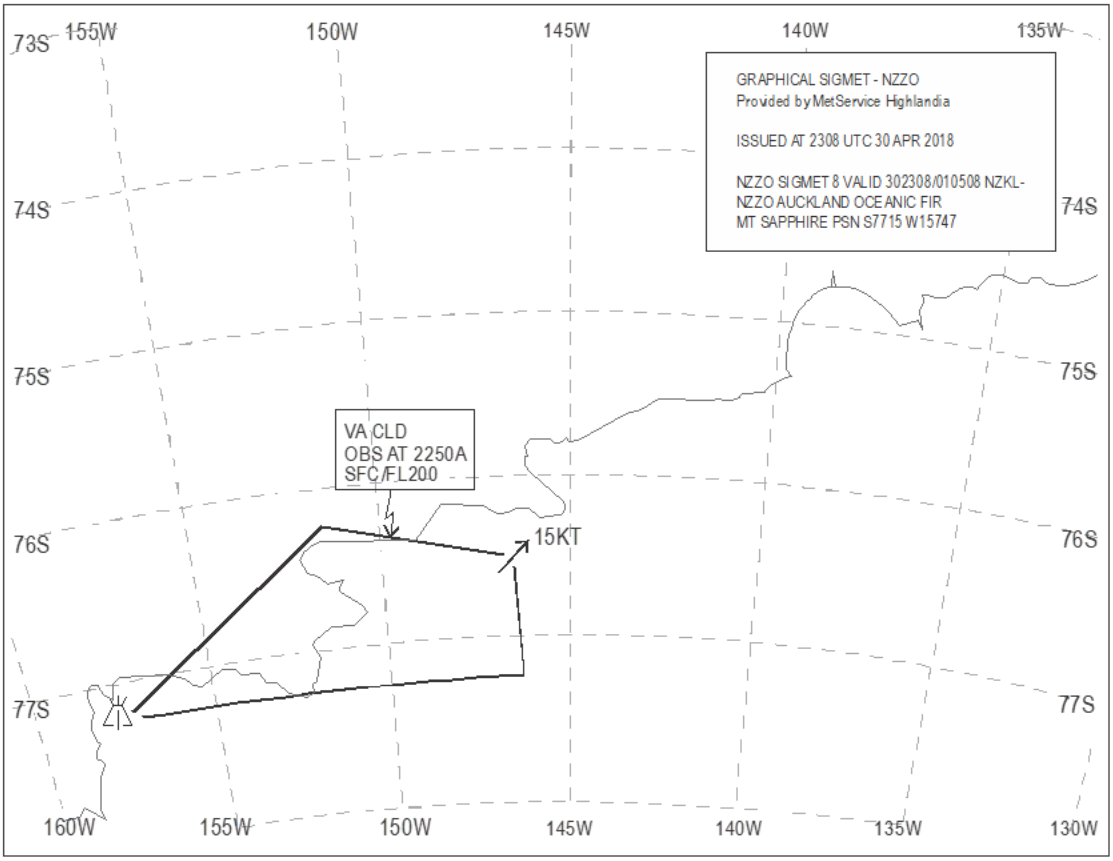
Note: Fictitious FIR.

SIGMET FOR VOLCANIC ASH IN GRAPHICAL FORMAT **MODEL SVA**
Example 1. Mercator projection

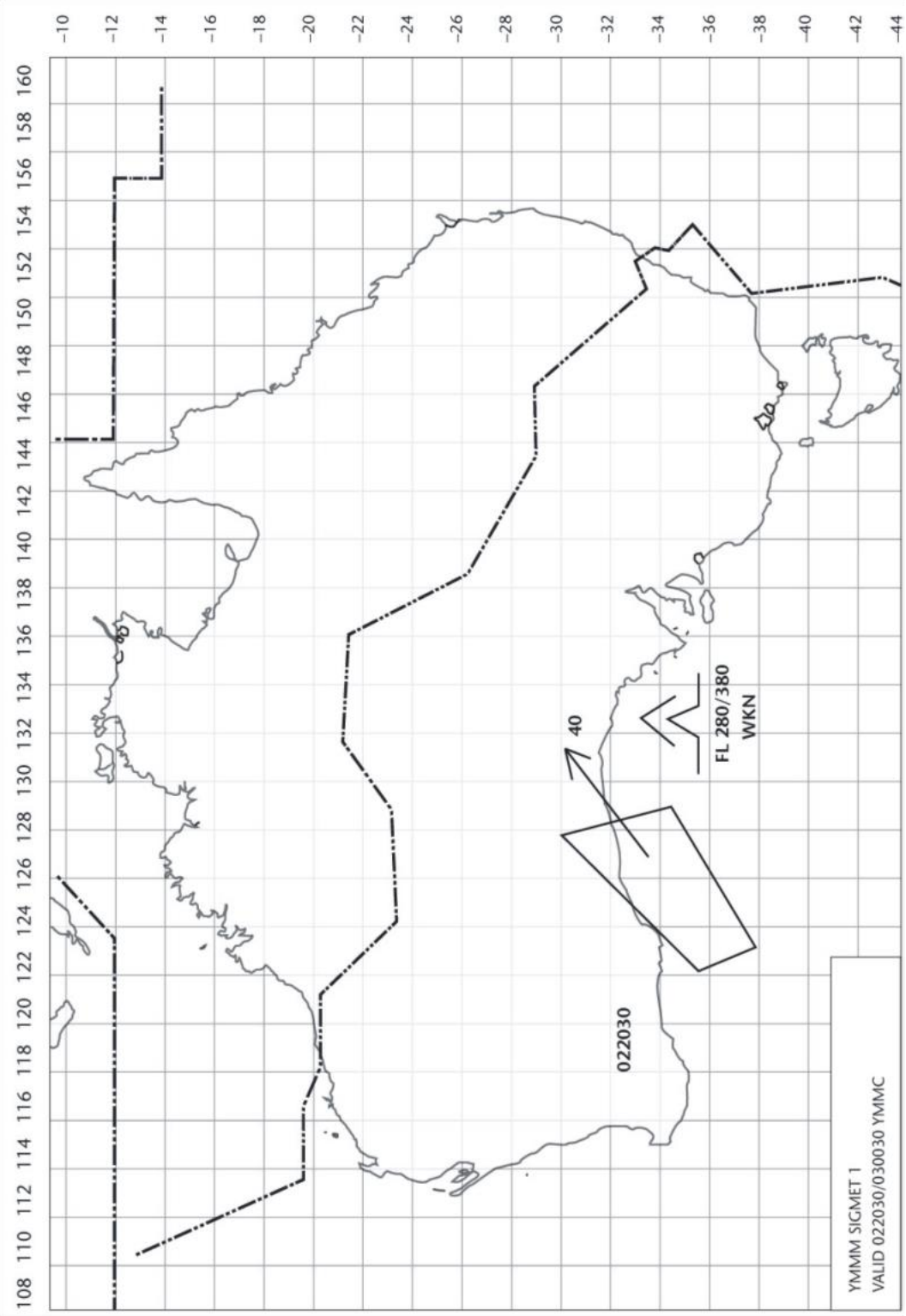




SIGMET FOR VOLCANIC ASH IN GRAPHICAL FORMAT **MODEL SVA**
Example 2. Polar stereographic projection



SIGMET FOR PHENOMENA OTHER THAN TROPICAL CYCLONE AND VOLCANIC ASH IN GRAPHICAL FORMAT **MODEL SGE**



SHEET OF NOTATIONS USED IN FLIGHT DOCUMENTATION **Model SN**

1. Symbols for significant weather

	Tropical cyclone		Drizzle
	Severe squall line*		Rain
	Moderate turbulence		Snow
	Severe turbulence		Shower Hail
	Mountain waves		Widespread blowing snow
	Moderate aircraft icing		Severe sand or dust haze
	Severe aircraft icing		Widespread sandstorm or duststorm
	Widespread fog		Widespread haze
	Radioactive materials in the atmosphere**		Widespread mist
	Volcanic eruption***		Widespread smoke
	Mountain obscuration		Freezing precipitation****

* In-flight documentation for flights operating up to FL 100. This symbol refers to "squall line".

** The following information should be included in a separate text box on the chart: radioactive materials in the atmosphere symbol; latitude/longitude of release site; and (if known) the name of the site of the radioactive source. In addition, the legend of SIGWX charts on which a release of radiation is indicated should contain "CHECK SIGMET AND NOTAM FOR RDOACT CLD". The centre of the radioactive materials in the atmosphere symbol should be placed on significant weather charts at the latitude/longitude site of the radioactive source.

*** The following information should be included in a separate text box on the chart: volcanic eruption symbol; the name of the volcano (if known); and the latitude/longitude of the eruption.

In addition, the legend of SIGWX charts should indicate "CHECK SIGMET, ADVISORIES FOR TC AND VA, AND ASHTAM AND NOTAM FOR VA". The dot on the base of the volcanic eruption symbol should be placed on significant weather charts at the latitude/longitude site of the volcanic event.

**** This symbol does not refer to icing due to precipitation coming into contact with an aircraft which is at a very low temperature.

Note: Height indications between which phenomena are expected, top above base as per chart legend.

2. Fronts and convergence zones and other symbols used

	Cold front at the surface	FL270	Position, speed and level of maximum wind
	Warm front at the surface		Convergence line
	Occluded front at the surface	0°:100	Freezing level
	Quasi-stationary front at the surface		Intertropical convergence zone
440	Tropopause high	10	State of the sea
370	Tropopause low	18	Sea-surface temperature
380	Tropopause level	40	Widespread strong surface wind*
----- 350 -----	Tropopause level contour		

FL 320 220/400 FL 310

Wind arrows indicate the maximum wind in jet and the flight level at which it occurs. If the maximum wind speed is 60 m/s (120 kt) or more, the flight levels between which winds are greater than 40 m/s (80 kt) is placed below the maximum wind level. In the example, winds are greater than 40 m/s (80 kt) between FL 220 and FL 400.

The heavy line delineating the jet axis begins/ends at the points where a wind speed of 40 m/s (80 kt) is forecast.

Symbol used whenever the height of the jet axis changes by +/-3000 ft or the speed changes by +/-20 kt

* This symbol refers to widespread surface wind speeds exceeding 15 m/s (30 kt).

3. Abbreviations used to describe clouds

3.1 Type

CI	=	Cirrus	AS	=	Altostratus	ST	=	Stratus
CC	=	Cirrocumulus	NS	=	Nimbostratus	CU	=	Cumulus
CS	=	Cirrostratus	SC	=	Stratocumulus	CB	=	Cumulonimbus
AC	=	Altocumulus						

3.2 Amount

Clouds except CB

FEW	=	few (1/8 to 2/8)	BKN	=	broken (5/8 to 7/8)
SCT	=	scattered (3/8 to 4/8)	OVC	=	overcast (8/8)

CB only

ISOL	=	individual CBs (isolated)
OCNL	=	well-separated CBs (occasional)
FRQ	=	CBs with little or no separation (frequent)
EMBD	=	CBs embedded in layers of other clouds or concealed by haze (embedded)

3.3 Heights

Heights are indicated on WAFS SIGWX charts in flight levels (FL), top over base. When XXX is used, tops or bases are outside the layer of the atmosphere to which the chart applies. The heights of the cloud base of cumulonimbus clouds are not shown on WAFS SIGWX charts.

In SWL charts:
(a) Heights are indicated as altitudes above mean sea level;
(b) The abbreviation SFC is used to indicate ground level;

4. Depicting of lines and systems on specific charts

4.1 Model – WAFS significant weather charts

Scalloped line	=	demarcation of areas of cumulonimbus cloud
Heavy broken line	=	delineation of area of moderate or severe turbulence not associated with convective cloud
Heavy solid line interrupted by wind arrow and flight level	=	position of jet stream axis with indication of wind direction, speed in kt or m/s and height in flight levels. The vertical extent of the jet stream is indicated (in flight levels), e.g. FL 270 accompanied by 240/290 indicates that the jet extends from FL 240 to FL 290.
Dashed line interrupted by a three-digit number	=	tropopause level contour where the number represents the flight level of the tropopause
Flight levels inside small rectangles	=	height in flight levels of tropopause at spot locations, e.g. 340. Low and high points of the tropopause topography are indicated by the letters L or H, respectively, inside a pentagon with the heigh in flight levels. Display explicit FL for jet depths and tropopause height even if outside forecast bounds.

4.2 Model SWL - Significant weather chart (low level)

X	=	position of pressure centres given in hectopascals
L	=	centre of low pressure
H	=	centre of high pressure
Scalloped lines	=	demarcation of area of significant weather
Dashed lines	=	altitude of 0°C isotherm in feet (hectofeet) or metres Note: 0°C level may also be indicated by 0°:060 i.e. 0°C level is at an altitude of 6 000 ft.
Figures on arrows	=	speed in kt or km/h of movement of frontal systems, depressions or anticyclones
Figure inside the state of the sea symbol	=	total wave height in feet or metres
Figure inside the sea-surface temperature	=	sea-surface temperature in °C
Figures inside the strong surface wind symbol	=	wind in kt or m/s

4.3 Arrows, feathers and pennants

Arrows indicate direction. Number of pennants and/or feathers correspond to speed.
Example: 270°/115 kt (equivalent to 57.5 m/s)

Pennants correspond to 50 kt or 25 m/s
Feathers correspond to 10 kt or 5 m/s
Half-feathers correspond to 5 kt or 2.5 m/s

* A conversion factor of 1 to 2 is used.

Appendix 2

TECHNICAL SPECIFICATIONS RELATED TO AERODROME METEOROLOGICAL REPORTS (LOCAL ROUTINE REPORT, LOCAL SPECIAL REPORT, AERODROME ROUTINE METEOROLOGICAL REPORT AND AERODROME SPECIAL METEOROLOGICAL REPORT)

(See Chapters 2 and 4 of this PANS.)

Table A2-1. Template for the local routine (MET REPORT) and local special (SPECIAL) reports

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, dependent on meteorological conditions;
O = inclusion optional.

Note 1.— The ranges and resolutions for the numerical elements included in local routine report and local special report are shown in Table A2-4 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services – ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400)*.

Note 3.— The location indicators and their significations can be found in Location Indicators *(Doc 7910)*.

Element as specified in Annex 3, Chapter 4	*Detailed content*	*Template(s)*			*Examples*
Identification of the type of report (M)	Type of report	MET REPORT *or* SPECIAL			MET REPORT SPECIAL
Location indicator (M)	ICAO location indicator (M)	nnnn			YUDO[1]
Time of the observation (M)	Day and actual time of the observation in UTC	nnnnnnZ			221630Z
Identification of an automated report (C)	Automated report identifier (C)	AUTO			AUTO
Surface wind (M)	Name of the element (M)	WIND			WIND 240/4MPS (WIND 240/8KT) WIND RWY 18 TDZ 190/6MPS (WIND RWY 18 TDZ 190/12KT) WIND VRB1MPS (WIND VRB2KT) WIND CALM
	Runway (O)[2]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			
	Runway section (O)[3]	TDZ			
	Wind direction (M)	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	C A L M	
	Wind speed (M)	[ABV]n[n][n]MPS (*or* [ABV]n[n]KT			

Element as specified in Annex 3, Chapter 4	*Detailed content*	*Template(s)*			*Examples*
	Significant speed variations (C)[4]	MAX[ABV]nn[n] MNMn[n]			WIND VRB BTN 350/ AND 050/1MPS (WIND VRB BTN 350/ AND 050/2KT) WIND 270/ABV49MPS (WIND 270/ABV99KT) WIND 120/3MPS MAX9 MNM2 (WIND 120/6KT MAX18 MNM4) WIND 020/5MPS VRB BTN 350/ AND 070/ (WIND 020/10KT VRB BTN 350/ AND 070/) WIND RWY 14R MID 140/6MPS (WIND RWY 14R MID 140/12KT) WIND RWY 27 TDZ 240/8MPS MAX14 MNM5 END 250/7MPS (WIND RWY 27 TDZ 240/16KT MAX28 MNM10 END 250/14KT)
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—		
	Runway section (O)[3]	MID			
	Wind direction (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	C A L M	
	Wind speed (O)[3]	[ABV]n[n][n]MPS (*or* [ABV]n[n]KT)			
	Significant speed variations (C)[4]	MAX[ABV]nn[n] MNMn[n]			
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—		
	Runway section (O)[3]	END			
	Wind direction (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	C A L M	
	Wind speed (O)[3]	[ABV]n[n][n]MPS (*or* [ABV]n[n]KT)			
	Significant speed variations (C)[4]	MAX[ABV]nn[n] MNMn[n]			
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—		
Visibility (M)	Name of the element (M)	VIS		C A V O K	VIS 350M CAVOK VIS 7KM VIS 10KM VIS RWY 09 TDZ 800M END 1200M VIS RWY 18C TDZ 6KM RWY 27 TDZ 4000M
	Runway (O)[2]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			
	Runway section (O)[3]	TDZ			
	Visibility (M)	n[n][n][n]M *or* n[n]KM			
	Runway section (O)[3]	MID			
	Visibility (O)[3]	n[n][n][n]M *or* n[n]KM			
	Runway section (O)[3]	END			
	Visibility (O)[3]	n[n][n][n]M *or* n[n]KM			
Runway visual range (C)[6]	Name of the element (M)	RVR			RVR RWY 32 400M RVR RWY 20 1600M RVR RWY 10L BLW 50M RVR RWY 14 ABV 2000M RVR RWY 10 BLW 150M RVR RWY 12 ABV 1200M RVR RWY 12 TDZ 1100M MID ABV 1400M RVR RWY 16 TDZ 600M MID 500M END 400M RVR RWY 26 500M RWY 20 800M
	Runway (C)[7]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			
	Runway section (C)[8]	TDZ			
	Runway visual range (M)	[ABV *or* BLW] nn[n][n]M			
	Runway section (C)[8]	MID			
	Runway visual range (C)[8]	[ABV *or* BLW] nn[n][n]M			
	Runway section (C)[8]	END			
	Runway visual range (C)[8]	[ABV *or* BLW] nn[n][n]M			
Present weather (C)[9, 10]	Intensity of present weather (C)[9]	FBL *or* MOD *or* HVY	—		

Element as specified in Annex 3, Chapter 4	*Detailed content*	*Template(s)*			*Examples*
	Characteristics and type of present weather (C)[9,11]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZUP[12] *or* FC[13] *or* FZRA *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* SHUP[12] *or* TSGR *or* TSGS *or* TSRA *or* TSSN *or* TSUP[12] *or* UP[12]	FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG *or* //[12]		MOD RA HVY TSRA HVY DZ FBL SN HZ FG VA MIFG HVY TSRASN FBL SNRA FBL DZ FG HVY SHSN BLSN HVY TSUP //
Cloud (M)[14]	Name of the element (M)	CLD			CLD NSC CLD SCT 300M OVC 600M (CLD SCT 1000FT OVC 2000FT) CLD OBSC VER VIS 150M (CLD OBSC VER VIS 500FT) CLD BKN TCU 270M (CLD BKN TCU 900FT) CLD RWY 08R BKN 60M RWY 26 BKN 90M (CLD RWY 08R BKN 200FT RWY 26 BKN 300FT) CLD /// CB ///M (CLD /// CB ///FT) CLD /// CB 400M (CLD /// CB 1200FT) CLD NCD
	Runway (O)[2]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			
	Cloud amount (M) *or* vertical visibility (O)[9]	FEW *or* SCT *or* BKN *or* OVC *or* ///[12]	OBSC	NSC *or* NCD[12]	
	Cloud type (C)[9]	CB *or* TCU *or* ///[12]	—		
	Height of cloud base *or* the value of vertical visibility (C)[9]	n[n][n][n]M (*or* n[n][n][n][n]FT) *or* ///M (*or* ///FT)[12]	[VER VIS n[n][n]M(*or* VER VIS n[n][n][n]FT)] *or* VER VIS ///M (*or* VER VIS ///FT)[12]		
Air temperature (M)	Name of the element (M)	T			T17 TMS08
	Air temperature (M)	[MS]nn			
Dew-point temperature (M)	Name of the element (M)	DP			DP15 DPMS18
	Dew-point temperature (M)	[MS]nn			
Pressure values (M)	Name of the element (M)	QNH			QNH 0995HPA QNH 1009HPA QNH 1022HPA QFE 1001HPA QNH 0987HPA QFE RWY 18 0956HPA RWY 24 0955HPA
	QNH (M)	nnnnHPA			
	Name of the element (O)	QFE			
	QFE (O)	[RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]] nnnnHPA [RWY nn[L] *or* RWY nn[C] *or* RWY nn[R] nnnnHPA]			
Supplementary information (C)[9]	Significant meteorological phenomena (C)[9]	CB *or* TS *or* MOD TURB *or* SEV TURB *or* WS *or* GR *or* SEV SQL *or* MOD ICE *or* SEV ICE *or* FZDZ *or* FZRA *or* SEV MTW *or* SS *or* DS *or* BLSN *or* FC[15]			FC IN APCH WS IN APCH 60M-WIND 360/13MPS WS RWY 12

<table>
<tr><th>Element as specified in Annex 3, Chapter 4</th><th>Detailed content</th><th colspan="5">Template(s)</th><th>Examples</th></tr>
<tr><td></td><td>Location of the phenomena (C)[9]</td><td colspan="5">IN APCH [n[n][n][n]M-WIND nnn/n[n]MPS] or
IN CLIMB-OUT [n[n][n][n]M-WIND nnn/n[n]MPS]
(IN APCH [n[n][n][n]FT-WIND nnn/n[n]KT] or
IN CLIMB-OUT [n[n][n][n]FT-WIND nnn/n[n]KT]) or
RWY nn[L] or RWY nn[C] or RWY nn[R]</td><td rowspan="2">REFZRA
CB IN CLIMB-OUT RETSRA</td></tr>
<tr><td></td><td>Recent weather (C)[9, 10]</td><td colspan="5">RERASN or REFZDZ or REFZRA or REDZ or
RE[SH]RA or RE[SH]SN or RESG or RESHGR or
RESHGS or REBLSN or RESS or REDS or RETSRA or
RETSSN or RETSGR or RETSGS or REFC or REPL or
REUP[12] or REFZUP[12] or RETSUP[12] or RESHUP[12] or
REVA or RETS</td></tr>
<tr><td>Trend forecast (O)[16]</td><td>Name of the element (M)</td><td colspan="5">TREND</td><td rowspan="13">TREND NOSIG TREND BECMG FEW 600M (TREND BECMG FEW 2000FT)

