Agenda Item 1: **Follow-up to the implementation of the space meteorology service, and amendments to Annex 3 and other ICAO documents related to the MET area**

Amendment 79 and 80 to ICAO Annex 3

(Presented by the Secretariat)

SUMMARY

This working paper presents Amendments 79 and 80 to ICAO Annex 3, and the follow-up to implementation by States.

References:

- Annex 3 – *Meteorological service for international air navigation*
- State letter: AN 10/1.1-20/16 dated 2 April 2020
- State letters: AN 10/1.1, AN 11/1.3.33, AN 11/6.3.32, AN 3/5.13, AN 4/1.2.29, AN 2/2.7, AN 13/2.1, AN 4/27 and AN 2/33-20/73 dated 30 July 2020

ICAO strategic objectives:	*A - Safety* *B - Air navigation capacity and efficiency* *E - Environmental protection*

1. Introduction

1.1 ICAO advised States of the entry into force of Amendment 79 to Annex 3 starting on 20 July 2020.

1.2 Due to the COVID-19 pandemic contingency, ICAO postponed the implementation of the GRF to 5 November 2021.

2. Discussion

2.1 Amendment 79 to Annex 3 was adopted upon recommendation of the METP meeting. The amendment included the following:

a) Introduction of changes to volcanic ash information provisions to facilitate reporting of volcanic ash resuspension occurrences;
b) Facilitating user access to references to quality management system guidelines;
c) Incorporation of SIGMET coordination as a recommended practice to enhance harmonisation of information provided in these warnings;
d) Improved representation of the location and extent of volcanic ash clouds;
e) Improving the forecasts of the World Area Forecast System (WAFS) by increasing horizontal and vertical spatial resolution of hazard grids for turbulence, icing and cumulonimbus (CB) cloud forecasts;

f) Improving tropical cyclone (TC) advisories and SIGMET information on tropical cyclones to avoid interpretation, and improving validation and translation of these messages from the traditional alphanumeric code (TAC) format to the ICAO weather exchange model (IWXXM) format;
g) Improving space weather advisory services to allow more than one space weather effect of the same intensity to be combined in a single space weather advisory, and for all space weather effects to be described using latitude bands;
h) Update of eddy dissipation rate (EDR) values to improve aircraft turbulence reporting;
i) Ensuring that missing or incorrect mandatory parameters in METARs can be easily indicated in TAC format in the IWXXM format in order to avoid validation failures once translated from TAC to IWXXM format;
j) Enabling low-level flight area forecasts to be transmitted to the air navigation information satellite distribution system (SADIS) and the WAFS Internet File Service (WIFS) for the benefit of users worldwide;
k) Simplifying the current requirements for SIGMET and AIRMET radioactive cloud messages (RDOACT CLD) for uniformity purposes;
l) Inclusion of reporting of heavy dust storms (HVY DS) in special air-reports (AIREPs) to align its format and content with Annex 3 and the Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM, Doc 4444); and
m) Introducing minor changes to Annex 3 to facilitate IWXXM exchange over the aeronautical fixed telecommunication network (AFTN - AMHS).

2.2 **Appendix A** to this working paper contains the letter communicating the adoption of Amendment 79 to Annex 3.

2.3 The Secretariat intends to monitor the implementation of the amendment. To this end, the Meeting is invited to fill in the table presented as **Appendix B** to the working paper.

2.4 Due to the Covid-19 contingency, ICAO postponed the entry into force of the GRF to 4 November 2021, rendering ineffective Amendment 77-B to Annex 3, by means of Amendment 80.

3. Suggested action

3.1 The Meeting is invited to:

a) take note of the information provided in this working paper;

b) complete the table in Appendix B; and

c) take any other actions it may deem appropriate.

