NCAA NAMIBIA CIVIL AVIATION AUTHORITY	Namibia Civil Aviation Authority - Safety Division	TECHNICAL STANDARDS (NAMCATS) Part 174: A-MET

Civil Aviation Technical Standards

Relating to

PART 174 – MET

APPENDICES AND ATTACHMENTS

Table of Contents

APPENDIX 1: FLIGHT DOCUMENTATION - MODEL CHART AND FORMS

MODEL A OPMET information

MODEL IS Upper wind and 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 Significant weather chart (high level)

Example. Polar stereographic projection (showing the jet stream vertical extent)

MODEL SWM Significant weather chart (medium level)

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

EXAMPLES

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

SELECTED ICAO LOCATION INDICATORS

CYUL	Montreal Pierre Elliot Trudeau/Intl	HECA	Cairo/Int	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 MC2/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 2418/2421 1000 SN BECMG 2500/2501 32004MPS 3500 BR NSC BECMG 2503/2504 32010G20MPS CAVOK=

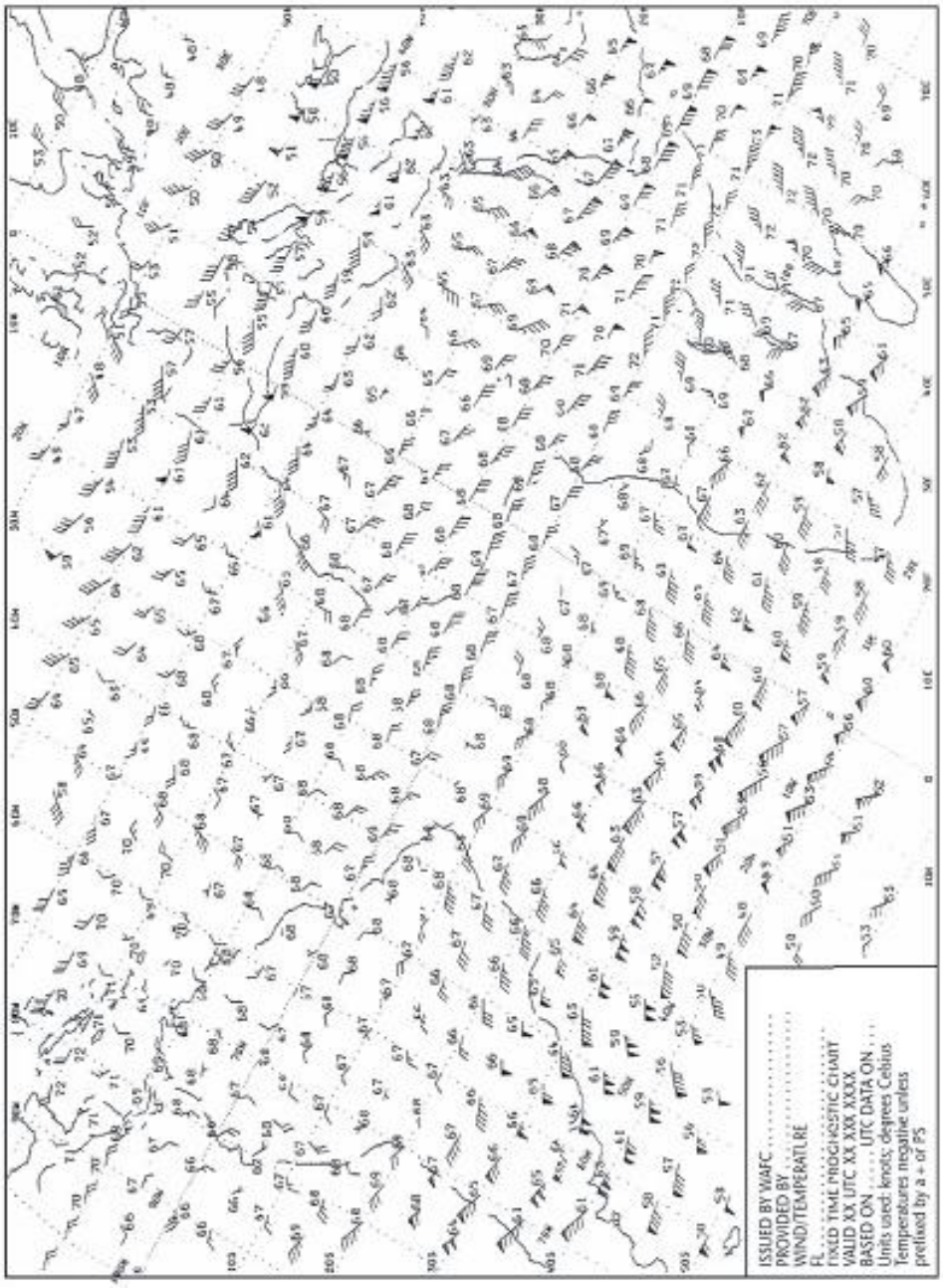
TAF YSSY 240443Z 2406/2506 05015KT 3000 BR SCT030 BECMG 2414/2416 33008KT FM 2422 04020KT CAVOK=

HECC SIGMET 2 VALID 240900/241200 HECA-

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

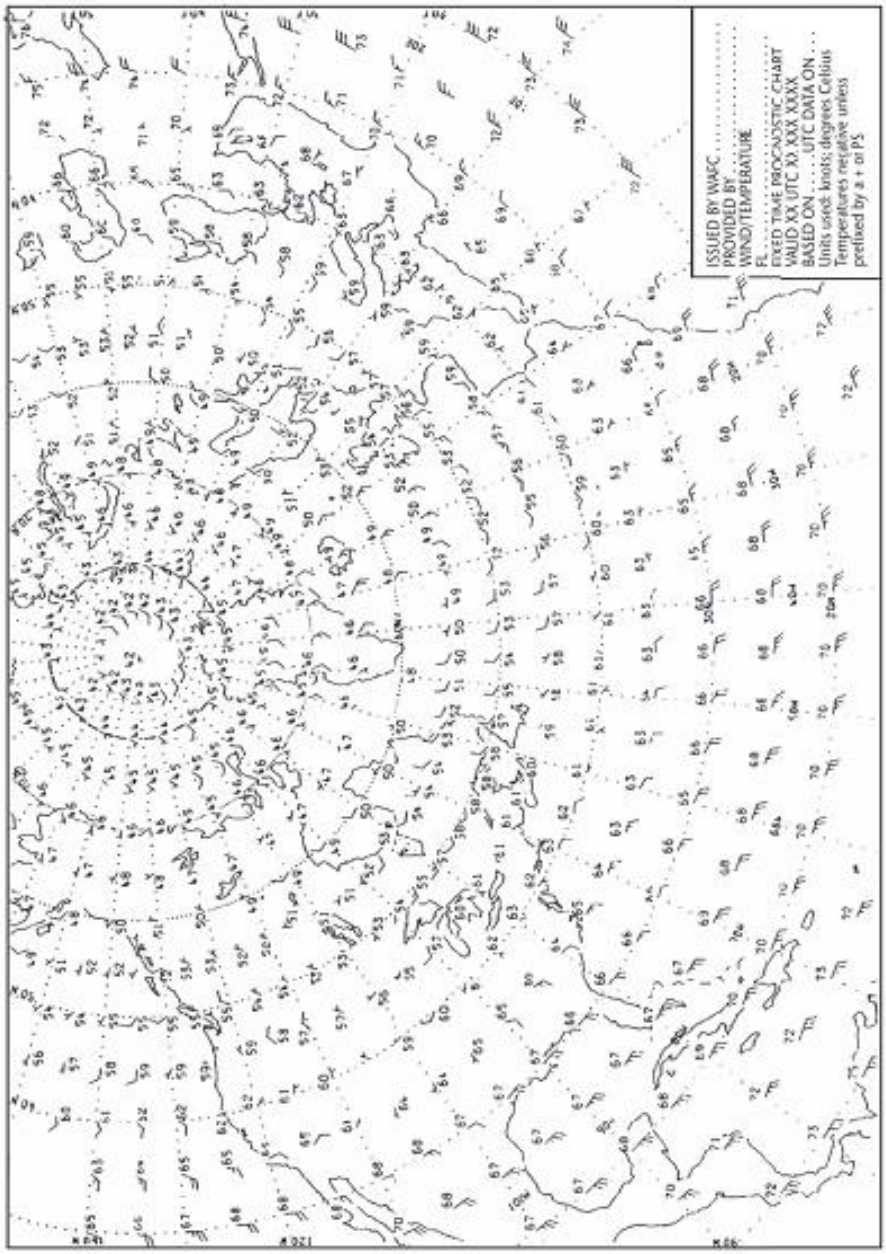
UPPER WIND AND TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE MODEL IS

Example 1. Arrows, feathers and pennants (Mercator projection)



UPPER WIND AND TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE
MODEL IS

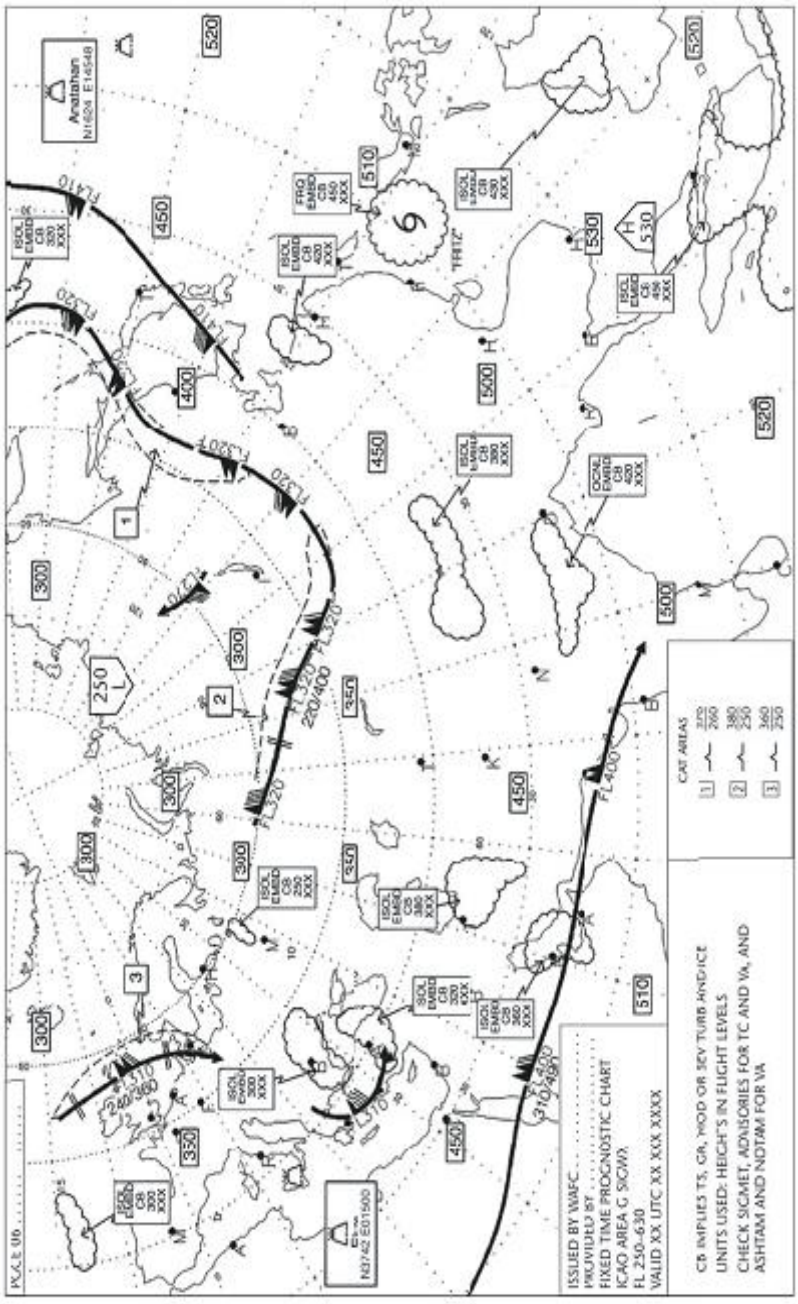
Example 2. Arrows, feathers and pennants (Polar stereographic projection)



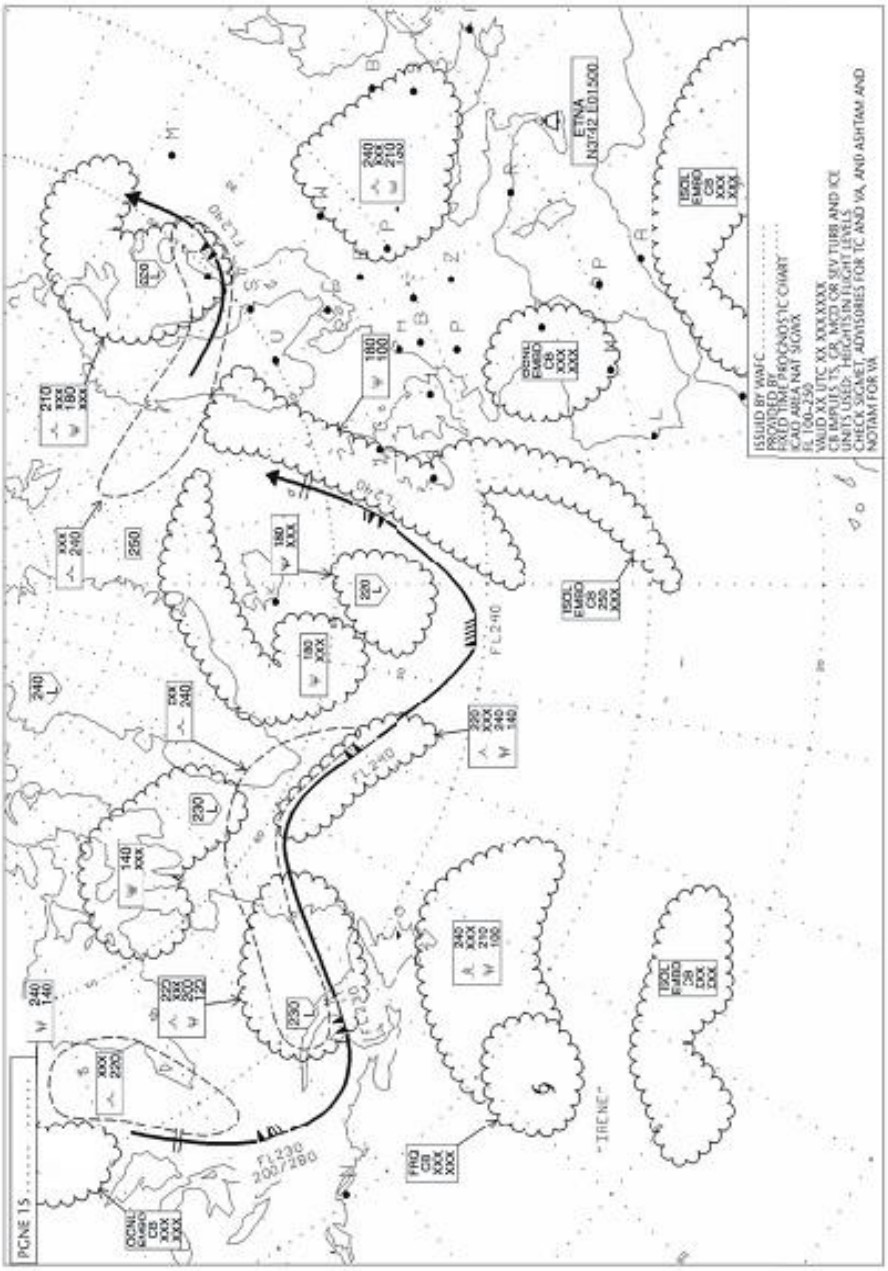
SIGNIFICANT WEATHER CHART (HIGH LEVEL)

MODEL SWH Example:

Polar stereographic projection (Showing the jetstream vertical extent)