TREND TEMPO 250/18 MPS MAX25 (TREND TEMPO 250/36KT MAX50)

TREND BECMG AT1800 VIS 10KM NSW
TREND BECMG TL1700 VIS 800M FG
TREND BECMG FM1030 TL1130 CAVOK

TREND TEMPO TL1200 VIS 600M BECMG AT1230 VIS 8KM NSW CLD NSC
TREND TEMPO FM0300 TL0430 MOD FZRA
TREND BECMG FM1900 VIS 500M HVY SNRA
TREND BECMG FM1100 MOD SN TEMPO FM1130 BLSN

TREND BECMG AT1130 CLD OVC 300M (TREND BECMG AT1130 CLD OVC 1000FT)

TREND TEMPO TL1530 HVY SHRA CLD BKN CB 360M (TREND TEMPO TL1530 HVY SHRA CLD BKN CB 1200FT)</td></tr>
<tr><td></td><td>Change indicator (M)[17]</td><td rowspan="12">NOSIG</td><td colspan="4">BECMG or TEMPO</td></tr>
<tr><td></td><td>Period of change (C)[9]</td><td colspan="4">FMnnnn and/or TLnnnn or ATnnnn</td></tr>
<tr><td></td><td>Wind (C)[9]</td><td colspan="4">nnn/[ABV]n[n][n]MPS [MAX[ABV]nn[n]]
(or nnn/[ABV]n[n]KT [MAX[ABV]nn])</td></tr>
<tr><td></td><td>Visibility (C)[9]</td><td colspan="3">VIS n[n][n][n]M or
VIS n[n]KM</td><td rowspan="4">C
A
V
O
K</td></tr>
<tr><td></td><td>Weather phenomenon: intensity (C)[9]</td><td>FBL or
MOD or
HVY</td><td>—</td><td>NSW</td></tr>
<tr><td></td><td>Weather phenomenon: characteristics and type (C)[9, 10, 11]</td><td>DZ or
RA or
SN or
SG or
PL or
DS or
SS or
FZDZ or
FZRA or
SHGR or
SHGS or
SHRA or
SHSN or
TSGR or
TSGS or
TSRA or
TSSN</td><td>FG or
BR or
SA or
DU or
HZ or
FU or
VA or
SQ or
PO or
FC or
TS or
BCFG or
BLDU or
BLSA or
BLSN or
DRDU or
DRSA or
DRSN or
FZFG or
MIFG or
PRFG</td><td></td></tr>
<tr><td></td><td>Name of the element (C)[9]</td><td colspan="3">CLD</td></tr>
<tr><td></td><td>Cloud amount and vertical visibility (C)[9,14]</td><td>FEW or
SCT or
BKN or
OVC</td><td>OBSC</td><td>NSC</td></tr>
<tr><td></td><td>Cloud type (C)[9,14]</td><td>CB or
TCU</td><td>—</td><td></td></tr>
</table>

Element as specified in Annex 3, Chapter 4	*Detailed content*	*Template(s)*					*Examples*
	Height of cloud base *or* the value of vertical visibility (C)[9,14]		n[n][n][n]M (*or* n[n][n][n][n]FT)	[VER VIS n[n][n]M (*or* VER VIS n[n][n][n]FT)]			

Notes.—

1. Fictitious location.
2. Optional values for one or more runways.
3. Optional values for one or more sections of the runway.
4. To be included in accordance with 2.2.1.5.2 c).
5. To be included in accordance with 2.2.1.5.2 b) 1).
6. To be included if visibility or runway visual range < 1 500 m.
7. To be included in accordance with 2.2.3.6.4 d).
8. To be included in accordance with 2.2.3.6.4 c).
9. To be included whenever applicable.
10. One or more, up to a maximum of three groups, in accordance with 2.2.4.2.9 a), 2.2.8.1.1 and 4.2.2.4.3.
11. Precipitation types listed under 2.2.4.2.3 a) may be combined in accordance with 2.2.4.2.9 c) and 4.2.2.4.1. Only moderate or heavy precipitation to be indicated in trend forecasts in accordance with 4.2.2.4.1.
12. For automated reports only.
13. Heavy used to indicate tornado or waterspout; moderate used to indicate funnel cloud not reaching the ground.
14. Up to four cloud layers in accordance with 2.2.5.4.3 e).
15. Abbreviated plain language may be used in accordance with 2.2.8.1.2.
16. To be included in accordance with Annex 3, 6.3.2.
17. Number of change indicators to be kept to a minimum in accordance with 4.2.2.1, normally not exceeding three groups.

Table A2-2. Template for aerodrome routine meteorological report (METAR) and aerodrome special meteorological report (SPECI)

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, dependent on meteorological conditions or method of observation;
O = inclusion optional.

Note 1.— The ranges and resolutions for the numerical elements included in METAR and SPECI are shown in Table A2-5 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the PANS-ABC (Doc 8400).

Note 3.— The location indicators and their significations can be found in Location Indicators *(Doc 7910).*

Element as specified in Annex 3, Chapter 4	*Detailed content*	*Template(s)*			*Examples*
Identification of the type of report (M)	Type of report (M)	METAR, METAR COR, SPECI *or* SPECI COR			METAR METAR COR SPECI
Location indicator (M)	ICAO location indicator (M)	nnnn			YUDO[1]
Time of the observation (M)	Day and actual time of the observation in UTC (M)	nnnnnnZ			221630Z
Identification of an automated or missing report (C)[2]	Automated *or* missing report identifier (C)	AUTO *or* NIL			AUTO NIL
END OF METAR IF THE REPORT IS MISSING.					
Surface wind (M)	Wind direction (M)	Nnn *or* ///[12]	VRB		24004MPS VRB01MPS ///10MPS (24008KT) (VRB02KT) 240//KT 19006MPS ////KT (19012KT) 00000MPS (00000KT) 140P49MPS (140P99KT)
	Wind speed (M)	[P]nn[n] *or* //[12]			
	Significant speed variations (C)[3]	G[P]nn[n]			12003G09MPS (12006G18KT) 24008G14MPS (24016G28KT)
	Units of measurement (M)	MPS (*or* KT)			
	Significant directional variations (C)[4]	nnnVnnn	—		02005MPS 350V070 (02010KT 350V070)
Visibility (M)	Prevailing *or* minimum visibility (M)[5]	Nnnn *or* ////[12]		C A V O K	0350 //// CAVOK 7000 9999 0800
	Minimum visibility and direction of the minimum visibility (C)[6]	nnnn[N] *or* nnnn[NE] *or* nnnn[E] *or* nnnn[SE] *or* nnnn[S] *or* nnnn[SW] *or* nnnn[W] *or* nnnn[NW]			2000 1200NW 6000 2800E 6000 2800
Runway visual range	Name of the element (M)	R			R32/0400

Element as specified in Annex 3, Chapter 4	*Detailed content*	*Template(s)*			*Examples*
(C)[7]	Runway (M)	nn[L]/*or* nn[C]/*or* nn[R]/			R12R/1700 R10/M0050 R14L/P2000
	Runway visual range (M)	[P *or* M]nnnn *or* ////[12]			R16L/0650 R16C/0500 R16L//// R10//// R16R/0450 R17L/0450
	Runway visual range past tendency (C)[8]	U, D *or* N			R12/1100U R26/0550N R20/0800D R12/0700
Present weather (C)[2, 9]	Intensity *or* proximity of present weather (C)[10]	– *or* +	—	VC	
	Characteristics and type of present weather (M)[11]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* FZUP[12] *or* FC[13] *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* SHUP[12] *or* TSGR *or* TSGS *or* TSRA *or* TSSN *or* TSUP[12] *or* UP[12]	FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG *or* //[12]	FG *or* PO *or* FC *or* DS *or* SS *or* TS *or* SH *or* BLSN *or* BLSA *or* BLDU *or* VA	RA HZ VCFG +TSRA FG VCSH +DZ VA VCTS –SN MIFG VCBLSA +TSRASN –SNRA DZ FG +SHSN BLSN UP FZUP TSUP FZUP //
Cloud (M)[14]	Cloud amount and height of cloud base *or* vertical visibility (M)	FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn *or* FEW///[12] *or* SCT///[12] *or* BKN///[12] *or* OVC///[12] *or* ///nnn[12] *or* //////[12]	VVnnn *or* VV///[12]	NSC *or* NCD[12]	FEW015 VV005 OVC030 VV/// NSC SCT010 OVC020 BKN/// ///015
	Cloud type (C)[2]	CB *or* TCU *or* ///[12]	—		BKN009TCU NCD SCT008 BKN025CB BKN025/// //////CB /////////// BKN///TCU
Air and dew-point temperature (M)	Air and dew-point temperature (M)	[M]nn/[M]nn or ///[M]nn[12] or [M]nn///[12] or /////[12]			17/10 ///10 17/// ///// 02/M08 M01/M10
Pressure values (M)	Name of the element (M)	Q			Q0995 Q1009 Q1022 Q//// Q0987
	QNH (M)	nnnn *or* ////[12]			

Element as specified in Annex 3, Chapter 4	*Detailed content*	*Template(s)*					*Examples*
Supplementary information (C)	Recent weather (C)[2, 9]	RERASN *or* REFZDZ *or* REFZRA *or* REDZ *or* RE[SH]RA *or* RE[SH]SN *or* RESG *or* RESHGR *or* RESHGS *or* REBLSN *or* RESS *or* REDS *or* RETSRA *or* RETSSN *or* RETSGR *or* RETSGS *or* RETS *or* REFC *or* REVA *or* REPL *or* REUP[12] *or* REFZUP[12] *or* RETSUP[12] *or* RESHUP[12] *or* REII[12]					REFZRA RETSRA
	Wind shear (C)[2]	WS Rnn[L] *or* WS Rnn[C] *or* WS Rnn[R] *or* WS ALL RWY					WS R03 WS ALL RWY WS R18C
	Sea-surface temperature and state of the sea *or* significant wave height (C)[15]	W[M]nn/Sn or W///Sn[12] or W[M]nn/S/ or W[M]nn/Hn[n][n] or W///Hn[n][n] [12] or W[M]nn/H///[12]					W15/S2 W12/H75 W///S3 WM01/S/ W///H104 W17/H/// W///H/// W///S/
Trend forecast (O)[16]	Change indicator (M)[17]	NOSIG	BECMG *or* TEMPO				NOSIG BECMG FEW020
	Period of change (C)[2]		FMnnnn *and/or* TLnnnn *or* ATnnnn				TEMPO 25018G25MPS (TEMPO 25036G50KT)
	Wind (C)[2]		nnn[P]nn[n][G[P]nn[n]]MPS (*or* nnn[P]nn[G[P]nn]KT)				BECMG FM1030 TL1130 CAVOK BECMG TL1700 0800 FG
	Prevailing visibility (C)[2]		nnnn			C A V O K	BECMG AT1800 9000 NSW
	Weather phenomenon: intensity (C)[10]		– *or* +	—	N S W		BECMG FM1900 0500 +SNRA
	Weather phenomenon: characteristics and type (C)[2, 9, 11]		DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG			BECMG FM1100 SN TEMPO FM1130 BLSN TEMPO FM0330 TL0430 FZRA TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC BECMG AT1130 OVC010 TEMPO TL1530 +SHRA BKN012CB
	Cloud amount and height of cloud base *or* vertical visibility (C)[2, 14]		FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	N S C		
	Cloud type (C)[2,14]		CB *or* TCU	—			

Notes.—

1. Fictitious location.
2. To be included whenever applicable.
3. To be included in accordance with 2.2.1.5.2 c).
4. To be included in accordance with 2.2.1.5.2 b) 1).
5. To be included in accordance with 2.2.2.4.4 b).
6. To be included in accordance with 2.2.2.4.4 a).
7. To be included if visibility or runway visual range < 1 500 m; for up to a maximum of four runways in accordance with 2.2.3.6.5 b).
8. To be included in accordance with 2.2.3.6.6.
9. One or more, up to a maximum of three groups, in accordance with 2.2.4.2.9 a), 2.2.8.1.1 and 4.2.2.4.1.
10. To be included whenever applicable; no qualifier for moderate intensity in accordance with 2.2.4.2.8.
11. Precipitation types listed under 2.2.4.2.3 a) may be combined in accordance with 2.2.4.2.9 c) and 4.2.2.4.1. Only moderate or heavy precipitation to be indicated in trend forecasts in accordance with 4.2.2.4.1.
12. To be included temporarily for meteorological elements which are: a) missing; or b) considered as incorrect. Each digit of the space allocation is to be replaced by "/" in the text message and to be indicated as "missing" in the IWXXM version.
13. Heavy used to indicate tornado or waterspout; moderate (no qualifier) to indicate funnel cloud not reaching the ground.
14. Up to four cloud layers in accordance with 2.2.5.4.3 e).
15. To be included in accordance with 2.2.8.1.5.
16. To be included in accordance with Annex 3, 6.3.2.
17. Number of change indicators to be kept to a minimum in accordance with 4.2.2.1, normally not exceeding three groups.

Table A2-3. Use of change indicators in trend forecasts

Change indicator	*Time indicator and period*	*Meaning*	
NOSIG	—	no significant changes are forecast	
BECMG	FM$n_1n_1n_1n_1$ TL$n_2n_2n_2n_2$	the change is forecast to	commence at $n_1n_1n_1n_1$ UTC and be completed by $n_2n_2n_2n_2$ UTC
	TLnnnn		commence at the beginning of the trend forecast period and be completed by nnnn UTC
	FMnnnn		commence at nnnn UTC and be completed by the end of the trend forecast period
	ATnnnn		occur at nnnn UTC (specified time)
	—		a) commence at the beginning of the trend forecast period and be completed by the end of the trend forecast period; *or* b) the time is uncertain
TEMPO	FM$n_1n_1n_1n_1$ TL$n_2n_2n_2n_2$	temporary fluctuations are forecast to	commence at $n_1n_1n_1n_1$ UTC and cease by $n_2n_2n_2n_2$ UTC
	TLnnnn		commence at the beginning of the trend forecast period and cease by nnnn UTC
	FMnnnn		commence at nnnn UTC and cease by the end of the trend forecast period
	—		commence at the beginning of the trend forecast period and cease by the end of the trend forecast period

Table A2-4. Ranges and resolutions for the numerical elements included in local reports

Element as specified in Annex 3, Chapter 4		*Range*	*Resolution*
Runway:	(no units)	01 – 36	1
Wind direction:	°true	010 – 360	10
Wind speed:	MPS	1 – 99*	1
	KT	1 – 199*	1
Visibility:	M	0 – 750	50
	M	800 – 4 900	100
	KM	5 – 9	1
	KM	10 –	0 (fixed value: 10 KM)
Runway visual range:	M	0 – 375	25
	M	400 – 750	50
	M	800 – 2 000	100
Vertical visibility:	M	0 – 75**	15
	M	90 – 600	30
	FT	0 – 250**	50
	FT	300 – 2 000	100
Clouds: height of cloud base:	M	0 – 75**	15
	M	90 – 3 000	30
	FT	0 – 250**	50
	FT	300 – 10 000	100
Air temperature; Dew-point temperature:	°C	–80 – +60	1
QNH; QFE:	hPa	0500 – 1 100	1

* There is no aeronautical requirement to report surface wind speeds of 50 m/s (100 kt) or more; however, provision has been made for reporting wind speeds up to 99 m/s (199 kt) for non-aeronautical purposes, as necessary.

** Under circumstances as specified in 2.2.5.4.2; otherwise a resolution of 30 m (100 ft) is to be used.

Table A2-5. Ranges and resolutions for the numerical elements included in METAR and SPECI

Element as specified in Annex 3, Chapter 4		*Range*	*Resolution*
Runway:	(no units)	01 – 36	1
Wind direction:	°true	000 – 360	10
Wind speed:	MPS KT	00 – 99* 00 – 199*	1 1
Visibility:	M M M M	0000 – 0750 0800 – 4 900 5 000 – 9 000 10 000 –	50 100 1 000 0 (fixed value: 9 999)
Runway visual range:	M M M	0000 – 0375 0400 – 0750 0800 – 2 000	25 50 100
Vertical visibility:	30's M (100's FT)	000 – 020	1
Clouds: height of cloud base:	30's M (100's FT)	000 – 100	1
Air temperature; Dew-point temperature:	°C	–80 – +60	1
QNH:	hPa	0850 – 1 100	1
Sea-surface temperature:	°C	–10 – +40	1
State of the sea:	(no units)	0 – 9	1
Significant wave height:	M	0 – 999	0.1

* There is no aeronautical requirement to report surface wind speeds of 50 m/s (100 kt) or more; however, provision has been made for reporting wind speeds up to 99 m/s (199 kt) for non-aeronautical purposes, as necessary.

Example A2-1. Routine report

a) Local routine report (same location and weather conditions as METAR):

MET REPORT YUDO 221630Z WIND 240/4MPS VIS 600M RVR RWY 12 TDZ 1000M MOD DZ FG CLD SCT 300M OVC 600M T17 DP16 QNH 1018HPA TREND BECMG TL1700 VIS 800M FG BECMG AT1800 VIS 10KM NSW

b) METAR for YUDO (Donlon/International):*

METAR YUDO 221630Z 24004MPS 0600 R12/1000U DZ FG SCT010 OVC020 17/16 Q1018 BECMG TL1700 0800 FG BECMG AT1800 9999 NSW

Meaning of both reports:

Routine report for Donlon/International* issued on the 22nd of the month at 1630 UTC; surface wind direction 240 degrees; wind speed 4 metres per second; visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) 600 metres; runway visual range representative of the touchdown zone for runway 12 is 1 000 metres and the runway visual range values have shown an upward tendency during previous 10 minutes (runway visual range tendency to be included in METAR only); and moderate drizzle and fog; scattered cloud at 300 metres; overcast at 600 metres; air temperature 17 degrees Celsius; dew-point temperature 16 degrees Celsius; QNH 1 018 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 800 metres in fog by 1700 UTC; at 1800 UTC visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 10 kilometres or more and nil significant weather.

* Fictitious location

Note.— In this example, the primary units "metre per second" and "metre" were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding non-SI alternative units "knot" and "foot" may be used instead.

Example A2-2. Special report

a) Local special report (same location and weather conditions as SPECI):

SPECIAL YUDO 151115Z WIND 050/25KT MAX37 MNM10 VIS 1200M RVR RWY 05 ABV 1800M HVY TSRA CLD BKN CB 500FT T25 DP22 QNH 1008HPA TREND TEMPO TL1200 VIS 600M BECMG AT1200 VIS 8KM NSW NSC

b) SPECI for YUDO (Donlon/International):*

SPECI YUDO 151115Z 05025G37KT 3000 1200NE+TSRA BKN005CB 25/22 Q1008 TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC

Meaning of both reports:

Special report for Donlon/International* issued on the 15th of the month at 1115 UTC; surface wind direction 050 degrees; wind speed 25 knots gusting between 10 and 37 knots (minimum wind speed not to be included in SPECI) visibility 1 200 metres (along the runway(s) in the local special report); prevailing visibility 3 000 metres (in SPECI) with minimum visibility 1 200 metres to north east (directional variations to be included in SPECI only); runway visual range above 1 800 metres on runway 05 (runway visual range not required in SPECI with prevailing visibility of 3 000 metres); thunderstorm with heavy rain; broken cumulonimbus cloud at 500 feet; air temperature 25 degrees Celsius; dew-point temperature 22 degrees Celsius; QNH 1 008 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) temporarily 600 metres from 1115 to 1200, becoming at 1200 UTC visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) 8 kilometres, thunderstorm ceases and nil significant weather and nil significant cloud.

* Fictitious location

Note.— In this example, the non-SI alternative units "knot" and "foot" were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding primary units "metres per second" and "metre" may be used instead.

Example A2-3. Volcanic activity report

VOLCANIC ACTIVITY REPORT YUSB* 231500 MT TROJEEN* VOLCANO N5605 W12652 ERUPTED 231445 LARGE ASH CLOUD EXTENDING TO APPROX 30000 FEET MOVING SW

Meaning:

Volcanic activity report issued by Siby/Bistock meteorological station at 1500 UTC on the 23rd of the month. Mt. Trojeen volcano 56 degrees 5 minutes north 126 degrees 52 minutes west erupted at 1445 UTC on the 23rd; a large ash cloud was observed extending to approximately 30 000 feet and moving in a south-westerly direction.

* Fictitious location

Appendix 3

TECHNICAL SPECIFICATIONS RELATED TO AIR-REPORTS

(See Chapter 3 of this PANS.)

Table A3-1. Template for the special air-report (downlink)

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional; included whenever available.

Note 1.— Message to be prompted by the pilot-in-command. Currently only the condition "SEV TURB" can be automated (see 3.1.4.6.3).

Note 2.— Criteria for meteorological phenomena included in special air-reports are listed in Appendix 8.

