

## APPENDIX E

### NOTES ON THE PRESENTATION OF THE AMENDMENT TO ANNEX 3

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

1. ~~text to be deleted is shown with a line through it~~ text to be deleted
2. **new text to be inserted is highlighted with grey shading** new text to be inserted
3. ~~text to be deleted is shown with a line through it~~ **followed by the new text which is highlighted with grey shading** new text to replace existing text

**INTERNATIONAL STANDARDS  
AND RECOMMENDED PRACTICES**

**METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION**

**ANNEX 3**

**CHAPTER 1. DEFINITIONS**

*Area of coverage (world area forecast system).* A geographical area for which a regional area forecast centre supplies forecasts for flights departing from aerodromes in its service area.

*Area of responsibility (world area forecast system).* A geographical area for which a regional area forecast centre prepares significant weather forecasts.

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*Regional area forecast centre (RAFC).* A meteorological centre designated to prepare and supply significant weather forecasts and upper wind and temperature charts for flights departing from aerodromes within its service area and to supply grid point data in digital form for up to world-wide coverage.

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*Service area (world area forecast system).* A geographical area within which a regional world area forecast centre is responsible for supplying issuing area forecasts to meteorological authorities and other users.

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

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*World area forecast centre (WAFC)*. A meteorological centre designated to prepare and ~~supply~~ **issue** significant weather forecasts and upper-air forecasts in digital ~~and/or pictorial~~ form on a global basis ~~to regional area forecast centres, and direct to States by appropriate means as part of the aeronautical fixed service.~~

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

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## CHAPTER 3. WORLD AREA FORECAST SYSTEM AND METEOROLOGICAL OFFICES

### 3.1 Objectives of the world area forecast system

The objectives of the world area forecast system shall be:

- ~~— a) to supply meteorological offices with forecasts of en-route meteorological conditions concerning upper winds, upper-air temperatures, direction, speed and height of maximum wind, tropopause height and significant weather in pictorial and/or alphanumeric form suitable, as far as practicable, for direct use by operators, flight crew members, air traffic services units and other aeronautical users;~~
- ~~— b) to supply meteorological authorities and other users with **global** upper wind, upper-air temperature **and humidity**, direction, speed and height of maximum wind, **and** tropopause height **and temperature** forecasts and forecasts of significant weather phenomena for **grid points** in digital form.~~

~~These~~ **This** objectives shall be achieved through a comprehensive, integrated, world-wide and, as far as practicable, uniform system, and in a cost-effective manner, **taking full advantage of evolving technologies.**

### 3.2 World area forecast centres

3.2.1 A Contracting State, having accepted the responsibility for providing a WAFC within the framework of the world area forecast system, shall arrange for that centre:

- a) to prepare global forecasts for grid points in digital form for all required levels and in a standard format; the forecasts shall comprise upper winds, upper-air temperatures **and humidity**, tropopause heights **and temperatures** and maximum wind speed, direction and height;
- b) to prepare global forecasts of significant weather phenomena **in digital form**;
- c) to issue the forecasts referred to in a) and b) above in digital ~~and/or pictorial~~ form **to meteorological authorities and other users in its service area**;
- d) to prepare and issue amendments to the forecasts;

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*Note 2.— Specifications for the preparation of significant weather and upper-air prognostic charts are contained in the Appendix.*

*Note 3.— The WAFS service areas are given in the CNS part of the regional air navigation plans.*

3.2.2 **Recommendation.**—In case of interruption of the operation of a WAFC, its functions ~~should~~ **shall** be carried out by the other WAFC.

3.2.3 **Recommendation.**—The forecasts of upper winds and upper-air temperatures; **and humidity;** direction, speed and height of maximum winds and tropopause heights **and temperatures** prepared four times daily by a WAFC ~~should~~ **shall** be valid for 6, 12, 18, 24, 30 and 36 hours after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based and ~~should~~ **shall** be available for start of transmission in the above ~~order as soon as technically feasible but~~ not later than 6 hours after standard time of observation.