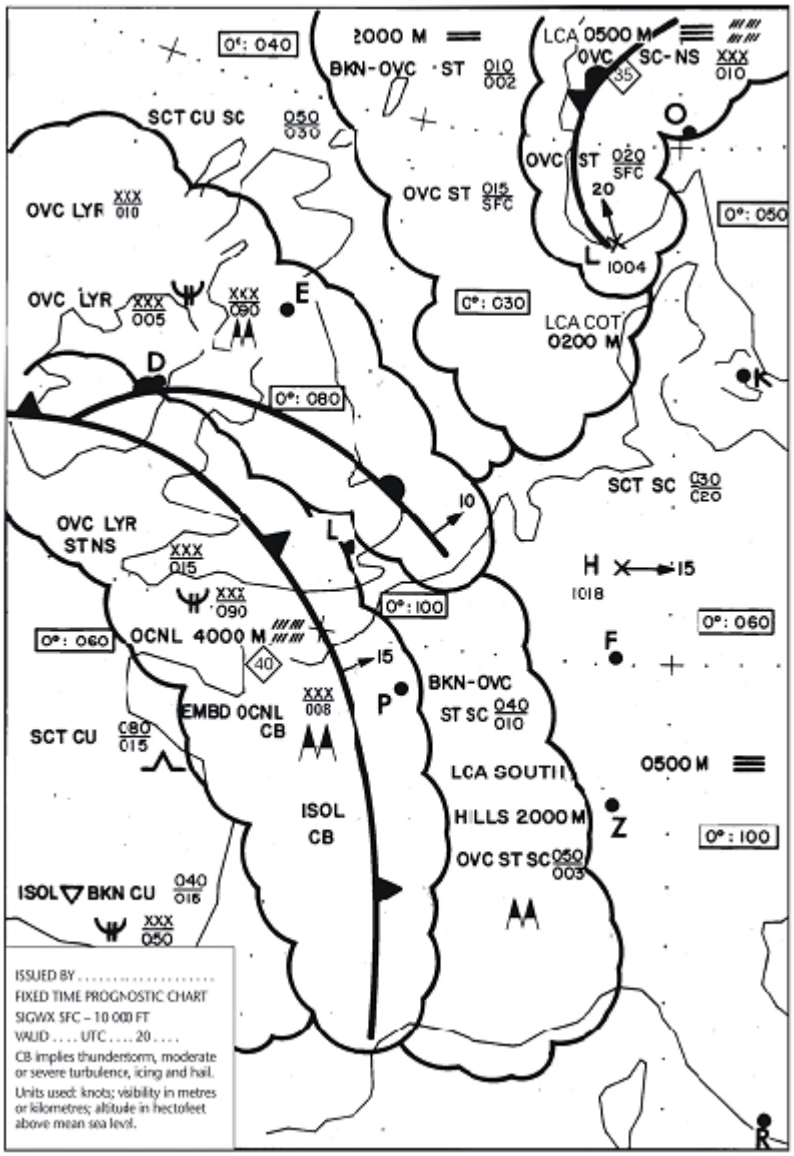


SIGNIFICANT WEATHER CHART (MEDIUM LEVEL) MODEL SWM

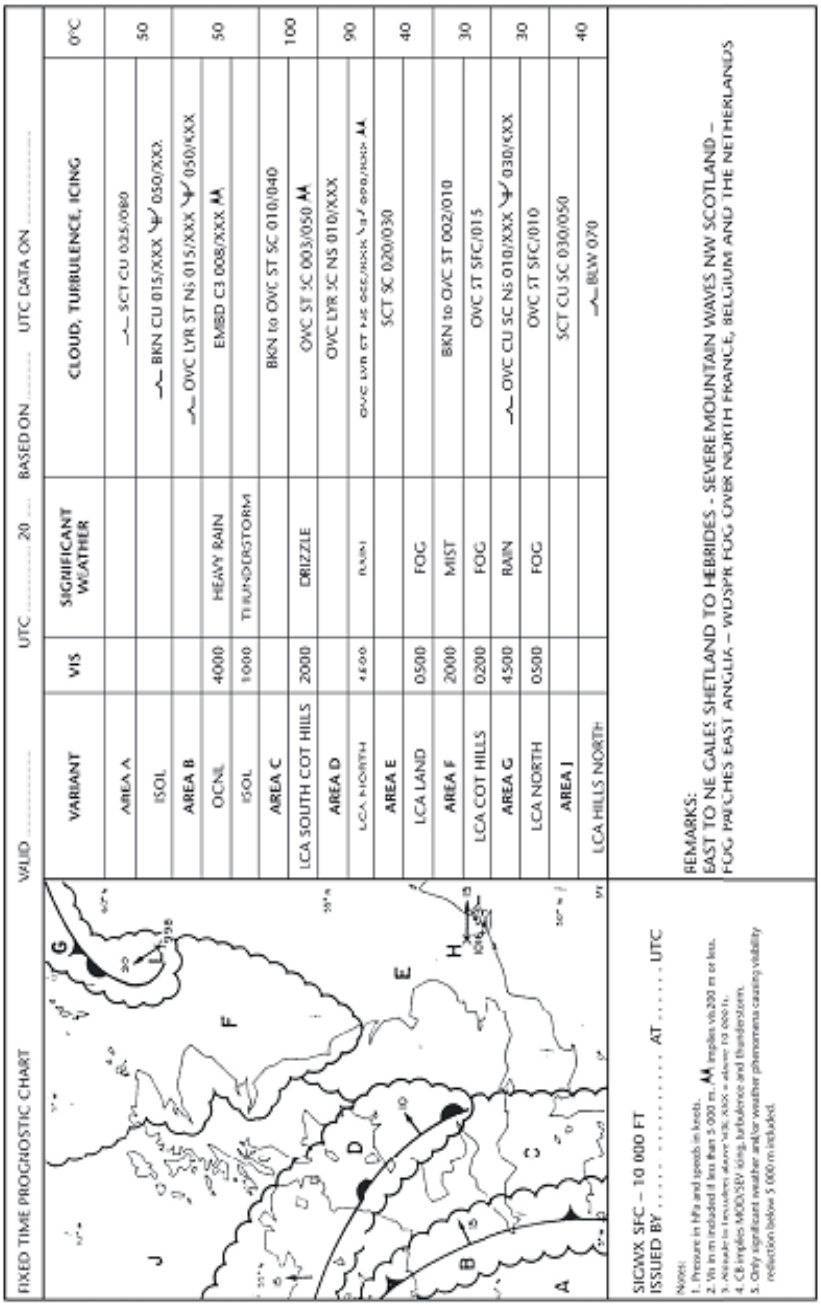


SIGNIFICANT WEATHER CHART (LOW LEVEL) MODEL SWL

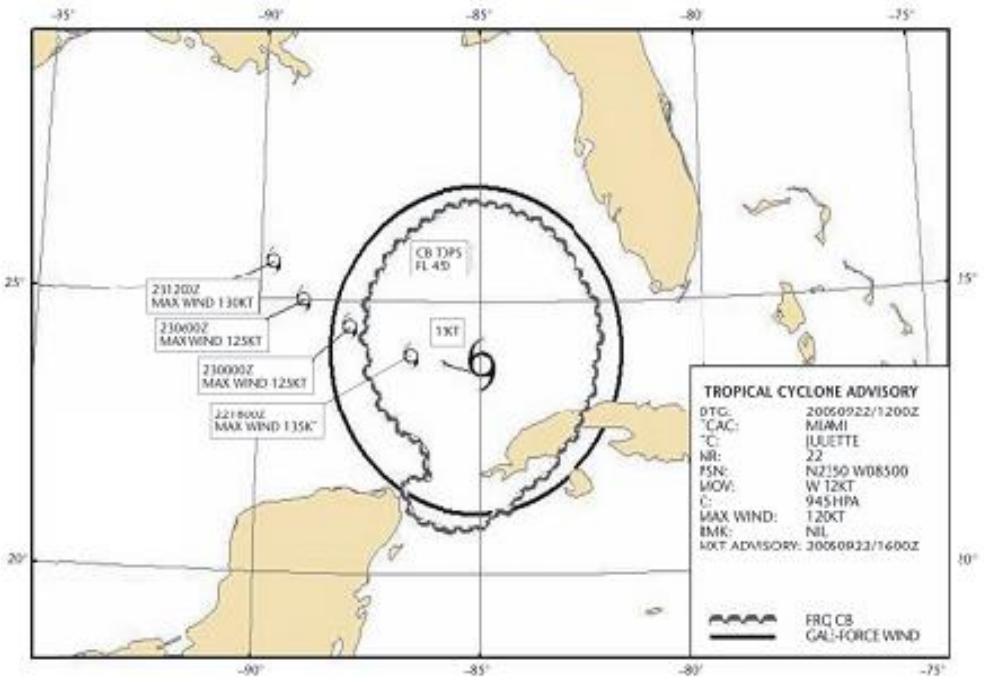
Example 1



SIGNIFICANT WEATHER CHART (LOW LEVEL) MODEL SWL
Example 2

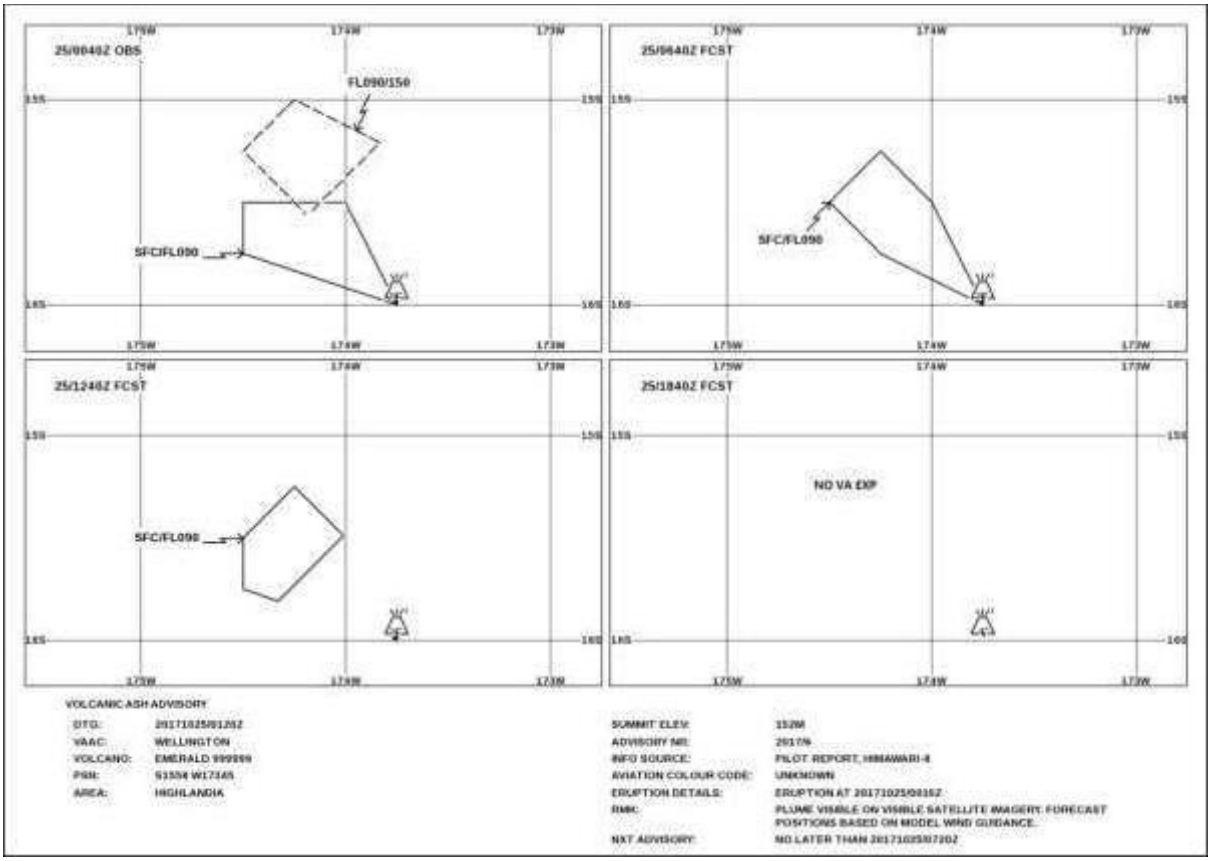


TROPICAL CYCLONE ADVISORY INFORMATION IN GRAPHICAL FORMAT MODEL TCG



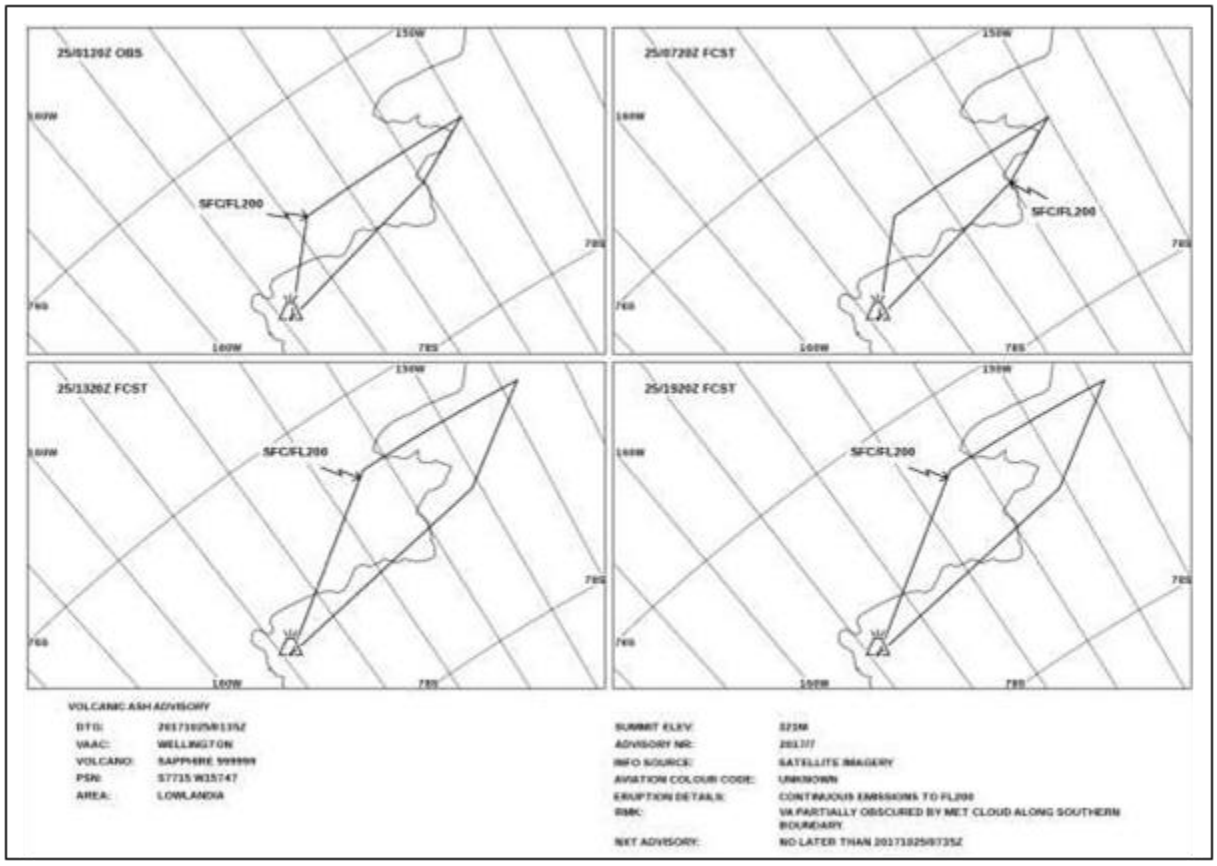
VOLCANIC ASH ADVISORY INFORMATION IN GRAPHICAL FORMAT **MODEL VAG**

Example 1. Mercator projection

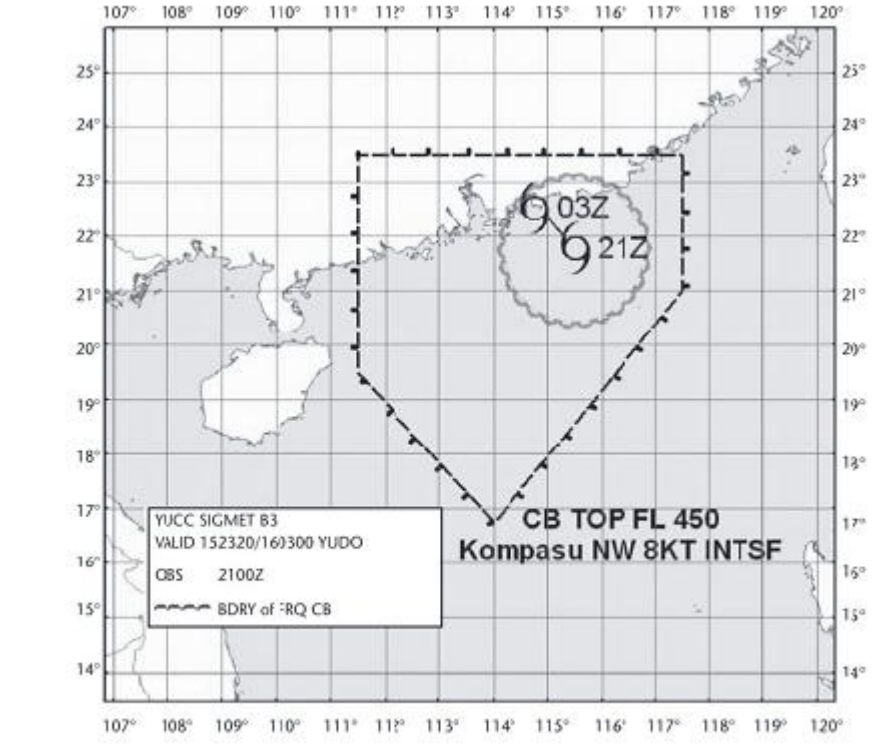


VOLCANIC ASH ADVISORY INFORMATION IN GRAPHICAL FORMAT **MODEL VAG**

Example 2. Polar stereographic projection



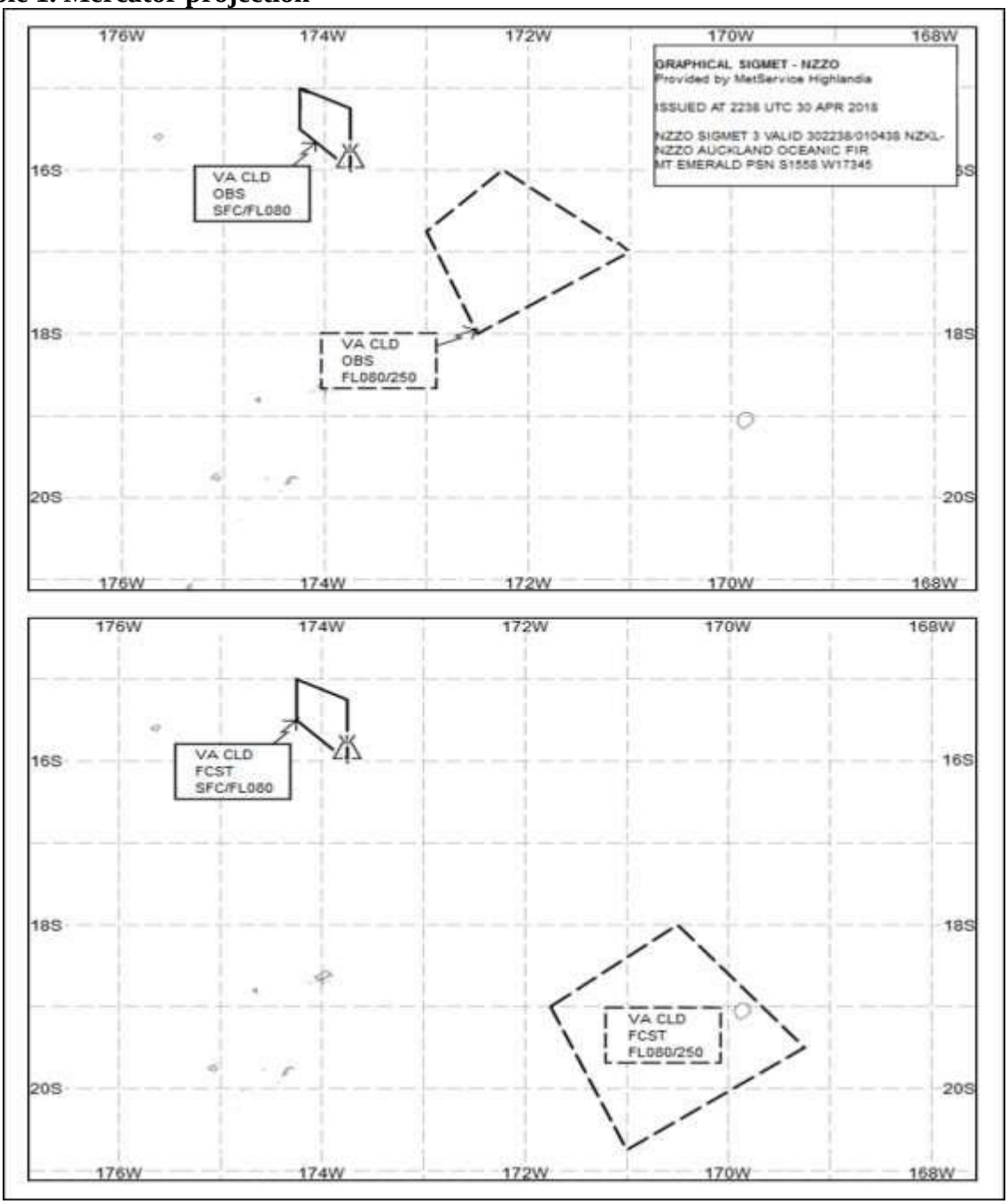
SIGMET FOR TROPICAL CYCLONE IN GRAPHICAL FORMAT MODEL STC



Note: Fictitious FIR.

SIGMET FOR VOLCANIC ASH IN GRAPHICAL FORMAT MODEL SVA

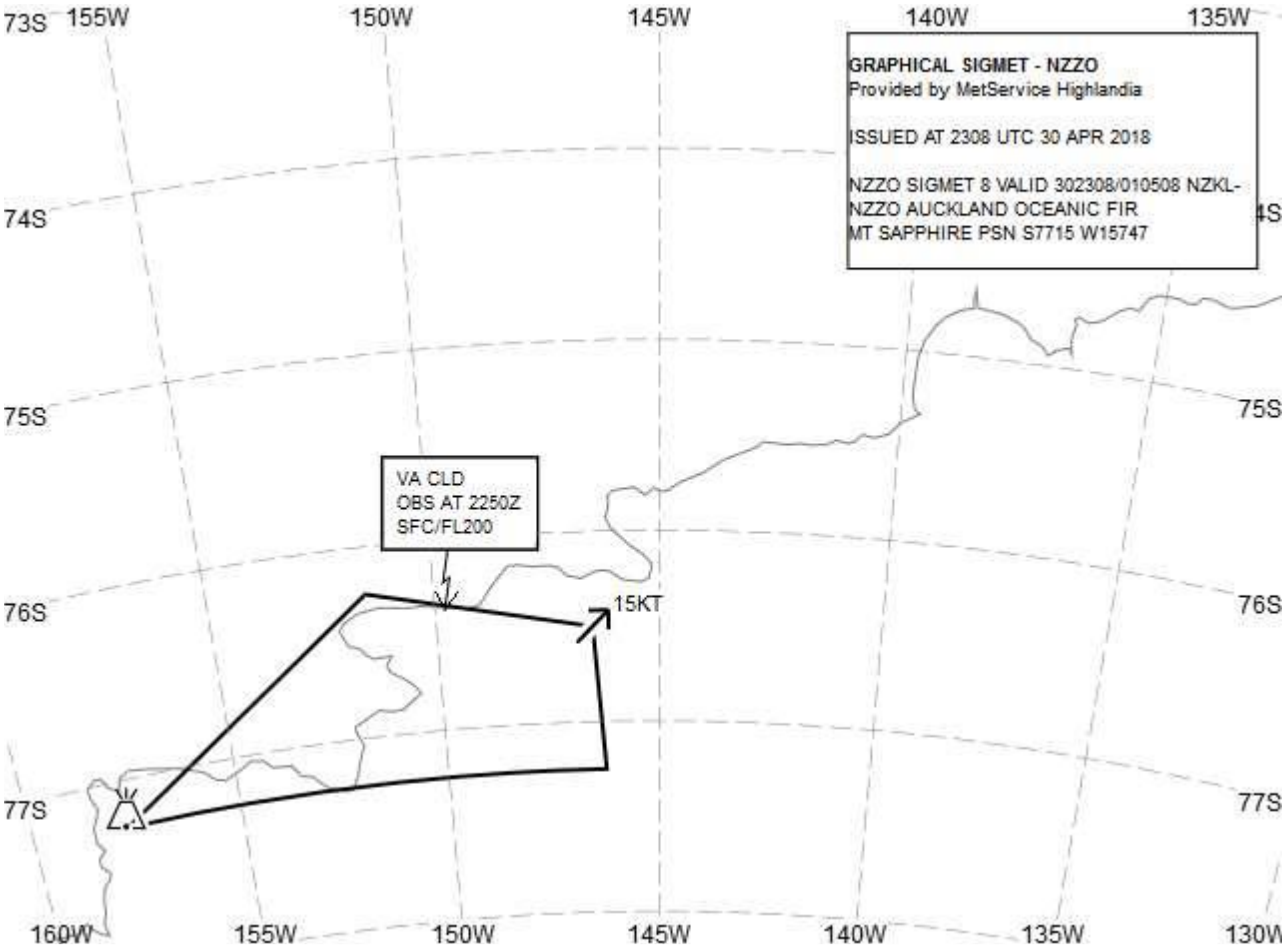
Example 1. Mercator projection



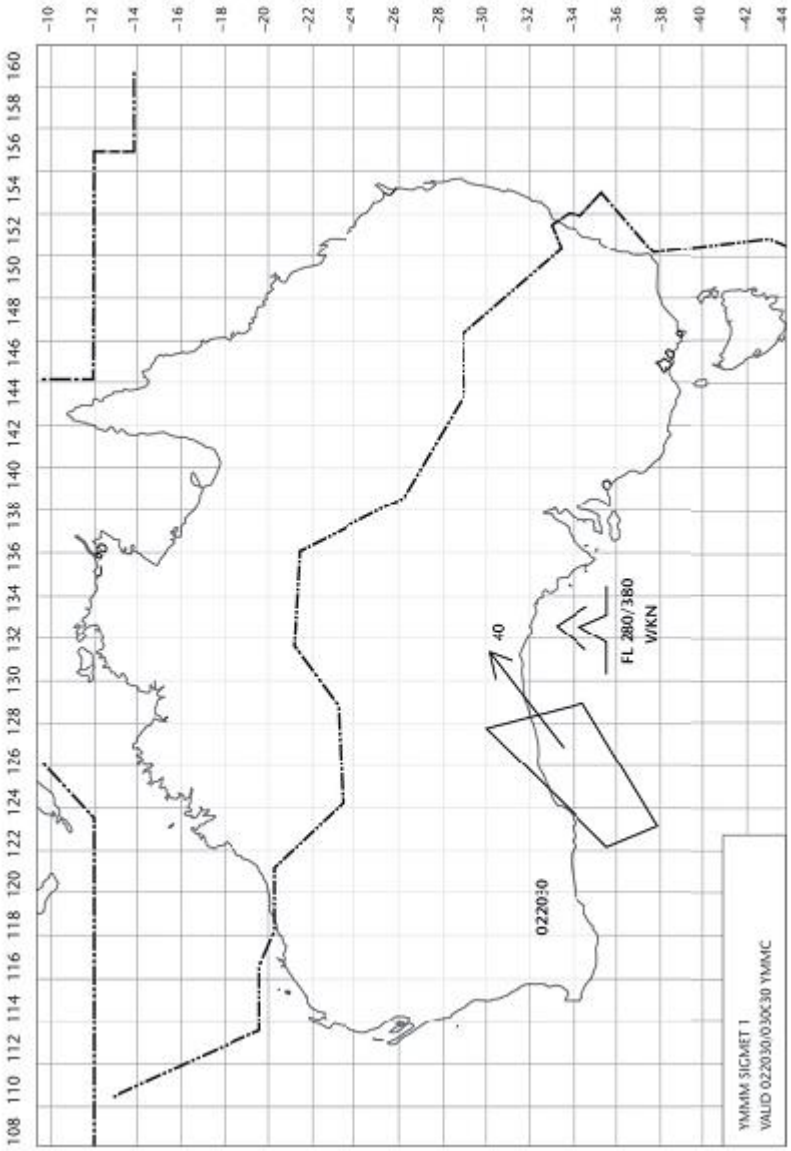
SIGMET FOR VOLCANIC ASH IN GRAPHICAL FORMAT **MODEL SVA**

Example2. Polar stereographic projection

. .



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



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 in 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		Position, speed and level of maximum wind
	Warm front at the surface		Convergence line
	Occluded front at the surface	0°C 100	Freezing level
	Quasi-stationary front at the surface		Intertropical convergence zone
	Tropopause high		State of the sea
	Tropopause low		Sea-surface temperature
	Tropopause level		Widespread strong surface wind*

FL 320 220/100 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 (110 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 320 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 SWH and SWM 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.