Element as specified in Annex 3, Chapter 5	*Detailed content*	*Template(s)*	*Examples*
Message type designator (M)	Type of air-report (M)	ARS	ARS
Aircraft identification (M)	Aircraft radiotelephony call sign (M)	nnnnnn	VA812
DATA BLOCK 1			
Latitude (M)	Latitude in degrees and minutes (M)	Nnnnn *or* Snnnn	S4506
Longitude (M)	Longitude in degrees and minutes (M)	Wnnnnn *or* Ennnnn	E01056
Level (M)	Flight level (M)	FLnnn *or* FLnnn to FLnnn	FL330 FL280 to FL310
Time (M)	Time of occurrence in hours and minutes (M)	OBS AT nnnnZ	OBS AT 1216Z
DATA BLOCK 2			
Wind direction (M)	Wind direction in degrees true (M)	nnn/	262/
Wind speed (M)	Wind speed in metres per second (*or* knots) (M)	nnnMPS (*or* nnnKT)	040MPS (080KT)
Wind quality flag (M)	Wind quality flag (M)	n	1
Air temperature (M)	Air temperature in tenths of degrees C (M)	T[M]nnn	T127 TM455
Turbulence (C)	Turbulence in hundredths of $m^{2/3} s^{-1}$ and the time of occurrence of the peak value (C)[1]	EDRnnn/nn	EDR064/08
Humidity (C)	Relative humidity in per cent (C)	RHnnn	RH054
DATA BLOCK 3			

Element as specified in Annex 3, Chapter 5	*Detailed content*	*Template(s)*	*Examples*
Condition prompting the issuance of a special air-report (M)		SEV TURB [EDRnnn][2] *or* SEV ICE *or* SEV MTW *or* TS GR[3] *or* TS[3] *or* HVY DS[4] *or* HVY SS[4] *or* VA CLD [FLnnn/nnn] *or* VA[5] [MT nnnnnnnnnnnnnnnnnnnn] *or* MOD TURB [EDRnnn][2] *or* MOD ICE	SEV TURB EDR076 VA CLD FL050/100

Notes.—

1. The time of occurrence to be reported in accordance with Table A3-3.
2. The turbulence to be reported in accordance with 3.1.4.6.3.
3. Obscured, embedded or widespread thunderstorms or thunderstorms in squall lines.
4. Duststorm or sandstorm.
5. Pre-eruption volcanic activity or a volcanic eruption.

Table A3-2. Template for special air-reports (uplink)

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable;
= = a double line indicates that the text following it should be placed on the subsequent line.

Note 1.— The ranges and resolutions for the numerical elements included in special air-reports are shown in Table A7-8 of Appendix 7.

Note 2.— Criteria for meteorological phenomena included in special air-reports are listed in Appendix 8.

Element	*Detailed content*	*Template*[1,2]	*Examples*
Identification (M)	Message identification	ARS	ARS
Aircraft identification (M)	Aircraft radiotelephony call sign	nnnnnn	VA812[3]
Observed phenomenon (M)	Description of observed phenomenon causing the issuance of the special air-report[4]	TS TSGR SEV TURB SEV ICE SEV MTW HVY DS HVY SS VA CLD VA [MT nnnnnnnnnn] MOD TURB MOD ICE	TS TSGR SEV TURB SEV ICE SEV MTW HVY DS HVY SS VA CLD VA VA MT ASHVAL[5] MOD TURB MOD ICE
Observation time (M)	Time of observation of observed phenomenon	OBS AT nnnnZ	OBS AT 1210Z
Observed location (C)	Location (referring to latitude and longitude (in degrees and minutes)) of observed phenomenon	NnnnnWnnnnn *or* NnnnnEnnnnn *or* SnnnnWnnnnn *or* SnnnnEnnnnn	N2020W07005 S4812E01036
Observed level (C)	Flight level *or* altitude of observed phenomenon	FLnnn *or* FLnnn/nnn *or* nnnnM (*or* [n]nnnnFT)	FL390 FL180/210 3000M 12000FT

Notes.—

1. No wind and temperature to be uplinked to other aircraft in flight in accordance with Annex 3, 5.8.2 b).
2. See Annex 3, 5.8.2 a).
3. Fictitious call sign.
4. In the case of special air-report for volcanic ash cloud, the vertical extent (if observed) and name of the volcano (if known) can be used.
5. Fictitious location.

Table A3-3. Time of occurrence of the peak value to be reported

Peak value of turbulence occurring during the one-minute period ..... minutes prior to the observation	*Value to be reported*
0 – 1	0
1 – 2	1
2 – 3	2
. . .	. . .
13 – 14	13
14 – 15	14
No timing information available	15

Table A3-4. Ranges and resolutions for the meteorological elements included in air-reports

Element as specified in Annex 3, Chapter 5		*Range*	*Resolution*
Wind direction:	°true	000 – 360	1
Wind speed:	MPS KT	00 – 125 00 – 250	1 1
Wind quality flag:	(index)*	0 – 1	1
Air temperature:	°C	–80 – +60	0.1
Turbulence: routine air-report:	$m^{2/3} s^{-1}$ (time of occurrence)*	0 – 2 0 – 15	0.01 1
Turbulence: special air-report:	$m^{2/3} s^{-1}$	0 – 2	0.01
Humidity:	%	0 – 100	1
* Non-dimensional			

Appendix 4

TECHNICAL SPECIFICATIONS RELATED TO AERODROME FORECASTS

(See Chapter 4 of this PANS.)

Table A4-1. Template for aerodrome forecasts (TAF)

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, dependent on meteorological conditions or method of observation;
O = inclusion optional.

Note 1.— The ranges and resolutions for the numerical elements included in TAF are shown in Table A4-3 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services – ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400)*.

Note 3.— The location indicators and their significations can be found in Location Indicators *(Doc 7910)*.

Element as specified in Annex 3, Chapter 6	*Detailed content*	*Template(s)*	*Examples*
Identification of the type of forecast (M)	Type of forecast (M)	TAF *or* TAF AMD *or* TAF COR	TAF TAF AMD
Location indicator (M)	ICAO location indicator (M)	nnnn	YUDO[1]
Time of issue of forecast (M)	Day and time of issue of the forecast in UTC (M)	nnnnnnZ	160000Z
Identification of a missing forecast (C)	Missing forecast identifier (C)	NIL	NIL
END OF TAF IF THE FORECAST IS MISSING.			
Days and period of validity of forecast (M)	Days and period of the validity of the forecast in UTC (M)	nnnn/nnnn	0812/0918
Identification of a cancelled forecast (C)	Cancelled forecast identifier (C)	CNL	CNL
END OF TAF IF THE FORECAST IS CANCELLED.			
Surface wind (M)	Wind direction (M)	nnn *or* VRB[2]	24004MPS; VRB01MPS (24008KT); (VRB02KT) 19005MPS (19010KT) 00000MPS (00000KT) 140P49MPS (140P99KT) 12003G09MPS (12006G18KT)
	Wind speed (M)	[P]nn[n]	
	Significant speed variations (C)[3]	G[P]nn[n]	
	Units of measurement (M)	MPS (*or* KT)	

Element as specified in Annex 3, Chapter 6	*Detailed content*	*Template(s)*				*Examples*	
						24008G14MPS (24016G28KT)	
Visibility (M)	Prevailing visibility (M)	nnnn			C A V O K	0350 7000 9000 9999	CAVOK
Weather (C)[4, 5]	Intensity of weather phenomena (C)[6]	*–* or +		—		RA +TSRA –FZDZ PRFG +TSRASN SNRA FG	HZ FG
	Characteristics and type of weather phenomena (C)[7]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN		FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG			
Cloud (M)[8]	Cloud amount and height of base *or* vertical visibility (M)	FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	NSC		FEW010 OVC020 NSC SCT005 BKN012 SCT008 BKN025CB	VV005 VV///
	Cloud type (C)[4]	CB *or* TCU	—				
Temperature (O)[9]	Name of the element (M)	TX				TX25/1013Z TN09/1005Z TX05/2112Z TNM02/2103Z	
	Maximum temperature (M)	[M]nn/					
	Day and time of occurrence of the maximum temperature (M)	nnnnZ					
	Name of the element (M)	TN					
	Minimum temperature (M)	[M]nn/					
	Day and time of occurrence of the minimum temperature (M)	nnnnZ					
Expected significant changes to one or more of the above elements during the period of validity (C)[4, 10]	Change *or* probability indicator (M)	PROB30 [TEMPO] *or* PROB40 [TEMPO] *or* BECMG *or* TEMPO *or* FM				TEMPO 0815/0818 25017G25MPS (TEMPO 0815/0818 25034G50KT) TEMPO 2212/2214 17006G13MPS 1000 TSRA SCT010CB BKN020 (TEMPO 2212/2214 17012G26KT 1000 TSRA SCT010CB BKN020) BECMG 3010/3011 00000MPS 2400 OVC010 (BECMG 3010/3011 00000KT 2400 OVC010) PROB30 1412/1414 0800 FG BECMG 1412/1414 RA TEMPO 2503/2504 FZRA TEMPO 0612/0615 BLSN	
	Period of occurrence *or* change (M)	nnnn/nnnn *or* nnnnnn[11]					
	Wind (C)[4]	nnn[P]nn[n][G[P]nn[n]]MPS *or* VRBnnMPS (*or* nnn[P]nn[G[P]nn]KT *or* VRBnnKT)					
	Prevailing visibility (C)[4]	nnnn			C A V O K		
	Weather phenomenon: intensity (C)[6]	*–* or +	—	NSW			
	Weather phenomenon: characteristics and type (C)[4, 7]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or*	FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or*				

Element as specified in Annex 3, Chapter 6	*Detailed content*	*Template(s)*				*Examples*
		SHGR *or* SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG			PROB40 TEMPO 2923/3001 0500 FG
	Cloud amount and height of base *or* vertical visibility (C)[4]	FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	NSC		FM051230 15015KMH 9999 BKN020 (FM051230 15008KT 9999 BKN020) BECMG 1618/1620 8000 NSW NSC BECMG 2306/2308 SCT015CB BKN020
	Cloud type (C)[4]	CB *or* TCU	—			

Notes.—

1. Fictitious location.
2. To be used in accordance with 4.1.2.1.
3. To be included in accordance with 4.1.2.1.
4. To be included whenever applicable.
5. One or more, up to a maximum of three, groups in accordance with 4.1.2.3.
6. To be included whenever applicable in accordance with 4.1.2.3. No qualifier for moderate intensity.
7. Weather phenomena to be included in accordance with 4.1.2.3.
8. Up to four cloud layers in accordance with 4.1.2.4.
9. To be included in accordance with 4.1.2.5, consisting of up to a maximum of four temperatures (two maximum temperatures and two minimum temperatures).
10. To be included in accordance with 4.1.3, 4.1.4 and 4.1.5.
11. To be used with FM only.

Table A4-2. Use of change and time indicators in TAF

Change or time indicator		*Time period*	*Meaning*	
FM		$n_dn_dn_hn_hn_mn_m$	used to indicate a significant change in most weather elements occurring at n_dn_d day, n_hn_h hours and n_mn_m minutes (UTC); all the elements given before "FM" are to be included following "FM" (i.e. they are all superseded by those following the abbreviation)	
BECMG		$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	the change is forecast to commence at $n_{d1}n_{d1}$ day and $n_{h1}n_{h1}$ hours (UTC) and be completed by $n_{d2}n_{d2}$ day and $n_{h2}n_{h2}$ hours (UTC); only those elements for which a change is forecast are to be given following "BECMG"; the time period $n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$ should normally be less than 2 hours and in any case should not exceed 4 hours	
TEMPO		$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	temporary fluctuations are forecast to commence at $n_{d1}n_{d1}$ day and $n_{h1}n_{h1}$ hours (UTC) and cease by $n_{d2}n_{d2}$ day and $n_{h2}n_{h2}$ hours (UTC); only those elements for which fluctuations are forecast are to be given following "TEMPO"; temporary fluctuations should not last more than one hour in each instance, and in the aggregate, cover less than half of the period $n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	
PROBnn	—	$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	probability of occurrence (in %) of an alternative value of a forecast element or elements; nn = 30 or nn = 40 only; to be placed after the element(s) concerned	—
	TEMPO	$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$		probability of occurrence of temporary fluctuations

Table A4-3. Ranges and resolutions for the numerical elements included in TAF

Element as specified in Annex 3, Chapter 6		*Range*	*Resolution*
Wind direction:	° true	000 – 360	10
Wind speed:	MPS KT	00 – 99* 00 – 199*	1 1
Visibility:	M M M M	0000 – 0750 0800 – 4 900 5 000 – 9 000 10 000 –	50 100 1 000 0 (fixed value: 9 999)
Vertical visibility:	30's M (100's FT)	000 – 020	1
Cloud: height of cloud base:	30's M (100's FT)	000 – 100	1
Air temperature (maximum and minimum):	°C	–80 – +60	1

* There is no aeronautical requirement to report surface wind speeds of 50 m/s (100 kt) or more; however, provision has been made for reporting wind speeds up to 99 m/s (199 kt) for non-aeronautical purposes, as necessary.

Example A4-1. TAF

TAF for YUDO (Donlon/International):*

TAF YUDO 151800Z 1600/1618 13005MPS 9000 BKN020 BECMG 1606/1608 SCT015CB BKN020 TEMPO 1608/1612 17006G12MPS 1000 TSRA SCT010CB BKN020 FM161230 15004MPS 9999 BKN020

Meaning of the forecast:

TAF for Donlon/International* issued on the 15th of the month at 1800 UTC valid from 0000 UTC to 1800 UTC on the 16th of the month; surface wind direction 130 degrees; wind speed 5 metres per second; visibility 9 kilometres, broken cloud at 600 metres; becoming between 0600 UTC and 0800 UTC on the 16th of the month, scattered cumulonimbus cloud at 450 metres and broken cloud at 600 metres; temporarily between 0800 UTC and 1200 UTC on the 16th of the month surface wind direction 170 degrees; wind speed 6 metres per second gusting to 12 metres per second; visibility 1 000 metres in a thunderstorm with moderate rain, scattered cumulonimbus cloud at 300 metres and broken cloud at 600 metres; from 1230 UTC on the 16th of the month surface wind direction 150 degrees; wind speed 4 metres per second; visibility 10 kilometres or more; and broken cloud at 600 metres.

* Fictitious location

Note.— In this example, the primary units "metre per second" and "metre" were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding non-SI alternative units "knot" and "foot" may be used instead.

Example A4-2. Cancellation of TAF

Cancellation of TAF for YUDO (Donlon/International):*

TAF AMD YUDO 161500Z 1600/1618 CNL

Meaning of the forecast:

Amended TAF for Donlon/International* issued on the 16th of the month at 1500 UTC cancelling the previously issued TAF valid from 0000 UTC to 1800 UTC on the 16th of the month.

* Fictitious location

Appendix 5

TECHNICAL SPECIFICATIONS RELATED TO FORECASTS ISSUED BY THE WORLD AREA FORECAST CENTRES

(See Chapters 5 and 8, and Appendix 1 of this PANS.)

Table A5-1. Fixed valid times of available upper-air gridded forecasts issued by the WAFCs with a horizontal resolution of 0.25° of latitude and longitude

Upper-air gridded forecasts	*1-hourly intervals*	*3-hourly intervals*	*6-hourly intervals*
Wind, temperature, geopotential altitude	6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24 hours*	27, 30, 33, 36, 39, 42, 45 and 48 hours*	54, 60, 66, 72, 78, 84, 90, 96, 102, 108, 114 and 120 hours*
Flight level and temperature of tropopause			
Direction, speed and flight level of maximum wind			
Humidity			
Horizontal extent, and flight levels of base and top, of cumulonimbus clouds	6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24 hours*	27, 30, 33, 36, 39, 42, 45 and 48 hours*	Not provided
Icing			
Turbulence			

* after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based.

Table A5-2. Fixed valid times of available upper-air gridded forecasts issued by the WAFCs with a horizontal resolution of 1.25° of latitude and longitude

Note.— Forecasts issued by the WAFCs with a horizontal resolution of 1.25° are provided for users unable to process forecasts issued by the WAFCs with a horizontal resolution of 0.25°.

Upper-air gridded forecasts	*3-hourly intervals*
Wind, temperature, geopotential altitude	6, 9, 12, 15, 18, 21, 24, 27, 30, 33 and 36 hours*
Flight level and temperature of tropopause	
Direction, speed and flight level of maximum wind	
Humidity	

* after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based.

Table A5-3. Availability (marked by X) of upper-air gridded forecasts issued by the WAFCs with a horizontal resolution of 0.25° of latitude and longitude as a function of flight level

Flight level	*ICAO Standard Atmosphere pressure level (hPa)*	*Geopotential altitude*	*Wind*	*Temperature*	*Turbulence*	*Icing*	*Humidity*
FL 050	843.1	X	X	X	–	X	X
FL 060	812.0	X	X	X	–	X	X
FL 070	781.9	X	X	X	–	X	X
FL 080	752.6	X	X	X	–	X	X
FL 090	724.3	X	X	X	–	X	X
FL 100	696.8	X	X	X	X	X	X
FL 110	670.2	X	X	X	X	X	X
FL 120	644.4	X	X	X	X	X	X
FL 130	619.4	X	X	X	X	X	X
FL 140	595.2	X	X	X	X	X	X
FL 150	571.8	X	X	X	X	X	X
FL 160	549.2	X	X	X	X	X	X
FL 170	527.2	X	X	X	X	X	X
FL 180	506.0	X	X	X	X	X	X
FL 190	485.5	X	X	X	X	X	–
FL 200	465.6	X	X	X	X	X	–
FL 210	446.5	X	X	X	X	X	–
FL 220	427.9	X	X	X	X	X	–
FL 230	410.0	X	X	X	X	X	–
FL 240	392.7	X	X	X	X	X	–
FL 250	376.0	X	X	X	X	X	–

Flight level	*ICAO Standard Atmosphere pressure level (hPa)*	*Geopotential altitude*	*Wind*	*Temperature*	*Turbulence*	*Icing*	*Humidity*
FL 260	359.9	X	X	X	X	X	–
FL 270	344.3	X	X	X	X	X	–
FL 280	329.3	X	X	X	X	X	–
FL 290	314.9	X	X	X	X	X	–
FL 300	300.9	X	X	X	X	X	–
FL 310	287.4	X	X	X	X	–	–
FL 320	274.5	X	X	X	X	–	–
FL 330	262.0	X	X	X	X	–	–
FL 340	250.0	X	X	X	X	–	–
FL 350	238.4	X	X	X	X	–	–
FL 360	227.3	X	X	X	X	–	–
FL 370	216.6	X	X	X	X	–	–
FL 380	206.5	X	X	X	X	–	–
FL 390	196.8	X	X	X	X	–	–
FL 400	187.5	X	X	X	X	–	–
FL 410	178.7	X	X	X	X	–	–
FL 420	170.4	X	X	X	X	–	–
FL 430	162.4	X	X	X	X	–	–
FL 440	154.7	X	X	X	X	–	–
FL 450	147.5	X	X	X	X	–	–
FL 460	140.6	X	X	X	–	–	–
FL 470	134.0	X	X	X	–	–	–

Flight level	*ICAO Standard Atmosphere pressure level (hPa)*	*Geopotential altitude*	*Wind*	*Temperature*	*Turbulence*	*Icing*	*Humidity*
FL 480	127.7	X	X	X	–	–	–
FL 490	121.7	X	X	X	–	–	–
FL 500	116.0	X	X	X	–	–	–
FL 510	110.5	X	X	X	–	–	–
FL 520	105.3	X	X	X	–	–	–
FL 530	100.4	X	X	X	–	–	–
FL 540	95.7	X	X	X	–	–	–
FL 550	91.2	X	X	X	–	–	–
FL 560	87.0	X	X	X	–	–	–
FL 570	82.8	X	X	X	–	–	–
FL 580	79.0	X	X	X	–	–	–
FL 590	75.2	X	X	X	–	–	–
FL 600	71.7	X	X	X	–	–	–

Table A5-4. Availability (marked by X) of upper-air gridded forecasts issued by the WAFCs with a horizontal resolution of 1.25° of latitude and longitude as a function of flight level

Note.— Forecasts issued by the WAFCs with a horizontal resolution of 1.25° are provided for users unable to process forecasts issued by the WAFCs with a horizontal resolution of 0.25°.