3.2.4 **Recommendation.**—Forecasts of significant weather phenomena prepared by WAFCs ~~should~~ **shall** be issued four times a day for fixed valid times of 0000, 0600, 1200 and 1800 UTC. The transmission of each forecast ~~should~~ **shall** be completed as soon as technically feasible but at least nine hours before its validity time when issued in chart form and at least twelve hours before its validity time when issued in the BUFR code form.

3.2.5 **Recommendation.**—~~When the f~~Forecasts of significant weather phenomena ~~are~~ **shall be** issued in binary code form, **using** the BUFR code ~~should be used~~ **form**.

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

3.2.6 **Recommendation.**—Forecasts of significant weather phenomena ~~should~~ **shall** include all the items listed in 9.6.1. ~~When the~~ **The** forecasts ~~are~~ issued in chart form or in the BUFR code form, they ~~should~~ **shall** be in agreement with the specifications in 3.3.7: **issued for the following flight levels:** 3.3.7 **Recommendation.**—The significant weather charts should include the phenomena listed in 9.6.1 between:

- a) **between** flight levels 250 ~~and~~ **to** 630; and
- b) **between** flight levels 100 ~~to~~ **and** 250 for limited geographical areas, as determined by regional air navigation agreement. If the average elevation of the topography of the area could extend a significant topographical effect to flight level 100, a higher level should be specified for the base of the charts, in consultation with the ~~RAFC or~~ WAFC concerned, and in accordance with regional air navigation agreement.

3.2.7 **Recommendation.**—*The grid point forecasts prepared by a WAFC should comprise:*

- a) *wind and temperature data for flight levels 50 (850 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa), 300 (300 hPa), 340 (250 hPa), 390 (200 hPa) and 450 (150 hPa);*
- b) *tropopause height **and temperature**, and direction, speed and height of maximum wind;*

c) humidity data for flight levels 50 (850 hPa), 100 (700 hPa), 140 (600 hPa) and 180 (500 hPa); ~~and~~

d) wind and temperature data for flight levels 530 (100 hPa) and 600 (70 hPa) when and where required; ~~and~~.

~~d) humidity data for flight levels 50 (850 hPa), 100 (700 hPa), 140 (600 hPa) and 180 (500 hPa).~~

3.2.8 **Recommendation.**— The **foregoing** grid point forecasts of upper winds and upper-air temperatures, direction, speed and height of maximum winds and tropopause heights should **shall** be prepared by a WAFC in a fixed grid with a horizontal resolution of 140 km.

*Note.*— 140 km represents a distance of about 1.25E of latitude.

3.2.10 **Recommendation.**— The **foregoing** grid point forecasts of upper winds, upper-air temperatures, direction, speed and height of maximum winds and tropopause heights should **shall** be issued by a WAFC in **binary code form using** the GRIB code form.

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

3.2.9-10 WAFCs shall adopt uniform formats and codes for the supply of forecasts and amendments.

3.2.11 **Recommendation.**— *The upper wind and upper-air temperature forecasts in pictorial form should be issued for flight levels as determined by regional air navigation agreement.*

— 3.2.12 **Recommendation.**— *Amendments to upper wind and upper-air temperature forecasts should be issued in accordance with the following criteria:*

— *Upper wind*            *Change in direction of 30E or more, provided the wind speed is 60 km/h (30 kt) or more before or after the change; change in speed of 40 km/h (20kt) or more.*

— *Upper-air*            *Change of more than 5EC.*  
*temperatures*

3.2.11 **Recommendation.**— WAFCs should apply the following criteria for the amendment of significant en-route weather forecasts:

*Aircraft icing and turbulence*            *Newly expected occurrence; error in expected position of phenomena; intensity increasing; intensity decreasing from severe to light or nil, or from moderate to nil.*

*Jet streams*            *Newly expected occurrence or disappearance; error in*

	<i>expected position &gt; 400 km; error in speed &gt; 20 per cent; error in core height &gt; 900 m (3000 ft).</i>
<i>Other significant en-route weather phenomena, and any new information concerning</i>	<i>Newly expected occurrence; no longer expected.</i>
<b>SWH forecasts aircraft turbulence, and occasional, frequent or embedded Cbs</b>	<b>Newly expected occurrence</b>
<b>SWM forecasts aircraft icing, turbulence, Cbs, and sandstorms/ duststorms</b>	<b>Newly expected occurrence</b>
<i>Volcanic eruptions or the accidental release of radioactive materials into the atmosphere of significance to aircraft operations.</i>	<b><i>Inclusion of Volcanic activity symbol, or radiation symbol.</i></b>