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 Models SWH and SWM – Significant weather charts (high and medium)

Scalloped line	=	demarcation of areas of significant weather
Heavy broken line	=	delineation of area of CAT
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.
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 height in flight levels. Display explicit FL for jet depths and tropopause height even if outside forecast bands.

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 isothermin feet (hectofeet) or metres. Note: 0°C level may also be indicated by 0°C, i.e. 0°C level is at an altitude of 6000 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 GLOBAL SYSTEMS, SUPPORTING CENTRES AND METEOROLOGICAL OFFICES

1. WORLD AREA FORECAST SYSTEM

1.1 Formats and codes

WAFCs must adopt uniform formats and codes for the supply of forecasts.

1.2 Upper-air gridded forecasts

1.2.1 The forecasts of upper wind; 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 must be prepared four times a day by a WAFC and must be valid for fixed valid times at 6, 9, 12, 15, 18, 21, 24, 27, 30, 33 and 36 hours after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based. Each forecast must be disseminated as soon as technically feasible, but not later than 5 hours after standard time of observation.

1.2.2 The grid point forecasts prepared by a WAFC must comprise:

(a) wind and temperature data for flight levels 50 (850 hPa), 80 (750 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 210 (450 hPa), 240 (400 hPa), 270 (350 hPa), 300 (300 hPa), 320 (275 hPa), 340 (250 hPa), 360 (225 hPa), 390 (200 hPa), 410 (175 hPa), 450 (150 hPa), 480 (125 hPa) and 530 (100 hPa);

(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 for layers centred at flight levels 60 (800 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa) and 300 (300 hPa);

Compliance Note: — Layers centred at a flight level referred to in f) have a depth of 100 hPa.

(g) turbulence for layers centred at flight levels 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa), 270 (350 hPa), 300 (300 hPa), 340 (250 hPa), 390 (200 hPa) and 450 (150 hPa) and

Compliance Note 1: - Layers centred at a flight level referred to in g) have a depth of 100 hPa for flight levels below 240, then 50 hPa for flight levels 240 and above.

Compliance Note 2. — Turbulence referred to in g) above encompasses all types of turbulence, including clear-air and in-cloud turbulence.

(h) geopotential altitude data for flight levels 50 (850 hPa), 80 (750 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 210 (450 hPa), 240 (400 hPa), 270 (350 hPa), 300 (300 hPa), 320 (275 hPa), 340 (250 hPa), 360 (225 hPa), 390 (200 hPa), 410 (175 hPa), 450 (150 hPa), 480 (125 hPa) and 530 (100 hPa).

Compliance Note: — The exact pressure levels (hPa) for a), d), f), g), and h) are provided in the Manual of Aeronautical Meteorological Practice

1.2.3 The foregoing grid point forecasts must be issued by a WAFC in binary code form using the GRIB code form prescribed by WMO.

Compliance Note: The GRIB code form is contained in WMO Publication No. 306, Manual on Codes, Volume I.2, Part B — Binary Codes.

1.2.4 The foregoing grid point forecasts a), b), c), d) and h) must be prepared by a WAFC in a regular grid with a horizontal resolution of 1.25° of latitude and longitude.

1.2.5 The foregoing grid point forecasts e), f) and g) must be prepared by a WAFC in a regular grid with a horizontal resolution of 0.25° of latitude and longitude.

1.3 Significant weather (SIGWIX) forecasts

1.3.1 General provisions

1.3.1.1 Forecasts of significant en-route weather phenomena must be prepared as SIGWX forecasts four times a day by a WAFC and must be valid for fixed valid times at 24 hours after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based. Each forecast must be disseminated as soon as technically feasible but not later than 7 hours after standard time of observation under normal operations and not later than 9 hours after standard time of observation during backup operations.

1.3.1.2 SIGWX forecasts must be issued in binary code form using the BUFR code form prescribed by WMO.

Note: The BUFR code form is contained in WMO Publication No. 306, Manual on Codes, Volume I.2, Part B — Binary Codes.

1.3.1.3 In addition to 1.3.1.2, SIGWX forecasts maybe disseminated in IWXXM GML form.

Compliance Note 1.— Guidance on the implementation of IWXXM is provided in the Manual on the ICAO Meteorological Information Exchange Model (IWXXM) (Doc 10003).

Compliance Note 2. — Geography markup language (GML) is an encoding standard of the Open Geospatial Consortium (OGC).

1.3.2 Types of SIGWX forecasts

SIGWX forecasts must be issued as high-level SIGWX forecasts for flight levels between 250 and 630.

Compliance Note: *Medium-level SIGWX forecasts for flight levels between 100 and 250 for limited geographical areas will continue to be issued until such time that flight documentation to be generated from the gridded forecasts of cumulonimbus clouds, icing and turbulence fully meets user requirements.*

1.3.3 Items included in SIGWX forecasts SIGWX forecasts must 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);

(b) severe squall lines;

(c) moderate or severe turbulence (in cloud or clear air);

(d) moderate or severe icing;

(e) widespread sandstorm/duststorm;

(f) cumulonimbus clouds associated with thunderstorms and with a) to e);

(g) flight level of tropopause;

(h) jet streams; 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 mayindicate “CHECK SIGMET, ADVISORIES FOR TC AND VA, AND ASHTAM AND NOTAM FOR VA”.

(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 maycontain "CHECK SIGMET AND NOTAM FOR RDOACT CLD".

Compliance Note 1: Medium-level SIGWX forecasts include all the items above.
Compliance Note 2: Items to be included in low-level SIGWX forecasts (i.e. flight levels below 100) re included in Appendix 5.

1.3.4 Criteria for including items in SIGWX forecasts:

The following criteria must be applied for SIGWX forecasts:

(a) items a) to f) in 1.3.3 may only be included if expected to occur between the lower and upper levels of the SIGWX forecast;

(b) the abbreviation "CB" may only be included when it refers to the occurrence or expected occurrence of cumulonimbus clouds:
  (i) affecting an area with a maximum spatial coverage of 50 per cent or more of the area concerned;
  (ii) along a line with little or no space between individual clouds; or
  (iii) embedded in cloud layers or concealed by haze;

(c) the inclusion of "CB" must be understood to include all weather phenomena normally associated with cumulonimbus clouds, i.e. thunderstorm, moderate or severe icing, moderate or severe turbulence and hail;

(d) 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 must be included on SIGWX forecasts irrespective of the height to which the ash column or radioactive material is reported or expected to reach; and

(e) in the case of co-incident or the partial overlapping of items a), i) and j) in 1.3.3, the highest priority must be given to item i), followed by items j) and a). The item with the highest priority must be

placed at the location of the event, and an arrow must be used to link the location of the other item(s) to its associated symbol or text box.

2. AERODROME METEOROLOGICAL OFFICES

2.1 Use of WAFS products

2.1.1 Aerodrome meteorological offices must 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 authority and the operator concerned.

2.1.2 In order to ensure uniformity and standardization of flight documentation, the WAFS GRIB and BUFR data received, must be decoded into standard WAFS charts in accordance with relevant provisions in this Annex, and the meteorological content and identification of the originator of the WAFS forecasts may not be amended.

2.2 Notification of WAFC concerning significant discrepancies

2.2.1 Aerodrome meteorological offices using WAFS BUFR or, IWXXM data must notify the WAFC concerned immediately if significant discrepancies are detected or reported in respect of WAFS SIGWX forecasts concerning:

(a) icing, turbulence, cumulonimbus clouds that are obscured, frequent, embedded or occurring at a squall line, and sandstorms/duststorm; and

(b) volcanic eruptions or a release of radioactive materials into the atmosphere, of significance to aircraft operations.

2.2.2 The WAFC receiving the message must acknowledge its receipt to the originator, together with a brief comment on the report and any action taken, using the same means of communication employed by the originator.

Compliance Note: Guidance on reporting significant discrepancies is provided in the Manual of Aeronautical Meteorological Practice

3. VOLCANIC ASH ADVISORY CENTRES (VAAC)

3.1 Volcanic ash advisory information

3.1.1 The advisory information on volcanic ash issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, must be in accordance with the template shown in Table A2-1.

When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, must be used.

3.1.2 Volcanic ash advisory information may be disseminated in IWXXM GML form in addition to the issuance of this advisory information accordance with 3.1.1.

3.1.3 The volcanic ash advisory information listed in Table A2-1, when prepared in graphical format, must be as specified in Appendix 1 and issued using the portable network graphics (PNG) format.

4. STATE VOLCANO OBSERVATORIES

4.1 Information from State volcano observatories

The information required to be sent by State volcano observatories to their associated ACCs/FICs, MWO and VAAC may comprise:

(a) for significant pre-eruption volcanic activity: the date/time (UTC) of report; name and, if known, number of the volcano; location (latitude/longitude); and description of volcanic activity; and

(b) for volcanic eruption: the date/time (UTC) of report and time of eruption (UTC) if different from time of report; name and, if known, number of the volcano; location (latitude/longitude); and description of the eruption including whether an ash column was ejected and, if so, an estimate

of height of ash column and the extent of any visible volcanic ash cloud, during and following an eruption; and

(c) for volcanic eruption cessation: the date/time (UTC) of report and time of eruption cessation (UTC); name and, if known, number of the volcano; and location (latitude/longitude).

Compliance Note 1: Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

Compliance Note 2: The State volcano observatories may use the Volcano Observatory Notice for Aviation (VONA) format to send information to their associated ACCs/FICs, MWO and VAAC. The VONA format 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 IAVWOPSG website.

5. TROPICAL CYCLONE ADVISORY CENTRES (TCAC)

5.1 Tropical cyclone advisory information

5.1.1 The advisory information on tropical cyclones must be issued for tropical cyclones when the maximum of the 10-minute mean surface wind speed is expected to reach or exceed17 m/s (34 kt) during the period covered by the advisory.

5.1.2 The advisory information on tropical cyclones disseminated in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, must be in accordance with the template shown in Table A2-2.

5.1.3 Tropical cyclone advisory centres must disseminate tropical cyclone advisory information in IWXXM GML form in addition to the dissemination of this advisory information in abbreviated plain language in accordance with 5.1.2.

Compliance Note: — The technical specifications for IWXXM are contained in the Manual on Codes (WMO-No. 306), Volume I.3, Part D — Representation Derived from Data Models. Guidance on

the implementation of IWXXM is provided in the Manual on the ICAO Meteorological Information Exchange Model (IWXXM) (Doc 10003).

5.1.4 The tropical cyclone advisory information listed in Table A2-2, when prepared in graphical format, must be as specified in Appendix 1 and issued using the portable network graphics (PNG) format.

6. SPACE WEATHER CENTRES

6.1 Space weather advisory information

6.1.1 Advisory information on space weather may be issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, and may be in accordance with the template shown in Table A2-3. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, may be used.

6.1.2 Space weather advisory information must be disseminated in IWXXM GML form, in addition to the dissemination of this advisory information in abbreviated plain language in accordance with 6.1.1.

Compliance 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 (IWXXM) (Doc 10003).

6.1.3 One or more of the following space weather effects may be included in the space weather advisory information, using their respective abbreviations as indicated below:

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

6.1.4 The following intensities maybe included in space weather advisory information, using their respective abbreviations as indicated below:

– moderate MOD
– severe SEV

Compliance 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).

6.1.5 Updated advisory information on space weather phenomena may be issued as necessary but at least every six hours until such time as the space weather phenomena are no longer detected and/or are no longer expected to have an impact.

Table A2-1. Template for advisory message for 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 maybe placed on the subsequent line.

Note 1: The ranges and resolutions for the numerical elements included in advisory messages for volcanic ash are shown in Appendix 6, Table A6-4.

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 19 are included only for clarity and they are not part of the advisory message, as shown in the example.

Element		Detailed content	Template (s)	Examples
1	Identification of the type of message (M	Type of message	VA ADVISORY	VA ADVISORY

Element		Detailed content	Template (s)	Examples
2	Status indicator (C)1	Indicator of test or exercise	STATUS: TEST or EXER	STATUS: TEST STATUS: EXER
3	Time of origin (M)	Year, month, day, time in UTC	DTG: nnnnnnnn/nnnnZ	DTG: 20080923/0130Z
4	Name of VAAC (M)	Name of VAAC	VAAC: nnnnnnnnnnn	VAAC: TOKYO
5	Name of volcano (M)	Name and IAVCEI[1] number of volcano	VOLCANO: nnnnnnnnnnnnnnnnnnnnn [nnnnnn] or UNKNOWN or UNNAMED	VOLCANO: KARYMSKY 300-130 VOLCANO: 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 PSN: UNKNOWN
7	State or region (M)	State, or region if ash is not reported over a State	AREA: nnnnnnnnnnnnnnn or UNKNOWN	AREA: RUSSIA UNKNOWN
8	Summit elevation (M)	Summit elevation in m (or ft)	SUMMIT ELEV: nnnnM (or nnnnnFT) or SFC or UNKNOWN	SUMMIT ELEV: 1536M SFC
9	Advisory number (M)	Advisory number: year	ADVISORY NR: nnnn/nnnn	ADVISORY NR: 2008/4

Element		Detailed content	Template (s)	Examples
		in full and message number (separate sequence for each volcano		
10	Information source (M)	Information source using free text	INFO SOURCE: Free text up to 32 characters	INFO SOURCE: HIMAWARI-8 KVERT KEMSD
11	Colour code (O)	Aviation colour code	AVIATION COLOUR CODE: RED or ORANGE or YELLOW or GREEN or UNKNOWN or NOT GIVEN or NIL	AVIATION COLOUR CODE: RED
12	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 20080923/0000Z FL300 REPORTED NO ERUPTION – RESUSPENDED VA[6] UNKNOWN
13	Time of	Day and time (in UTC)	OBS (or EST) VA DTG: nn/nnnnZ	OBS VA DTG: 23/0100Z

Element		Detailed content	Template (s)	Examples
	observation (or estimation) of ash (M)	of observation (or estimation) of volcanic ash		
14	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 clou	OBS VA CLD or EST VA CLD: TOP FLnnn or SFC/FLnnn or FLnnn/nnn [nnKM WID LINE[2] 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]] 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	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 TOP FL240 MOV W 40KMH VA NOT IDENTIFIABLE FM SATELLITE DATA WIND FL050/070 180/12MPS

Element		Detailed content	Template (s)	Examples
			MOV SW nnKMH (or KT) or MOV W nnKMH (or KT) or MOV NW nnKMH (or KT)3 or VA NOT IDENTIFIABLE FM SATELLITE DATA WIND FLnnn/nnn nnn/nn[n]MPS (or KT)4 or WIND FLnnn/nnn VRBnnMPS (or KT) or WIND SFC/FLnnn nnn/nn[n]MPS (or KT) or WIND SFC/FLnnn VRBnnMPS (or KT	
15	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 Item 12); 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[2] 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] –	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
			Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]]3 or NO VA EXP or NOT AVBL or NOT PROVIDED	
16	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 Item 12); 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[2] 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]]3 or NO VA EXP or	FCST VA CLD +12 HR: 23/1300Z SFC/FL270 N4830 E16130 – N4830 E16600 – N5300 E16600 – N5300 E16130 NO VA EXP NOT AVBL NOT PROVIDED

Element		Detailed content	Template (s)	Examples
			NOT AVBL or NOT PROVIDED	
17	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 Item 12); 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[2]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]][3] or NO VA EXP or NOT AVBL or NOT PROVIDED	FCST VA CLD +18 HR: 23/1900Z NO VA EXP NOT AVBL NOT PROVIDED
18	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

Element		Detailed content	Template (s)	Examples
				DISPERSING VA CLD ARE EVIDENT ON SATELLITE IMAGERY RE-SUSPENDED VA[67] NIL
19	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	NXT ADVISORY: 20080923/0730Z NO LATER THAN nnnnnnnn/nnnnZ NO FURTHER ADVISORIES WILL BE ISSUED BY nnnnnnnn/nnnnZ

Notes. —

1. Used only when the message issued to indicate that a test or an exercise is taking place. When the word “TEST” or the abbreviation “EXER” is included, the message may contain information that may 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. 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.
4. Up to 4 selected layers.
5. If ash reported (e.g. AIREP) but not identifiable from satellite data.
6. To be included (as free text) only for those situations where volcanic ash has been re-suspended.
7. To be included (as free text) where space in the remarks section allows.

Example A2-1. Advisory message for volcanic ash

FVFE01 RJTD 230130
VA ADVISORY

DTG: 20080923/0130Z
VAAC: TOKYO
VOLCANO: KARYMSKY 300130
PSN: N5403 E15927
AREA: RUSSIA
SUMMIT ELEV: 1536M
ADVISORY NR: 2008/4
INFO SOURCE: HIMAWARI-8 KVERT KEMSD
AVIATION COLOUR CODE: RED
ERUPTION DETAILS: ERUPTION AT 20080923/0000Z 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:	20080923/0730Z

Table A2-2. Template for advisory message for tropical cyclones

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable;
O = inclusion optional;
= = a double line indicates that the text following it maybe placed on the subsequent line.

Compliance Note 1: The ranges and resolutions for the numerical elements included in advisory messages for tropical cyclones are shown in Appendix 6, Table A6-4.

Compliance 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).

Compliance Note 3: Inclusion of a "colon" after each element heading is mandatory.

Compliance Note 4: The numbers 1 to 21 are included only for clarity and they are not part of the advisory message, as shown in the example.

Element		Detailed content	Template(s)	Examples
1	Identification of the type of message	Type of message	TC ADVISORY	TC ADVISORY
2	Status indicator (C)[1]	Indicator of test or exercise	STATUS: TEST or EXER	STATUS: TEST STATUS: EXER
3	Time of origin (M)	Year, month, day, time in UTC	DTG: nnnnnnnn/nnnnZ	DTG: 20040925/1900Z

4	Name of TCAC (M)	Name of TCAC (location indicator or full name)	TCAC: nnnn or nnnnnnnnnn	TCAC: YUFO[12] TCAC: 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)	Advisory number: Year in full and message number (separate sequence starting with "01" for each cyclone)	ADVISORY NR: nnnn/[n][n]nn	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: 25/1800Z N2706 W07306
8	Observed CB cloud[3] (O)	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 WI4 Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] –	CB: WI 250NM OF TC CENTRE TOP FL500 NIL

			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]] TOP [ABV or BLW] FLnnn NIL	
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	MOV: N nnKMH (or KT) or NNE nnKMH (or KT) or NE nnKMH (or KT) or	MOV: NW 20KMH

		km/h (1 kt))	ENE 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	
10	Changes in intensity (M)	surface Changes of maximum surface wind speed at time of observation	INTST INTST CHANGE: INTSF or WKN or NC	INTST CHANGE: INTSF
11	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
12	Forecast of centre Position (+6 HR) (M)	Day and time (in UTC) (6 hours from the "DTG" given in Item 2); 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: 25/2200Z N2748 W07350
13	Forecast of maximum surface	Forecast of maximum surface wind (6 hours after the "DTG" given in Item 2)	FCST MAX nn[n]MPS WIND +6 HR: (or nn[n]KT)	FCST MAX 22MPS WIND +6 HR:

	wind (+6 HR) (M)			
14	Forecast of centre position (+12 HR) (M)	Day and time (in UTC) (12 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +12 nn/nnnnZ HR: Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]	FCST PSN +12 HR: 26/0400Z N2830 W07430
15	Forecast of maximum surface wind (+12 HR) (M)	Forecast of maximum surface wind (12 hours after the "DTG" given in Item 2)	FCST MAX WIND nn[n]MPS +12 HR: (or nn[n]KT)	FCST MAX WIND 22MPS +12 HR:
16	Forecast of centre position (+18 HR) (M)	Day and time (in UTC) (18 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +18 nn/nnnnZ HR: Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]	FCST PSN +18 HR: 26/1000Z N2852 W07500
17	Forecast of	Forecast of maximum	FCST MAX	FCST MAX WIND 21MPS

	maximum surface wind (+18 HR) (M)	surface wind (18 hours after the "DTG" given in Item 2)	WIND nn[n]MPS +18 HR: (or nn[n]KT)	+18 HR:
18	Forecast of centre position (+24 HR) (M)	Day and time (in UTC) (24 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +24 nn/nnnnZ HR: Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]	FCST PSN +24 HR: 26/1600Z N2912 W07530
19	Forecast of maximum surface wind (+24 HR) (M)	Forecast of maximum surface wind (24 hours after the "DTG" given in Item 2)	FCST MAX WIND nn[n]MPS +24 HR: (or nn[n]KT)	FCST MAX WIND 20MPS +24 HR:
20	Remarks (M)	Remarks, as necessary	RMK: Free text up to 256 characters or NIL	RMK: NIL
21	Expected time of	Expected year, month, day	NXT MSG: [BFR]	NXT MSG: 20040925/2000Z

	issuance of next advisory (M)	and time (in UTC) of issuance of next advisory	nnnnnnnn/nnnnZ or NO MSG EXP	

Notes. —

1. *Used only when the message issued to indicate that a test or an exercise is taking place. When the word "TEST" or the abbreviation "EXER" is included, the message may contain information that may 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. *The number of coordinates maybe kept to a minimum and maynot normally exceed seven.*

Example A2-2. Advisory message for tropical cyclones

TC
ADVISORY
DTG: 20040925/19600Z
TCAC: YUFO
TC: GLORIA
ADVISORY NR: 2004/13
OBS PSN: 25/1800Z N2706 W
CB: WI 250NM OF TC CENTRE
MOV: NW 20KMH
INTST CHANGE: INTSF
C: 965HPA

MAX WIND: 25MPS
FCST PSN +6 HR: 25/2200Z N2748
07350
FCST MAX WIND +6 HR: 22MPS
FCST PSN +12 HR: 26/0400Z N2830 W07430
FCST MAX WIND +12 HR: 22MPS
FCST PSN +18 HR: 26/1000Z N2852 W07500
FCST MAX WIND +18 HR: 21MPS
FCST PSN +24 HR: 26/1600Z N2912 W07530
FCST MAX WIND +24 HR: 20MPS
RMK: NIL
NXT MSG: 20040925/2000Z

Table A2-3. Template for advisory message for space weather information

Key: M = inclusion mandatory, part of every message
C = inclusion conditional, included whenever applicable

Compliance Note 1. — The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes (PANS-ABC, Doc 8400).

Compliance Note 2. — The spatial resolutions are shown in Attachment E.

Compliance Note3. – Inclusion of a «colon» after each element heading is mandatory.