Flight level	*ICAO Standard Atmosphere pressure level (hPa)*	*Geopotential altitude*	*Wind*	*Temperature*	*Humidity*
FL 050	843.1	X	X	X	X
FL 080	752.6	X	X	X	X
FL 100	696.8	X	X	X	X
FL 140	595.2	X	X	X	X
FL 180	506.0	X	X	X	X
FL 210	446.5	X	X	X	–
FL 240	392.7	X	X	X	–
FL 270	344.3	X	X	X	–
FL 300	300.9	X	X	X	–
FL 320	274.5	X	X	X	–
FL 340	250.0	X	X	X	–
FL 360	227.3	X	X	X	–
FL 390	196.8	X	X	X	–
FL 410	178.7	X	X	X	–
FL 450	147.5	X	X	X	–
FL 480	127.7	X	X	X	–
FL 530	100.4	X	X	X	–

Table A5-5. SIGWX forecast fixed valid times marked by X

*Fixed valid time** in hours*	*SIGWX forecast in*		
	IWXXM form	*PNG format*	*BUFR format**
6	X	–	X
9	X	–	X
12	X	–	X
15	X	–	X
18	X	–	X
21	X	–	X
24	X	X	X
27	X	–	X
30	X	–	X
33	X	–	X
36	X	–	X
39	X	–	X
42	X	–	X
45	X	–	X
48	X	–	X

** BUFR format until 25 November 2026.*
*** after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based.*

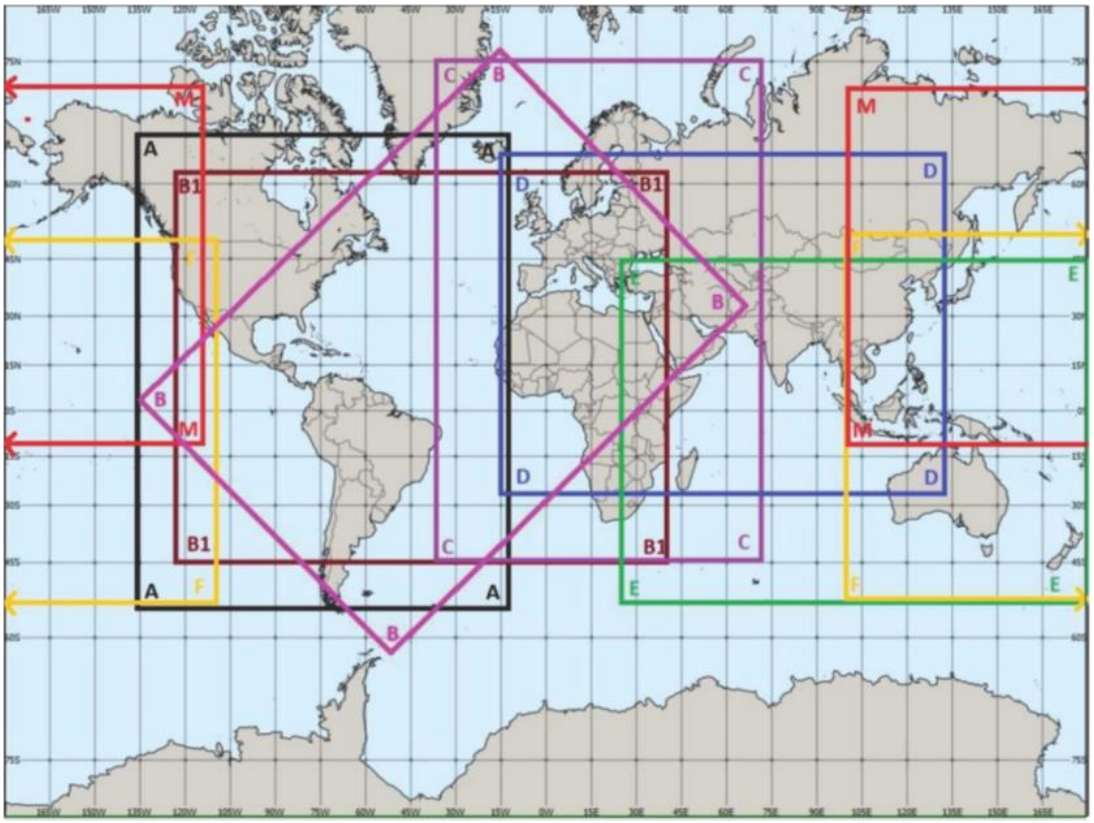


Chart	*Latitude*	*Longitude*	*Chart*	*Latitude*	*Longitude*
A	N6700	W13724	D	N6300	W01500
A	N6700	W01236	D	N6300	E13200
A	S5400	W01236	D	S2700	E13200
A	S5400	W13724	D	S2700	W01500
B	N0304	W13557	E	N4455	E02446
B	N7644	W01545	E	N4455	E18000
B	N3707	E06732	E	S5355	E18000
B	S6217	W05240	E	S5355	E02446
B1	N6242	W12500	F	N5000	E10000
B1	N6242	E04000	F	N5000	W11000
B1	S4530	E04000	F	S5242	W11000
B1	S4530	W12500	F	S5242	E10000
C	N7500	W03500	M	N7000	E10000
C	N7500	E07000	M	N7000	W11000
C	S4500	E07000	M	S1000	W11000
C	S4500	W03500	M	S1000	E10000

Figure A5-1. Fixed areas of coverage of forecasts issued by the WAFCs valid at T+24 HR in chart form – Mercator projection

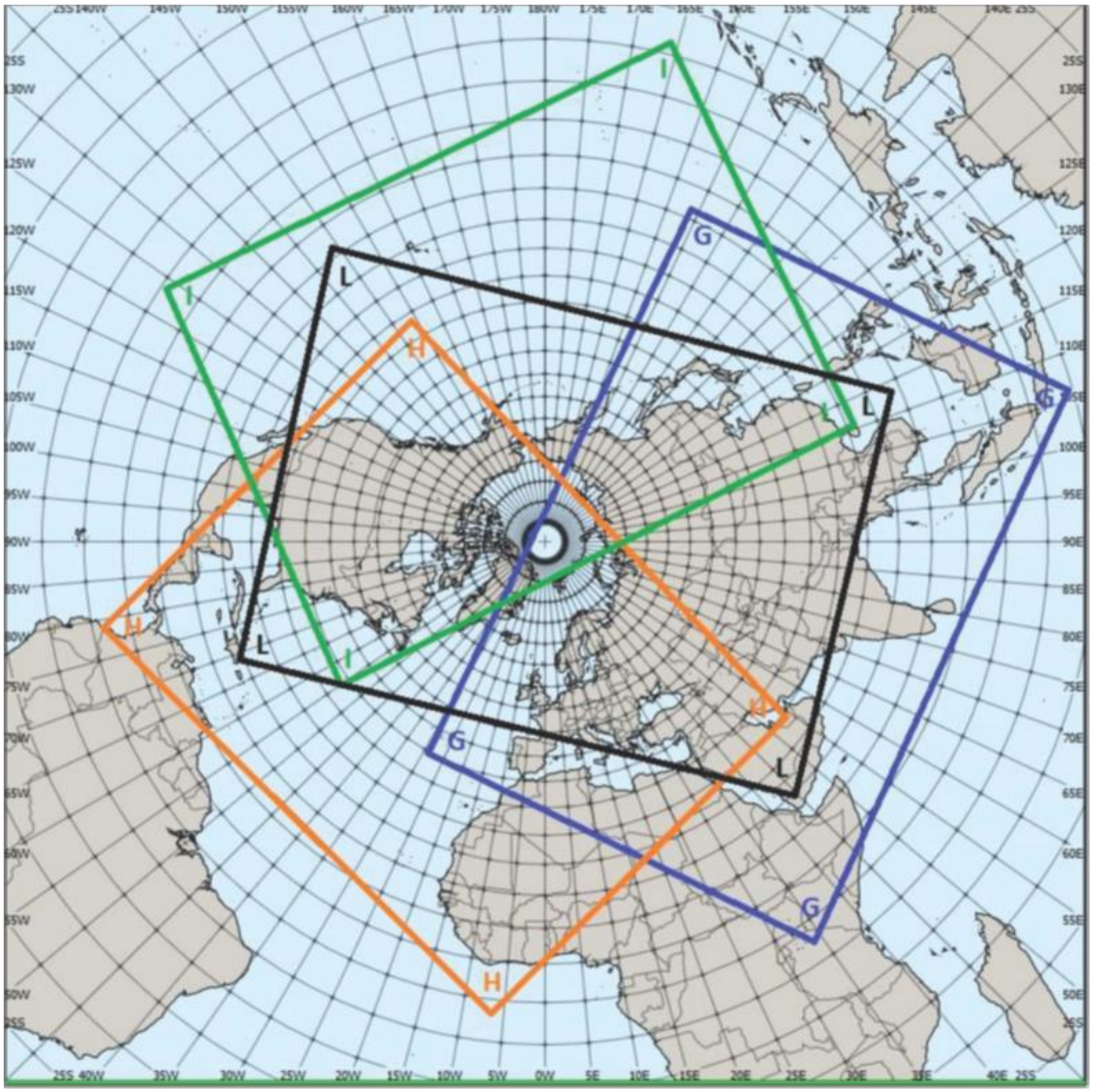


Chart	*Latitude*	*Longitude*	*Chart*	*Latitude*	*Longitude*
G	N3552	W02822	I	N1912	E11130
G	N1341	E15711	I	N3330	W06012
G	S0916	E10651	I	N0126	W12327
G	S0048	E03447	I	S0647	E16601
H	N3127	W14836	L	N1205	E11449
H	N2411	E05645	L	N1518	E04500
H	S0127	W00651	L	N2020	W06900
H	N0133	W07902	L	N1413	W14338

Figure A5-2. Fixed areas of coverage of forecasts issued by the WAFCs valid at T+24 HR in chart form – Polar stereographic projection (northern hemisphere)

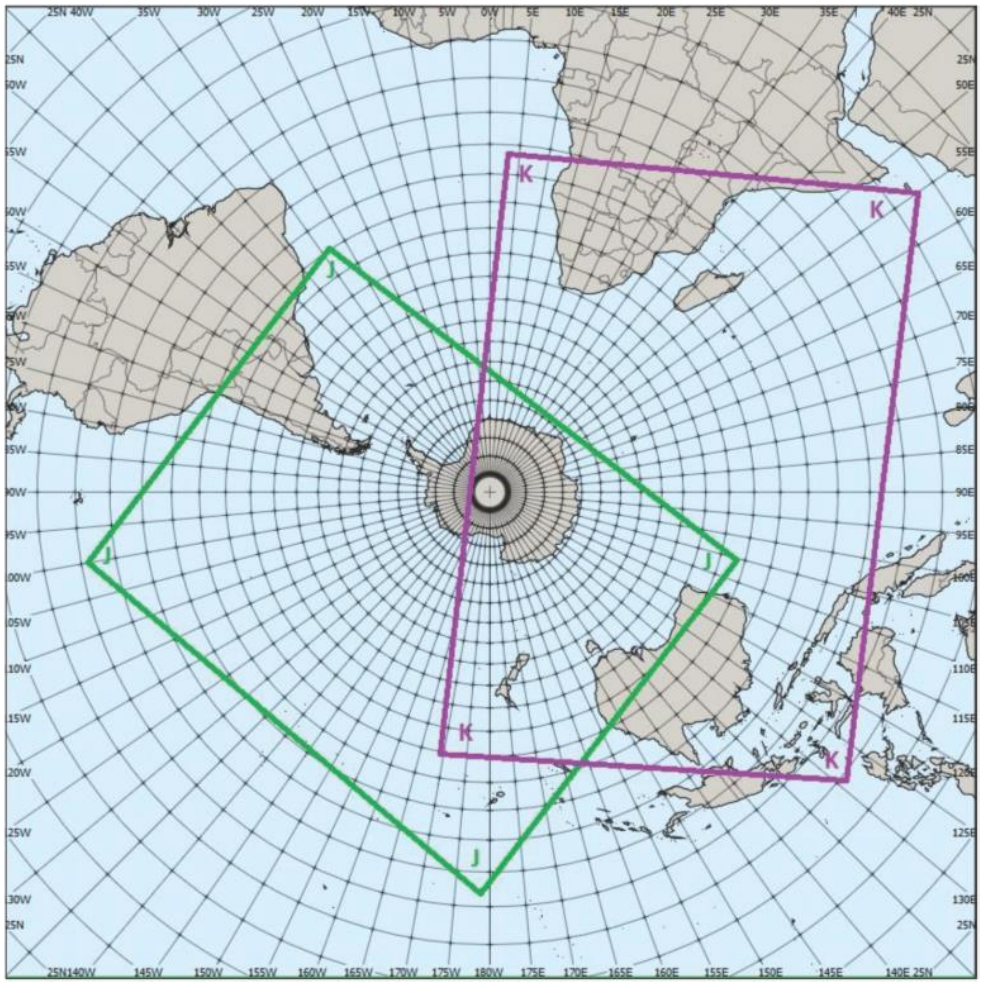


Chart	*Latitude*	*Longitude*
J	S0318	W17812
J	N0037	W10032
J	S2000	W03400
J	S2806	E10717
K	N1255	E05549
K	N0642	E12905
K	S2744	W16841
K	S1105	E00317

Figure A5-3. Fixed areas of coverage of forecasts issued by the WAFCs valid at T+24 HR in chart form – Polar stereographic projection (southern hemisphere)

Note.— Examples of model charts derived from forecasts issued by the WAFCs are shown in Appendix 1 (see Model IS and Model SWH).

Appendix 6

TECHNICAL SPECIFICATIONS RELATED TO AREA FORECASTS FOR LOW-LEVEL FLIGHTS IN ABBREVIATED PLAIN LANGUAGE (GAMET)

(See Chapter 5 of this PANS.)

Table A6-1. Template for GAMET

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, dependent on meteorological conditions;
O = inclusion optional;
= = a double line indicates that the text following it should be placed on the subsequent line.

Note.— The location indicators and their significations can be found in Location Indicators *(Doc 7910)*.

Element	*Detailed content*	*Template(s)*	*Examples*
Location indicator of FIR/CTA (M)	ICAO location indicator of the ATS unit serving the FIR or CTA to which the GAMET refers (M)	nnnn	YUCC[1]
Identification (M)	Message identification (M)	GAMET	GAMET
Validity period (M)	Day-time groups indicating the period of validity in UTC (M)	VALID nnnnnn/nnnnnn	VALID 220600/221200
Location indicator of aerodrome meteorological office *or* meteorological watch office (M)	Location indicator of aerodrome meteorological office *or* meteorological watch office originating the message with a separating hyphen (M)	nnnn–	YUDO–[1]
Name of the FIR/CTA *or* part thereof (M)	Location indicator and name of the FIR/CTA, *or* part thereof for which the GAMET is issued (M)	nnnn nnnnnnnnnn FIR[/n] [BLW FLnnn] *or* nnnn nnnnnnnnnn CTA[/n] [BLW FLnnn]	YUCC AMSWELL FIR/2 BLW FL120 YUCC AMSWELL FIR

Element	*Detailed content*	*Template(s)*			*Examples*
		Identifier and time	*Location*	*Content*	
Indicator for the beginning of Section I (M)	Indicator to identify the beginning of Section I (M)	SECN I			SECN I
Surface wind (C)	Widespread surface wind exceeding 15 m/s (30 kt)	SFC WIND: [nn/nn]	[N OF Nnn *or* Snn] *or* [S OF Nnn *or* Snn] *or* [W OF Wnnn *or* Ennn] *or* [E OF Wnnn *or* Ennn] *or* [nnnnnnnnnn][2]	nnn/[n]nnMPS (*or* nnn/[n]nnKT)	SFC WIND: 10/12 310/16MPS SFC WIND: E OF W110 050/40KT
Surface visibility (C)	Widespread surface visibility below 5 000 m including the weather phenomena causing the reduction in visibility	SFC VIS: [nn/nn]		nnnnM FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* PO *or* DS *or* SS *or* DZ *or* RA *or* SN *or* SG *or* FC *or* GR *or* GS *or* PL *or* SQ	SFC VIS: 06/08 N OF N51 3000M BR
Significant weather (C)	Significant weather conditions encompassing thunderstorms, heavy sandstorm and duststorm, and volcanic ash	SIGWX: [nn/nn]		ISOL TS *or* OCNL TS *or* FRQ TS *or* OBSC TS *or* EMBD TS *or* HVY DS *or* HVY SS *or* SQL TS *or* ISOL TSGR *or* OCNL TSGR *or* FRQ TSGR *or* OBSC TSGR *or* EMBD TSGR *or* SQL TSGR *or* VA	SIGWX: 11/12 ISOL TS SIGWX: 12/14 S OF N35 HVY SS
Mountain obscuration (C)	Mountain obscuration	MT OBSC: [nn/nn]		nnnnnnnnnn[2]	MT OBSC: S OF N48 MT PASSES
Cloud (C)	Widespread areas of broken *or* overcast cloud with height of base less than 300 m (1 000 ft) above ground level (AGL) *or* above mean sea level (AMSL) *and/or* any occurrence of cumulonimbus (CB) *or* towering cumulus (TCU) clouds	SIG CLD: [nn/nn]		BKN *or* OVC [n]nnn/[n]nnnM *(or* [n]nnn/[n]nnnFT) AGL *or* AMSL ISOL *or* OCNL *or* FRQ *or* OBSC *or* EMBD CB[3] *or* TCU[3] [n]nnn/[n]nnnM *(or* [n]nnn/[n]nnnFT) AGL *or* AMSL	SIG CLD: 06/09 N OF N51 OVC 800/1100FT AGL 10/12 ISOL TCU 1200/8000FT AGL
Icing (C)	Icing (except for that occurring in convective clouds and for severe icing for which a SIGMET information has already been issued)	ICE: [nn/nn]		MOD FLnnn/nnn *or* MOD ABV FLnnn *or* SEV FLnnn/nnn *or* SEV ABV FLnnn	ICE: MOD FL050/080
Turbulence (C)	Turbulence (except for that occurring in convective clouds and for severe turbulence for which a SIGMET information has already been issued)	TURB: [nn/nn]		MOD FLnnn/nnn *or* MOD ABV FLnnn *or* SEV FLnnn/nnn *or* SEV ABV FLnnn	TURB: MOD ABV FL090

Element	*Detailed content*	*Template(s)*			*Examples*
		Identifier and time	*Location*	*Content*	
Mountain wave (C)	Mountain wave (except for severe mountain wave for which a SIGMET information has already been issued)	MTW: [nn/nn]		MOD FLnnn/nnn *or* MOD ABV FLnnn *or* SEV FLnnn/nnn *or* SEV ABV FLnnn	MTW: N OF N63 MOD ABV FL080
SIGMET (C)	SIGMET information applicable to the FIR/CTA concerned or a sub-area thereof, for which the area forecast is valid	SIGMET APPLICABLE:	—	[n][n]n[4]	SIGMET APPLICABLE: 3, A5, B06
or HAZARDOUS WX NIL (C)[5]		HAZARDOUS WX NIL			HAZARDOUS WX NIL
Indicator for the beginning of Section II (M)	Indicator to identify the beginning of Section II (M)	SECN II			SECN II
Pressure centres and fronts (M)	Pressure centres and fronts and their expected movements and developments	PSYS: [nn]	Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn *or* Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn TO Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn	L [n]nnnHPA *or* H [n]nnnHPA *or* FRONT *or* NIL	PSYS: 06 N5130 E01000 L 1004HPA MOV NE 25KT WKN
			—	MOV N *or* MOV NE *or* MOV E *or* MOV SE *or* MOV S *or* MOV SW *or* MOV W *or* MOV NW nnKMH (*or* nnKT) WKN *or* NC *or* INTSF	
Upper winds and temperatures (M)	Upper wind and upper-air temperature for at least the following altitudes: 600, 1 500 and 3 000 m (2 000, 5 000 and 10 000 ft)	WIND/T:	Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn *or* [N OF Nnn *or* Snn] *or* [S OF Nnn *or* Snn] *or* [W OF Wnnn *or* Ennn] *or* [E OF Wnnn *or* Ennn] *or* [nnnnnnnnn][2]	[n]nnnM (*or* [n]nnnFT) nnn/[n]nnMPS (*or* nnn/[n]nnKT) PSnn *or* MSnn	WIND/T: 2000FT N5500 W01000 270/18MPS PS03 5000FT N5500 W01000 250/20MPS MS02 10000FT N5500 W01000 240/22MPS MS11
Cloud (M)	Cloud information not included in Section I giving type, height of base and top above ground level (AGL) *or* above mean sea level (AMSL)	CLD: [nn/nn]		FEW or SCT *or* BKN *or* OVC ST *or* SC *or* CU *or* AS *or* AC *or* NS [n]nnn/[n]nnnM (*or* [n]nnn/[n]nnnFT) AGL *or* AMSL *or* NIL	CLD: BKN SC 2500/8000FT AGL CLD: NIL
Freezing level (M)	Height indication of 0°C level(s) above ground level (AGL) *or* above mean sea level (AMSL), if lower than the top of the airspace for which the forecast is supplied	FZLVL:		[ABV] [n]nnnFT AGL *or* AMSL	FZLVL: 3000FT AGL
Forecast QNH (M)	Forecast lowest QNH during the period of validity	MNM QNH:		[n]nnnHPA	MNM QNH: 1004HPA

Element	*Detailed content*	*Template(s)*			*Examples*
		Identifier and time	*Location*	*Content*	
Sea-surface temperature and state of the sea (O)	Sea-surface temperature and state of the sea if required by regional air navigation agreement	SEA:		Tnn HGT [n]nM	SEA: T15 HGT 5M
Volcanic eruptions (M)	Name of volcano	VA:		nnnnnnnnn *or* NIL	VA: ETNA VA: NIL

Notes.—

1. Fictitious location.
2. Free text describing well-known geographical locations should be kept to a minimum.
3. The location of the CB and/or TCU should be specified in addition to any widespread areas of broken or overcast cloud as given in the example.
4. List as necessary, with comma separating.
5. When no elements are included in Section I.

Example A6-1. GAMET area forecast

YUCC GAMET VALID 220600/221200 YUDO –
YUCC AMSWELL FIR/2 BLW FL120
SECN I

SFC WIND:	10/12 310/16MPS
SFC VIS:	06/08 N OF N51 3000M BR
SIGWX:	11/12 ISOL TS
SIG CLD:	06/09 N OF N51 OVC 800/1100FT AGL 10/12 ISOL TCU 1200/8000FT AGL
ICE:	MOD FL050/080
TURB:	MOD ABV FL090
SIGMET APPLICABLE:	3, 5

SECN II

PSYS:	06 N5130 E01000 L 1004HPA MOV NE 25KT WKN
WIND/T:	2000FT N5500 W01000 270/18MPS PS03 5000FT N5500 W01000 250/20MPS MS02 10000FT N5500 W01000 240/22MPS MS11
CLD:	BKN SC 2500/8000FT AGL
FZLVL:	3000FT AGL
MNM QNH:	1004HPA
SEA:	T15 HGT 5M
VA:	NIL

Meaning: An area forecast for low-level flights (GAMET) issued for sub-area two of the Amswell* flight information region (identified by YUCC Amswell area control centre) for below flight level 120 by the Donlon/International* aerodrome meteorological office (YUDO); the message is valid from 0600 UTC to 1200 UTC on the 22nd of the month.

Section I:

surface wind speed and direction:	between 1000 UTC and 1200 UTC surface wind direction 310 degrees; wind speed 16 metres per second;
surface visibility:	between 0600 UTC and 0800 UTC north of 51 degrees north 3 000 metres (due to mist);
significant weather phenomena:	between 1100 UTC and 1200 UTC isolated thunderstorms without hail;
significant clouds:	between 0600 UTC and 0900 UTC north of 51 degrees north overcast base 800, top 1 100 feet above ground level; between 1000 UTC and 1200 UTC isolated towering cumulus base 1 200, top 8 000 feet above ground level;
icing:	moderate between flight level 050 and 080;
turbulence:	moderate above flight level 090 (at least up to flight level 120);
SIGMET information:	3 and 5 applicable to the validity period and sub-area concerned.