~~3.2.14 **Recommendation.**—Amendments to the upper wind and upper-air temperature forecasts should be prepared in accordance with the criteria in 3.2.12 in the form of amended meteorological bulletins and abbreviated plain-language messages and should be issued with the minimum possible delay.~~

~~—Note.—Guidance on the use of abbreviated plain language is given in Attachment A.~~

**3.2.1512 Recommendation.**—Amendments to forecasts of significant weather phenomena should be issued with the minimum possible delay in accordance with the criteria in 3.2.11~~3~~ and supplied in the form of **amended BUFR files**. ~~abbreviated plain-language messages.~~

~~—Note.—Guidance on the preparation of abbreviated plain-language significant weather forecast messages is given in Attachment A.~~

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Editorial Note: — Paragraphs 3.2.11 to 3.2.14 and Attachment A may become redundant depending on how the WAFCs propose to issue amendments.

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### 3.3 Regional area forecast centres

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*Editorial Note: — Delete Section 3.3 in toto.*

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### **3.4-3 Meteorological offices**

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*Editorial Note: — Renumber paragraphs 3.4.1 to 3.4.4 to read 3.3.1 to 3.3.4*

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3.4.5 The extent to which an aerodrome meteorological office prepares forecasts and/or makes use of products from WAFCs and/or RAFCs and other sources shall be determined by the meteorological authority concerned.

3.4.6 Meteorological offices using WAFS GRIB and/or BUFR data and/or WAFS forecast charts shall notify the WAFC and RAFC concerned immediately if significant discrepancies in accordance with 3.2.13 1 and 3.3.10 are detected or reported in respect of WAFS significant weather data and products. The WAFC receiving the message shall 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. If it is considered necessary to issue an amendment, an appropriate ADMIN message shall be transmitted to all users through satellite broadcasts. There is no requirement for meteorological offices to report incidents of radiological emergencies.

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

3.4.7 **Recommendation.**— *Aerodrome meteorological offices should use as far as practicable output products of the world area forecast system in the preparation of flight documentation.*

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

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*Editorial Note: — Renumber paragraph 3.4.8 to read 3.4.9*

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### **3.5-4 Meteorological watch offices**

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*Editorial Note: — Renumber paragraphs 3.5.1 and 3.5.2 to read 3.4.1 and 3.4.2*

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~~3.5.4.3~~ The extent to which a meteorological watch office makes use of products from WAFCs and/or RAFCs and other sources shall be determined by the meteorological authority concerned.

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### **3.6-5 Volcanic ash advisory centres**

~~3.6-5.1~~ A Contracting State having accepted, by regional air navigation agreement, the responsibility for providing a VAAC within the framework of the international airways volcano watch, shall arrange for that centre to respond to a notification that a volcano has erupted, or is expected to erupt or volcanic ash is reported in its area of responsibility, by arranging for that centre to:

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- c) issue advisory information regarding the extent and forecast movement of the volcanic ash “cloud” to:

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- 3) world area forecast centres, ~~relevant regional area forecast centres~~, international OPMET data banks, international NOTAM offices, and centres designated by regional air navigation agreement for the operation of aeronautical fixed service satellite distribution systems; and

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*Editorial Note: — Renumber paragraph 3.6.2 to read 3.5.2*

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~~3.6-5.3~~ **Recommendation.** — *The volcanic ash advisory information listed in 3.6-5.2, when issued in graphical format should be as specified in the Appendix 1.*

### **3.7 6 Tropical cyclone advisory centres**

~~3.7-6.1~~ A Contracting State having accepted, by regional air navigation agreement, the responsibility for providing a TCAC shall arrange for that centre to:

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- b) issue advisory information concerning the position of the cyclone centre, its direction and speed of movement, central pressure and maximum surface wind near the centre; in abbreviated plain language to:

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- 3) world area forecast centres, ~~relevant regional area forecast centres~~ and international OPMET data banks, and centres designated by regional air navigation agreement for the operation of aeronautical fixed service satellite distribution systems.