Compliance Note 4. — The numbers 1 to 14 are included only for clarity and they are not part of the advisory message, 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 STATUS: EXER
3	Time of origin (M)	Year, month, day, time in UTC	DTG: nnnnnnnn/nnnnZ	DTG: 20161108/0100Z
4	Name of SWXC (M)	Name of SWXC	SWXC: Nnnnnnnnnnnn	SWXC: DONLON
5	Advisory number (M)	Advisory number: year in full and unique message number	ADVISORY NR: nnnn/[n][n][n]n	ADVISORY NR: 2016/1
6	Number of advisory being replaced (C)	Number of the previously issued advisory being replaced	NR RPLC: nnnn/[n][n][n]n	NR RPLC: 2016/1
7	Space weather effect and intensity (M)	Effect and intensity of the space weather phenomena	SWX EFFECT: HF COM MOD or SEV [AND][3] or SATCOM MOD or SEV [AND][3] or GNSS MOD or SEV [AND][3] or RADIATION[4] MOD or SEV	SWX EFFECT: HF COM MOD SWX EFFECT: GNSS SEV SWX EFFECT: HF COM MOD AND SWX EFFECT: GNSS MOD SWX EFFECT: RADIATION MOD SWX EFFECT: SATCOM SEV
8	Observed or expected extent of	Time: day, time in UTC; Observed (or forecast if	OBS or FCST SWX: nn/nnnnZ DAYLIGHT SIDE or	OBS SWX: 08/0100Z DAYLIGHT SIDE

	space weather phenomena (M)	phenomena have yet to occur); horizontal extent 2 (latitude bands and longitude in degrees) and/or altitude of space weather phenomena	HNH and/or MNH and/or EQN and/or EQS and/or MSH and/or HSH and Wnnn(nn) or Ennn(nn) – Wnnn(nn) or Ennn(nn) and/or ABV FLnnn or FLnnn–nnn or 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 NO SWX EXP	FCST SWX: 08/0100Z HNH HSH W18000 — W09000 ABV FL350 08/0100Z S2000 W17000 – S2000 W13000 – S1000 W13000 – S1000 W17000 – S2000 W17000 NO SWX EXP OBS SWX: 08/0100Z HNH HSH E18000-W18000

9	Forecast of the phenomena for the next 6 hours (M)	Day, time (in UTC) (6 hours from time given in item 8, rounded to the next full hour); Forecast extent and/or altitude of the space weather phenomena for the fixed valid time	FCST SWX +6 HR: nn/nnnnZ DAYLIGHT SIDE or HNH and/or MNH and/or EQN and/or EQS and/or MSH and/or HSH and Wnnn(nn) or Ennn(nn) – Wnnn(nn) or Ennn(nn) and/or ABV FLnnn or FLnnn–nnn and/ or 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] –	FCST SWX +6 HR: 08/0700Z DAYLIGHT SIDE FCST SWX +6 HR: 08/0700Z HNH HSH W18000 — W09000 ABV FL350 FCST SWX +6 HR: 08/0700Z HNH HSH E18000-W18000 NO SWX EXP NOT AVBL

			Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] or NO SWX EXP or NOT AVBL	
10	Forecast of the phenomena for the next 12 hours (M)	Day, time (in UTC) (12 hours from time given in item 8, rounded to the next full hour); Forecast extent and/or altitude of the space weather phenomena for the fixed valid time	FCST SWX +12 HR: nn/nnnnZ DAYLIGHT SIDE or HNH and/or MNH and/or EQN and/or EQS and/or MSH and/or HSH and Wnnn(nn) or Ennn(nn) – Wnnn(nn) or Ennn(nn) and/or ABV FLnnn or FLnnn–nnn and/ or Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] –	FCST SWX +12 HR: 08/1300Z DAYLIGHT SIDE FCST SWX +12 HR: 08/1300Z HNH HSH W18000 — W09000 ABV FCST SWX +12 HR: 08/1300Z HNH HSH E18000-W18000 NO SWX EXP NOT AVBL

			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 NO SWX EXP or NOT AVBL	
11	Forecast of the phenomena for the next 18 hours (M)	Day, time (in UTC) (18 hours from time given in item 8, rounded to the next full hour); Forecast extent and/or altitude of the space weather phenomena for the fixed valid time	FCST SWX +18 HR: nn/nnnnZ DAYLIGHT SIDE or HNH and/or MNH and/or EQN and/or EQS and/or MSH and/or HSH and Wnnn(nn) or Ennn(nn) – Wnnn(nn) or Ennn(nn) and/or ABV FLnnn or FLnnn–nnn and/ or	FCST SWX +18 HR: 08/1900Z DAYLIGHT FCST SWX +18 HR: 08/1900Z HNH HSH W18000 — W09000 ABV FL350 FCST SWX +18 HR: 08/1900Z HNH HSH E18000-W18000 NO SWX EXP NOT AVBL

			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 NO SWX EXP or NOT AVBL	
12	Forecast of the phenomena for the next 24 hours (M)	Day, time (in UTC) (24 hours from time given in item 8, rounded to the next full hour); Forecast extent and/or altitude of the space weather phenomena for the fixed valid time	FCST SWX +24 HR: nn/nnnnZ DAYLIGHT SIDE or HNH and/or MNH and/or EQN and/or EQS and/or MSH and/or HSH and Wnnn(nn) or Ennn(nn) –	FCST SWX +24 HR: 09/0100Z DAYLIGHT SIDE FCST SWX +24 HR: 09/0100Z HNH HSH W18000 — W09000 ABV FL350 FCST SWX +24 HR: 09/0100Z HNH HSH E18000-W18000 NO SWX EXP NOT AVBL

			Wnnn(nn) or Ennn(nn) and/or ABV FLnnn or FLnnn–nnn and/ or 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 NO SWX EXP or NOT AVBL	
13	Remarks (M)	Remarks, as necessary	RMK: Free text up to 256 characters or NIL	RMK: SWX EVENT HAS CEASED RMK: WWW.SPACEWEATHER PROVIDER.GOV RMK: NIL
14	Next advisory (M)	Year, month, day and time in UTC	NXT ADVISORY: nnnnnnnn/nnnnZ or NO FURTHER ADVISORIES or	NXT ADVISORY: 20161108/0700Z NO FURTHER ADVISORIES 20210726/1800Z

			WILL BE ISSUED BY	WILL BE ISSUED BY

Notes.

—

1. Used only when the message issued to indicate that a test or an exercise is taking place. When the word "TEST" or the abbreviation "EXER" is included, the message may contain information that maynot be used operationally or will otherwise end immediately after the word "TEST".

2. Ficticious location.

3 One or more effects with the same intensity may be combined.

4. One or more latitude ranges may be included in the space weather advisory information

Example A2-3: Space weather advisory message (GNSS and HF COM effects)

SWX ADVISORY	
DTG:	20161108/0100Z
SWXC:	DONLON*
SWX EFFECT:	HF COM MOD AND GNSS MOD
ADVISORY NR:	2016/2
NR RPLC :	2016/1
OBS SWX:	20161108/0100Z HNH HSH E18000 – W18000
FCST SWX +12 HR:	20161108/1300Z HNH HSH E18000 – W18000
FCST SWX +18 HR:	20161108/1900Z HNH HSH E18000 – W18000

FCST SWX +24 HR:	20161109/0100Z NO SWX EXP
RMK:	LOW LVL GEOMAGNETIC STORMING CAUSING INCREASED AURORAL ACT AND SUBSEQUENT MOD DEGRADATION OF GNSS AND HF COM AVBL IN THE AURORAL ZONE. THIS STORMING EXP TO SUBSIDE IN THE FCST PERIOD. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY:	NO FURTHER ADVISORIES

* Fictitious location

Example A2-4: Space weather advisory message (RADIATION effects)

SWX ADVISORY	
DTG:	20161108/0000Z
SWXC:	DONLON*
SWX EFFECT:	RADIATION MOD
ADVISORY NR:	2016/2
NR RPLC :	2016/1
FCST SWX:	20161108/0100Z HNH HSH E18000 – W18000 ABV FL350
FCST SWX +6 HR:	20121108/0700Z HNH HSH E18000 – W18000 ABV FL350

FCST SWX +12 HR:	20161108/1300Z HNH HSH E18000 – W18000 ABV FL350
FCST SWX +18 HR:	20161108/1900Z HNH HSH E18000 – W18000 ABV FL350
FCST SWX +24 HR:	20161109/0100Z NO SWX EXP
RMK:	RADIATION LVL EXCEEDED 100 PCT OF BACKGROUND LVL AT FL350 AND ABV. THE CURRENT EVENT HAS PEAKED AND LVL SLW RTN TO BACKGROUND LVL. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY:	NO FURTHER ADVISORIES

* Fictitious location

Example A2-5: Space weather advisory message (HF COM effects)

SWX ADVISORY	
DTG:	20161108/0100Z
SWXC:	DONLON*
SWX EFFECT:	HF COM SEV
ADVISORY NR:	2016/1
OBS SWX:	20161108/0100Z DAYLIGHT SIDE
FCST SWX +6 HR:	20121108/0700Z DAYLIGHT SIDE
FCST SWX +12 HR:	20161108/1300Z DAYLIGHT SIDE
FCST SWX +18 HR:	20161108/1900Z DAYLIGHT SIDE

FCST SWX +24 HR:	PERIODIC HF COM ABSORPTION OBS AND LIKELY TO CONT IN THE NEAR TERM. CMPL AND PERIODIC LOSS OF HF ON THE SUNLIT SIDE OF THE EARTH EXP. CONT HF COM DEGRADATION LIKELY OVER THE NXT 7 DAYS. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY:	20161108/0700Z

* Fictitious location

APPENDIX 3: TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL OBSERVATIONS

1. GENERAL PROVISIONS RELATED TO METEOROLOGICAL OBSERVATIONS

1.1 The meteorological instruments used at an aerodrome must be situated in such a way as to supply data which are representative of the area for which the measurements are required.

Compliance Note: Specifications concerning the siting of equipment and installations on operational areas, aimed at reducing the hazard to aircraft to a minimum, are contained in Civil Aviation Aerodrome Regulations.

1.2 Meteorological instruments at aeronautical meteorological stations must be exposed, operated and maintained in accordance with the practices, procedures and specifications promulgated by the World Meteorological Organization.

1.3 The observers at an aerodrome must be located, in so far as is practicable, so as to supply data which are representative of the area for which the observations are required.

1.4 Where automated equipment forms part of an integrated semi-automatic observing system, displays of data which are made available to the local air traffic services units must be a subset of and displayed parallel to those available in the local meteorological service unit. In those displays, each meteorological element must be annotated to identify, as appropriate, the locations for which the element is representative.

2. GENERAL CRITERIA RELATED TO METEOROLOGICAL REPORTS

2.1 Format of meteorological reports

2.1.1. Local routine and special reports must be issued in abbreviated plain language, in accordance with the template shown in Table A3-1.

2.1.2. METAR and SPECI must be issued in accordance with the template shown in Table A32 and disseminated in the METAR and SPECI code forms prescribed by the World Meteorological Organization.

Compliance Note: The METAR and SPECI code forms are contained in WMO Publication No. 306, Manual on Codes, Volume I.1, Part A — Alphanumeric Codes.

2.1.3. METAR and SPECI must be disseminated in IWXXM GML form in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.

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

2.2 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;

b) no cloud of operational significance;

c) no weather of significance to aviation.

Information on visibility, runway visual range, present weather and cloud amount, cloud type and height of cloud base must be replaced in all meteorological reports by the term "CAVOK".

2.3 Criteria for issuance of local special reports and SPECI

2.3.1. The list of criteria for the issuance of local special reports must 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 authority, the appropriate 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 Table A3-1;

e) when noise abatement procedures were 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.

2.3.2 Where required, SPECI must 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:
   (i) moderate or heavy precipitation (including showers thereof)
   (ii) thunderstorm (with precipitation);

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

   (i) thunderstorm (without precipitation);

f) when the amount of a cloud layer below 450 m (1 500 ft) changes:
   (i) from SCT or less to BKN or OVC; or
   (ii) from BKN or OVC to SCT or less.

2.3.3 Where required in accordance with the regulations, SPECI must be issued whenever changes in accordance with the following criteria occur:

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

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

(ii) 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:

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

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

Compliance Note 1. In local special reports, visibility refers to the value(s) to be reported; in SPECI, visibility refers to the value(s) to be reported.

Compliance Note 2. Visibility refers to "prevailing visibility" except in the case where only the lowest visibility is reported.

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:

(i) duststorm

(ii) sandstorm
(iii) funnel cloud (tornado or waterspout);

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

(i) low drifting dust, sand or snow

(ii) blowing dust, sand or snow

(iii) 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:

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

(ii) 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 authority and the operators concerned.

Compliance 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 TAF developed in response to Appendix 5, 1.3.2 j).

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

3. DISSEMINATION OF METEOROLOGICAL REPORTS

3.1 METAR and SPECI

3.1.1. METAR and SPECI must be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services, in accordance with regional air navigation agreement.

3.1.2. METAR and SPECI must be disseminated to other aerodromes in accordance with regional air navigation agreement.

3.1.3. SPECI representing deterioration in conditions must be disseminated immediately after the observation. A SPECI representing a deterioration of one weather element and an improvement in another element must be disseminated immediately after the observation.

3.1.4. A SPECI representing an improvement in conditions may be disseminated only after the improvement has been maintained for 10 minutes; it must be amended before dissemination, if necessary, to indicate the conditions prevailing at the end of that 10-minute period.

3.2 Local routine and special reports

3.2.1. Local routine reports must be transmitted to local air traffic services units and must be made available to the operators and to other users at the aerodrome.

3.2.2. Local special reports must be transmitted to local air traffic services units as soon as the specified conditions occur. However, as agreed between the meteorological authority and the appropriate ATS authority concerned, they need not be issued in respect of:

a) any element for which there is in the local air traffic services unit a display corresponding to the one in the meteorological station, and where arrangements are in force for the use of this display to update information included in local routine and special reports; and

b) Runway visual range, when all changes of one or more steps on the reporting scale in use are being reported to the local air traffic services unit by an observer on the aerodrome.

Local special reports must also be made available to the operators and to other users at the aerodrome.

4. OBSERVING AND REPORTING OF METEOROLOGICAL ELEMENTS

Introductory Note. Selected criteria applicable to meteorological information referred to under 4.1 to 4.8 for inclusion in aerodrome reports are given in tabular form at Attachment C.

4.1 Surface wind

4.1.1. Siting

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

4.1.1.2. Representative surface wind observations must be obtained by the use of sensors appropriately sited. Sensors for surface wind observations for local routine and special reports must 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 must be provided.

Compliance 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.

4.1.2. Displays

4.1.2.1. Surface wind displays relating to each sensor must 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 must relate to the same sensors, and

where separate sensors are required as specified in 4.1.1.2, the displays must be clearly marked to identify the runway and section of runway monitored by each sensor.

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

4.1.3. Averaging

4.1.3.1. The averaging period for surface wind observations is:

a) 2 minutes for local routine and special reports 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 must be used for obtaining mean values; hence, the time interval in these circumstances must be correspondingly reduced.

Compliance 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.

4.1.3.2. The averaging period for measuring variations from the mean wind speed (gusts) reported in accordance with 4.1.5.2 c) is 3 seconds for local routine reports, local special reports, METAR, SPECI and for wind displays used for depicting variations from the mean wind speed (gusts) in air traffic services units.

4.1.4. Accuracy of measurement

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

4.1.5. Reporting

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

4.1.5.2. In local routine reports, local special reports, METAR and SPECI:

a) the units of measurement used for the wind speed must be indicated;
b) variations from the mean wind direction during the past 10 minutes must be reported as follows, if the total variation is 60° or more:
   (i) 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 must be reported as the two extreme directions between which the surface wind has varied;
   (ii) 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 must be reported as variable with no mean wind direction; or
   (iii) when the total variation is 180° or more, the wind direction must be reported as variable with no mean wind direction;

c) variations from the mean wind speed (gusts) during the past 10 minutes must be reported when the maximum wind speed exceeds the mean speed by:
   (i) 2.5 m/s (5 kt) or more in local routine and special reports when noise abatement procedures are applied in accordance with the PANS-ATM (Doc 84444); or
   (ii) 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 must be indicated as calm;

e) when a wind speed of 50 m/s (100 kt) or more is reported, it must 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 may be reported.

Note. — See note under 4.1.3.1.

4.1.5.3. In local routine and special reports:

a) if the surface wind is observed from more than one location along the runway, the locations for which these values are representative must 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 must be given, and the runways to which the values refer must be reported;

c) when variations from the mean wind direction are reported in accordance with 4.1.5.2 b) 2), the two extreme directions between which the surface wind has varied must be reported; and

d) when variations from the mean wind speed (gusts) are reported in accordance with 4.1.5.2 c), they must be reported as the maximum and minimum values of the wind speed attained.

4.1.5.4. In METAR and SPECI, when variations from the mean wind speed (gusts) are reported in accordance with 4.1.5.2 c), the maximum value of the wind speed attained must be reported.

4.2 Visibility

4.2.1. Siting

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

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

4.2.2 Displays

When instrumented systems are used for the measurement of visibility, visibility displays relating to each sensor must 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 must relate to the same sensors, and where separate sensors are required as specified in 4.2.1, the displays must be clearly marked to identify the area, e.g. runway and section of runway, monitored by each sensor.

4.2.3 Averaging

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

a) 1 minute for local routine and special reports 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 may be used for obtaining mean values.

Compliance 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 reports given in 2.3.

4.2.4 Reporting

4.2.4.1 In local routine reports, local special reports, METAR and SPECI, the visibility must 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 the visibility is 5 km or more but less than 10 km; and it must be given as 10 km when the visibility 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 must be rounded down to the nearest lower step in the scale.

Compliance Note: — Specifications concerning the use of CAVOK are given in 2.2.

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

4.2.4.3 In local routine and special reports, 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 Chapter Part VI of this regulations, the values representative of the touchdown zone must 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 must 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 must be reported, and the runways to which the values refer must be indicated.

4.2.4.4 In METAR and SPECI, visibility must be reported as prevailing visibility, as defined in 4.2 of these regulations. 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 must 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 must be reported; and

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

4.3 Runway visual range

4.3.1 Siting

4.3.1.1 Runway visual range must 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.

4.3.1.2 Runway visual range must 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 must 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 must 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 must be decided after considering aeronautical, meteorological and climatological factors such as long runways, swamps and other fog-prone areas.

4.3.2 Instrumented systems

Compliance 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).

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

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

4.3.3 **Display**

4.3.3.1 Where runway visual range is determined by instrumented systems, one display or more, if required, must 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 must be related to the same sensors, and where separate sensors are required as specified in 4.3.1.2, the displays must be clearly marked to identify the runway and section of runway monitored by each sensor.

4.3.3.2 Where runway visual range is determined by human observers, runway visual range must 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 3.2.2 a) or b) apply). The transmission of such reports must normally be completed within 15 seconds after the termination of the observation.

4.3.4 **Averaging**

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

a) 1 minute for local routine and special reports 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 may be used for obtaining mean values.

Compliance 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.

4.3.5 **Runway light intensity**

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

a) for a runway with the lights switched on and the 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 the 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 must be based on the maximum light intensity available on the runway.

Compliance Note: Guidance on the conversion of instrumented readings into runway visual range is given at Attachment D.

4.3.6 **Reporting**

4.3.6.1 In local routine reports, local special reports, METAR and SPECI, the runway visual range must be reported in steps of 25 m when the runway visual range 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 the runway visual range is more

than 800 m. Any observed value which does not fit the reporting scale in use must be rounded down to the nearest lower step in the scale.

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

4.3.6.3 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 must be reported using the abbreviation "ABV" in local routine and special reports 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 must be reported using the abbreviation "BLW" in local routine and special reports and the abbreviation "M" in METAR and SPECI, followed by the minimum value that can be determined by the system.

4.3.6.4 In local routine and special reports:

a) the units of measurement used must be included;

b) if runway visual range is observed from only one location along the runway, i.e. the touchdown zone, it must 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 must be reported first, followed by the values representative of the mid-point and stop-end and the locations for which these values are representative must be indicated; and

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

4.3.6.5 In METAR and SPECI:

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

b) Where there is more than one runway available for landing, touchdown zone runway visual range values may be included for all such runways, up to a maximum of four, and the runways to which the values refer must be indicated.

4.3.6.6 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 must 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 must be indicated by the abbreviation "U" or "D", respectively. In circumstances when actual fluctuations during the 10-minute period show no distinct tendency, this must be indicated using the abbreviation "N". When indications of tendency are not available, no abbreviations may be included.

4.4 Present weather

4.4.1 Siting

When instrumented systems are used for observing present weather phenomena listed under 4.4.2.3, and 4.4.2.4, representative information must be obtained by the use of sensors appropriately sited.

4.4.2 Reporting

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

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

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

a) Precipitation

Drizzle	*DZ*
Rain	*RA*
Hail *- reported when diameter of largest hailstones is 5 mm or more*	*GR*
Small hail and/or snow pellets *- reported when diameter of largest hailstones is less than 5 mm;*	*GS*

b) Obscurations (hydrometeors)

Fog *- reported when visibility is less than 1 000 m, except when qualified by "MI", "BC", "PR" or "VC" (see 4.4.2.6 and 4.4.2.7)*	*FG*
Mist *- Reported when visibility is at least 1 000 m but not more than 5 000 m;*	*BR*

c) Obscurations (lithometeors)

- The following may 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 4.4.2.6) 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*

4.4.2.4 In automated local routine reports, local special reports, METAR and SPECI, in addition to the precipitation types listed under 4.4.2.3 a), the abbreviation UP must be used for unidentified precipitation when the type of precipitation cannot be identified by the automatic observing system.

4.4.2.5 In local routine reports, local special reports, METAR and SPECI, the following characteristics of present weather phenomena, as necessary, must 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 A3-1 and A3-2. 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" must be used without qualification.

Freezing *FZ*

— Super cooled water droplets or precipitation, used with types of present weather phenomena in accordance with the templates shown in Tables A3-1 and A3-2.

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).

4.4.2.6 In local routine reports, local special reports, METAR and SPECI, the following characteristics of present weather phenomena, as necessary, must 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 A3-1 and A3-2. Showers observed in the vicinity of the aerodrome (see 4.4.2.7) must be reported as "VCSH" without qualification regarding type or intensity of Precipitation.

Blowing *BL*
— Used in accordance with the templates shown in Tables A3-1 and A3-2 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 A3-1 and A3-2 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

Patches *BC*
— Fog patches randomly covering the aerodrome.