Section II:

pressure systems:	at 0600 UTC low pressure of 1 004 hectopascals at 51.5 degrees north 10.0 degrees east, expected to move north-eastwards at 25 knots and to weaken;
winds and temperatures:	at 2 000 feet above ground level at 55 degrees north 10 degrees west wind direction 270 degrees, wind speed 18 metres per second, temperature plus 3 degrees Celsius; at 5 000 feet above ground level at 55 degrees north 10 degrees west wind direction 250 degrees, wind speed 20 metres per second, temperature minus 2 degrees Celsius; at 10 000 feet above ground level at 55 degrees north 10 degrees west wind direction 240 degrees, wind speed 22 metres per second, temperature minus 11 degrees Celsius;
clouds:	broken stratocumulus, base 2 500 feet, top 8 000 feet above ground level;
freezing level:	3 000 feet above ground level;
minimum QNH:	1 004 hectopascals;
sea:	surface temperature 15 degrees Celsius; and state of the sea 5 metres;
volcanic ash:	nil.

* Fictitious location

Appendix 7

TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL INFORMATION CONTAINING ADVISORIES, ALERTS, WARNINGS (SIGMET, AIRMET) AND NOTICES

(See Chapter 6 of this PANS.)

Table A7-1. Template for Volcano Observatory Notice for Aviation (VONA)

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable;
= = a double line indicates that the text following it should be placed on the subsequent line.

Note 1.— The ranges and resolutions for the numerical elements included in VONA are shown in Table A7-8 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services – ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400).*

Note 3.— Inclusion of a colon after each element heading is mandatory.

Note 4.— The numbers 1 to 20 are included only for clarity and are not part of the notice, as shown in the examples.

Element		*Detailed content*	*Template(s)*		*Examples*	
1	Identification of the type of message (M)	Type of message	VONA		VONA	
2	Status indicator (C)[1]	Indicator of test *or* exercise	STATUS:	TEST *or* EXER	STATUS:	TEST EXER
3	Time of origin (M)	Year, month, day and time in UTC	DTG:	Nnnnnnnn/nnnnZ	DTG:	20210223/0130Z
4	Name of volcano (M)	Name and IAVCEI[2] number of volcano	VOLCANO:	nnnnnnnnnnnnnnnnnnn [nnnnnn] *or* UNKNOWN *or* UNNAMED	VOLCANO:	KARYMSKY 300130 UNKNOWN UNNAMED
5	Location of volcano *or* volcanic ash source (M)	Location in degrees and minutes of volcano *or* specific vent (if known) *or* coordinates[3] in degrees and minutes of field of volcanic ash.	PSN:	Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn *or* Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][–	PSN:	N5403 E15927 UNKNOWN N5400 E15930 – N5400 E16100 –

Element		*Detailed content*	*Template(s)*		*Examples*	
				Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] *or* UNKNOWN		N5300 E15945
6	State *or* Region (M)	State, *or* region if ash is not reported over a State	AREA:	nnnnnnnnnnnnnnnn	AREA:	RUSSIAN FEDERATION NEW ZEALAND TO FIJI
7	Source elevation (M)	Source elevation in m (*or* ft) (elevation of the vent *or* the average height of volcanic ash field for re-suspended volcanic ash)	SOURCE ELEV:	nnnnM (*or* nnnnnFT) AMSL (*or* BLW MSL[4]) *or* UNKNOWN	SOURCE ELEV:	1536M AMSL 50FT BLW MSL UNKNOWN
8	Notice number (M)	Year in full and message number (separate sequence for each volcano)	NOTICE NR:	nnnn/[n][n][n]n	NOTICE NR:	2021/4
9	Current colour code (M)	Current aviation colour code	CURRENT COLOUR CODE:	GREEN *or* YELLOW *or* ORANGE *or* RED *or* UNASSIGNED *or* NIL[5]	CURRENT COLOUR CODE:	GREEN
10	Previous colour code (M)	Previous aviation colour code	PREVIOUS COLOUR CODE:	GREEN *or* YELLOW *or* ORANGE *or* RED *or* UNASSIGNED *or* NIL[5]	PREVIOUS COLOUR CODE:	YELLOW UNASSIGNED
11	Name SVO (M)	Name of SVO	SVO:	Free text up to 256 characters	SVO:	KVERT ALASKA VOLCANO OBSERVATORY
12	Activity status (M)	Description of current activity status of the volcano[6]	ACT STS:	ERUPTION OCCURRED *or* ERUPTION ONGOING *or* HEIGHTENED UNREST *or* DECREASED UNREST *or* LAST VA EMISSION nnnnnnnn/nnnnZ *or* RE-SUSPENDED VA *or* UNKNOWN *or* NIL	ACT STS:	ERUPTION ONGOING RE-SUSPENDED VA
13	Onset time (M)	Time of onset (UTC) of eruptive activity *or* NIL for re-suspended volcanic ash.	ONSET:	nnnnnnnn/nnnnZ *or* UNKNOWN *or* NIL	ONSET:	20190923/0015Z NIL
14	Duration (M)	Duration of volcanic ash producing eruption (in minutes *or* hours *or* days)	DUR:	[n]n MIN *or* [n]n HR	DUR:	1 HR 45 MIN

Element		*Detailed content*	*Template(s)*		*Examples*	
		or indication that eruption is continuing *or* NIL if no eruption has occurred.		*or* [n][n]n DAY[S] *or* ONGOING EPISODIC *or* ONGOING CONS *or* UNKNOWN *or* NIL		ONGOING EPISODIC NIL
15	Volcanic ash cloud height (M)	Estimate of volcanic ash cloud height in m, km (*or* ft) above source/vent *or* AMSL.	VA CLD HGT:	[ABV[7]] [n][n]nnnM *or* [ABV[7]][n]nKM (*or* [ABV[7]] [n][n]nnnFT) ABV SOURCE *or* AMSL *or* UNKNOWN *or* NO VA CLD PRODUCED	VA CLD HGT:	15KM AMSL ABV 9000FT AMSL 10000FT ABV SOURCE
16	Height source (M)	Source of height data (e.g. ground observer, air-report, radar, LIDAR, satellite, webcam, etc.)	HGT SOURCE:	Free text up to 32 characters *or* NO VA CLD PRODUCED	HGT SOURCE:	GND OBSERVER LIDAR
17	Movement (M)	Direction of the movement of the observed cloud	MOV:	N *or* NE *or* E *or* SE *or* S *or* SW *or* W *or* NW *or* VERTICAL *or* OBSCD *or* UNKNOWN *or* NO VA CLD PRODUCED	MOV:	SW VERTICAL
18	Contacts (M)	SVO contact details	CTC:	Free text up to 128 characters	CTC:	DUTY VOLCANOLOGIST, TEL +123-456-789 EMAIL, DUTY.VOLCANOLOGIST [AT]VOLCANO.COM WWW.VOLCANO.COM
19	Remarks (M)	Remarks, as necessary[8]	RMK:	Free text up to 256 characters *or* NIL	RMK:	REP FM MATAFOUNA ISLAND RESORT ALSO REP AT 20210223/0100Z THAT THEY CAN OBS W STEAM CLD EXTD VER FM THE METIS SHOAL SITE. PHOTO REP OF THE METIS SHOAL WILL BE SENT IN FM THE MATAFOUNA ISLAND RESORT LATER TODAY.
20	Next Notice (M)	Indication of the issuance of next VONA	NXT NOTICE:	A NEW VONA WILL BE ISSUED IF COND CHANGE SIGNIFICANTLY OR IF THE COLOUR CODE CHANGES *or* WILL BE ISSUED BY nnnnnnnn/nnnnZ	NXT NOTICE:	WILL BE ISSUED BY 20210223/0730Z A NEW VONA WILL BE ISSUED IF COND CHANGE SIGNIFICANTLY OR IF THE COLOUR CODE CHANGES

Notes.—

1. To be used only when a test (TEST) or an exercise (EXER) is taking place. When the word “TEST” or the abbreviation “EXER” is included, the VONA may contain information that should not be used operationally or will otherwise end immediately after the word “TEST”.
2. International Association of Volcanology and Chemistry of the Earth’s Interior (IAVCEI).
3. When disseminated in abbreviated plain language in accordance with 6.1.5, the number of coordinates is to be kept to a minimum and should not normally exceed seven.
4. Used only for submarine volcanoes.
5. The abbreviation “NIL” can be used only when no aviation colour code is applied for the volcano concerned.
6. Eruptive or pre-eruptive activity takes precedence over volcanic ash re-suspension. Re-suspended volcanic ash can be addressed in the RMK field.
7. Used when top of volcanic ash cloud is obscured by meteorological cloud.
8. Such as colour and shape of volcanic ash cloud, re-suspended volcanic ash, heightened volcanic unrest, monitoring data, observatory actions, volcano’s previous activity, expected outlook.

Table A7-2. Template for advisory information on volcanic ash

Key: M = inclusion mandatory, part of every message;
O = inclusion optional;
C = inclusion conditional, included whenever applicable;
= = a double line indicates that the text following it should be placed on the subsequent line.

Note 1.— The ranges and resolutions for the numerical elements included in advisory information on volcanic ash are shown in Table A7-8 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services – ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400).*

Note 3.— Inclusion of a colon after each element heading is mandatory.

Note 4.— The numbers 1 to 18 are included only for clarity and are not part of the advisory information, as shown in the examples.

Element		*Detailed content*	*Template(s)*	*Examples*
1	Identification of the type of message (M)	Type of message	VA ADVISORY	VA ADVISORY
2	Status indicator (C)[1]	Indicator of test *or* exercise	STATUS: TEST *or* EXER	STATUS: TEST EXER
3	Time of origin (M)	Year, month, day and time in UTC	DTG: nnnnnnnn/nnnnZ	DTG: 20240923/0130Z
4	Name of VAAC (M)	Name of VAAC	VAAC: nnnnnnnnnnnn	VAAC: TOKYO
5	Name of volcano (M)	Name and IAVCEI[2] number of volcano	VOLCANO: nnnnnnnnnnnnnnnnnnnnn [nnnnnn] *or* UNKNOWN *or* UNNAMED	VOLCANO: KARYMSKY 300130 UNNAMED UNKNOWN
6	Location of volcano (M)	Location of volcano in degrees and minutes	PSN: Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn *or* UNKNOWN	PSN: N5403 E15927 UNKNOWN
7	State *or* region (M)	State, *or* region if ash is not reported over a State	AREA: nnnnnnnnnnnnnnnn *or* UNKNOWN	AREA: RUSSIAN FEDERATION UNKNOWN
8	Source elevation (M)	Source elevation in m (*or* ft) (elevation of the vent *or* the average height of volcanic ash field for re-suspended volcanic ash	SOURCE ELEV: nnnnM (*or* nnnnnFT) AMSL (*or* BLW MSL[3]) *or* UNKNOWN	SOURCE ELEV: 1536M AMSL 50FT BLW MSL 0M
9	Advisory number (M)	Year in full and message number (separate sequence for each volcano)	ADVISORY NR: nnnn/[n][n][n]n	ADVISORY NR: 2008/4
10	Information source (M)	Information source using free text	INFO SOURCE: *Free text up to 32 characters*	INFO SOURCE: HIMAWARI-8 KVERT KEMSD

	Element	*Detailed content*	*Template(s)*		*Examples*	
11	Eruption details (M)	Eruption details (including date/time of eruption(s))	ERUPTION DETAILS:	*Free text up to 64 characters* *or* UNKNOWN	ERUPTION DETAILS:	ERUPTION AT 20240923/0000Z FL300 REPORTED NO ERUPTION - RE-SUSPENDED VA[4] UNKNOWN
12	Time of observation (*or* estimation) of ash (M)	Day and time (in UTC) of observation (*or* estimation) of volcanic ash	OBS (*or* EST) VA DTG:	nn/nnnnZ *or* NOT PROVIDED	OBS VA DTG:	23/0100Z NOT PROVIDED
13	Observed *or* estimated ash cloud (M)	Horizontal (in degrees and minutes) and vertical extent at the time of observation of the observed *or* estimated ash cloud *or*, if the base is unknown, the top of the observed *or* estimated ash cloud; Movement of the observed *or* estimated ash cloud Availability of information on observed *or* estimated ash cloud	OBS VA CLD *or* EST VA CLD:	TOP FLnnn *or* SFC/FLnnn *or* FLnnn/nnn [nnKM WID LINE[3,5] BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]][5,6,7] MOV N nnKMH (*or* KT) *or* MOV NE nnKMH (*or* KT) *or* MOV E nnKMH (*or* KT) *or* MOV SE nnKMH (*or* KT) *or* MOV S nnKMH (*or* KT) *or* MOV SW nnKMH (*or* KT) *or* MOV W nnKMH (*or* KT) *or* MOV NW nnKMH (*or* KT)[6] *or* VA NOT IDENTIFIABLE FM SATELLITE DATA WIND FLnnn/nnn nnn/nn[n]MPS (*or* KT)[5,8] *or* WIND FLnnn/nnn VRBnnMPS (*or* KT) *or* WIND SFC/FLnnn nnn/nn[n]MPS (*or* KT) *or* WIND SFC/FLnnn VRBnnMPS (*or* KT) *or* NOT AVBL *or* NOT PROVIDED	OBS VA CLD:	FL250/300 N5400 E15930 – N5400 E16100 – N5300 E15945 MOV SE 20KT SFC/FL200 N5130 E16130 – N5130 E16230 – N5230 E16230 – N5230 E16130 MOV SE 15KT VA NOT IDENTIFIABLE FM SATELLITE DATA WIND FL050/070 180/12MPS NOT AVBL NOT PROVIDED
14	Forecast height and position of the ash clouds (+6 HR) (M)	Day and time (in UTC) (6 hours from the "Time of observation (*or* estimation) of ash" given in Item12); Forecast height and position (in degrees and minutes) for each cloud mass for that fixed valid time	FCST VA CLD +6 HR:	nn/nnnnZ SFC *or* FLnnn/[FL]nnn [nnKM WID LINE[5] BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]][4,5,6,7] *or* NO VA EXP *or* NOT AVBL *or* NOT PROVIDED	FCST VA CLD +6 HR:	23/0700Z FL250/350 N5130 E16030 – N5130 E16230 – N5330 E16230 – N5330 E16030 SFC/FL180 N4830 E16330 – N4830 E16630 – N5130 E16630 – N5130 E16330 NO VA EXP NOT AVBL NOT PROVIDED

	Element	*Detailed content*	*Template(s)*		*Examples*	
15	Forecast height and position of the ash clouds (+12 HR) (M)	Day and time (in UTC) (12 hours from the "Time of observation (*or* estimation) of ash" given in Item12); Forecast height and position (in degrees and minutes) for each cloud mass for that fixed valid time	FCST VA CLD +12 HR:	nn/nnnnZ SFC *or* FLnnn/[FL]nnn [nnKM WID LINE[5] BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]][5,6,7] *or* NO VA EXP *or* NOT AVBL *or* NOT PROVIDED	FCST VA CLD+12 HR:	23/1300Z SFC/FL270 N4830 E16130 – N4830 E16600 – N5300 E16600 – N5300 E16130 NO VA EXP NOT AVBL NOT PROVIDED
16	Forecast height and position of the ash clouds (+18 HR) (M)	Day and time (in UTC) (18 hours from the "Time of observation (*or* estimation) of ash" given in Item12); Forecast height and position (in degrees and minutes) for each cloud mass for that fixed valid time	FCST VA CLD +18 HR:	nn/nnnnZ SFC *or* FLnnn/[FL]nnn [nnKM WID LINE[3,5] BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]][5,6,7] *or* NO VA EXP *or* NOT AVBL *or* NOT PROVIDED	FCST VA CLD+18 HR:	23/1900Z NO VA EXP NOT AVBL NOT PROVIDED
17	Remarks (M)	Remarks, as necessary	RMK:	Free text up to 256 characters *or* NIL	RMK:	LATEST REP FM KVERT (0120Z) INDICATES ERUPTION HAS CEASED. TWO DISPERSING VA CLD ARE EVIDENT ON SATELLITE IMAGERY RE-SUSPENDED VA NIL
18	Next advisory (M)	Year, month, day and time in UTC	NXT ADVISORY:	nnnnnnnn/nnnnZ *or* NO LATER THAN nnnnnnnn/nnnnZ *or* NO FURTHER ADVISORIES *or* WILL BE ISSUED BY nnnnnnnn/nnnnZ		20240923/0730Z NO LATER THAN 20240923/0730Z NO FURTHER ADVISORIES WILL BE ISSUED BY 20240923/0730Z

Notes.—

1. To be used only when a test (TEST) or an exercise (EXER) is taking place. When the word “TEST” or the abbreviation “EXER” is included, the advisory may contain information that should not be used operationally or will otherwise end immediately after the word “TEST”.
2. International Association of Volcanology and Chemistry of the Earth’s Interior (IAVCEI).
3. Used only for submarine volcanoes.
4. To be included (as free text) only in cases where volcanic ash has been re-suspended.
5. When disseminated in abbreviated plain language in accordance with 6.1.1, the number of coordinates should not normally exceed seven.
6. When disseminated in abbreviated plain language in accordance with 6.1.1, a straight line between two points drawn on a map in the Mercator projection or a straight line between two points which crosses lines of longitude at a constant angle.
7. Up to four selected layers.
8. If ash reported (such as AIREP) but not identifiable from satellite data.
9. To be included (as free text) within the limits of space allocation (256 characters).

Table A7-3. Template for advisory information on tropical cyclones

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable;
= = a double line indicates that the text following it should be placed on the subsequent line.

Note 1.— The ranges and resolutions for the numerical elements included in advisory information on tropical cyclones are shown in Table A7-8 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the PANS-ABC (Doc 8400).

Note 3.— Inclusion of a colon after each element heading is mandatory.

Note 4.— The numbers 1 to 22 are included only for clarity and are not part of the advisory information, as shown in the examples.

	Element	*Detailed content*	*Template(s)*	*Examples*
1	Identification of the type of message (M)	Type of message	TC ADVISORY	TC ADVISORY
2	Status indicator (C)[1]	Indicator of test *or* exercise	STATUS: TEST *or* EXER	STATUS: TEST EXER
3	Time of origin (M)	Year, month, day and time in UTC of issue	DTG: nnnnnnnn/nnnnZ	DTG: 20040925/1400Z
4	Name of TCAC (M)	Name of TCAC (location indicator *or* full name)	TCAC: nnnn *or* nnnnnnnnnn	TCAC: YUFO[2] MIAMI
5	Name of tropical cyclone (M)	Name of tropical cyclone *or* "NN" for unnamed tropical cyclone	TC: nnnnnnnnnnnn *or* NN	TC: GLORIA
6	Advisory number (M)	Year in full and message number (separate sequence for each cyclone)	ADVISORY NR: nnnn/[n][n][n]n	ADVISORY NR: 2004/13
7	Observed position of the centre (M)	Day and time in UTC and position of the centre of the tropical cyclone (in degrees and minutes)	OBS PSN: nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	OBS PSN: 25/1300Z N2706 W07306
8	Observed CB cloud[3] (M)	Location of CB cloud (referring to latitude and longitude (in degrees and minutes)) and vertical extent (flight level)	CB: WI nnnKM (or nnnNM) OF TC CENTRE *or* WI[4] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – [Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] and TOP [ABV *or* BLW] FLnnn *or* NIL	CB: WI 250NM OF TC CENTRE TOP FL500 NIL

	Element	*Detailed content*	*Template(s)*		*Examples*	
9	Direction and speed of movement (M)	Direction and speed of movement given in sixteen compass points and km/h (*or* kt), respectively, *or* stationary (< 2 km/h (1 kt))	MOV:	N nnKMH (*or* KT) *or* NNE nnKMH (*or* KT) *or* NE nnKMH (*or* KT) *or* E nnKMH (*or* KT) *or* ESE nnKMH (*or* KT) *or* SE nnKMH (*or* KT) *or* SSE nnKMH (*or* KT) *or* S nnKMH (*or* KT) *or* SSW nnKMH (*or* KT) *or* SW nnKMH (*or* KT) *or* WSW nnKMH (*or* KT) *or* W nnKMH (*or* KT) *or* WNW nnKMH (*or* KT) *or* NW nnKMH (*or* KT) *or* NNW nnKMH (*or* KT) *or* STNR	MOV:	NW 20KMH
10	Changes in intensity (M)	Changes of maximum surface wind speed at time of observation	INTST CHANGE	INTSF *or* WKN *or* NC	INTST CHANGE:	INTSF
11	Central pressure (M)	Central pressure (in hPa)	C:	nnnHPA	C:	965HPA
12	Maximum surface wind (M)	Maximum surface wind near the centre (mean over 10 minutes, in m/s (*or* kt))	MAX WIND:	nn[n]MPS (*or* nn[n]KT)	MAX WIND:	22MPS
13	Forecast of centre position (+6 HR)[5] (M)	Day and time (in UTC) (6 hours from the "DTG" given in Item 3); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +6 HR:	nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +6 HR:	25/1800Z N2748 W07350
14	Forecast of maximum surface wind (+6 HR)[5] (M)	Forecast of maximum surface wind (6 hours after the "DTG" given in Item 3)	FCST MAX WIND +6 HR:	nn[n]MPS (*or* nn[n]KT)	FCST MAX WIND +6 HR:	22MPS
15	Forecast of centre position (+12 HR)[5] (M)	Day and time (in UTC) (12 hours from the "DTG" given in Item 3); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +12 HR:	nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +12 HR:	26/0000Z N2830 W07430
16	Forecast of maximum surface wind (+12 HR)[5] (M)	Forecast of maximum surface wind (12 hours after the "DTG" given in Item 3)	FCST MAX WIND +12 HR:	nn[n]MPS (*or* nn[n]KT)	FCST MAX WIND +12 HR:	22MPS

	Element	*Detailed content*	*Template(s)*		*Examples*	
17	Forecast of centre position (+18 HR)[5] (M)	Day and time (in UTC) (18 hours from the "DTG" given in Item 3); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +18 HR:	nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +18 HR:	26/0600Z N2852 W07500
18	Forecast of maximum surface wind (+18 HR)[5] (M)	Forecast of maximum surface wind (18 hours after the "DTG" given in Item 3)	FCST MAX WIND +18 HR:	nn[n]MPS (*or* nn[n]KT)	FCST MAX WIND +18 HR:	21MPS
19	Forecast of centre position (+24 HR)[5] (M)	Day and time (in UTC) (24 hours from the "DTG" given in Item 3); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +24 HR:	nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +24 HR:	26/1200Z N2912 W07530
20	Forecast of maximum surface wind (+24 HR)[5] (M)	Forecast of maximum surface wind (24 hours after the "DTG" given in Item 3)	FCST MAX WIND +24 HR:	nn[n]MPS (*or* nn[n]KT)	FCST MAX WIND +24 HR:	20MPS
21	Remarks (M)	Remarks, as necessary	RMK:	Free text up to 256 characters *or* NIL	RMK:	NIL
22	Expected time of issuance of next advisory (M)	Expected year, month, day and time (in UTC) of issuance of next advisory	NXT MSG:	[BFR] nnnnnnnn/nnnnZ *or* NO MSG EXP	NXT MSG:	20040925/1800Z

Notes.—

1. To be used only when a test (TEST) or an exercise (EXER) is taking place. When the word "TEST" or the abbreviation "EXER" is included, the advisory may contain information that should not be used operationally or will otherwise end immediately after the word "TEST".
2. Fictitious location.
3. In the case of CB clouds associated with a tropical cyclone covering more than one area within the area of responsibility, this element can be repeated, as necessary.
4. When disseminated in abbreviated plain language in accordance with 6.2.2, the number of coordinates should be kept to a minimum and should not normally exceed seven.
5. As far as practicable, forecast times are to coincide with main synoptic hours, that is, 00, 06, 12 and 18 UTC. When the time of origin is not at one of the main synoptic hours, the forecast times are to coincide with the nearest main synoptic hour.