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*Editorial Note: — Renumber paragraph 3.7.2 to read 3.6.2*

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## CHAPTER 5. AIRCRAFT OBSERVATIONS AND REPORTS

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### 5.8 Exchange of air-reports

5.8.1 The meteorological authority concerned shall make arrangements with the appropriate ATS authority to ensure that, on receipt by the ATS units of:

- a) routine and special air-reports by voice communications, the ATS units relay them without delay to their associated meteorological watch office;
- b) routine air-reports by data link communications, the ATS units relay them without delay to WAFCs and, as appropriate, to RAFCs;
- c) special air-reports by data link communications, the ATS units relay them without delay to their associated meteorological watch office; **and** WAFCs and, as appropriate, to RAFCs.

5.8.2 The meteorological watch offices shall assemble the routine air-reports received by voice communications and shall disseminate them to WAFCs and, as appropriate, RAFCs, and other meteorological offices in accordance with regional air navigation agreement. The exchange of collectives on an hourly basis may be found desirable when reports are numerous.

5.8.3 The meteorological watch office shall transmit without delay the special air-reports received by voice communications to WAFCs and, as appropriate, RAFCs.

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5.8.6 Air-reports received at WAFCs and RAFCs shall be further disseminated as basic meteorological data.

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## CHAPTER 7. SIGMET AND AIRMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS

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### 7.2 Format and exchange of SIGMET messages

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7.2.11 SIGMET messages shall be disseminated to meteorological watch offices, WAFCs and, as appropriate, RAFCs and to other meteorological offices, in accordance with regional air navigation agreement. SIGMET messages for volcanic ash shall also be disseminated to VAACs.

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## CHAPTER 9. SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

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### 9.4 Flight documentation — general

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9.4.2 **Recommendation.**— Meteorological offices should, as far as practicable, provide information received within the framework of the world area forecast system for flight documentation. The flight documentation should be presented in the form of charts, tabular forms, or abbreviated plain-language texts. Aerodrome forecasts should be presented in the TAF code, or in abbreviated plain-language text using a tabular presentation.

9.4.3 **Recommendation.**— *Charts included in flight documentation should have a high standard of clarity and legibility and should have the following physical characteristics:*

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g) labels on the charts *for flight documentation* should be clear and simple and should present the name of the ~~regional~~ *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.

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9.4.6 **Recommendation.**— *The minimum number of charts for flights between flight level 250 and flight level ~~450~~ 630 should include a high-level significant weather chart (flight level 250 to flight level ~~450~~ 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 should be as agreed between meteorological authorities and other users within a service area and the appropriate regional area forecast centre(s) concerned within a service area.*

9.4.7 **Recommendation.**— *The set of charts to be provided under the area forecast system for flights below flight level 250 ~~and for flights above flight level 450 including supersonic flights~~ should be as agreed between user States and other users and the regional area forecast centre concerned within a service area.*

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## CHAPTER 11. REQUIREMENTS FOR AND USE OF COMMUNICATIONS

### 11.1 Requirements for communications

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11.1.3 Suitable telecommunications facilities shall be made available to permit world ~~and regional~~ area forecast centres to supply the required world area forecast system products to meteorological offices, meteorological authorities and other users.

11.1.4 **Recommendation.**— *The telecommunications facilities used for the supply of world area forecast system products should be:*

— *a) for world area forecast centres, the aeronautical fixed service, and*

— *b) for regional area forecast centres, the aeronautical fixed service, except as otherwise determined by regional air navigation agreement.*

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11.1.13 **Recommendation.**— *When upper-air data for grid points in digital form are made available to operators for flight planning by computer, the transmission arrangements should be as agreed among the world-~~or regional~~ area forecast centre concerned, the meteorological authority and the operators.*

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**ATTACHMENT A. GUIDANCE ON AREA FORECASTS IN ABBREVIATED  
PLAIN LANGUAGE**

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*Editorial Note: — Delete Attachment A, Parts 2 and 3 in toto and renumber subsequent attachments accordingly.*

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