Partial *PR*
A substantial part of the aerodrome covered by fog while the remainder is clear.

4.4.2.7 In automated local routine reports, local special reports, METAR and SPECI when showers (SH) referred to in 4.4.2.6 cannot be determined based upon a method that takes account of the presence of convective cloud, the precipitation maynot be characterized by SH

4.4.2.8 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 must be indicated as follows:

	(local routine and special reports)	(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 A3-1 and A3-2. Light intensity may 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 Table A3-2 when not reported under 4.4.2.5 and 4.4.2.6.

4.4.2.9 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 4.4.2.3, and 4.4.2.4 must be used, as necessary, together with an indication, where appropriate, of the characteristics given in 4.4.2.5 and 4.4.2.6 and intensity or proximity to the aerodrome given in 4.4.2.8, 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, must 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 must 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 must 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.

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

4.5 Clouds

4.5.1 Siting

4.5.1.1 When instrumented systems are used for the measurement of the cloud amount and the height of cloud base, representative observations must be obtained by the use of sensors appropriately sited. For local routine and special reports, in the case of aerodromes with precision approach runways, sensors for cloud amount and height of cloud base must 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 must be installed at a distance of less than 1 200 m before the landing threshold.

4.5.2 Display

When automated equipment is used for the measurement of the height of cloud base, height of cloud base display(s) must 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 must relate to the same sensor, and where separate sensors are required as specified in 4.5.1, the displays must clearly identify the area monitored by each sensor.

4.5.3. Reference level

The height of cloud base must 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 must be made in order that the height of cloud bases reported to arriving aircraft refer to the

threshold elevation. In the case of reports from offshore structures, the height of cloud base must be given above mean sea level.

4.5.4. **Reporting**

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

4.5.4.2. At aerodromes where low-visibility procedures are established for approach and landing, as agreed between the meteorological authority and the appropriate ATS authority concerned, in local routine and special reports the height of cloud base must 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).

4.5.4.3. In local routine reports, local special reports, METAR and SPECI:

a) cloud amount must 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 must be indicated as “CB” and “TCU”, respectively;

c) the vertical visibility must 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” must be used;

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

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

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

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

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

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

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

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

4.5.4.4 Any observed value in 4.5.4.1, 4.5.4.2 and 4.5.4.3 c) which does not fit the reporting scale in use must be rounded down to the nearest lower step in the scale.

4.5.4.5 In local routine and special reports:

a) the units of measurement used for the height of cloud base and vertical visibility must 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 must be reported and the runways to which the values refer must be indicated.

4.5.4.6 In automated local routine, 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 must be replaced by "///";

b) when no clouds are detected by the automatic observing system, it must 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 must be replaced by "///"; and

d) the vertical visibility must 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/sensor.

4.6 Air temperature and dew-point temperature

4.6.1 Display

4.6.1.1. When automated equipment is used for the measurement of air temperature and dew point temperature, air temperature and dew-point temperature displays must 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 must relate to the same sensors.

4.6.2 Reporting

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

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

4.7 Atmospheric pressure

4.7.1 Display

4.7.1.1. When automated equipment is used for the measurement of atmospheric pressure, QNH and, if required in accordance with 4.7.3.2 b), QFE displays relating to the barometer must 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 4.7.3.2 d), the displays must be clearly marked to identify the runway to which the QFE value displayed refers.

4.7.2 Reference level

4.7.2.1 The reference level for the computation of QFE is 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, must refer to the relevant threshold elevation.

4.7.3 Reporting

4.7.3.1. For local routine reports, local special reports, METAR and SPECI, QNH and QFE must 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 must be rounded down to the nearest lower whole hectopascal.

4.7.3.2. In local routine and special reports:

a) QNH must be included;

b) QFE must be included if required by users or, as agreed between the meteorological authority, air traffic services authorities and the operators concerned, on a regular basis;

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

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

4.7.3.3. In METAR and SPECI, only QNH values must be included.

4.8 Supplementary information

4.8.1 Reporting

4.8.1.1 In local routine reports, local special reports, METAR and SPECI, the following recent weather phenomena, i.e. weather phenomena observed at the aerodrome during the period since the last issued routine report or last hour, whichever is the shorter, but not at the time of observation, must be reported, up to a maximum of three groups, in accordance with the templates shown in Tables A3-1 and A3-2, in the supplementary information:

— freezing precipitation
—moderate or heavy precipitation (including showers thereof)
— blowing snow
—duststorm, sandstorm
—thunderstorm
— funnel cloud (tornado or water spout)
—volcanic ash

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

4.8.1.2 In local routine and special reports, the following significant meteorological conditions, or combinations thereof, must 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 water spout)	FC

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

4.8.1.3 In automated local routine reports, local special reports, METAR and SPECI, in addition to the recent weather phenomena listed under 4.8.1.1, recent unknown precipitation must be reported in accordance with the template shown in Table A3-2 when the type of precipitation cannot be identified by the automatic observing system.

Compliance Note: The meteorological authority, in consultation with users, may agree not to provide recent weather information where SPECI are issued.

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

Note. The local circumstances referred to in 4.8.1.4 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.

4.8.1.5 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 may be included in the supplementary information, in accordance with regional air navigation agreement.

Compliance 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.

Table A3-1. 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.

Compliance Note 1. The ranges and resolutions for the numerical elements included in the local routine and special reports are shown in Table A3-4 of this Appendix.

Compliance 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).

Element as specified in 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 CALM (WIND VRB2KT) 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
	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	CALM	
	Wind speed (M)	[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]	MID			
	Wind direction (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	CALM	
	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			

Element as specified in Chapter 4	Detailed content	Template(s)			Examples
	Wind direction (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ or VRB	C A L M	MAX28 MNM10 END 250/14KT)
	Wind speed (O)[3]	[ABV]nn[n][n]MPS (or [ABV]nn[n]KT)			
	Significant speed variations (C)[4]	MAX[ABV]nn[n] MNMnn[n]			
	Significant directional variations (C)[4]	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)[5]	RWY nn[L] or RWY nn[C] or RWY nn[R]			
	Runway section (O)[5]	TDZ			
	Visibility (M)	n[n][n][n]M or n[n]KM			
	Runway section (O)[5]	MID			
	Visibility (O)[5]	n[n][n][n]M or n[n]KM			
	Runway section (O)[5]	END			
	Visibility (O)[5]	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	—		
	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[12] 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 (')[13]		MOD RA HVY TSRA HVY DZ FBL SN HZ FG VA MIFG HVY TSRASN FBL SNRA FBL DZ FG HVY SHSN BLSN HVY TSUP (')

Element as specified in Chapter 4	*Detailed content*	*Template(s)*				*Examples*
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)[9]	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]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 REFZRA CB IN CLIMB-OUT RETSRA
	Location of the phenomena (C)[9]	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]				
	Recent weather (C)[9,10]	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[13] *or* REFZUP[13] *or* RETSUP[13] *or* RESHUP[13] *or* REVA *or* RETS				
Trend forecast (O)[11]	Name of the element (M)	TREND				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
	Change indicator (M)[17]	NOSIG	BECMG *or* TEMPO			
	Period of change (C)[9]		FMnnnn *and/or* TLnnnn *or* ATnnnn			
	Wind (C)[9]	nnn[ABV]n[n][n]MPS [MAX[ABV]nn[n]] [*or* nnn[ABV]n[n]KT [MAX[ABV]nn]]				
	Visibility (C)[9]	VIS n[n][n][n]M *or* VIS n[n]KM			CAVOK	
	Weather phenomenon: intensity (C)[9]	FBL *or* MOD *or* HVY	—	NSW		

Element as specified in Chapter 4	Detailed content	Template(s)				Examples
	Weather phenomenon: characteristics and type (C)[4, 10, 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			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)
	Name of the element (C)[4]	CLD				
	Cloud amount and vertical visibility (C)[4,14]	FEW or SCT or BKN or OVC	OBSC	NSC		
	Cloud type (C)[4,14]	CB or TCU	—			
	Height of cloud base or the value of vertical visibility (C)[4,14]	n[n][n][n] M (or 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 4.1.5.2 c).
5. To be included in accordance with 4.1.5.2 b) 1).
6. To be included if visibility or runway visual range < 1 500 m.
7. To be included in accordance with 4.3.6.4 d).
8. To be included in accordance with 4.3.6.4 c).
9. To be included whenever applicable.
10. One or more, up to a maximum of three groups, in accordance with 4.4.2.8 a), 4.8.1.1 and Appendix 5, 2.2.4.3.
11. Precipitation types listed under 4.4.2.3 a) may be combined in accordance with 4.4.2.8 c) and Appendix 5, 2.2.4.1. Only moderate or heavy precipitation to be indicated in trend forecasts in accordance with Appendix 5, 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 4.5.4.3 e).
15. Abbreviated plain language may be used in accordance with 4.8.1.2.
16. To be included
17. Number of change indicators to be kept to a minimum normally not exceeding three groups.

Table A3-2. Template for METAR and SPECI

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

Compliance Note 1. The ranges and resolutions for the numerical elements included in METAR and SPECI are shown in Table A3-5 of this appendix.

Compliance 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).

Element	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	AUTO *or* NIL	AUTO NIL

automated or missing report (C)[2]	identifier (C)				
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) 12003G09MPS (12006G18KT) 24008G14MPS (24016G28KT) 02005MPS 350V070 (02010KT 350V070)	
	Wind speed (M)	[P]nn[n]A *or* //[12]			
	Significant speed variations (C)[3]	G[P]nn[n]			
	Units of measurement (M)	MPS (*or* KT)			
	Significant directional variations (C)[4]	nnnVnnn			
Visibility (M)	Prevailing *or* minimum visibility (M)[5]	nnnn *or* ////[12]	C A V	0350 //// CAVOK 7000	

	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]			O K	9999 0800 2000 1200NW 6000 2800E 6000 2800
Runway visual range (C)[7]	Name of the element (M)	R				R32/0400 R12R/1700
	Runway (M)	nn[L]/*or* nn[C]/*or* nn[R]/				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*	FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* TS *or* BCFG *or*	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 //

		SHGS *or* SHRA *or* SHSN *or* SHUP[12] *or* TSGR *or* TSGS *or* TSRA *or* TSSN *or* TSUP[12] *or* UP[12]	BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG *or* //[12]			
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*	VVnnn *or* VV///[12]	NSC *or* NCD[12]		FEW015 VV005 OVC030 VV/// NSC SCT010 OVC020 BKN/// ///015

		///nnn[12] *or* //////[12]				
	Cloud type (C)[2]	CB *or* TCU *or* ///[12]	—			BKN009TCU NCD SCT008 BKN025CB BKN025/// ///CB
Air and dew-point temperature (M)	Air and dew-point temperature (M)	[M]nn/[M]nn				17/10 02/M08 M01/M10
Pressure values (M)	Name of the element (M)	Q				Q0995 Q1009 Q1022 Q0987
	QNH (M)	nnnn				
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*				REFZRA RETSRA

			REFZUP[12] *or* RETSUP[12] *or* RESHUP[12]			
	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[M]nn/Hn[n][n]			W15/S2 W12/H75
	State of the runway (C)[16]	Runway designator (M)	R nn[L]/ *or* Rnn[C]/ *or* Rnn[R]/			
		Runway deposits (M)	n *or* /	CLRD//	R/SNOCLO	
		Extent of runway contamination (M)	n *or* /			R99/421594 R/SNOCLO R14L/CLRD//
		Depth of deposit (M)	nn *or* //			
		Friction coefficient *or* braking action (M)	nn *or* //			

Trend forecast (O)[17]	Change indicator (M)[18]	NOSIG	BECMG or TEMPO					NOSIG BECMG FEW020 TEMPO 25018G25MPS (TEMPO 25036G50KT) BECMG FM1030 TL1130 CAVOK BECMG TL1700 0800 FG BECMG AT1800 9000 NSW BECMG FM1900 0500 +SNRA 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
	Period of change (C)[2]		FMnnnn and/or TLnnnn or ATnnnn					
	Wind (C)[2]		nnn[P]nn[n][G[P]nn[n]]MPS (or nnn[P]nn[G[P]nn]KT)					
	Prevailing visibility (C)[2]		nnnn				CAVOK	
	Weather phenomenon: intensity (C)[10]		– or +	—	NSW			
	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	FG or BR or SA or DU or HZ or FU or VA or SQ or				

			SHGR or SHGS or SHRA or SHSN or TSGR or TSGS or TSRA or TSSN	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 amount and height of cloud base or vertical visibility (C)[2, 14]		FEWnnn or SCTnnn or BKNnnn or OVCnnn VVnnn	VVnnn or VV///	NSC		
	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 4.1.5.2 c).
4. To be included in accordance with 4.1.5.2 b) 1).
5. To be included in accordance with 4.2.4.4 b).
6. To be included in accordance with 4.2.4.4 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 4.3.6.5 b).
8. To be included in accordance with 4.3.6.6.
9. One or more, up to a maximum of three groups, in accordance with 4.4.2.8 a), 4.8.1.1 and Appendix 5, 2.2.4.1.
10. To be included whenever applicable; no qualifier for moderate intensity in accordance with 4.4.2.7.
11. Precipitation types listed under 4.4.2.3 a) may be combined in accordance with 4.4.2.8 c). Only moderate or heavy precipitation to be indicated in trend forecasts.
12. When a meteorological element is temporarily missing, or its value considered temporarily as incorrect, it is replaced by "/" for each digit of the abbreviation of the text message and indicated as missing for its 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 4.5.4.3 e).
15. To be included in accordance with 4.8.1.5 a).
16. To be included in accordance with Chapter 6, 6.3.2. b).
17. Number of change indicators to be kept to a minimum in accordance with Appendix 5, 2.2.1, normally not exceeding three groups.
18. Number of change indicators to be kept to a minimum, normally not exceeding three groups.
19. When a meteorological element is temporarily missing, or its value considered temporarily as incorrect, it is replaced by "/" for each digit of the abbreviation of the text message and indicated as missing for its IWXXM version.

Table A3-3. Use of change indicators in trend forecasts

Change indicator	*Time indicator and period*	*Meaning*	
NOSIG	—	no significant changes are forecast	
BECMG	FMnnnn TLnnnn	the change is forecast to	commence at nnnn UTC and be completed by nnnn 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	FMnnnn TLnnnn	temporary fluctuations are forecast to	commence at nnnn UTC and cease by nnnn 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 A3-4. Ranges and resolutions for the numerical elements included in local reports

Runway:		01 – 36	1
Wind direction:	°true	010 – 360	10
Wind speed:	MPS KT	1 – 99* 1 – 199*	1 1
Visibility:	M M KM KM	0 – 750 800 – 4 900 5 – 9 10 –	50 100 1 0 (fixed value: 10 KM)
Runway visual range:	M M M	0 – 375 400 – 750 800 – 2 000	25 50 100
Vertical visibility:	M M FT FT	0 – 75** 90 – 600 0 – 250** 300 – 2 000	15 30 50 100
Clouds: height of cloud base:	M M FT FT	0 – 75** 90 – 3 000 0 – 250** 300 – 10 000	15 30 50 100
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 4.5.4.3; otherwise a resolution of 30 m (100 ft) is to be used.

Tables A3-5. Ranges and resolutions for the numerical elements included in METAR and SPECI

Element as specified in 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 A3-1. 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 A3-2. 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 A3-3. 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 4: TECHNICAL SPECIFICATIONS RELATED TO AIRCRAFT OBSERVATIONS AND REPORTS

1. CONTENTS OF AIR-REPORTS

1.1. Routine air-reports by air-ground data link

1.1.1. When air-ground data link is used and Automatic Dependent Surveillance – contract (ADS-C) or SSR Mode S is being applied, the elements contained in routine air-reports must 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)

Compliance 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), and the SSR Mode S message format is specified in Part 171 of the NAM-CARs.

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 must 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)

Compliance 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 communication (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 Civil Aviation CNS Regulations

1.2. Special air-reports by air-ground data link

When air-ground data link is used, the elements contained in special air-reports must 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 Table A4-1)

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

Compliance 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 4.2.

1.3 Special air-reports by voice communications

When voice communications are used, the elements contained in special air-reports must 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 Table A4-1.

Compliance Note 1. Air-reports are considered routine by default. The message type designator for special air-reports is specified in the Manual of Air Traffic Services.

Compliance 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 4.2.

2. CRITERIA FOR REPORTING

2.1. General

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

2.2. **Wind direction**

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

2.3. **Wind speed**

The wind speed must 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 must be indicated.

2.4. **Wind quality flag**

The wind quality flag must 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.

2.5. **Air temperature**

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

2.6. **Turbulence**

The turbulence must be reported in terms of the Eddy Dissipation Rate (EDR).

Compliance 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 (i.e. altitude, airspeed and weight).

2.6.1. **Routine air-reports**

The turbulence must be reported during the en-route phase of the flight and must 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, must be observed. The average and peak values must be reported Ain terms of EDR. The time of occurrence of the peak value must be reported as indicated in Table A4-2. The turbulence must be reported during the climb-out phase for the first 10 minutes of the flight and must refer to the 30-second period immediately preceding the observation. The peak value of turbulence must be observed.

2.6.2. **Interpretation of the turbulence report**

Turbulence must be considered:

a) severe when the peak value of EDR equals or exceeds 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 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.

2.6.3. **Special air-reports**

Special air-reports on turbulence must 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 must be made with reference to the 1-minute period immediately preceding the observation. Both the average and peak value of turbulence must be observed. The average and peak values must be reported in terms of EDR. Special air-reports must be issued every minute until such time as the peak values of EDR fall below 0.20.

2.7. **Humidity**

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

Compliance Note: The ranges and resolutions for the meteorological elements included in air-reports are shown in Table A4-3.

3. EXCHANGE OF AIR-REPORTS

3.1. Responsibilities of the meteorological watch offices

3.1.1. The meteorological watch office must transmit without delay the special air-reports received by voice communications to the WAFCs and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services.

3.1.2. The meteorological watch office must transmit without delay special air-reports of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud received to the associated VAACs.

3.1.3. When a special air-report is received at the meteorological watch office but the forecaster considers that the phenomenon causing the report is not expected to persist and, therefore, does not warrant issuance of a SIGMET, the special air-report must be disseminated in the same way that SIGMET messages are disseminated to meteorological watch offices, WAFCs, and other meteorological offices in accordance with regional air navigation agreement.

Note. The template used for special air-reports which are uplinked to aircraft in flight is in Appendix 6, Table A6-1B.

3.2. Responsibilities of world area forecast centres

Air-reports received at WAFCs must be further disseminated as basic meteorological data.

Compliance Note: The dissemination of basic meteorological data is normally carried out on the WMO global telecommunication system.

3.3. Supplementary dissemination of air-reports

Where supplementary dissemination of air-reports is required to satisfy special aeronautical or meteorological requirements, such dissemination must be arranged and agreed between the meteorological authorities concerned.

3.4. Format of air-reports

Air-reports must be exchanged in the format in which they are received.

4. SPECIFIC PROVISIONS RELATED TO REPORTING WIND SHEAR AND VOLCANIC ASH

4.1. Reporting of wind shear

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

4.1.2. Where wind shear conditions in the climb-out or approach phases of flight were reported or forecast but not encountered, the pilot-in-command must 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.

4.2. Post-flight reporting of volcanic activity

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

4.2.1. On arrival of a flight at an aerodrome, the completed report of volcanic activity must 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 must be dealt with in accordance with local arrangements made by the meteorological authority and the operator.

4.2.2. The completed report of volcanic activity received by an aerodrome meteorological office must 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.

Table A4-1. Template for the special air-report (downlink)

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional; included whenever available.

Compliance Note: — Message to be prompted by the pilot-in-command. Currently only the condition "SEV TURB" can be automated (see 2.6.3).

Element	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

Element	Detailed content	Template(s)	Examples
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)	40MPS (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			
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	SEV TURB EDR076 VA CLD FL050/100

Element	Detailed content	Template(s)	Examples
		HVY DS[4] or HVY SS[4] or VA CLD [FL nnn/nnn] or VA[5] [MT nnnnnnnnnnnnnnnnnnn] or MOD TURB [EDRnnn][2] or MOD ICE	

Note. -

1. *The time of occurrence to be reported in accordance with Table A4-2*
2. *The turbulence to be reported in accordance with 2.6.3*
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 A4-2. 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 A4-3. Ranges and resolutions for the meteorological elements included in air reports

Element as specified in 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 (time of occurrence)*	$m^{2/3} s^{-1}$	0– 2 0– 15	0.01 1
Turbulence: special air-report:	$m^{2/3} 5^{-1}$	0– 2	0.01
Humidity:	%	0-100	1
* Non-dimensional			

APPENDIX 5: TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

1. CRITERIA RELATED TO TAF

1.1. TAF format

1.1.1. TAF must be issued in accordance with the template shown in Table A5-1 and disseminated in the TAF code form prescribed by the World Meteorological Organization.

Compliance Note: The TAF code form is contained in WMO Publication No. 306, Manual on Codes, Volume I.1, Part A — Alphanumeric Codes.

1.1.2. TAF must be disseminated in digital form, in addition to the dissemination of the TAF in accordance with 1.1.1. TAF must be disseminated in IWXXM GML form in addition to the dissemination of the TAF in accordance with 1.1.1.

1.2. Inclusion of meteorological elements in TAF

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

1.2.1. Surface wind

In forecasting surface wind, the expected prevailing direction must 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 must 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 must 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 must be indicated. When a wind speed of 50 M/S (100 KT) or more is forecast, it must be indicated to be more than 49 M/S (99 KT).

1.2.2. Visibility

When the visibility is forecast to be less than 800 m, it must 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 must be expressed as 10 km, except when conditions of CAVOK are forecast to apply. The prevailing visibility must be forecast. When visibility is forecast to vary in different directions and the prevailing visibility cannot be forecast, the lowest forecast visibility must be given.

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, must be forecast if they are expected to occur at the aerodrome:

—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)

—other weather phenomena given in Appendix 5, as agreed between the meteorological authority, the appropriate ATS authority and operators concerned.

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

1.2.4. Cloud

Cloud amount must 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 must 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 must 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 must be limited to cloud of operational significance; when no cloud of operational significance is forecast, and "CAVOK" is not appropriate, the abbreviation "NSC" must be used.

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 must be given, together with their corresponding times of occurrence.

1.3. Use of change groups

Compliance Note: Guidance on the use of change and time indicators in TAF is given in Table A5-2.

1.3.1 The criteria used for the inclusion of change groups in TAF or for the amendment of TAF may 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 thereof)

—thunderstorm

—duststorm

—sandstorm.