Table A7-4. Template for advisory message for space weather information

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable;
= = a double line indicates that the text following it should be placed on the subsequent line.

Note 1.— The explanations for the abbreviations can be found in the PANS-ABC (Doc 8400).

Note 2.— The spatial resolutions are shown in Appendix 7, Table A7-9.

Note 3.— Inclusion of a colon after each element heading is mandatory.

Note 4.— The numbers 1 to 14 are included only for clarity and are not part of the advisory information, as shown in the examples.

Element		*Detailed content*	*Template(s)*		*Examples*	
1	Identification of the type of message (M)	Type of message	SWX ADVISORY		SWX ADVISORY	
2	Status indicator (C)[1]	Indicator of test *or* exercise	STATUS:	TEST *or* EXER	STATUS:	TEST EXER
3	Time of origin (M)	Year, month, day and time in UTC	DTG:	nnnnnnnn/nnnnZ	DTG:	20161108/0100Z
4	Name of SWXC (M)	Name of SWXC	SWXC:	nnnnnnnnnnnn	SWXC:	DONLON[2]
5	Space weather effect (M)	Effect of the space weather phenomena	SWX EFFECT:	HF COM *or* SATCOM *or* GNSS *or* RADIATION[4]	SWX EFFECT:	HF COM SATCOM GNSS RADIATION
6	Advisory number (M)	Year in full and unique message number	ADVISORY NR:	nnnn/[n][n][n]n	ADVISORY NR:	2016/1
7	Number(s) of advisory/ies being replaced (C)	Number(s) of the previously issued advisory/ies being replaced[3]	NR RPLC:	nnnn/[n][n][n]n [nnnn/[n][n][n]n][3]	NR RPLC:	2016/1 2020/35 2021/1 2020/15 2020/16
8	Observed *or* expected space weather event (M)	Day and time (in UTC) of observed phenomena (*or* forecast if phenomena have yet to occur); Intensity, horizontal extent[4]; Altitude of space weather phenomena[5]	OBS (*or* FCST) SWX:	nn/nnnnZ MOD *or* SEV HNH *and/or* MNH *and/or* EQN *and/or* EQS *and/or* MSH *and/or* HSH Wnnn *or* Ennn – Wnnn *or* Ennn *and/or* DAYSIDE *or* NIGHTSIDE *or* MOD *or* SEV Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn –	OBS SWX:	08/0100Z MOD DAYSIDE 08/0100Z SEV HNH HSH DAYSIDE MOD MNH MSH DAYSIDE 08/0100Z SEV HNH HSH W180 – E180 MOD MNH MSH W090-E030

	Element	*Detailed content*	*Template(s)*		*Examples*	
				Nnn *or* Snn Wnnn *or* Ennn [– Nnn *or* Snn Wnnn *or* Ennn][6, 7] and[5], ABV FLnnn *or* FLnnn–nnn *or* NO SWX EXP		08/0100Z SEV N80 W180 - N70 W075 - N60 E015 - N70 E075 - N80 W180 MOD N60 W180 – N50 W075 – N40 E015 – N50 E075 – N60 W180 08/0100Z SEV HNH HSH W180 – W090 ABV FL350 MOD HNH HSH W180-W090 FL250-350 08/0100Z MOD S20 W170 – S20 W130 – S10 W130 – S10 W170 – S20 W170 08/0100Z MOD N80 W180 - N70 W075 - N60 E015 - N70 E075 - N80 W180 ABV FL400 NO SWX EXP
9	Forecast of the phenomena (+6 HR) (M)	Day and time (in UTC) (6 hours from the time given in Item 8, rounded to the next full hour); Forecast intensity, extent, and altitude for the fixed valid time[4, 5]	FCST SWX +6 HR:	nn/nnnnZ MOD *or* SEV HNH *and/or* MNH *and/or* EQN *and/or* EQS *and/or* MSH *and/or* HSH Wnnn *or* Ennn – Wnnn *or* Ennn *and/or* DAYSIDE *or* NIGHTSIDE *or* MOD *or* SEV Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn [– Nnn *or* Snn Wnnn *or* Ennn][6, 7] and[5], ABV FLnnn *or* FLnnn–nnn *or* NO SWX EXP *or* NOT AVBL	FCST SWX +6 HR:	08/0700Z SEV HNH HSH DAYSIDE MOD HNH HSH NIGHTSIDE 08/0700Z MOD HNH HSH W180 – W090 ABV FL350 08/0700Z SEV HNH HSH W180 –E180 MOD MNH MSH W090-E030 08/0700Z SEV N80 W180 - N70 W075 - N60 E015 - N70 E075 - N80 W180 MOD N60 W180 – N50 W075 – N40 E015 – N50 E075 – N60 W180 08/0700Z MOD HNH HSH DAYSIDE 08/0700Z MOD S20 W170 – S20 W130 – S10 W130 – S10 W170 – S20 W170 08/0700Z MOD N80 W180 - N70 W075 - N60 E015 - N70 E075 - N80 W180 ABV FL400 NO SWX EXP NOT AVBL

Element		Detailed content	Template(s)	Examples
10	Forecast of the phenomena (+12 HR) (M)	Day and time (in UTC) (12 hours from the time given in Item 8, rounded to the next full hour). Forecast intensity, extent, and altitude for the fixed valid time[4, 5]	FCST SWX +12 HR: nn/nnnnZ MOD *or* SEV HNH *and/or* MNH *and/or* EQN *and/or* EQS *and/or* MSH *and/or* HSH Wnnn *or* Ennn – Wnnn *or* Ennn *and/or* DAYSIDE *or* NIGHTSIDE *or* MOD *or* SEV Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn [– Nnn *or* Snn Wnnn *or* Ennn][6, 7] and[5], ABV FLnnn *or* FLnnn–nnn *or* NO SWX EXP *or* NOT AVBL	FCST SWX +12 HR: 08/1300Z MOD DAYSIDE 08/1300Z MOD HNH HSH W180 – W090 ABV FL350 08/1300Z MOD HNH HSH W180 –~~W~~E180 08/1300Z MOD HNH HSH DAYSIDE 08/1300Z MOD EQN W090-E030 08/1300Z MOD S20 W170 – S20 W130 – S10 W130 – S10 W170 – S20 W170 08/1300Z MOD N80 W180 - N70 W075 - N60 E015 - N70 E075 - N80 W180 ABV FL400 NO SWX EXP
11	Forecast of the phenomena (+18 HR) (M)	Day and time (in UTC) (18 hours from the time given in Item 8, rounded to the next full hour). Forecast intensity, extent, and altitude for the fixed valid time[4, 5]	FCST SWX +18 HR: nn/nnnnZ MOD *or* SEV HNH *and/or* MNH *and/or* EQN *and/or* EQS *and/or* MSH *and/or* HSH Wnnn *or* Ennn – Wnnn *or* Ennn *and/or* DAYSIDE *or* NIGHTSIDE *or* MOD *or* SEV Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn [– Nnn *or* Snn Wnnn *or* Ennn][6, 7] and[5], ABV FLnnn *or* FLnnn–nnn *or* NO SWX EXP *or* NOT AVBL	FCST SWX +18 HR: 08/1900Z MOD DAYSIDE 08/1900Z MOD HNH HSH W180 – W090 ABV FL350 08/1900Z MOD HNH HSH W180 –E180 08/1900Z MOD HNH HSH DAYSIDE 08/1900Z MOD EQN W090-E030 08/1900Z MOD S20 W170 – S20 W130 – S10 W130 – S10 W170 – S20 W170 08/1900Z MOD N80 W180 - N70 W075 - N60 E015 - N70 E075 - N80 W180 ABV FL400 NO SWX EXP NOT AVBL

Element		*Detailed content*	*Template(s)*		*Examples*	
12	Forecast of the phenomena (+24 HR) (M)	Day and time (in UTC) (24 hours from the time given in Item 8, rounded to the next full hour). Forecast intensity, extent, and altitude for the fixed valid time[4, 5]	FCST SWX +24 HR:	nn/nnnnZ MOD *or* SEV HNH *and/or* MNH *and/or* EQN *and/or* EQS *and/or* MSH *and/or* HSH Wnnn *or* Ennn – Wnnn *or* Ennn *and/or* DAYSIDE *or* NIGHTSIDE *or* MOD *or* SEV Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn – Nnn *or* Snn Wnnn *or* Ennn [– Nnn *or* Snn Wnnn *or* Ennn][6, 7] and[5], ABV FLnnn *or* FLnnn–nnn *or* NO SWX EXP *or* NOT AVBL	FCST SWX +24 HR:	09/0100Z MOD DAYSIDE 09/0100Z MOD HNH HSH W180 – W090 ABV FL350 09/0100Z MOD HNH HSH W180 –E180 09/0100Z MOD HNH HSH DAYSIDE 09/0100Z MOD EQN W090-E030 09/0100Z MOD S20 W170 – S20 W130 – S10 W130 – S10 W170 – S20 W170 09/0100Z MOD N80 W180 - N70 W075 - N60 E015 - N70 E075 - N80 W180 ABV FL400 NO SWX EXP NOT AVBL
13	Remarks (M)	Remarks, as necessary	RMK:	*Free text up to 256 characters* *or* NIL	RMK:	END OF SWX RADIATION EVENT WWW.SPACEWEATHER PROVIDER.GOV NIL
14	Next advisory (M)	Year, month, day and time in UTC	NXT ADVISORY:	nnnnnnnn/nnnnZ *or* NO FURTHER ADVISORIES *or* WILL BE ISSUED BY nnnnnnnn/nnnnZ	NXT ADVISORY: WILL BE ISSUED BY	20161108/0700Z NO FURTHER ADVISORIES 20210726/1800Z

Notes.—

1. To be used only when a test (TEST) or an exercise (EXER) is taking place. When the word “TEST” or the abbreviation “EXER” is included, the advisory may contain information that should not be used operationally or will otherwise end immediately after the word “TEST”.
2. Fictitious location.
3. Up to four advisories may be replaced.
4. More than one intensity and extent area may be included in the space weather advisory information.
5. Altitude information only applies to radiation events.
6. The end point is a repeat of the start point.
7. When disseminated in abbreviated plain language, the number of coordinates should be kept to a minimum and should not normally exceed seven.

Table A7-5. Template for SIGMET and AIRMET information

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable;
= = a double line indicates that the text following it should be placed on the subsequent line.

Note 1.— The ranges and resolutions for the numerical elements included in SIGMET and AIRMET information are shown in Table A7-8 of this appendix.

Note 2.— Criteria for meteorological phenomena included in SIGMET and AIRMET information are listed in Appendix 8.

Note 3.— In accordance with 6.4.5 and 6.5.5, severe or moderate icing and severe or moderate turbulence (SEV ICE, MOD ICE, SEV TURB, MOD TURB) associated with thunderstorms, cumulonimbus clouds or tropical cyclones should not be included.

Note 4.— The location indicators and their significations can be found in Location Indicators *(Doc 7910)*.

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET information examples*	*AIRMET information examples*
Location indicator of FIR/CTA (M)[1]	ICAO location indicator of the ATS unit serving the FIR or CTA to which the SIGMET/AIRMET refers	nnnn		YUCC[2] YUDD[2]	
Identification (M)	Message identification and sequence number[3]	SIGMET [n][n]n	AIRMET [n][n]n	SIGMET 1 SIGMET 01 SIGMET A01	AIRMET 9 AIRMET 19 AIRMET B19
Validity period (M)	Day-time groups indicating the period of validity in UTC	VALID nnnnnn/nnnnnn		VALID 010000/010400 VALID 221215/221600 VALID 101520/101800 VALID 251600/252200 VALID 152000/160000 VALID 192300/200300	
Location indicator of MWO (M)	Location indicator of MWO originating the message with a separating hyphen	nnnn–		YUDO–[2] YUSO–[2]	
Name of the FIR/CTA (M)	Location indicator and name of the FIR/CTA[4] for which the SIGMET/AIRMET is issued	nnnn nnnnnnnnnn FIR *or* UIR *or* FIR/UIR *or* nnnn nnnnnnnnnn CTA	nnnn nnnnnnnnnn FIR[/n]	YUCC AMSWELL FIR[2] YUDD SHANLON FIR[2] YUDD SHANLON FIR/UIR[2] YUDD SHANLON UIR YUDD SHANLON CTA[2]	YUCC AMSWELL FIR/2[2] YUDD SHANLON FIR[2] YUDD SHANLON FIR/UIR[2] YUDD SHANLON UIR
IF THE SIGMET OR AIRMET INFORMATION IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.					
Status indicator (C)[5]	Indicator of test or exercise	TEST *or* EXER	TEST *or* EXER	TEST EXER	TEST EXER

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET information examples*	*AIRMET information examples*
Phenomenon (M)[6]	Description of phenomenon causing the issuance of SIGMET/AIRMET	OBSC[7] TS[GR[8]] EMBD[9] TS[GR[8]] FRQ[10] TS[GR[8]] SQL[11] TS[GR[8]] TC nnnnnnnnnn PSN Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] (CB) *or* TC NN[12] PSN Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] (CB) SEV TURB[13] SEV ICE[14] SEV ICE (FZRA)[14] SEV MTW[15] HVY DS HVY SS [VA ERUPTION] [MT nnnnnnnnnn] [PSN Nnn[nn] *or* Snn[nn] Ennn[nn] *or* Wnnn[nn]] VA CLD RDOACT CLD	SFC WIND nnn/nn[n]MPS (*or* SFC WIND nnn/nn[n]KT) SFC VIS [n][n]nnM (nn)[16] ISOL[17] TS[GR[8]] OCNL[18] TS[GR[8]] MT OBSC BKN CLD nnn/[ABV][n]nnnM (*or* BKN CLD [n]nnn/[ABV][n]nnnnFT) *or* BKN CLD SFC/[ABV][n]nnnM (*or* BKN CLD SFC/[ABV][n]nnnnFT) OVC CLD nnn/[ABV][n]nnnM (*or* OVC CLD [n]nnn/[ABV][n]nnnnFT) *or* OVC CLD SFC/[ABV][n]nnnM (*or* OVC CLD SFC/[ABV][n]nnnnFT) ISOL[17] CB[19] OCNL[18] CB[19] FRQ[10] CB[19] ISOL[17] TCU[19] OCNL[18] TCU[19] FRQ[10] TCU[19] MOD TURB[13] MOD ICE[14] MOD MTW[15]	OBSC TS OBSC TSGR EMBD TS EMBD TSGR FRQ TS FRQ TSGR SQL TS SQL TSGR TC GLORIA PSN N10 W060 CB TC NN PSN S2030 E06030 CB SEV TURB SEV ICE SEV ICE (FZRA) SEV MTW HVY DS HVY SS VA ERUPTION MT ASHVAL[2] PSN S15 E073 VA CLD RDOACT CLD	SFC WIND 040/40MPS SFC WIND 310/20KT SFC VIS 1500M (BR) ISOL TS ISOL TSGR OCNL TS OCNL TSGR MT OBSC BKN CLD 120/900M BKN CLD 400/3000FT BKN CLD 1000/5000FT BKN CLD SFC/3000M BKN CLD SFC/ABV10000FT OVC CLD 270/ABV3000M OVC CLD 900/ABV10000FT OVC CLD1000/5000FT OVC CLD SFC/3000M OVC CLD SFC/ABV10000FT ISOL CB OCNL CB FRQ CB ISOL TCU OCNL TCU FRQ TCU MOD TURB MOD ICE MOD MTW
Observed or forecast phenomenon (M)[20, 21]	Indication whether the information is observed and expected to continue, *or* forecast	OBS [AT nnnnZ] *or* FCST [AT nnnnZ]		OBS OBS AT 1210Z FCST FCST AT 1815Z	

Element	Detailed content	SIGMET template	AIRMET template	SIGMET information examples	AIRMET information examples
Location (C)[20, 21, 33]	Location (referring to latitude and longitude (in degrees and minutes))	Nnn[nn] Wnnn[nn] *or* Nnn[nn] Ennn[nn] *or* Snn[nn] Wnnn[nn] *or* Snn[nn] Ennn[nn] *or* N OF Nnn[nn] *or* S OF Nnn[nn] *or* N OF Snn[nn] *or* S OF Snn[nn] [AND] W OF Wnnn[nn] *or* E OF Wnnn[nn] *or* W OF Ennn[nn] *or* E OF Ennn[nn] *or* N OF Nnn[nn] *or* N OF Snn[nn] AND S OF Nnn[nn] *or* S OF Snn[nn] *or* W OF Wnnn[nn] *or* W OF Ennn[nn] AND E OF Wnnn[nn] *or* E OF Ennn[nn] *or* N OF LINE[22] *or* NE OF LINE[22] *or* E OF LINE[22] *or* SE OF LINE[22] *or* S OF LINE[22] *or* SW OF LINE[22] *or* W OF LINE[22] *or* NW OF LINE[22] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] [AND N OF LINE[22] *or* NE OF LINE[22] *or* E OF LINE[22] *or* SE OF LINE[22] *or* S OF LINE[22] *or* SW OF LINE[22] *or* W OF LINE[22] *or* NW OF LINE[22] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]] *or* WI[22, 23] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – [Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] *or* APRX nnKM WID LINE[22] BTN (*or* nnNM WID LINE[22] BTN) Nnn[nn] *or* Snn[1nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] or ENTIRE UIR *or* ENTIRE FIR *or* ENTIRE FIR/UIR *or* ENTIRE CTA *or*[24] WI nnnKM (*or* nnnNM) OF TC CENTRE *or*[25] WI nnKM (*or* nnNM) OF Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]		N2020 W07005 N48 E010 S60 W160 S0530 E16530 N OF N50 S OF N5430 N OF S10 S OF S4530 W OF W155 E OF W45 W OF E15540 E OF E09015 N OF N1515 AND W OF E13530 S OF N45 AND N OF N40 N OF LINE S2520 W11510 – S2520 W12010 SW OF LINE N50 W005 – N60 W020 SW OF LINE N50 W020 – N45 E010 AND NE OF LINE N45 W020 – N40 E010 WI N6030 E02550 – N6055 E02500 – N6050 E02630 – N6030 E02550 APRX 50KM WID LINE BTN N64 W017 – N60 W010 – N57 E010 ENTIRE FIR ENTIRE UIR ENTIRE FIR/UIR ENTIRE CTA WI 400KM OF TC CENTRE WI 250NM OF TC CENTRE WI 30KM OF N6030 E02550	

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET information examples*	*AIRMET information examples*
Level (C)[20, 21]	Flight level *or* altitude	[SFC/]FLnnn *or* [SFC/]nnnnM (*or* [SFC/][n]nnnnFT) *or* FLnnn/nnn *or* TOP FLnnn *or* [TOP] ABV FLnnn (*or* [TOP] ABV [n]nnnnFT) [nnnn/]nnnnM (*or* [[n]nnnn/][n]nnnnFT) *or* [nnnnM/]FLnnn (*or* [[n]nnnnFT/]FLnnn) *or*[24] TOP [ABV *or* BLW] FLnnn		FL180 SFC/FL070 SFC/3000M SFC/10000FT FL050/080 TOP FL390 ABV FL250 TOP ABV FL100 ABV 7000FT TOP ABV 9000FT TOP ABV 10000FT 3000M 2000/3000M 8000FT 6000/12000FT 2000M/FL150 10000FT/FL250 TOP FL500 TOP ABV FL500 TOP BLW FL450	
Movement or expected movement (C)[20, 26, 34]	Movement *or* expected movement (direction and speed) with reference to one of the sixteen points of compass, *or* stationary	MOV N [nnKMH] *or* MOV NNE [nnKMH] *or* MOV NE [nnKMH] *or* MOV ENE [nnKMH] *or* MOV E [nnKMH] *or* MOV ESE [nnKMH] *or* MOV SE [nnKMH] *or* MOV SSE [nnKMH] *or* MOV S [nnKMH] *or* MOV SSW [nnKMH] *or* MOV SW [nnKMH] *or* MOV WSW [nnKMH] *or* MOV W [nnKMH] *or* MOV WNW [nnKMH] *or* MOV NW [nnKMH] *or* MOV NNW [nnKMH] (*or* MOV N [nnKT] *or* MOV NNE [nnKT] *or* MOV NE [nnKT] *or* MOV ENE [nnKT] *or* MOV E [nnKT] *or* MOV ESE [nnKT] *or* MOV SE [nnKT] *or* MOV SSE [nnKT] *or* MOV S [nnKT] *or* MOV SSW [nnKT] *or* MOV SW [nnKT] *or* MOV WSW [nnKT] *or* MOV W [nnKT] *or* MOV WNW [nnKT] *or* MOV NW [nnKT] *or* MOV NNW [nnKT]) *or* STNR		MOV SE MOV NNW MOV E 40KMH MOV E 20KT MOV WSW 20KT STNR	
Changes in intensity (C)[20]	Expected changes in intensity	INTSF *or* WKN *or* NC		INTSF WKN NC	
Forecast time (C)[20, 21, 26]	Indication of the forecast time of phenomenon	FCST AT nnnnZ	—	FCST AT 2200Z	—
TC forecast position (C)[24]	Forecast position of TC centre at the end of the validity period of the SIGMET information	TC CENTRE PSN Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] or[31] TC CENTRE PSN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] CB	—	TC CENTRE PSN N1030 E16015 TC CENTRE PSN N1015 E15030 CB	—