1.3.2 The criteria used for the inclusion of change groups in TAF or for the amendment of TAF must 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 must be established by the meteorological authority in consultation with the appropriate ATS authority and operators concerned, taking into account changes in the wind which would:
   (i) require a change in runway(s) in use; and
   (ii) 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:
   (i) 150, 350, 600, 800, 1 500 or 3 000 m; or
   (ii) 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:
   (i) low drifting dust, sand or snow
   (ii) blowing dust, sand or snow
   (iii) squall
   (iv) 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:
   (i) 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); or
   (ii) 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:
   (i) from NSC, FEW or SCT to BKN or OVC; or
   (ii) 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 authority and the operators concerned.

Compliance 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 Appendix 3.

1.3.3. When a change in any of the elements given in Part VIII is required to be indicated in accordance with the criteria given in 1.3.2, the change indicators "BECMG" or "TEMPO" must be used followed by the time period during which the change is expected to occur. The time period must be indicated as the beginning and end of the period in whole hours UTC. Only those elements for which a significant change is expected may 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 must be indicated.

1.3.4. The change indicator "BECMG" and the associated time group must 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 must normally not exceed 2 hours but in any case must not exceed 4 hours.

1.3.5. The change indicator "TEMPO" and the associated time group must 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" must be used in accordance with 1.3.4 or the validity period must be subdivided in accordance with 1.3.6.

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 must 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" must be self-contained and all forecast conditions given before the abbreviation must be superseded by those following the abbreviation.

1.4. Use of probability groups

1.4.1. The probability of occurrence of an alternative value of a forecast element or elements must 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 must 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 must 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 must 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, must not be considered a probability but instead must 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 may not be used to qualify the change indicator "BECMG" nor the time indicator "FM".

1.5. Numbers of change and probability groups

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

1.6. Dissemination of TAF

TAF and amendments thereto must be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services, in accordance with regional air navigation agreement.

2. CRITERIA RELATED TO TREND FORECASTS

2.1. Format of trend forecasts

Trend forecasts must be issued in accordance with the templates shown in Appendix 5, Tables A3-1 and A3-2. The units and scales used in the trend forecast must be the same as those used in the report to which it is appended.

Compliance Note: — Examples of trend forecasts are given in Appendix 3.

2.2. Inclusion of meteorological elements in trend forecasts

2.2.1. General provisions

The trend forecast must indicate significant changes in respect of one or more of the elements: surface wind, visibility, weather and clouds. Only those elements may 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, must be indicated. In the case of a significant change in visibility, the phenomenon causing the reduction of visibility must also be indicated. When no change is expected to occur, this must be indicated by the term “NOSIG”.

2.2.2. **Surface wind**

The trend forecast must 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 must be established by the meteorological authority in consultation with the appropriate ATS authority and operators concerned, taking into account changes in the wind which would:
   (i) require a change in runway(s) in use; and

   (ii) Indicate that the runway tailwind and crosswind components will change through values representing the main operating limits for typical aircraft operating at the aerodrome.

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 must indicate the change. When significant numbers of flights are conducted in accordance with the visual flight rules, the forecast must additionally indicate changes to or passing through 5 000 m.

Compliance Note: In trend forecasts appended to local routine and special reports, 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.

2.2.4. **Weather phenomena**

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

—moderate or heavy precipitation (including showers thereof)

—thunderstorm (with precipitation)

—duststorm

—sandstorm

—other weather phenomena, as agreed by the meteorological authority with the ATS authority and operators concerned.

2.2.4.2.The trend forecast must indicate the expected onset or cessation of one or more of the following weather phenomena or combinations thereof:

—low drifting dust, sand or snow

— blowing dust, sand or snow

—thunderstorm (without precipitation)

— squall

— funnel cloud (tornado or waterspout).

2.2.4.3.The total number of phenomena reported in 2.2.4.1 and 2.2.4.2 may not exceed three.

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

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 must 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 must 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" must be used.

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 must indicate the change.

2.2.7. **Additional criteria**

Criteria for the indication of changes based on local aerodrome operating minima, additional to those specified in 2.2.2 to 2.2.6, must be used as agreed between the meteorological authority and the operator concerned.

2.3. Use of change groups

Compliance Note: — Guidance on the use of change indicators in trend forecasts is given in Appendix 5, *Table A3-3.*

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

2.3.2. The change indicator "BECMG" must 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 must 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 must 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 must be omitted and only "TL" and its associated time group may 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 must be omitted and only "FM" and its associated time group may 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 must 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 must be omitted and the change indicator "BECMG" must be used alone.

2.3.3. The change indicator "TEMPO" must 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 must 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 must 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 must be omitted and only "TL" and its associated time group may 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 must be omitted and only "FM" and its associated time group may 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 must be omitted and the change indicator "TEMPO" must be used alone.

2.4. Use of the probability indicator

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

3. CRITERIA RELATED TO FORECASTS FOR TAKE-OFF

3.1. Format of forecasts for take-off

The format of the forecast must be as agreed between the meteorological authority and the operator concerned. The order of the elements and the terminology, units and scales used in forecasts for take-off must be the same as those used in reports for the same aerodrome.

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 must be agreed between the meteorological authority and the operators concerned. The criteria must be consistent with the corresponding criteria for special reports established for the aerodrome in accordance with Appendix 3.

4. CRITERIA RELATED TO AREA FORECASTS FOR LOW-LEVEL FLIGHTS

4.1. Format and content of GAMET area forecasts

When prepared in GAMET format, area forecasts must 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. The content and order of elements in a GAMET area forecast, when prepared, must be in accordance with the template shown in Table A5-3. Additional elements in Section II must be included in accordance with regional air navigation agreement. Elements which are already covered by a SIGMET message must be omitted from GAMET area forecasts.

4.2. Amendments to GAMET area forecasts

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 must be issued, amending only the weather element concerned.

Compliance 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 Appendix 6.

4.3. Content of area forecasts for low-level flights in chart form

4.3.1. When chart form is used for area forecasts for low-level flights, the forecast of upper wind and upper-air temperature must 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.

4.3.2. When chart form is used for area forecasts for low-level flights, the forecast of SIGWX phenomena must 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 must include the following items:

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

b) the elements in area forecasts for low-level flights as given in Table A5-3 except elements concerning:
   (i) upper winds and temperatures; and
   (ii) 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 3.

4.4. Exchange and dissemination of area forecasts for low-level flights

4.4.1 Area forecasts for low-level flights prepared in support of the issuance of AIRMET information must be exchanged between aerodrome meteorological offices and/or meteorological watch offices responsible for the issuance of flight documentation for low-level flights in the flight information regions concerned.

4.4.2 Area forecasts for low-level flights, in support of international air navigation, prepared in accordance with regional air navigation agreement and in support of the issuance of AIRMET information may be disseminated to aeronautical fixed service Internet-based services.

Table A5-1. Template for TAF

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

Compliance Note 1. The ranges and resolutions for the numerical elements included in TAF are shown in Table A5-4 of this Appendix.

Compliance 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).

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			1606/1624 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)
	Wind speed (M)	[P]nn[n]			00000MPS (00000KT) 140P49MPS (140P99KT)
	Significant speed variations (C)[3]	G[P]nn[n]			12003G09MPS (12006G18KT) 24008G14MPS (24016G28KT)
	Units of measurement (M)	MPS (*or* KT)			
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* +	—		
	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*	FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or*		RA HZ +TSRA FG –FZDZ PRFG +TSRASN SNRA FG

		SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN		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 VV005 OVC020 VV/// NSC SCT005 BKN012 SCT008 BKN025CB
	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				
	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)				TEMPO 0815/0818 25017G25MPS (TEMPO 0815/0818 25034G50KT) TEMPO 2212/2214 17006G13MPS 1000 TSRA SCT010CB BKN020 (TEMPO 2212/2214 17012G26KT 1000 TSRA SCT010CB BKN020)
	Prevailing visibility (C)[4]	nnnn			CAVOK	BECMG 3010/3011 00000MPS 2400 OVC010 (BECMG 3010/3011 00000KT 2400 OVC010) PROB30 1412/1414 0800 FG
	Weather phenomenon: intensity (C)[5]	– *or* +	—	NSW		BECMG 1412/1414 RA TEMPO 2503/2504 FZRA TEMPO 0612/0615 BLSN PROB40 TEMPO 2923/3001 0500 FG
	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* SHGR *or* SHGS *or*	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*			

		SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG			
	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
	Cloud type (C)[4]	CB *or* TCU	—			BECMG 2306/2308 SCT015CB BKN020

Notes. —

1. Fictitious location.
2. To be used in accordance with 1.2.1.
3. To be included in accordance with 1.2.1.
4. To be included whenever applicable.
5. One or more, up to a maximum of three, groups in accordance with 1.2.3.
6. To be included whenever applicable in accordance with 1.2.3. No qualifier for *moderate* intensity.
7. Weather phenomena to be included in accordance with 1.2.3.
8. Up to four cloud layers in accordance with 1.2.4.
9. To be included in accordance with 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 1.3, 1.4 and 1.5.
11. To be used with FM only.

Table A5-2. Use of change and time indication in TAF

Change or time indicator		*Time period*	*Meaning*	
FM		ndndhhhmhmnm	used to indicate a significant change in most weather elements occurring at ndnd day, hhhm hours and nmnm 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		ndnd1hh1hm1nm1nd2nd2hh2hm2	the change is forecast to commence at nd1nd1 day and nh1nh1 hours (UTC) and be completed by nd2nd2 day and nh2nh2 hours (UTC); only those elements for which a change is forecast are to be given following "BECMG"; the time period nd1nd1nh1nh1nd2nd2nh2nh2 should normally be less than 2 hours and in any case should not exceed 4 hours	
TEMPO		nd1nd1nh1nh1nd2nd2nh2nh2	temporary fluctuations are forecast to commence at nd1nd1 day and nh1nh1 hours (UTC) and cease by nd2nd2 day and nh2nh2 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 nd1nd1nh1nh1nd2nd2nh2nh2	
PROBnn	—	nnnd1nd1nh1nh1nd2nd2nh2nh2	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	nnnd1nd1nh1nh1nd2nd2nh2nh2		probability of occurrence of temporary fluctuations

Table A5-3. 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 maybe placed on the subsequent line.

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	Content	Location	
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 WSPD: [nn/nn]	[n]nn MPS (or [n]nn KT)	[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]	SFC WSPD: 10/12 16 MPS SFC WSPD: 40 KT E OF W110
Surface visibility (C)	Widespread surface visibility below 5 000 m including the weather phenomena causing the reduction in visibility	SFC VIS: [nn/nn]	nnnn M 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 IC or FC or GR or GS or PL or SQ		SFC VIS: 06/08 3000 M BR N of N51

Element	Detailed content	Template(s)			Examples
		Identifier and time	Content	Location	
Significant weather (C)	Significant weather conditions encompassing thunderstorms and heavy sandstorm and duststorm	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 SS S OF N35
Mountain obscuration (C)	Mountain obscuration	MT OBSC: [nn/nn]	nnnnnnnnn[2]		MT OBSC: MT PASSES S OF N48
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 nnn[n]/nnn[n] M (*or* nnn[n]/nnn[n] FT) AGL *or* AMSL ISOL *or* OCNL *or* FRQ *or* OBSC *or* EMBD CB[3] *or* TCU[3] nnn[n]/nnn[n] M (*or* nnn[n]/nnn[n] FT) AGL *or* AMSL		SIG CLD: 06/09 OVC 800/1100 FT AGL N OF N51 10/12 ISOL TCU 1200/8000 FT AGL
Icing (C)	Icing (except for that occurring in convective clouds and for severe icing for which a SIGMET message 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 message 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
Mountain wave (C)	Mountain wave (except for severe mountain wave for which a SIGMET message has already been issued)	MTW: [nn/nn]	MOD FLnnn/nnn *or* MOD ABV FLnnn *or* SEV FLnnn/nnn *or* SEV ABV FLnnn		MTW: MOD ABV FL080 N OF N63

Element	Detailed content	Template(s)			Examples
		Identifier and time	Content	Location	
SIGMET (C)	SIGMET messages applicable to the FIR/CTA concerned or a sub-area thereof, for which the area forecast is valid	SIGMET APPLICABLE:	n [,n] [,n]		SIGMET APPLICABLE: 3,5
or HAZARDOUS WX NIL (C)[4]		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]	L [n]nnn HPA *or* H [n]nnn HPA *or* FRONT *or* NIL	Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn *or* Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn TO Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn	PSYS: 06 L 1004 HPA N5130 E01000 MOV NE 25KT WKN
			MOV N *or* NE *or* E *or* SE *or* S *or* SW *or* W *or* NW nnKMH (nnKT) WKN *or* NC *or* INTSF	–	
Upper winds and temperatures (M)	Upper winds and upper-air temperatures for at least the following altitudes: 600, 1 500 and 3 000 m (2 000, 5 000 and 10 000 ft)	WIND/T:	[n]nnn M (*or* [n]nnn FT) nnn/[n]nn MPS (*or* nnn/[n]nn KT) PSnn *or* MSnn	Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn *or*	WIND/T: 2000 FT 270/18 MPS PS03 5000 FT 250/20 MPS MS02 10000 FT 240/22 MPS 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]nnn M (*or* [n]nnn/[n]nnn FT) AGL *or* AMSL *or* NIL	[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]	CLD: BKN SC 2500/8000 FT AGL
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] nnnn FT AGL *or* AMSL		FZLVL: 3000 FT AGL
Forecast QNH (M)	Forecast lowest QNH during the period of validity	MNM QNH:	[n]nnn HPA		MNM QNH: 1004 HPA
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]n M		SEA: T15 HGT 5 M
Volcanic eruptions (M)	Name of volcano	VA:	nnnnnnnnn *or* NIL		VA: ETNA

Notes. —

1. Fictitious location.
2. Free text describing well-known geographical locations maybe kept to a minimum.

3. The location of the CB and/or TCU maybe specified in addition to any widespread areas of broken or overcast cloud as given in the example.
4. When no elements are included in Section I

Table A5-4. Ranges and resolutions for the numerical elements included in TAF

Elements		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 A5-1. TAF

TAF for FYWH (Hosea Kutako International Airport):

TAF FYWH 160000Z 1606/1624 13010KT 9000 BKN020 BECMG 1606/1608 SCT015CB BKN020 TEMPO 1608/1612 17010G25KT 1000 TSRA SCT010CB BKN020 FM161230 15010KT 9999 BKN020

Meaning of the forecast:

TAF for Hosea Kutako International Airport issued on the 16th of the month at 0000 UTC valid from 0600 UTC to 2400 UTC on the 16th of the month; surface wind direction 130 degrees; wind speed 10 knots; 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 10 knots gusting to 25 knots; 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 10 knots ; visibility 10 kilometres or more; and broken cloud at 600 metres.

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 NAMCAR Part 2, the corresponding non-SI alternative units “knot” and “foot” may be used instead.

Example A5-2. Cancellations of TAF

Cancellation of TAF for FYWH (Hosea Kutako Kenyatta International Airport):

TAF AMD FYWH 161500Z 1606/1624 CNL

Meaning of the forecast:

Amended TAF for Hosea Kutako International Airport issued on the 16th of the month at 1500 UTC cancelling the previously issued TAF valid from 0600 UTC to 2400 UTC on the 16th of the month.

Example A5-3. GAMET area forecast

YUCC GAMET VALID 220600/221200 YUDO –
YUCC AMSWELL FIR/2 BLW FL120
SECN I
SFC WSPD: 10/12 16 MPS
SFC VIS: 06/08 3000 M BR N OF N51
SIGWX: 11/12 ISOL TS

SIG CLD: 6/09 OVC 800/1100 FT AGL N OF N51 10/12 ISOL TCU 1200/8000 FT AGL
ICE: MOD FL050/080
TURB: MOD ABV FL090
SIGMETS APPLICABLE: 3,5
SECN II
PSYS: 06 L 1004 HPA N5130 E01000 MOV NE 25 KT WKN
WIND/T: 2000 FT 270/18 MPS PS03 5000 FT 250/20 MPS MS02 10000 FT 240/22 MPS MS11
CLD: BKN SC 2500/8000 FT AGL
FZLVL: 3000 FT AGL
MNM QNH: 1004 HPA
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 speeds: between 1000 UTC and 1200 UTC 16 metres per second;

Surface visibility: between 0600 UTC and 0800 UTC 3 000 metres north of 51 degrees north (due to mist);

Significant weather phenomena:	between 1100 UTC and 1200 UTC isolated thunderstorms Without hail;
Significant clouds:	between 0600 UTC and 0900 UTC overcast base 800, top 1 100 feet Above ground level north of 51 degrees north; 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 messages:	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 northeastwards at 25 knots and to weaken;
winds and temperatures:	at 2 000 feet above ground level wind direction 270 degrees; wind speed 18 metres per second, temperature plus 3 degrees Celsius; at 5 000 feet above ground level wind direction 250 degrees; wind speed 20 metres per second, temperature minus 2 degrees Celsius; at 10 000 feet above ground level 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

Notes. —

1. *Fictitious location.*
2. *Free text describing well-known geographical locations must be kept to a minimum.*
3. *The location of the CB and/or TCU must be specified in addition to any widespread areas of broken or overcast cloud as given in the example.*
4. *When no elements are included in Section I.*

APPENDIX 6: TECHNICAL SPECIFICATIONS RELATED TO SIGMET AND AIRMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS AND ALERTS

Compliance Note: Data type designators to be used in abbreviated headings for SIGMET, tropical cyclone and volcanic ash advisory messages are given in WMO Publication No. 386, Manual on the Global Telecommunication System.

1. SPECIFICATIONS RELATED TO SIGMET INFORMATION

1.1 Format of SIGMET messages

1.1.1. The content and order of elements in a SIGMET message must be in accordance with the template shown in Table A6-1A.

1.1.2. Messages containing SIGMET information must be identified as: “SIGMET”.

1.1.3. The sequence number referred to in the template in Table A6-1A must correspond with the number of SIGMET messages issued for the flight information region since 0001 UTC on the day concerned. The meteorological watch offices whose area of responsibility encompasses more than one FIR and/or CTA must issue separate SIGMET messages for each FIR and/or CTA within their area of responsibility.

1.1.4. In accordance with the template in Table A6-1A, only one of the following phenomena may be included in a SIGMET message, 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

1.1.5. SIGMET information may not contain unnecessary descriptive material. In describing the weather phenomena for which the SIGMET is issued, no descriptive material additional to that given in 1.1.4 must be included. SIGMET information concerning thunderstorms or a tropical cyclone may not include references to associated turbulence and icing.

1.1.6. Meteorological watch offices must issue SIGMET information in digital form, in addition to the issuance of this SIGMET information in abbreviated plain language in accordance with 1.1.1. SIGMET information must be disseminated in IWXXM GML form in addition to the dissemination of SIGMET information in accordance with 1.1.1.

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

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

1.2. Dissemination of SIGMET messages

1.2.1 SIGMET messages must be disseminated to meteorological watch offices, WAFCs and to other meteorological offices in accordance with regional air navigation agreement. SIGMET messages for volcanic ash must also be disseminated to VAACs.

1.2.2 SIGMET messages must be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services, in accordance with regional air navigation agreement.

2. SPECIFICATIONS RELATED TO AIRMET INFORMATION

2.1 Format of AIRMET messages

2.1.1 The content and order of elements in an AIRMET message must be in accordance with the template shown in Table A6-1A.

2.1.2 The sequence number referred to in the template in Table A6-1A must correspond with the number of AIRMET messages issued for the flight information region since 0001 UTC on the day concerned. The meteorological watch offices whose area of responsibility encompasses more than

one FIR and/or CTA must issue separate AIRMET messages for each FIR and/or CTA within its area of responsibility.

2.1.3 The flight information region must be divided in sub-areas, as necessary.

2.1.4 In accordance with the template in Table A6-1A, only one of the following phenomena must be included in an AIRMET message, 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 WSPD (+ wind speed and units)
— 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, IC, PL, PO, RA, SA, SG, SN, SQ, SS or VA)
— thunderstorms	
– isolated thunderstorms without hail	ISOL TS
– occasional thunderstorms without hail	OCNL TS
– isolated thunderstorms with hail	ISOL TSGR
– occasional thunderstorms 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)
– overcast	OVC CLD (+ height of the base and top and units)
– cumulonimbus clouds which are:	
– isolated	ISOL CB
– occasional	OCNL CB
– frequent	FRQ CB
– towering cumulus clouds which are:	
– 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

2.1.5 AIRMET information may not contain unnecessary descriptive material. In describing the weather phenomena for which the AIRMET is issued, no descriptive material additional to that given in 2.1.4 must be included. AIRMET information concerning thunderstorms or cumulonimbus clouds may not include references to associated turbulence and icing.

Compliance Note: The specifications for SIGMET information which is also applicable to low-level flights are given in 1.1.4.

2.1.6 Meteorological offices may issue AIRMET information in digital form, in addition to the issuance of this AIRMET information in abbreviated plain language in accordance with 2.1.1. AIRMET information must be disseminated in IWXXM GML form in addition to the dissemination of AIRMET information in accordance with 2.1.1.

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

2.2 Dissemination of AIRMET messages

2.2.1 AIRMET messages maybe disseminated to meteorological watch offices in adjacent flight information regions and to other meteorological watch offices or aerodrome meteorological offices, as agreed by the meteorological authorities concerned.

2.2.2 AIRMET messages maybe transmitted to international operational meteorological databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services, in accordance with regional air navigation agreement.

3. SPECIFICATIONS RELATED TO SPECIAL AIR-REPORTS

Compliance Note: This appendix deals with the uplink of special air-reports. The general specifications related to special air-reports are in Appendix 4.

3.1. Special air-reports must be uplinked for 60 minutes after their issuance.

3.1.1 Information on wind and temperature included in automated special air-reports may not be uplinked to other aircraft in flight.

4. DETAILED CRITERIA RELATED TO SIGMET AND SPECIAL AIR-REPORTS (UPLINK)

4.1. Identification of the flight information region

In cases where the airspace is divided into a flight information region (FIR) and an upper flight information region (UIR), the SIGMET must be identified by the location indicator of the air traffic services unit serving the FIR.

Compliance Note: The SIGMET message applies to the whole airspace within the lateral limits of the FIR, i.e. to the FIR and to the UIR. The particular areas and/or flight levels affected by the meteorological phenomena causing the issuance of the SIGMET are given in the text of the message.