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET information examples*	*AIRMET information examples*
Forecast position (C)[20, 21, 26, 27, 33]	Forecast position of phenomenon at the end of the validity period of the SIGMET information[32]	Nnn[nn] Wnnn[nn] *or* Nnn[nn] Ennn[nn] *or* Snn[nn] Wnnn[nn] *or* Snn[nn] Ennn[nn] *or* N OF Nnn[nn] *or* S OF Nnn[nn] *or* N OF Snn[nn] *or* S OF Snn[nn] [AND] W OF Wnnn[nn] *or* E OF Wnnn[nn] *or* W OF Ennn[nn] *or* E OF Ennn[nn] *or* N OF Nnn[nn] *or* N OF Snn[nn] AND S OF Nnn[nn] *or* S OF Snn[nn] *or* W OF Wnnn[nn] *or* W OF Ennn[nn] AND E OF Wnnn[nn] *or* E OF Ennn[nn] *or* N OF LINE[22] *or* NE OF LINE[22] *or* E OF LINE[22] *or* SE OF LINE[22] *or* S OF LINE[22] *or* SW OF LINE[22] *or* W OF LINE[22] *or* NW OF LINE[22] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] [AND N OF LINE[22] *or* NE OF LINE[22] *or* E OF LINE[22] *or* SE OF LINE[22] *or* S OF LINE[22] *or* SW OF LINE[22] *or* W OF LINE[22] *or* NW OF LINE[22] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]]	—	N30 W170 N OF N30 S OF S50 AND W OF E170 S OF N46 AND N OF N39 NE OF LINE N35 W020 – N45 W040 SW OF LINE N48 W020 – N43 E010 AND NE OF LINE N43 W020 – N38 E010 WI N20 W090 – N05 W090 – N10 W100 – N20 W100 – N20 W090 APRX 50KM WID LINE BTN N64 W017 – N57 W005 – N55 E010 – N55 E030 ENTIRE FIR ENTIRE UIR ENTIRE FIR/UIR ENTIRE CTA NO VA EXP WI 30KM OF N6030 E02550 WI 150NM OF TC CENTRE	—

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET information examples*	*AIRMET information examples*
		or WI[22, 23] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] *or* APRX nnKM WID LINE[22] BTN (nnNM WID LINE[22] BTN) Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] *or* ENTIRE FIR *or* ENTIRE UIR *or* ENTIRE FIR/UIR *or* ENTIRE CTA *or*[28] NO VA EXP *or*[25] WI nnKM (*or* nnNM) OF Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] *or*[24] WI nnnKM (nnnNM) OF TC CENTRE			
Repetition of elements (C)[29]	Repetition of elements included in a SIGMET information for volcanic ash cloud or tropical cyclone	[AND][29]	—	AND	—

OR

Cancellation of SIGMET/ AIRMET (C)[30]	Cancellation of SIGMET/AIRMET referring to its identification	CNL SIGMET [n][n]n nnnnnn/nnnnnn *or*[28] CNL SIGMET [n][n]n nnnnnn/nnnnnn VA MOV TO nnnn FIR	CNL AIRMET [n][n]n nnnnnn/nnnnnn	CNL SIGMET 2 101200/101600 CNL SIGMET A13 251030/251430 VA MOV TO YUDO FIR[2]	CNL AIRMET 05 151520/151800

Notes.—

1. See Annex 3, 7.4.1.7.
2. Fictitious location.
3. In accordance with 6.4.3 and 6.5.2.
4. See 6.5.3.
5. To be used only when a test (TEST) or an exercise (EXER) is taking place. When the word “TEST” or the abbreviation “EXER” is included, SIGMET and AIRMET may contain information that should not be used operationally or will otherwise end immediately after the word “TEST”. Any information included after the abbreviation “TEST” or “EXER” is to be included on a subsequent line.
6. In accordance with 6.4.4 and 6.5.4.
7. In accordance with Appendix 8, 1 a).
8. In accordance with Appendix 8, 4.
9. In accordance with Appendix 8,1 b).
10. In accordance with Appendix 8, 2.
11. In accordance with Appendix 8, 3.
12. Used for unnamed tropical cyclones.
13. In accordance with Appendix 8, 5 and 6.
14. In accordance with Appendix 8, 7.
15. In accordance with Appendix 8, 8.
16. In accordance with 6.5.4.
17. In accordance with Appendix 8, 1 c).
18 In accordance with Appendix 8, 1 d).
19. The use of cumulonimbus (CB) and towering cumulus (TCU) is restricted to AIRMET information in accordance with 6.5.4.
20. In the case of volcanic ash cloud covering more than one area within the FIR, these elements can be repeated, as necessary. Each location and forecast position are to be preceded by an observed or forecast time.
21. In the case of cumulonimbus clouds associated with a tropical cyclone covering more than one area within the FIR, these elements can be repeated, as necessary. Each location and forecast position are to be preceded by an observed or forecast time.
22. A straight line is to be used between two points drawn on a map in the Mercator projection or between two points which crosses lines of longitude at a constant angle.
23. The number of coordinates is to be kept to a minimum and should not normally exceed seven.
24. Only for SIGMET information for tropical cyclones.
25. Only for SIGMET information for radioactive cloud. A radius of up to 30 kilometres (16 nautical miles) from the source and a vertical extent from surface (SFC) to the upper limit of the flight information region/upper flight information region (FIR/UIR) or control area (CTA) are to be applied.
26. The elements “forecast time” and “forecast position” are not to be used in conjunction with the element “movement or expected movement”.
27. The levels of the phenomena remain fixed throughout the forecast period.
28. Only for SIGMET information for volcanic ash.
29. To be used for more than one cumulonimbus clouds associated with a tropical cyclone simultaneously affecting the FIR concerned.
30. End of the message (as the SIGMET and AIRMET information is being cancelled).
31. The abbreviation CB is to be used when the forecast position for the cumulonimbus cloud is included.
32. The forecast position for cumulonimbus (CB) cloud occurring in connection with tropical cyclones relates to the forecast time of the tropical cyclone centre position, not to the end of the validity period of SIGMET information.
33. For SIGMET information for radioactive cloud, only within (WI) is to be used for the elements “location” and “forecast position”.
34. For SIGMET information for radioactive cloud, only stationary (STNR) is to be used for the element “movement or expected movement”.
35. To be used for more than one volcanic ash clouds simultaneously affecting the FIR concerned.

Table A7-6. Template for aerodrome warnings

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable.

Note 1.— The ranges and resolutions for the numerical elements included in aerodrome warnings are shown in Table A7-8 of this appendix.

Note 2.— Establishment of criteria for meteorological phenomena included in aerodrome warnings are addressed in Appendix 8.

Note 3.— The explanations for the abbreviations can be found in the PANS-ABC (Doc 8400).

Note 4.— The location indicators and their significations can be found in Location Indicators *(Doc 7910)*.

Element	*Detailed content*	*Templates*	*Examples*
Location indicator of the aerodrome (M)	Location indicator of the aerodrome	nnnn	YUCC[1]
Identification of the type of message (M)	Type of message and sequence number	AD WRNG [n]n	AD WRNG 2
Validity period (M)	Day and time of validity period in UTC	VALID nnnnnn/nnnnnn	VALID 211230/211530
IF THE AERODROME WARNING IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.			
Phenomenon (M)[2]	Description of phenomenon prompting the issuance of the aerodrome warning	TC[3] nnnnnnnnnn *or* [HVY] TS *or* GR *or* [HVY] SN [nnCM][3] *or* [HVY] FZRA *or* [HVY] FZDZ *or* RIME[4] *or* [HVY] SS *or* [HVY] DS *or* SA *or* DU *or* SFC WSPD nn[n]MPS MAX nn[n] (SFC WSPD nn[n]KT MAX nn[n]) *or* SFC WIND nnn/nn[n]MPS MAX nn[n] (SFC WIND nnn/nn[n]KT MAX nn[n]) *or* SQ *or* FROST *or* TSUNAMI *or* VA [DEPO] *or* TOX CHEM *or* *Free text up to 32 characters*[5]	TC ANDREW HVY SN 25CM SFC WSPD 20MPS MAX 30 VA TSUNAMI
Observed or forecast phenomenon (M)	Indication whether the information is observed and expected to continue, *or* forecast	OBS [AT nnnnZ] *or* FCST	OBS AT 1200Z OBS
Changes in intensity (C)	Expected changes in intensity	INTSF *or* WKN *or* NC	WKN

OR

Cancellation of aerodrome warning[6]	Cancellation of aerodrome warning referring to its identification	CNL AD WRNG [n]n nnnnnn/nnnnnn	CNL AD WRNG 2 211230/211530[6]

Notes.—

1. Fictitious location.
2. One phenomenon or a combination thereof, in accordance with Annex 3, 7.6.1.2.
3. In accordance with Annex 3, 7.6.1.2.
4. Hoar frost *or* rime in accordance with Annex 3, 7.6.1.2.
5. Free text should be kept to a minimum.
6. End of the warning (as the aerodrome warning is being cancelled).

Table A7-7. Template for wind shear warnings

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable.

Note 1.— The ranges and resolutions for the numerical elements included in wind shear warnings are shown in Table A7-8 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the PANS-ABC (Doc 8400).

Note 3.— The location indicators and their significations can be found in Location Indicators *(Doc 7910)*.

Element	*Detailed content*	*Template(s)*	*Examples*
Location indicator of the aerodrome (M)	Location indicator of the aerodrome	nnnn	YUCC[1]
Identification of the type of message (M)	Type of message and sequence number	WS WRNG [n]n	WS WRNG 1
Time of origin and validity period (M)	Day and time of issue and, where applicable, validity period in UTC	nnnnnn [VALID TL nnnnnn] *or* [VALID nnnnnn/nnnnnn]	211230 VALID TL 211330 221200 VALID 221215/221315
IF THE WIND SHEAR WARNING IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.			
Phenomenon (M)	Identification of the phenomenon and its location	[MOD] *or* [SEV] WS IN APCH *or* [MOD] *or* [SEV] WS [APCH] RWYnnn *or* [MOD] *or* [SEV] WS IN CLIMB-OUT *or* [MOD] *or* [SEV] WS CLIMB-OUT RWYnnn *or* MBST IN APCH *or* MBST [APCH] RWYnnn *or* MBST IN CLIMB-OUT *or* MBST CLIMB-OUT RWYnnn	WS APCH RWY12 MOD WS RWY34 WS IN CLIMB-OUT MBST APCH RWY26 MBST IN CLIMB-OUT
Observed, reported or forecast phenomenon (M)	Identification whether the phenomenon is observed *or* reported and expected to continue, *or* forecast	REP AT nnnn nnnnnnnn *or* OBS [AT nnnn] *or* FCST	REP AT 1510 B747 OBS AT 1205 FCST
Details of the phenomenon (C)	Description of phenomenon causing the issuance of the wind shear warning	SFC WIND: nnn/nnMPS (*or* nnn/nnKT) nnnM (nnnFT)-WIND: nnn/nnMPS (*or* nnn/nnKT) *or* nnKMH (*or* nnKT) LOSS nnKM (*or* nnNM) FNA RWYnn *or* nnKMH (*or* nnKT) GAIN nnKM (*or* nnNM) FNA RWYnn	SFC WIND: 320/5MPS 60M-WIND: 360/13MPS (SFC WIND: 320/10KT 200FT-WIND: 360/26KT) 60KMH LOSS 4KM FNA RWY13 (30KT LOSS 2NM FNA RWY13)
OR			
Cancellation of wind shear warning[2]	Cancellation of wind shear warning referring to its identification	CNL WS WRNG [n]n nnnnnn/nnnnnn	CNL WS WRNG 1 211230/211330[2]

Notes.—

1. Fictitious location.
2. End of the warning (as the wind shear warning is being cancelled).

Table A7-8. Ranges and resolutions for the numerical elements included in special air-reports, volcanic ash and tropical cyclone advisory information, VONA, SIGMET and AIRMET information and aerodrome and wind shear warnings

Element as specified in Chapter 6		*Range*	*Resolution*
Source elevation:	M	000 – 8 100	1
	FT	000 – 27 000	1
Advisory number:	for VA (index)*	000 – 2 000	1
	for TC (index)*	00 – 99	1
Notice number:	for VONA (index)*	000 – 2 000	1
Maximum surface wind:	MPS	00 – 99	1
	KT	00 – 199	1
Central pressure:	hPa	850 – 1 050	1
Surface wind speed:	MPS	15 – 49	1
	KT	30 – 99	1
Surface visibility:	M	0000 – 0750	50
	M	0800 – 5 000	100
Cloud: height of base:	M	000 – 300	30
	FT	000 – 1 000	100
Cloud: height of top:	M	000 – 2 970	30
	M	3 000 – 20 000	300
	FT	000 – 9 900	100
	FT	10 000 – 60 000	1 000
Latitudes:	° (degrees)	00 – 90	1
	′ (minutes)	00 – 60	1
Longitudes:	° (degrees)	000 – 180	1
	′ (minutes)	00 – 60	1
Flight levels:		000 – 650	10
Movement:	KMH	0 – 300	10
	KT	0 – 150	5
* Non-dimensional			

Table A7-9. Ranges and resolutions for the numerical elements included in space weather advisory information

(See Chapter 6, 6.3 of this PANS)

Element to be forecast		*Range*	*Resolution*
Flight Level affected by radiation		250 – 600	10
Longitudes for advisories (degrees)		000 – 180	5
Latitudes for advisories (degrees)		00 – 90	5
Latitude bands for advisories:	High latitudes northern hemisphere (HNH)	N90 – N60	30
1.1.1	Middle latitudes northern hemisphere (MNH)	N60 – N30	1.1.1
1.1.1	Equatorial latitudes northern hemisphere (EQN)	N30 – N00	1.1.1
1.1.1	Equatorial latitudes southern hemisphere (EQS)	S00 – S30	1.1.1
1.1.1	Middle latitudes southern hemisphere (MSH)	S30 – S60	1.1.1
1.1.1	High latitudes southern hemisphere (HSH)	S60 – S90	1.1.1

Example A7-1. Volcano Observatory Notice to Aviation

VONA	
DTG:	20240216/0130Z
VOLCANO:	KARYMSKY 300130
PSN:	N5403 E15927
AREA:	RUSSIAN FEDERATION
SOURCE ELEV:	1536M AMSL
NOTICE NR:	2024/4
CURRENT COLOUR CODE:	YELLOW
PREVIOUS COLOUR CODE:	ORANGE
SVO:	KVERT
ACT STS:	DECREASED ACT
ONSET:	NIL
DUR:	NIL
VA CLD HGT:	15KM AMSL
HGT SOURCE:	GND OBSERVER
MOV:	SW
CTC:	DUTY VOLCANOLOGIST, TEL +123-456-789 EMAIL, DUTY.VOLCANOLOGIST[AT]VOLCANO.COM, WWW.VOLCANO.COM
RMK:	SATELLITE, SEISMIC AND INFRASOUND DATA SHOW NO EVIDENCE OF FURTHER ERUPTIVE ACT. FUTURE EXPLOSIONS AT KARYMSKY ARE LIKELY. THEY OCCUR WO WRNG AND TYPICALLY PRODUCE SMALL VA CLD THAT DISSIPATE QUICKLY; HOWEVER, LARGER ASH EM ARE POSS.
NXT NOTICE:	WILL BE ISSUED BY 20240223/0130Z

Example A7-2. Advisory information on volcanic ash

VA ADVISORY	
DTG:	20240923/0130Z
VAAC:	TOKYO
VOLCANO:	KARYMSKY 300130
PSN:	N5403 E15927
AREA:	RUSSIAN FEDERATION
SOURCE ELEV:	1536M AMSL
ADVISORY NR:	2024/4
INFO SOURCE:	HIMAWARI-8 KVERT KEMSD
ERUPTION DETAILS:	ERUPTION AT 20240923/0000Z FL300 REPORTED
OBS VA DTG:	23/0100Z
OBS VA CLD:	FL250/300 N5400 E15930 – N5400 E16100 – N5300 E15945 MOV SE 20KT SFC/FL200 N5130 E16130 – N5130 E16230 – N5230 E16230 – N5230 E16130 MOV SE 15KT
FCST VA CLD +6 HR:	23/0700Z FL250/350 N5130 E16030 – N5130 E16230 – N5330 E16230 – N5330 E16030 SFC/FL180 N4830 E16330 – N4830 E16630 – N5130 E16630 – N5130 E16330
FCST VA CLD +12 HR:	23/1300Z SFC/FL270 N4830 E16130 – N4830 E16600 – N5300 E16600 – N5300 E16130
FCST VA CLD +18 HR:	23/1900Z NO VA EXP
RMK:	LATEST REP FM KVERT (0120Z) INDICATES ERUPTION HAS CEASED. TWO DISPERSING VA CLD ARE EVIDENT ON SATELLITE IMAGERY
NXT ADVISORY:	20240923/0730Z

Example A7-3. Advisory information on tropical cyclones

TC ADVISORY

DTG:	20040925/120000Z
TCAC:	YUFO*
TC:	GLORIA
ADVISORY NR:	2004/13
OBS PSN:	25/1200Z N2706 W07306
CB:	WI 250NM OF TC CENTRE TOP FL500
MOV:	NW 20KMH
INTST CHANGE:	INTSF
C:	965HPA
MAX WIND:	22MPS
FCST PSN + 6 HR:	25/1800Z N2748 W07350
FCST MAX WIND + 6 HR:	22MPS
FCST PSN + 12 HR:	26/0000Z N2830 W07430
FCST MAX WIND + 12 HR:	22MPS
FCST PSN + 18 HR:	26/0600Z N2852 W07500
FCST MAX WIND + 18 HR:	21MPS
FCST PSN + 24 HR:	26/1200Z N2912 W07530
FCST MAX WIND + 24 HR:	20MPS
RMK:	NIL
NXT MSG:	20040925/1800Z

*Fictitious location

Example A7-4. Advisory information on space weather (HF COM effects)

SWX ADVISORY

DTG:	20201108/0100Z
SWXC:	DONLON*
SWX EFFECT:	HF COM
ADVISORY NR:	2020/1
OBS SWX:	08/0100Z SEV MNH EQN EQS MSH DAYSIDE MOD NIGHTSIDE
FCST SWX +6 HR:	08/0700Z NO SWX EXP
FCST SWX +12 HR:	08/1300Z NO SWX EXP
FCST SWX +18 HR:	08/1900Z NO SWX EXP
FCST SWX +24 HR:	09/0100Z NO SWX EXP
RMK:	SWX EVENT IMPACTING LOWER HF COM FREQ BAND. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY:	WILL BE ISSUED BY 20201108/0700Z

* Fictitious location

Example A7-5. Advisory information on space weather (GNSS effects)

SWX ADVISORY	
DTG:	20201108/0100Z
SWXC:	DONLON*
SWX EFFECT:	GNSS
ADVISORY NR:	2020/2
NR RPLC:	2020/1
OBS SWX:	08/0100Z MOD HNH HSH W180 – E180
FCST SWX +6 HR:	08/0700Z MOD HNH HSH W180 – E180
FCST SWX +12 HR:	08/1300Z NO SWX EXP
FCST SWX +18 HR:	08/1900Z NO SWX EXP
FCST SWX +24 HR:	09/0100Z NO SWX EXP
RMK:	SWX EVENT INPR POSSIBLY IMPACTING GNSS PER. AREA OF IMPACT MOVES WITH EARTH'S ROTATION, STAYING STRONGER ON NIGHTSIDE. EXP TO SUBSIDE IN THE FCST PERIOD. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY:	WILL BE ISSUED BY 20201108/0700Z

* Fictitious location

Example A7-6. Advisory information on space weather (RADIATION effects)

SWX ADVISORY	
DTG:	20201108/0100Z
SWXC:	DONLON*
SWX EFFECT:	RADIATION
ADVISORY NR:	2020/15
NR RPLC:	2020/13 2020/14
OBS SWX:	08/0100Z MOD N80 W180 - N70 W075 - N60 E015 - N70 E075 - N80 W180 ABV FL400
FCST SWX +6 HR:	08/0700Z NO SWX EXP
FCST SWX +12 HR:	08/1300Z NO SWX EXP
FCST SWX +18 HR:	08/1900Z NO SWX EXP
FCST SWX +24 HR:	09/0100Z NO SWX EXP
RMK:	RTN TO BACKGROUND LVL INSIDE THE FIRST FCST PERIOD. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY:	WILL BE ISSUED BY 20201108/0700Z

* Fictitious location

Example A7-7. SIGMET and AIRMET information and the corresponding cancellations

SIGMET YUDD SIGMET 2 VALID 101200/101600 YUSO – YUDD SHANLON FIR/UIR OBSC TS FCST S OF N54 AND E OF W012 TOP FL390 MOV E 20KT WKN	**Cancellation of SIGMET** YUDD SIGMET 3 VALID 101345/101600 YUSO – YUDD SHANLON FIR/UIR CNL SIGMET 2 101200/101600
AIRMET YUDD AIRMET 1 VALID 151520/151800 YUSO – YUDD SHANLON FIR ISOL TS OBS N OF S50 TOP ABV FL100 STNR WKN	**Cancellation of AIRMET** YUDD AIRMET 2 VALID 151650/151800 YUSO – YUDD SHANLON FIR CNL AIRMET 1 151520/151800

Example A7-8. SIGMET information for tropical cyclone

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

Meaning:

The third SIGMET information issued for the AMSWELL* flight information region (identified by YUCC Amswell 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 within 250 nautical miles of the centre of the tropical cyclone with top at flight level 500 moving westwards at 10 knots; no changes in intensity are expected; at 2200 UTC the centre of the tropical cyclone is forecast to be located at 27 degrees 40 minutes north and 73 degrees 45 minutes west.