4.2. Criteria related to phenomena included in SIGMET and AIRMET messages and special air-reports (uplink)

4.2.1 An area of thunderstorms and cumulonimbus clouds must 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).

4.2.2 An area of thunderstorms must 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).

4.2.3 Squall line (SQL) must indicate a thunderstorm along a line with little or no space between individual clouds.

4.2.4 Hail (GR) must be used as a further description of the thunderstorm, as necessary.

4.2.5 Severe and moderate turbulence (TURB) may refer only to: low-level turbulence associated with strong surface winds; rotor streaming; or turbulence whether in cloud or not in cloud (CAT). Turbulence may not be used in connection with convective clouds.

4.2.6 Turbulence must be considered:

a) severe when the peak value of EDR equals or exceeds 0.45; and

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

4.2.7 Severe and moderate icing (ICE) must refer to icing in other than convective clouds. Freezing rain (FZRA) must refer to severe icing conditions caused by freezing rain.

4.2.8 A mountain wave (MTW) must 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.

4.2.9 Sandstorm/duststorm must be considered:

a) heavy whenever the visibility is below 200 m and the sky is obscured; and

b) moderate whenever the visibility is:

c) below 200 m and the sky is not obscured; or

d) between 200 m and 600 m.

5. SPECIFICATIONS RELATED TO AERODROME WARNINGS

5.1. Format and dissemination of aerodrome warnings

5.1.1 The aerodrome warnings must be issued in accordance with the template in Table A6-2 where required by operators or aerodrome services, and must be disseminated in accordance with local arrangements to those concerned.

5.1.2 The sequence number referred to in the template in Table A6-2 must correspond with the number of aerodrome warnings issued for the aerodrome since 0001 UTC on the day concerned.

5.1.3 In accordance with the template in Table A6-2, aerodrome warnings must relate to the occurrence or expected occurrence of one or more of the following phenomena:

—tropical cyclone (to be included if the 10-minute mean surface wind speed at the aerodrome is expected to be 17 M/S (34 KT) or more)
—thunderstorm
— hail

—hoar frost or rime
—sandstorm
—duststorm
— rising sand or dust
—strong surface wind and gusts
— squall
— frost
—volcanic ash
—tsunami
—volcanic ash deposition
—toxic chemicals
—other phenomena as agreed locally.

Compliance Note: Aerodrome warnings related to the occurrence or expected occurrence of tsunami are not required where a national public safety plan for tsunami is integrated with the "at risk" aerodrome concerned.

5.1.4 The use of text additional to the abbreviations listed in the template in Table A6-2 must be kept to a minimum. The additional text must be prepared in abbreviated plain language using approved ICAO abbreviations and numerical values. If no ICAO approved abbreviations are available, English plain language text must be used.

5.2 Quantitative criteria for aerodrome warnings

When quantitative criteria are necessary for the issue of aerodrome warnings covering, for example, the expected maximum wind speed or the expected total rainfall, the criteria used must be as agreed between the aerodrome meteorological office and the users concerned.

6. SPECIFICATIONS RELATED TO WIND SHEAR WARNINGS

6.1 Detection of wind shear

6.1.1. Evidence of the existence of wind shear must be derived from:

a) ground-based, wind shear remote-sensing equipment, for example, 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 Part IX of this regulations; 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.

Compliance Note: 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)

— Low-level temperature inversions.

6.2 Format and dissemination of wind shear warnings and alerts

Compliance Note: 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 3, *Tables A3-1 and A3-2.*

6.2.1. The wind shear warnings must be issued in accordance with the template in Table A6-3 and must be disseminated in accordance with local arrangements to those concerned.

6.2.2. The sequence number referred to in the template in Table A6-3 must correspond with the number of wind shear warnings issued for the aerodrome since 0001 UTC on the day concerned.

6.2.3. The use of text additional to the abbreviations listed in the template in Table A6-3 must be kept to a minimum. The additional text must be prepared in abbreviated plain language using approved ICAO abbreviations and numerical values. If no ICAO approved abbreviations are available, English plain language text must be used.

6.2.4. 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, must be disseminated unchanged in accordance with local arrangements to those concerned.

Compliance 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.

Compliance 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.

6.2.5. The wind shear alerts must be disseminated from automated, ground-based, wind shear remote-sensing or detection equipment in accordance with local arrangements to those concerned.

6.2.6. 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 must include a specific reference to microburst.

6.2.7. Where information from ground-based, wind shear detection or remote-sensing equipment is used to prepare a wind shear alert, the alert must, if practicable, relate to specific sections of the runway and distances along the approach path or take-off path as agreed between the meteorological authority, the appropriate ATS authority and the operators concerned.

Table A6-1A. Template for SIGMET and AIRMET messages

Key: M = inclusion mandatory, part of every message;
C = conditional, included whenever applicable;
= = a double line indicates that the text following it may be placed on the subsequent line.

Compliance Note 1. — The ranges and resolutions for the numerical elements included in SIGMET and AIRMET messages are shown in Table A6-4 of this appendix.

Compliance Note 2. — In accordance with 1.1.5 and 2.1.5, 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 maynot be included.

Element	Detailed content	SIGMET template	AIRMET template	SIGMET message examples	AIRMET message 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	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/UIR[2] UIR FIR/UIR YUDD SHANLON CTA[2]	YUCC AMSWELL FIR/2[2] YUDD SHANLON FIR[2]
IF THE SIGMET OR AIRMET MESSAGE 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**
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]	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]nnnnM (*or* BKN CLD [n]nnn/[ABV][n]nnnnFT) *or* BKN CLD SFC/[ABV][n]nnnnM (*or* BKN CLD SFC/[ABV][n]nnnnFT) OVC CLD nnn/[ABV]nnnnM (*or* OVC CLD [n]nnn/[ABV][n]nnnnFT)	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/ABV 10000FT OVC CLD 1000/5000FT OVC CLD 270/ABV3

		[MT] [nnnnnnnnnn] [PSN Nnn[nn] or Snn[nn] Ennn[nn] or Wnnn[nn]] VA CLD RDOACT CLD	*or* OVC CLD SFC/[ABV][n] nnnnM (*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]		000M OVC CLD 900/ABV10000FT OVC CLD SFC/3000M OVC CLD SFC/ABV 10000FT 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	
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		N2020 W07005 N48 E010 S60 W160 S0530 E16530 N OF N50 S OF N5430 N OF S10	

		S OF Snn[nn] or [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]]]	S OF S4530 W OF W155 W OF E15540 E OF W45 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†

		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[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 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]	
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* (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 SE MOV NNW MOV E 40KMH (MOV E 20KT) MOV WSW 20KT STNR

		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		INTSF WKN NC	
Changes in intensity (C)[20]	Expected changes in intensity (C)	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 message	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 E1600015 TC CENTRE PSN N1015 E15030 CB	—

Forecast position (C)[20, 21, 26, 27, 33]	Forecast position of phenomenon at the end of the validity period of the SIGMET message[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	—	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 TC CENTRE PSN N2740 W07345 NO VA EXP WI 30KM OF N6030 E02550 † WI 150NM OF TC CENTRE	—

		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] *or* WI[22,23] 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 message 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/nnnnn n *or*[28] CNL SIGMET [n][n]n nnnnnn/nnnnn n VA MOV TO nnnn FIR	CNL AIRMET [n][n]n nnnnnn/nnnnn n	CNL SIGMET 2 101200/101600 CNL SIGMET A13 251030/251430 VA MOV TO YUDO FIR2	CNL AIRMET 05 151520/151800

1. *See 4.1.*
2. *Fictitious location.*
3. *In accordance with 1.1.3 and 2.1.2.*
4. *See 2.1.3.*
5. Used only when the message issued to indicate that a test or an exercise is taking place. When the word "TEST" or the abbreviation "EXER" is included,
6. In accordance with 1.1.4 and 2.1.4.
7. *In accordance with 4.2.1 a).*
8. *In accordance with 4.2.4.*
9. *In accordance with 4.2.1 b).*
10. *In accordance with 4.2.2.*
11. *In accordance with 4.2.3.*
12. *Used for unnamed tropical cyclones.*
13. *In accordance with 4.2.5 and 4.2.6.*
14. *In accordance with 4.2.7.*
15. *In accordance with 4.2.8.*
16. *In accordance with 2.1.4.*
17. *In accordance with 4.2.1 c).*
18. *In accordance with 4.2.1 d).*

19. *The use of cumulonimbus (CB) and towering cumulus (TCU) is restricted to AIRMETs in accordance with 2.1.4.*
20. In the case of volcanic ash cloud or 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 is 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 must 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 are to be kept to a minimum and maynot normally exceed seven.*
24. *Only for SIGMET messages for tropical cyclones.*
25. *Only for SIGMET messages for radioactive cloud. When detailed information on the release is not available, a radius of up to 30 kilometres (or 16 nautical miles) from the source can be applied; 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) is to be applied. [Applicable 7 November 2019] A radius of up to 30 kilometres (or 16 nautical miles) from the source may be applied; 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) is 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 messages for volcanic ash.*
29. *To be used for two volcanic ash clouds or cunulonimbus clouds associated with a tropical cyclone simultaneously affecting the FIR concerned.*
30. *End of the message (as the SIGMET/AIRMET message is being cancelled).*
31. *The term 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 relate to the forecast time of the tropical cyclone centre position, not to the end of the validity period of the SIGMET message.*
33. *For SIGMET messages for radioactive cloud, only within (WI) is to be used for the elements "location" and "forecast position".*
34. *For SIGMET messages for radioactive cloud, only stationary (STNR) is to be used for the element "movement or expected movement".*

(Tracked changes are used to show the changes from existing Table A6-1. The template to be used for SIGMET and AIRMET messages is presented in Table A6-1A.)

Table A6-1B. Template for SIGMET and AIRMET messages and 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 maybe placed on the subsequent line.

Compliance Note: The ranges and resolutions for the numerical elements included in SIGMET/AIRMET messages and in special air-reports are shown in Table A6-4 of this appendix.

TABLE A6-1B 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 maybe placed on the subsequent line.

Note. The ranges and resolutions for the numerical elements included in special air-reports are shown in Table A6-4 of this appendix.

Element	Detailed content	Template [1, 2]	Examples
Identification (M)	Message identification	ARS	ARS
Identification (M)	Aircraft radiotelephony call sign	nnnnnn	VA812[3]
Observed phenomenon (M) [7]	Description of observed phenomenon causing the	TS TSGR SEV TURB SEV ICE SEV MTW	TS TSGR SEV TURB SEV ICE SEV MTW

	issuance of the special air-report [4]	HVY DS HVY SS VA CLD VA [MT nnnnnnnnnn] MOD TURB MOD ICE	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]nnnnnFT)	FL390 FL180/210 3000M 12000FT

Notes. —

1. No wind and temperature to be uplinked to other aircraft in flight in accordance with 3.2.
2. See 3.1.
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 A6-2. Template for aerodrome warnings

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable.

Compliance Note 1. The ranges and resolutions for the numerical elements included in aerodrome warnings are shown in Table A6-4 of this Appendix.

Compliance 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).

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 causing 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 5.1.3.*
3. *In accordance with 5.1.3.*
4. *Hoar frost or rime in accordance with 5.1.3.*

5. *In accordance with 5.1.4.*

6. *End of the message (as the aerodrome warning is being cancelled).*

Example A6-1. SIGMET and AIRMET message and 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 A6-2 SIGMET messages for tropical cyclone

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

Meaning:

The third SIGMET message 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; no changes in intensity are expected; at 2200 UTC the centre of the tropical cyclone forecast to be located at 27 degrees 40 minutes north and 73 degrees 45 minutes west.

* Fictitious location

Example A6-3. SIGMET message for volcanic ash

YUDD SIGMET 2 VALID 211100/211700 YUSO –
YUDD SHANLON FIR/UIR VA ERUPTION MT ASHVAL PSN S1500 E07348 VA CLD OBS AT 1100Z
APRX 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 message issued for the SHANLON* flight information region (identified by YUDD Shanlon area control centre/upper flight information region) by the Shanlon/International* meteorological watch office (YUSO) since 0001 UTC; the message is valid from 1100 UTC to 1700 UTC on the 21st of the month; volcanic ash eruption of Mount Ashval* located at 15 degrees south and 73 degrees 48 minutes east; volcanic ash cloud observed at 1100 UTC in an approximately 50km wide line between 15 degrees south and 73 degrees 48 minutes east, and 15 degrees 30 minutes south and 76 degrees 42 minutes east; between flight levels 310 and 450 intensifying at 1700 UTC the volcanic ash cloud is forecast to be located in an approximately 50km wide line between 15 degrees 6 minutes south and 75 degrees east, 15 degrees 18 minutes south and 81 degrees 12 minutes east, and 17 degrees 12 minutes south and 83 degrees 30 minutes east.

* Fictitious location

Example A6-4. SIGMET message for radioactive cloud

YUCC SIGMET 2 VALID 201200/201600 YUDO –
YUCC AMSWELL FIR RDOACT CLD OBS AT 1155Z WI 30KM OF N6030 E02550 SFC/FL550 STNR

Meaning:

The second SIGMET message 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 A6-5. SIGMET message 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 message 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

APPENDIX 7: TECHNICAL SPECIFICATIONS RELATED TO AERONAUTICAL CLIMATOLOGICAL INFORMATION

1. PROCESSING OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

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

2. EXCHANGE OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

Aeronautical climatological information must be exchanged on request between meteorological authorities. Operators and other aeronautical users desiring such information must normally apply to the meteorological authority responsible for its preparation.

3. CONTENT OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

3.1. Aerodrome climatological tables

3.1.1. An aerodrome climatological table must 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).

3.1.2. Aerodrome climatological tables must include information required for the preparation of aerodrome climatological summaries in accordance with 3.2.

3.2. Aerodrome climatological summaries

3.2.1. **Aerodrome** climatological summaries must 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 WMO Publication No. 49, Technical Regulations, Volume II, C.3.2.

APPENDIX 8: TECHNICAL SPECIFICATIONS RELATED TO SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

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

1. MEANS OF SUPPLY AND FORMAT OF METEOROLOGICAL INFORMATION

1.1. Meteorological information must be supplied to operators and flight crew members by one or more of the following, as agreed between the meteorological authority and 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 light documentation facilities while retaining access by operators and aircrew members to consultation, as necessary, with the aerodrome meteorological office, in accordance with 5.1.

1.2. The meteorological authority, in consultation with the operator, must determine:

a) the type and format of meteorological information to be supplied; and

b) methods and means of supplying that information.

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

2. SPECIFICATIONS RELATED TO INFORMATION FOR PRE-FLIGHT PLANNING AND INFLIGHT REPLANNING

2.1. Format of upper-air gridded information

Upper-air gridded information supplied by WAFCs for pre-flight and in-flight re-planning must be in the GRIB code form.

Compliance Note: The GRIB code form is contained in WMO Publication No. 306, Manual on Codes, Volume I.2, Part B — Binary Codes.

2.2. Format of information on significant weather

2.2.1 Information on significant weather supplied by WAFCs for pre-flight planning and in-flight re-planning must be in the BUFR code form.

2.2.2 In addition to 2.2.1, information on significant weather supplied by WAFCs for pre-flight planning and in-flight replanning maybe in IWXXM GML form.

Compliance Note 1.— Guidance on the implementation of IWXXM is provided in the Manual on the ICAO Meteorological Information Exchange Model (IWXXM) (Doc 10003).

Compliance Note: 2. — Geography markup language (GML) is an encoding standard of the Open Geospatial Consortium (OGC).

2.3. Specific needs of helicopter operations

Meteorological information for pre-flight planning and in-flight re-planning by operators of helicopters flying to offshore structures must include data covering the layers from sea level to flight level 100. Particular mention must 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.

3. SPECIFICATIONS RELATED TO BRIEFING AND CONSULTATION

3.1. Information required to be displayed

The material displayed must be readily accessible to the flight crew members or other flight operations personnel concerned.

4. SPECIFICATIONS RELATED TO FLIGHT DOCUMENTATION

4.1. Presentation of information

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

Compliance 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 World Meteorological Organization on the basis of relevant operational requirements stated by the International Civil Aviation Organization.

4.1.2 The flight documentation related to concatenated route-specific upper wind and upper-air temperature forecasts must be provided as agreed between the meteorological authority and operator concerned.

Compliance Note: Guidance on the design, formulation and use of concatenated charts is given in the Manual of Aeronautical Meteorological Practice (Doc 8896).

4.1.3 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 must be presented in accordance with the templates in Appendices 1, 2, 3, 5 and 6, respectively. Such meteorological information received from other meteorological offices must be included in flight documentation without change.

Compliance Note: Examples of the form of presentation of METAR/SPECI and TAF are given in Appendix 1.

4.1.4. The location indicators and the abbreviations used must be explained in the flight documentation.

4.1.5. The forms and the legend of charts included in flight documentation must be printed in English. Where appropriate, approved abbreviations must be used. The units employed for each element must be indicated; they must be in accordance with Units of Measurement Requirements

4.2 Charts in flight documentation

4.2.1 Characteristics of charts

4.2.1.1 Charts included in flight documentation must have a high standard of clarity and legibility and must have the following physical characteristics:

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

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

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

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

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

f) latitude and longitude values must be indicated at various points throughout the charts (i.e. not only at the edges); and

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

Compliance 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.

4.2.1.2 Meteorological information included in flight documentation must be represented as follows:

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

b) temperatures must 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 must be depicted in a sufficiently dense latitude/longitude grid; and

d) Wind arrows must take precedence over temperatures and either must take precedence over chart background.

4.2.1.3 For short-haul flights, charts must be prepared covering limited areas at a scale of 1:15 × 10^6 as required.

4.2.2 **Set of charts to be provided**

4.2.2.1 The minimum number of charts for flights between flight level 250 and flight level 630 must include a high-level SIGWX chart (flight level 250 to flight level 630) and a forecast 250 hPa wind and temperature chart. The actual charts provided for pre-flight and in-flight planning and for flight documentation must be as agreed between meteorological authorities and users concerned.

4.2.2.2 Charts to be provided must be generated from the digital forecasts provided 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 authority and the operator concerned.

4.2.3 **Height indications**

4.2.3.1 In flight documentation, height indications must 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, must 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, must be expressed in height above the aerodrome elevation.

4.3 **Specifications related to low-level flights**

4.3.1 **In chart form**

4.3.1.1 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), must contain the following as appropriate to the flight:

a) information from relevant SIGMET and AIRMET messages;

b) upper wind and upper-air temperature charts as given in Appendix 1; and

c) Significant weather charts as given in Appendix 1.

4.3.2 **In abbreviated plain language**

4.3.2.1 Where the forecasts are not 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 (up to flight level 150 in mountainous areas or higher, where necessary), must contain the following information as appropriate to the flight:

a) SIGMET and AIRMET information; and

b) GAMET area forecasts.

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

5. SPECIFICATIONS RELATED TO AUTOMATED PRE-FLIGHT INFORMATION SYSTEMS FOR BRIEFING, CONSULTATION, FLIGHT PLANNING AND FLIGHT DOCUMENTATION

5.1. Access to the systems

Automated pre-flight information systems providing self-briefing facilities must provide for access by operators and flight crew members to consultation, as necessary, with an aerodrome meteorological office by telephone or other suitable telecommunications means.

5.2. Detailed specifications of the systems

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

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 the WMO, or based on a menu-driven user interface, or other appropriate mechanisms as agreed between the meteorological authority and the operators concerned; and

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

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

6. SPECIFICATIONS RELATED TO INFORMATION FOR AIRCRAFT IN FLIGHT

6.1. Supply of information requested by an aircraft in flight

If an aircraft in flight requests meteorological information, the aerodrome meteorological office or meteorological watch office which receives the request must arrange to supply the information with the assistance, if necessary, of another aerodrome meteorological office or meteorological watch office.

6.2. Information for in-flight planning by the operator

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

a) METAR and SPECI (including trend forecasts as issued in accordance with regional air navigation agreement);

b) TAF and amended TAF;

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

d) upper wind and upper-air temperature information;

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

f) Other meteorological information in alphanumeric or graphical form as agreed between the meteorological authority and the operator concerned.