* Fictitious location

Example A7-9. SIGMET information 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 50KM WID LINE BTN S1500 E07348 – S1530 E07642 FL310/450 INTSF FCST AT 1700Z APRX 50KM WID LINE BTN S1506 E07500 – S1518 E08112 – S1712 E08330

Meaning:

The second SIGMET information 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 approximately 50-km-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, intensifying at 1700 UTC the volcanic ash cloud is forecast to be located in an approximately 50-km-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.

* Fictitious location

Example A7-10. SIGMET information for radioactive cloud

YUCC SIGMET 2 VALID 201200/201600 YUDO –
YUCC AMSWELL FIR RDOACT CLD OBS AT 1155Z WI 30KM OF N6030 E02550 SFC/FL550 STNR

Meaning:

The second SIGMET information issued for the AMSWELL* flight information region (identified by YUCC Amswell 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 30 kilometres of 60 degrees 30 minutes north 25 degrees 50 minutes east between the surface and flight level 550. The radioactive cloud is stationary.

* Fictitious location

Example A7-11. SIGMET information for severe turbulence

YUCC SIGMET 5 VALID 221215/221600 YUDO –
YUCC AMSWELL FIR SEV TURB OBS AT 1210Z N2020 W07005 FL250 INTSF FCST AT 1600Z S OF N2020 AND E OF W06950

Meaning:

The fifth SIGMET information issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1215 UTC to 1600 UTC on the 22nd of the month; severe turbulence was observed at 1210 UTC 20 degrees 20 minutes north and 70 degrees 5 minutes west at flight level 250; the turbulence is expected to strengthen in intensity; at 1600 UTC the severe turbulence is forecast to be located south of 20 degrees 20 minutes north and east of 69 degrees 50 minutes west.

* Fictitious location

Example A7-12. AIRMET information for moderate mountain wave

YUCC AIRMET 2 VALID 221215/221600 YUDO –
YUCC AMSWELL FIR MOD MTW OBS AT 1205Z N48 E010 FL080 STNR NC

Meaning:

The second AIRMET information issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1215 UTC to 1600 UTC on the 22nd of the month; moderate mountain wave was observed at 1205 UTC at 48 degrees north and 10 degrees east at flight level 080; the mountain wave is expected to remain stationary and not to undergo any changes in intensity.

* Fictitious location

Appendix 8

TECHNICAL SPECIFICATIONS FOR METEOROLOGICAL PHENOMENA INCLUDED IN SIGMET AND AIRMET INFORMATION, SPECIAL AIR-REPORTS (UPLINK) AND AERODROME WARNINGS

Note.— See Chapter 5 and Appendices 3 and 7 of this PANS.

1. An area of thunderstorms and cumulonimbus clouds should be considered:

   a) obscured (OBSC) if it is obscured by haze or smoke or cannot be readily seen due to darkness;

   b) embedded (EMBD) if it is embedded within cloud layers and cannot be readily recognized;

   c) isolated (ISOL) if it consists of individual features which affect, or are forecast to affect, an area with a maximum spatial coverage less than 50 per cent of the area concerned (at a fixed time or during the period of validity); and

   d) occasional (OCNL) if it consists of well-separated features which affect, or are forecast to affect, an area with a maximum spatial coverage between 50 and 75 per cent of the area concerned (at a fixed time or during the period of validity).

2. An area of thunderstorms should be considered frequent (FRQ) if within that area there is little or no separation between adjacent thunderstorms with a maximum spatial coverage greater than 75 per cent of the area affected, or forecast to be affected, by the phenomenon (at a fixed time or during the period of validity).

3. Squall line (SQL) should indicate a thunderstorm along a line with little or no space between individual clouds.

4. Hail (GR) should be used as a further description of the thunderstorm, as necessary.

5. Severe and moderate turbulence (TURB) should refer only to: low-level turbulence associated with strong surface winds; rotor streaming; or turbulence whether in cloud or not in cloud (CAT). Turbulence should not be used in connection with convective clouds.

6. Turbulence shall be considered:

   a) severe when the peak value of EDR is equal to or above 0.45; and

   b) moderate when the peak value of EDR is equal to or above 0.20 and below 0.45.

7. Severe and moderate icing (ICE) should refer to icing in other than convective clouds. Freezing rain (FZRA) should refer to severe icing conditions caused by freezing rain.

8. A mountain wave (MTW) should be considered:

   a) severe whenever an accompanying downdraft of 3.0 m/s (600 ft/min) or more and/or severe turbulence is observed or forecast; and

   b) moderate whenever an accompanying downdraft of 1.75–3.0 m/s (350–600 ft/min) and/or moderate turbulence is observed or forecast.

9. Sandstorm (SS) or duststorm (DS) should be considered:

   a) heavy whenever the visibility is below 200 m and the sky is obscured; and

   b) moderate whenever the visibility is:

      1) below 200 m and the sky is not obscured; or

      2) between 200 m and 600 m.

10. When quantitative criteria are necessary for the issue of aerodrome warnings covering, for example, the expected maximum wind speed or the expected total snowfall, the criteria used should be as agreed between the aerodrome meteorological office and the users concerned.

Appendix 9

TECHNICAL SPECIFICATIONS RELATED TO FORECASTS OF QUANTITAVE VOLCANIC ASH CONCENTRATION INFORMATION

(See Chapter 5 of this PANS.)

Table A9-1. Vertical extents of forecasts of quantitative volcanic ash concentration information

Mean sea level to FL 50 (850 hPa)
FL 50 (850 hPa) to FL 100 (700 hPa)
FL 100 (700 hPa) to FL 150 (570 hPa)
FL 150 (570 hPa) to FL 200 (470 hPa)
FL 200 (470 hPa) to FL 250 (380 hPa)
FL 250 (380 hPa) to FL 300 (300 hPa)
FL 300 (300 hPa) to FL 350 (240 hPa)
FL 350 (240 hPa) to FL 400 (190 hPa)
FL 400 (190 hPa) to FL 450 (150 hPa)
FL 450 (150 hPa) to FL 500 (120 hPa)
FL 500 (120 hPa) to FL 550 (90 hPa)
FL 550 (90 hPa) to FL 600 (70 hPa)

Table A9-2. Quantitative volcanic ash concentration ranges

Contamination descriptor	*Concentration ranges*
Very high	Equal to or above 10 mg/m^3
High	Equal to or above 5 and below 10 mg/m^3
Medium	Equal to or above 2 and below 5 mg/m^3
Low[1]	Equal to or above 0.2 and below 2 mg/m^3
Very low[2]	Below 0.2 mg/m^3

1. 0.2 mg/m^3 is the agreed quantitative threshold for discernible ash.
2. Ash that may be detectable by more sensitive satellite and other remote sensing or in-situ monitoring capabilities.

ATTACHMENT A. OPERATIONALLY DESIRABLE ACCURACY OF MEASUREMENT OR OBSERVATION

Note.— The guidance contained in this table relates to Annex 3, 2.2, in particular to 2.2.7, and this PANS, Chapter 2.

Element to be observed	*Operationally desirable accuracy of measurement or observation**
Mean surface wind	Direction: ± 10° Speed: ± 0.5 m/s (1 kt) up to 5 m/s (10 kt) ± 10% above 5 m/s (10 kt)
Variations from the mean surface wind	± 1 m/s (2 kt), in terms of longitudinal and lateral components
Visibility	± 50 m up to 600 m ± 10% between 600 m and 1 500 m ± 20% above 1 500 m
Runway visual range	± 10 m up to 400 m ± 25 m between 400 m and 800 m ± 10% above 800 m
Cloud amount	± 1 okta
Cloud height	± 10 m (33 ft) up to 100 m (330 ft) ± 10% above 100 m (330 ft)
Air temperature and dew-point temperature	± 1°C
Pressure value (QNH, QFE)	± 0.5 hPa

* The operationally desirable accuracy is not intended as an operational requirement; it is to be understood as a goal that has been expressed by the operators.

Note.— Guidance on the uncertainties of measurement or observation can be found in the Guide to Instruments and Methods of Observation *(WMO-No. 8)*.

ATTACHMENT B. OPERATIONALLY DESIRABLE ACCURACY OF FORECASTS

Note 1.— The guidance contained in this table relates to Annex 3, 2.2, in particular to 2.2.8, and this PANS, Chapters 4 and 5.

Note 2.— If the accuracy of the forecasts remains within the operationally desirable range shown in the second column, for the percentage of cases indicated in the third column, the effect of forecast errors is not considered serious in comparison with the effects of navigational errors and of other operational uncertainties.

Element to be forecast	*Operationally desirable accuracy of forecasts*	*Minimum percentage of cases within range*
	TAF	
Wind direction	± 20°	80% of cases
Wind speed	± 2.5 m/s (5 kt)	80% of cases
Visibility	± 200 m up to 800 m ± 30% between 800 m and 10 km	80% of cases
Precipitation	Occurrence or non-occurrence	80% of cases
Cloud amount	One category below 450 m (1 500 ft) Occurrence or non-occurrence of BKN or OVC between 450 m (1 500 ft) and 3 000 m (10 000 ft)	70% of cases
Cloud height	± 30 m (100 ft) up to 300 m (1 000 ft) ± 30% between 300 m (1 000 ft) and 3 000 m (10 000 ft)	70% of cases
Air temperature	± 1°C	70% of cases
	TREND FORECAST	
Wind direction	± 20°	90% of cases
Wind speed	± 2.5 m/s (5 kt)	90% of cases
Visibility	± 200 m up to 800 m ± 30% between 800 m and 10 km	90% of cases
Precipitation	Occurrence or non-occurrence	90% of cases

Element to be forecast	*Operationally desirable accuracy of forecasts*	*Minimum percentage of cases within range*
Cloud amount	One category below 450 m (1 500 ft) Occurrence or non-occurrence of BKN or OVC between 450 m (1 500 ft) and 3 000 m (10 000 ft)	90% of cases
Cloud height	± 30 m (100 ft) up to 300 m (1 000 ft) ± 30% between 300 m (1 000 ft) and 3 000 m (10 000 ft)	90% of cases
	FORECAST FOR TAKE-OFF	
Wind direction	± 20°	90% of cases
Wind speed	± 2.5 m/s (5 kt) up to 12.5 m/s (25 kt)	90% of cases
Air temperature	± 1°C	90% of cases
Pressure value (QNH)	± 1 hPa	90% of cases
	AREA, FLIGHT AND ROUTE FORECASTS	
Upper-air temperature	± 2°C (Mean for 900 km (500 NM))	90% of cases
Relative humidity	± 20%	90% of cases
Upper wind	± 5 m/s (10 kt) (Modulus of vector difference for 900 km (500 NM))	90% of cases
Significant en-route weather phenomena and cloud	Occurrence or non-occurrence Location: ± 100 km (60 NM) Vertical extent: ± 300 m (1 000 ft) Flight level of tropopause: ± 300 m (1 000 ft) Max wind level: ± 300 m (1 000 ft)	80% of cases 70% of cases 70% of cases 80% of cases 80% of cases

ATTACHMENT C. SELECTED CRITERIA APPLICABLE TO AERODROME METEOROLOGICAL REPORTS

(The guidance in this table relates to Annex 3, Chapter 4 and this PANS, Chapter 2.)

	Surface wind				*Visibility (VIS)*			*Runway visual range*[1] *(Time, MIN)*		*Present weather*	*Cloud*					*Temperature*	*Pressure (QNH, QFE)*		*Supplementary information*
	Directional variations[3]			Speed variations[3]	Directional variations[4]			Past tendency[5]			*Amount*				*Type*[2]				
Specifications	≥ 60° and < 180°		≥ 180°	Exceeding the mean speed by ≥ 5 m/s (10 kt)	General rule	Special cases Minimum VIS ≠ prevailing VIS		$\lvert \bar{R}_{5(AB)} - \bar{R}_{5(BC)} \rvert$		No general criteria applicable to all the WX phenomena (for specific criteria, see 2.2.4.2)	Layers reported if coverage					No criteria			
	Mean speed					Minimum VIS < 1 500 m or < 0.5 × prevailing VIS	VIS fluctuating and prevailing VIS cannot be determined	< 100 m	≥ 100 m		Lowest layer	Next layer >	Next higher layer >	CB[6] or TCU	Identification		Parameters reported	Updated if changes > agreed magnitude	Parameter to be included
	< 1.5 m/s (3 kt)	≥ 1.5 m/s (3 kt)																	
Local routine and special report	2/10 min[7] VRB + 2 extreme directions	2/10 min[7] mean + 2 extreme directions	2 min VRB (no extremes)	10 min[8] Minimum and maximum speed	1 min VIS along the runway(s)	N/A	N/A	1 min N/A[9]			Always	2/8	4/8	Always	CB TCU	No criteria	QNH QFE[10]	Yes	All[11]
METAR/ SPECI	10 min VRB (no extremes)	10 min mean + 2 extreme directions	10 min VRB (no extremes)	10 min[8] Maximum speed	10 min Prevailing VIS	Prevailing VIS and minimum VIS + direction	Minimum VIS	10 min No tendency observed (“N”)	Upward (“U”) or downward (“D”)		Always	2/8	4/8	Always	CB TCU		QNH	No	Recent WX of operational significance and wind shear[12]
								No tendency available, the tendency is to be omitted											
Relevant reporting scales for all messages	Direction in three figures rounded to the nearest 10 degrees (degrees 1 – 4 down, degrees 5 – 9 up)			Speed in 1 m/s or 1 kt Speed < 0.5 m/s (1 kt) indicated as CALM	*If* VIS < 800 m 800 m ≤ VIS < 5 000 m 5 000 m ≤ VIS < 10 km VIS ≥ 10 km	*Step applicable* : 50 m : 100 m : 1 km : None, given as 10 km or covered under CAVOK		*If* RVR < 400 m 400 m ⩽ RVR ⩽ 800 m 800 m < RVR < 2 000 m	*Step applicable* : 25 m : 50 m : 100 m[13]	N/A	*If* Base ≤ 3 000 m (10 000 ft) (Reference level: Aerodrome elevation[14] or mean sea level for offshore structures)			*Step applicable* : 30 m (100 ft)		Rounded to whole degrees: up for decimal 5	In whole hPa[15] rounded down for decimals 1 – 9		N/A

Notes.—

1. Considered for the past 10 minutes (exception: if the 10-minute period includes a marked discontinuity (i.e. runway visual range changes or passes 175, 300, 550 or 800 m, lasting ≥ 2 minutes), only data after the discontinuity to be used). A simple diagrammatic convention is used to illustrate those parts of the 10-minute period prior to the observation relevant to runway visual range criteria, i.e. AB, BC and AC.
2. Layer composed of CB and TCU with a common base should be reported as “CB”.
3. Considered for the past 10 minutes (exception: if the 10-minute period includes a marked discontinuity (i.e. the direction changes ≥ 30° with a speed ≥ 5 m/s or the speed changes ≥ 5 m/s lasting ≥ 2 minutes), only data after the discontinuity to be used).
4. If several directions, the most operationally significant direction used.
5. Let $\bar{R}_{5(AB)}$ = 5-minute mean runway visual range value during period AB and $\bar{R}_{5(BC)}$ = 5-minute mean runway visual range value during period BC.
6. CB (cumulonimbus) and TCU (towering cumulus = cumulus congestus of great vertical extent) if not already indicated as one of the other layers.
7. Time averaging, for mean values and, if applicable, referring period for extreme values, indicated in the upper left-hand corner.
8. According to the Manual on Codes (WMO-No. 306), Volume I.1, Part A — *Alphanumeric Codes*, 15.5.5, “it is recommended that the wind measuring systems should be such that peak gusts should represent a three-second average”.
9. N/A = not applicable.
10. QFE is to be included if required. Reference elevation for QFE should be aerodrome elevation except for precision approach runways, and non-precision approach runways with threshold ≥ 2 m (7 ft) below or above aerodrome elevation, where the reference level should be the relevant threshold elevation.
11. As listed in 2.2.8.
12. Also sea-surface temperature, and state of the sea or the significant wave height from offshore structures in accordance with regional air navigation agreement.
13. Report if RVR and/or VIS < 1 500 m, limits for assessments 50 and 2 000 m.
14. For landing at aerodromes with precision approach runways and with the threshold elevation ≥ 15 m below the aerodrome elevation, the threshold elevation to be used as a reference.
15. Measured in 0.1 hPa.

ATTACHMENT D. CONVERSION OF INSTRUMENTED READINGS INTO RUNWAY VISUAL RANGE AND VISIBILITY

(See 2.2.3.5 of this PANS.)

1. The conversion of instrumented readings into runway visual range and visibility is based on Koschmieder's Law or Allard's Law, depending on whether the pilot can be expected to obtain main visual guidance from the runway and its markings or from the runway lights. In the interest of standardization in runway visual range assessments, this Attachment provides guidance on the use and application of the main conversion factors to be used in these computations.

2. In Koschmieder's Law, one of the factors to be taken into account is the pilot contrast threshold. The agreed constant to be used for this is 0.05 (dimensionless).

3. In Allard's Law, the corresponding factor is the illumination threshold. This is not a constant, but a continuous function dependent on the background luminance. The agreed relationship to be used in instrumented systems with continuous adjustment of the illumination threshold by a background luminance sensor is shown by the curve in Figure D-1. The use of a continuous function which approximates the step function such as displayed in Figure D-1 is preferred, due to its higher accuracy, to the stepped relationship described in 4.

4. In instrumented systems without continuous adjustment of the illumination threshold, the use of four equally spaced illumination threshold values with agreed corresponding background luminance ranges is convenient but will reduce accuracy. The four values are shown in Figure D-1 in the form of a step function; they are tabulated in Table D-1 for greater clarity.

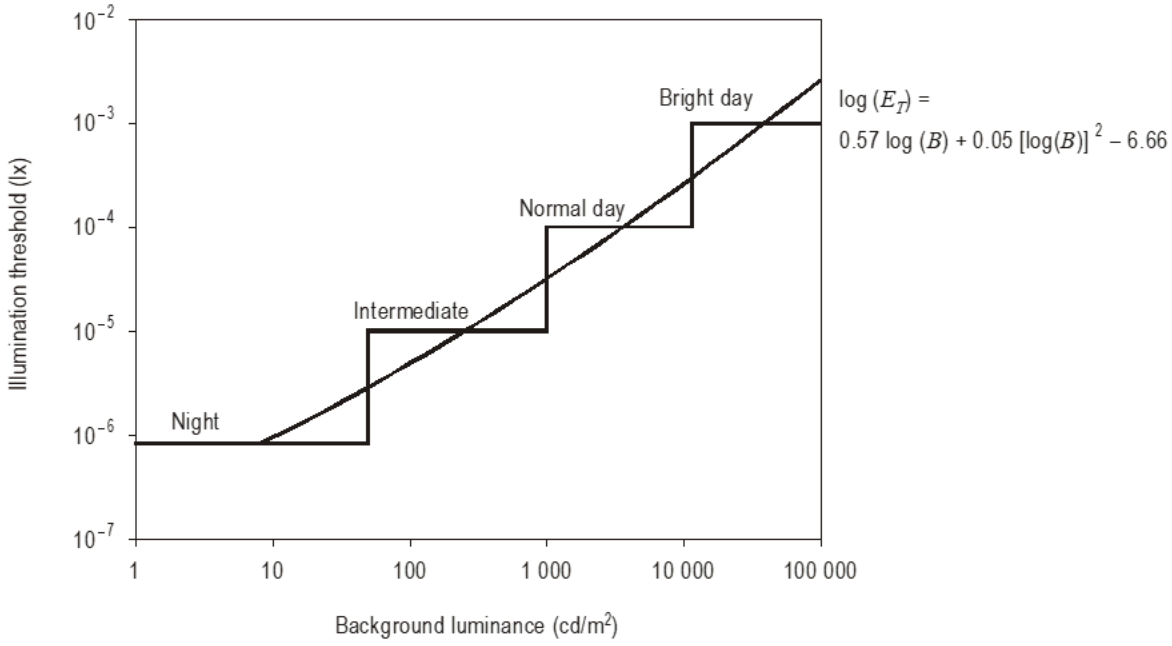


Figure D-1. Relationship between the illumination threshold E_T (lx) and background luminance B (cd/m^2)

Table D-1. Illumination threshold steps

Condition	*Illumination threshold (lx)*	*Background luminance (cd/m^2)*
Night	8×10^{-7}	≤ 50
Intermediate	10^{-5}	51 – 999
Normal day	10^{-4}	1 000 – 12 000
Bright day (sunlit fog)	10^{-3}	> 12 000

Note 1.— Information and guidance material on the runway lights to be used for assessment of runway visual range are contained in the Manual of Runway Visual Range Observing and Reporting Practices *(Doc 9328).*

Note 2.— In accordance with the definition of visibility for aeronautical purposes, the intensity of lights to be used for the assessment of visibility is in the vicinity of 1 000 cd.

— END —

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