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

Figure A8-1. Fixed areas of coverage of WAFS forecasts in chart form — Mercator projection

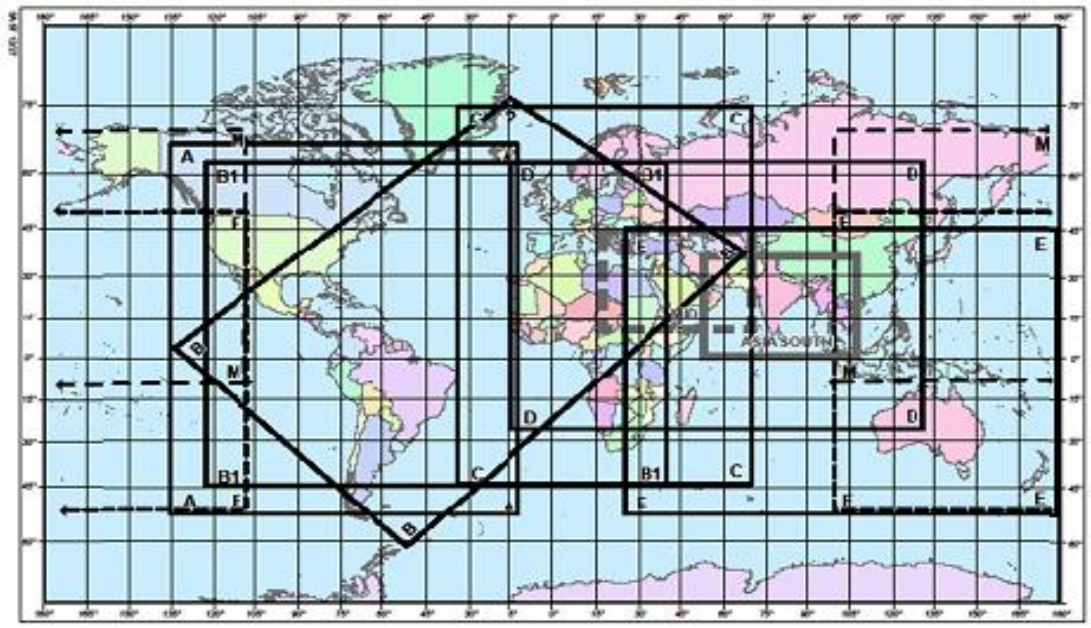


CHART	LATITUDE	LONGITUDE	CHART	LATITUDE	LONGITUDE
A	N6700	W13724	D	N6300	W01500
A	N6700	W01236	D	N6300	E13200
A	S5400	W01236	D	S2700	E13200
A	S5400	W13724	D	S2700	W01500
ASIA	N3600	E05300	E	N4455	E02446
ASIA	N3600	E10800	E	N4455	E18000
ASIA	0000	E10800	E	S5355	E18000
ASIA	0000	E05300	E	S5355	E02446
B	N0304	W13557	F	N5000	E10000
B	N3707	E06732	F	S5242	W11000
B	N3707	E06732	F	S5242	W11000
B	S6217	W05240	F	S5242	E10000
B1	N6242	W12500	M	N7000	E10000
B1	S4530	E04000	M	S1000	W11000
B1	S4530	E04000	M	S1000	W11000
B1	S4530	W12500	M	S1000	E10000
B1	N7500	W03500	MID	N4400	E01700
C	N7500	E07000	MID	N4400	E07000
C	S4500	E07000	MID	N1000	E07000
C	S4500	W03500	MID	N1000	E01700

Figure A8-2. Fixed areas of coverage of WAFS forecasts in chart form — Polar stereographic projection (northern hemisphere)

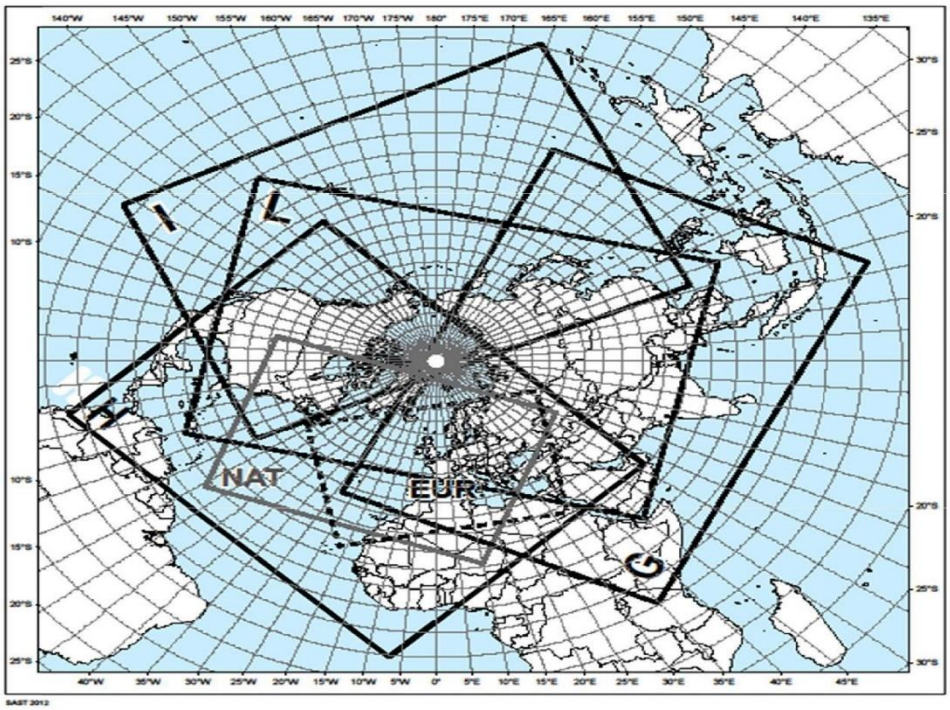


CHART	LATITUDE	LONGITUDE	CHART	LATITUDE	LONGITUDE
EUR	N4633	W05634	I	N1912	E11130
EUR	N5842	E06824	I	N3330	W06012
EUR	N2621	E03325	I	N0126	W12327
EUR	N2123	W02136	I	S0647	E16601
G	N3552	W02822	L	N1205	E11449
G	N1341	E15711	L	N1518	E04500
G	S0048	E03447	L	N1413	W14338
H	N3127	W14836	NAT	N4439	W10143
H	N2411	E05645	NAT	N5042	E06017
H	S0127	W00651	NAT	N1938	E00957
H	N0133	W07902	NAT	N1711	W05406

Figure A8-3. Fixed areas of coverage of WAFS forecasts in chart form — Polar stereographic projection (southern hemisphere)

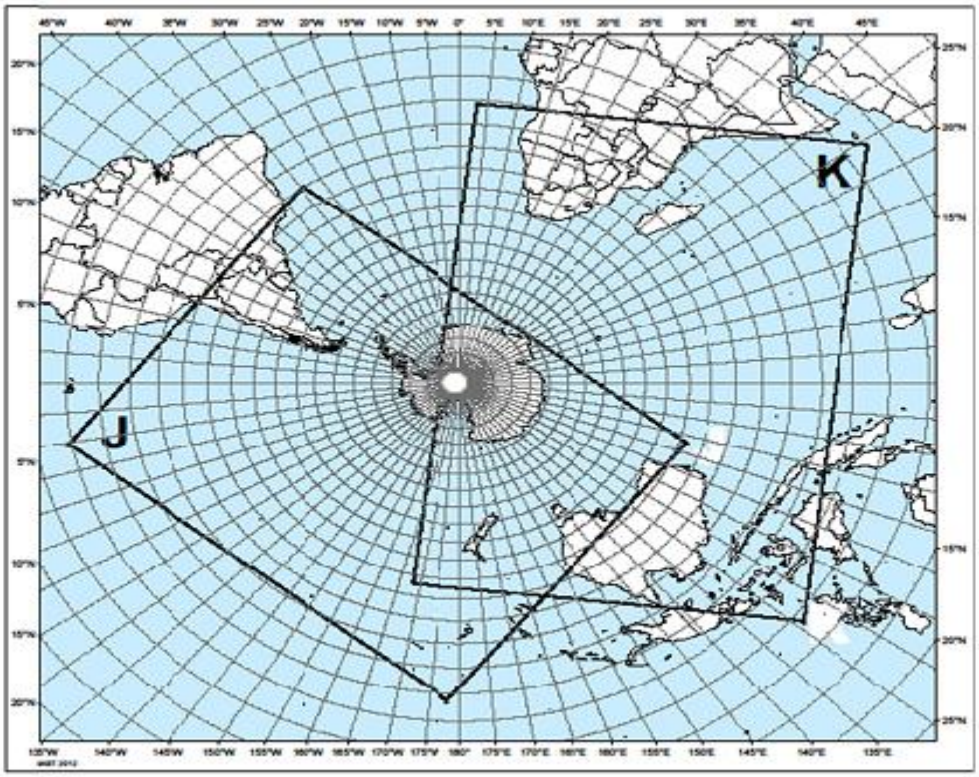


CHART	L ATITUDE	LONGITUDE
J	S0318	W17812
J	N0037	W10032
J	S2000	W03400
J	S2806	E10717
K	N1255	E05549
K	N0642	E12905
K	S2744	W16841
K	S1105	E00317

APPENDIX 9: TECHNICAL SPECIFICATIONS RELATED TO INFORMATION FOR AIR TRAFFIC SERVICES, SEARCH AND RESCUE AND AERONAUTICAL INFORMATION SERVICES

1. INFORMATION TO BE PROVIDED FOR AIR TRAFFIC SERVICES UNITS

1.1. List of information for the aerodrome control tower

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

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

b) SIGMET 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 and ATS authorities concerned; and

e) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the meteorological and ATS authorities concerned.

1.2. List of information for the approach control unit

1.2.1. The following meteorological information must 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 and trend forecasts and amendments thereto, for the aerodrome(s) with which the approach control unit is concerned;

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

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 and ATS authorities concerned; and

e) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the meteorological and ATS authorities concerned.

1.3. List of information for the area control centre and flight information centre

1.3.1. The following meteorological information must 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 or the control area and, if required by the flight information centre or area control centre, covering aerodromes in neighbouring flight information regions, 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 information and appropriate special air-reports for the flight information region or control area and, if determined by regional air navigation agreement and required by the flight information centre or area control centre, for neighbouring flight information regions;

c) any other meteorological information required by the flight information centre or area control centre to meet requests from aircraft in flight; if the information requested is not available in the associated meteorological watch office, that office must 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 and ATS authorities concerned;

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

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

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

h) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the meteorological and ATS authorities concerned.

1.4. Supply of information to aeronautical telecommunications stations

Where necessary for flight information purposes, current meteorological reports and forecasts must be supplied to designated aeronautical telecommunication stations. A copy of such information must be forwarded, if required, to the flight information centre or the area control centre.

1.5. Format of information

1.5.1. 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 must be supplied to air traffic services units in the form in which they are prepared, disseminated to other aerodrome meteorological offices or meteorological watch offices received from other aerodrome meteorological offices or meteorological watch offices, unless otherwise agreed locally.

1.5.2. When computer-processed upper-air data for grid points are made available to air traffic services units in digital form for use by air traffic services computers, the contents, format and transmission arrangements must be as agreed between the meteorological authority and the appropriate ATS authority concerned. The data must normally be supplied as soon as is practicable after the processing of the forecasts has been completed.

2. INFORMATION TO BE PROVIDED FOR SEARCH AND RESCUE SERVICES UNITS

2.1. List of information

2.1.1. Information to be supplied to rescue coordination centres must include the meteorological conditions that existed in the last known position of a missing aircraft and along the intended route of that aircraft with particular reference to:

a) significant en-route weather phenomena;

b) cloud amount and type, particularly cumulonimbus; height indications of bases and tops;

c) visibility and phenomena reducing visibility;

d) surface wind and upper wind;

e) state of ground, in particular, any snow cover or flooding;

f) sea-surface temperature, state of the sea, ice cover if any and ocean currents, if relevant to the search area; and

g) Sea-level pressure data.

2.2. Information to be provided on request

2.2.1. On request from the rescue coordination centre, the designated aerodrome meteorological office or meteorological watch office must 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.

2.2.2. To facilitate search and rescue operations, the designated aerodrome meteorological office or meteorological watch office must, 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.

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

3. INFORMATION TO BE PROVIDED FOR AERONAUTICAL INFORMATION SERVICES UNITS

3.1 List of information

3.1.1. The following information must be supplied, as necessary, to an aeronautical information services unit:

a) information on meteorological service for international air navigation, intended for inclusion in the aeronautical information publication(s) concerned;

Note. Details of this information are given in Civil Aviation Aeronautical Information Services Regulations

b) information necessary for the preparation of NOTAM or ASHTAM including, in particular, information on:

(i) the establishment, withdrawal and significant changes in operation of aeronautical meteorological services. This information is required to be provided to the aeronautical information services unit sufficiently in advance of the effective date to permit issuance of NOTAM in compliance with *Civil Aviation Aeronautical Information Services Regulations.*

(ii) the occurrence of volcanic activity; and

Compliance Note: The specific information required is given in Part V *and* Part VII

(iii) release of radioactive materials into the atmosphere, as agreed between the meteorological and appropriate civil aviation authorities concerned; and

Compliance Note: The specific information required is given in Part V.

c) information necessary for the preparation of aeronautical information circulars including, in particular, information on:

(i) expected important changes in aeronautical meteorological procedures, services and facilities provided; and

(ii) effect of certain weather phenomena on aircraft operations.

APPENDIX 10: TECHNICAL SPECIFICATIONS RELATED TO REQUIREMENTS FOR AND USE OF COMMUNICATIONS

1. SPECIFIC REQUIREMENTS FOR COMMUNICATIONS

1.1. Required transit times of operational meteorological information

Messages and bulletins containing operational meteorological information must achieve transit times of less than 5 minutes, unless otherwise determined to be lower by regional air navigation agreement.

1.2. Grid point data for ATS and operators

1.2.1. When upper-air data for grid points in digital form are made available for use by air traffic services computers, the transmission arrangements must be as agreed between the meteorological authority and the appropriate ATS authority concerned.

1.2.2. When upper-air data for grid points in digital form are made available to operators for flight planning by computer, the transmission arrangements must be as agreed between the WAFC concerned, the meteorological authority and the operators concerned.

2. USE OF AERONAUTICAL FIXED SERVICE COMMUNICATIONS AND THE PUBLIC INTERNET

2.1. Meteorological bulletins in alphanumeric format

2.1.1. Composition of bulletins

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

2.1.2. Filing times of bulletins

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

2.1.3. Heading of bulletins

Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service or the public Internet must 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.

Compliance Note 1. Detailed specifications on format and contents of the heading are given in WMO Publication No. 386, Manual on the Global Telecommunication System, Volume I and are reproduced in the Manual of Aeronautical Meteorological Practice (Doc 8896).

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

2.1.4 Structure Transmission of bulletins containing operational meteorological information.

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

2.2. World area forecast system products

2.2.1. Telecommunications for the supply of WAFS products

The telecommunications facilities used for the supply of world area forecast system products must be the aeronautical fixed service or the public Internet.

2.2.2. Quality requirements for charts

Where world area forecast system products are disseminated in chart form, the quality of the charts received must be such as to permit reproduction in a sufficiently legible form for flight planning and documentation. Charts received must be legible over 95 per cent of their area.

2.2.3. Quality requirements for transmissions

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

2.2.4. Heading of bulletins containing WAFS products

Meteorological bulletins containing WAFS products in digital form to be transmitted via aeronautical fixed service or the public Internet must contain a heading as given in 2.1.3.

3. USE OF AERONAUTICAL MOBILE SERVICE COMMUNICATIONS

3.1. Content and format of meteorological messages

3.1.1 The content and format of reports, forecasts and SIGMET information transmitted to aircraft must be consistent with the provisions of Part VI, VIII, and IX of this regulations

3.1.2. The content and format of air-reports transmitted by aircraft must be consistent with the provisions of Part VII of this regulation and the Manual of air traffic services.

3.2. Content and format of meteorological bulletins

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

4. USE OF AERONAUTICAL DATA LINK SERVICE — D-VOLMET

4.1. Detailed content of meteorological information available for D-VOLMET

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

4.1.2. The flight information regions for which SIGMET messages are to be available for uplink to aircraft in flight must be determined by regional air navigation agreement.

4.2. Criteria related to information to be available for D-VOLMET

4.2.1. The latest available METAR, SPECI and TAF, and valid SIGMET must be used for uplink to aircraft in flight.

4.2.2. TAF included in the D-VOLMET must 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.

4.2.3. If no SIGMET message is valid for a flight information region, an indication of “NIL SIGMET” must be included in the D-VOLMET.

4.3. Format of information to be available for D-VOLMET

The content and format of reports, forecasts and SIGMET information included in DVOLMET must be consistent with the provisions of Parts VI, VIII, and IX of this regulation

5. USE OF AERONAUTICAL BROADCASTING SERVICE — VOLMET BROADCASTS

5.1. Detailed content of meteorological information to be included in VOLMET broadcasts

5.1.1. 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 must be determined by regional air navigation agreement.

5.1.2. The flight information regions for which SIGMET messages are to be included in scheduled VOLMET broadcasts must be determined by regional air navigation agreement. Where this is done, the SIGMET message must be transmitted at the beginning of the broadcast or of a five-minute time block.

5.2. Criteria related to information to be included in VOLMET broadcasts

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

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

5.2.3. Where SIGMET messages are included in scheduled VOLMET broadcasts, an indication of "NIL SIGMET" must be transmitted if no SIGMET message is valid for the flight information regions concerned.

5.3. Format of information to be included in VOLMET broadcasts

The content and format of reports, forecasts and SIGMET information included in VOLMET broadcasts must be consistent with the provisions of Part VI, VIII, and IX of this regulations

5.3.1. VOLMET broadcasts must use standard radiotelephony phraseologies.

Compliance 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.

ATTACHMENT A: OPERATIONALLY DESIRABLE ACCURACY OF MEASUREMENT OR OBSERVATION

Compliance Note The guidance contained in this table relates to Sub-Part 4 – Supply, use, quality management and interpretation of meteorological information, and Sub-Part 6 – Meteorological observations and reports.

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.

Compliance Note: Guidance on the uncertainties of measurement or observation can be found in WMO Publication No. 8 Guide to Meteorological Instruments and Methods of Observation.

ATTACHMENT B: OPERATIONALLY DESIRABLE ACCURACY OF MEASUREMENT OR OBSERVATION

Compliance Note 1. *The guidance contained in this table relates to Sub-Part 4 – Supply, use, quality management and implementation of meteorological information and Sub-Part 8 — Forecasts.*

Compliance 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**
Wind direction (5 kt)	± 20°	80% of cases
Wind speed	± 2.5 m/s	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

Element to be forecast	Operationally desirable accuracy of forecasts	Minimum percentage of cases within range
Precipitation	Occurrence or non-occurrence	90% 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)	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)	80% of cases 70% of cases 70% of cases 80% of cases 80% of cases

Element to be forecast	Operationally desirable accuracy of forecasts	Minimum percentage of cases within range
	Flight level of tropopause: ± 300 m (1 000 ft) Max wind level: ± 300 m (1 000 ft)	

ATTACHMENT C SELECTED CRITERIA APPLICABLE TO AERODROME REPORTS

The guidance in this table relates to Sub-Part 6 and Appendix 3.

	Surface wind				Visibility (VIS)			Runway Visual Range [1] A B C (OBS -10 -5 Time) (Time MIN)		Present weather	Cloud					Temperature	Pressure (QNH, QFE)		Supplementary information
											Amount				Type [2]				
	Directional Variations [3]			Speed variations [3]	Directional Variations [4]			Past tendency [5]			Layers reported if coverage								
	≥60° and < 180°		≥180°			Special cases Minimum VIS ≠ prevailing VIS		$\lvert R_{5(AB)}-R_{5(BC)}\rvert$											
	Mean Speed																		
Specifications	< 1.5 m/s (3 kt)	≥1.5 m/s (3 kt)		Exceeding the mean speed by ≥5 m/s (10 k	General Rule	Minimum VIS < 1 500 m or < 0.5 × prevailing VIS	VIS fluctuating and prevailing VIS cannot be determined	< 100 m	≥100	No general criteria applicable to all the WX phenomena (for specific criteria, see Appendix 3, 4.4.2)	Lowest Layer	Next Layer >	Next Higher Layer >	CB[6] or TCU	Identification	No Criteria	Parameters reported	Updated if changes > agreed magnitude	Parameter to be included

Local routine and special reports	2/10 min	7	2/10 Min	7	2 Min		10 Min	8	1 min		n/a	n/a	1 Min			Always	2/8	4/8	Always	CB TCU		QNH QFE[10]	Yes	All[11]
	VRB + 2 extreme directions[8]		mean + 2 extreme directions[8]		VRB (no extremes)[8]		Minimum and maximum speed		VIS along the runway (s)				n/a[9]											
METAR/SPECI	10 Min		10 min		10 min		10 min	8	10 min		Prevailing VIS and minimum VIS + direction	Minimum VIS	10 min	Upward (“U”) or downward (“D”)		Always	2/8	4/8	Always	CB TCU		QNH	No	Recent WX of operational significance and wind shear[12]
	VRB (no extremes)		Mean +2 extreme directions		VRB (no extremes)		Maximum Speed[8]		Prevailing VIS				No tendency observed (“N”)											
													No tendency available, the tendency is to be omitted											

Relevant reporting scales for all messages	Direction in three figures rounded off 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 Step applicable VIS < 800 m : 50 m 800 m ≤VIS < 5 000 m : 100 m 5 000 m ≤VIS < 10 km : 1 km VIS ≥10 km : None, given as 10 km or covered under CAVOK			If Step applicable RVR < 400 m : 25 m 400 m ≤RVR ≤800 m : 50 m 800 m < RVR < 2 000 m : 100 m [13]		N/A	If Step applicable Base ≤3 000 m (10 000 ft) : 30 m (100 ft) (Reference level: Aerodrome elevation [14] or mean sea level for offshore structures)					Rounded off to whole degrees: up for decimal 5	In whole hPa [15] rounding 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 maybe 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 R5(AB)= 5-minute mean runway visual range value during period AB and R5(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 WMO Manual on Codes(WMO-No. 306), Volume I.1, Part A — Alphanumeric Codes, paragraph 15.5.5,“it is recommended that the wind measuring systems maybe such that peak gusts mayrepresent a three-second average”.
9. N/A = not applicable.
10. QFE is to be included if required. Reference elevation for QFE maybe 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 maybe the relevant threshold elevation.
11. As listed in Appendix 3, 4.8.
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 Appendix 3, 4.3.5)

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 paragraph 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 FigureD-1 in the form of a step function; they are tabulated in Table D-1 for greater clarity.

Compliance 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).

Compliance 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.

Table D-1. Illumination threshold steps

Condition	*Illumination threshold (lx)*	*Background luminance (cd/m^2)*
Night	8×10^{-7}	≤5
Intermediate	10^{-5}	51 – 999
Normal day	10^{-4}	1 000 – 12 000

Bright day (sunlit fog)	10^{-3}	> 12 000

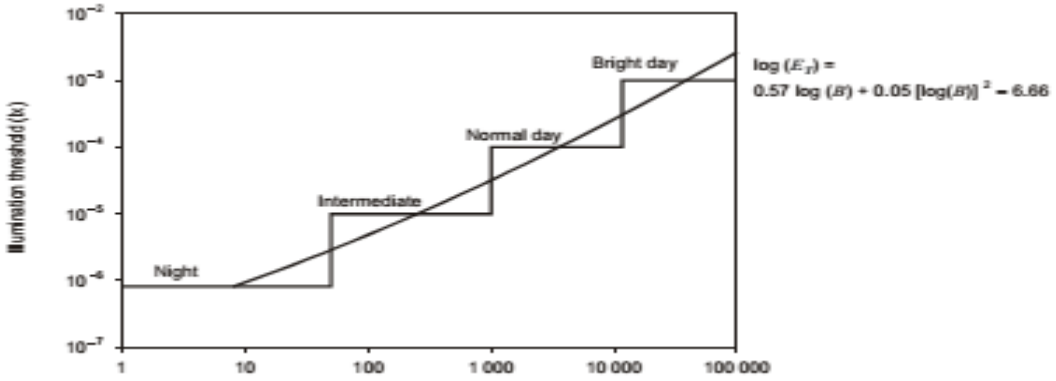


Figure D-1. Relationship between the illumination threshold E_T (lx) and background luminance B(cd/m^2)

ATTACHMENT E. SPATIAL RANGES AND RESOLUTIONS FOR SPACE WEATHER ADVISORY INFORMATION

Element to be forecast		Range	Resolution
Flight level affected by radiation		250 – 600	10
Longitudes for advisories (degrees)		000 – 180	15
Latitudes for advisories (degrees)		00 – 90	10
Latitude bands for advisories:	High latitudes northern hemisphere (HNH)	N9000 – N6000	30
	Middle latitudes northern hemisphere (MNH)	N6000 – N3000	
	Equitorial latitudes northern hemisphere (EQN)	N3000 – N0000	
	Equitorial latitudes sourthern hemisphere (EQS)	S0000 – S3000	
	Middle latitudes sourthern hemisphere (MSH)	S3000 – S6000	
	High latitudes sourthern hemisphere (HSH)	S6000 – S9000	