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International Civil Aviation Organization | Organisation de l'aviation civile internationale | Organización de Aviación Civil Internacional | Международная организация гражданской авиации | منظمة الطيران المدني الدولي | 国际民用航空组织

Tel.: +1 514-954-8219 ext. 6717

Ref.: AN 10/1.1-20/16 2 April 2020

Subject: Adoption of Amendment 79 to Annex 3

Action required: a) Notify any disapproval before 20 July 2020; b) Notify any differences and compliance before 5 October 2020[1] c) Consider the use of the Electronic Filing of Differences (EFOD) System for notification of differences and compliance

Sir/Madam,

1. I have the honour to inform you that Amendment 79 to the *International Standards and Recommended Practices, Meteorological Service for International Air Navigation* (Annex 3 to the Convention on International Civil Aviation) was adopted by the Council at the fourth meeting of its 219th Session on 9 March 2020. Copies of the Amendment and the Resolution of Adoption are available as attachments to the electronic version of this State letter on the ICAO-NET (http://portal.icao.int) where you can access all other relevant documentation.

2. When adopting the amendment, the Council prescribed 20 July 2020 as the date on which it will become effective, except for any part concerning which a majority of Contracting States have registered their disapproval before that date. In addition, the Council resolved that Amendment 79, to the extent it becomes effective, will become applicable on 5 November 2020 unless otherwise indicated.

3. Amendment 79 arises from recommendations developed by the fourth meeting of the Meteorology Panel (METP/4) concerning SIGMET information concerning the release of radioactive material in the atmosphere, improved harmonization of SIGMET information, space weather advisory information, routine observations at aerodromes (METAR) information, tropical cyclone advisory and related SIGMET information, the ICAO Meteorological Information Exchange Model (IWXXM), the international airways volcano watch (IAVW), the world area forecast system (WAFS), special air-reports on turbulence, quality management system, dissemination of AIRMET and GAMET and the inclusion of heavy dust storms (HVY DS) in special air-reports.

[1] 4 October 2021 for provisions indicating applicable as of 4 November 2021.

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4. The provisions in Annex 3 with a delayed applicability date of 4 November 2021 and concerning the dissemination of significant weather (SIGWX) forecasts in IWXXM GML form are intended to enable World Meteorological Organization (WMO) to develop the supporting data models and to allow sufficient time for full implementation by States.

5. The subjects are given in the amendment to the Foreword of Annex 3, a copy of which is in Attachment A.

6. In conformity with the Resolution of Adoption, may I request:

a) that before 20 July 2020 you inform me if there is any part of the adopted Standards and Recommended Practices (SARPs) amendments in Amendment 79 concerning which your Government wishes to register disapproval, using the form in Attachment B for this purpose. Please note that only statements of disapproval need be registered and if you do not reply it will be assumed that you do not disapprove of the amendment;

b) that before 5 October 2020[2] you inform me of the following, using the Electronic Filing of Differences (EFOD) System or the form in Attachment C for this purpose:

1) any differences that will exist on 5 November 2020 between the national regulations or practices of your Government and the provisions of the whole of Annex 3, as amended by all amendments up to and including Amendment 79, and thereafter of any further differences that may arise; and

2) the date or dates by which your Government will have complied with the provisions of the whole of Annex 3, as amended by all amendments up to and including Amendment 79.

7. With reference to the request in paragraph 6 a) above, it should be noted that a registration of disapproval of Amendment 79 or any part of it in accordance with Article 90 of the Convention does not constitute a notification of differences under Article 38 of the Convention. To comply with the latter provision, a separate statement is necessary if any differences do exist, as requested in paragraph 6 b) 1). It is recalled in this respect that international Standards in Annexes have a conditional binding force, to the extent that the State or States concerned have not notified any difference thereto under Article 38 of the Convention.

8. With reference to the request in paragraph 6 b) above, it should be also noted that the ICAO Assembly, at its 39th Session (27 September to 6 October 2016), resolved that Member States should be encouraged to use the EFOD System when notifying differences (Resolution A39-22, refers). The EFOD System is currently available on the Universal Safety Oversight Audit Programme (USOAP) restricted website (http://www.icao.int/usoap) which is accessible by all Member States. You are invited to consider using this for notification of compliance and differences.

9. Guidance on the determination and reporting of differences is given in the Note on the Notification of Differences in Attachment D. Please note that a detailed repetition of previously notified differences, if they continue to apply, may be avoided by stating the current validity of such differences.

10. I would appreciate it if you would also send a copy of your notifications, referred to in paragraph 6 b) above, to the ICAO Regional Office accredited to your Government.

[2] 4 October 2021 for provisions indicating applicable as of 4 November 2021.

11. At the fifth meeting of its 204th Session, the Council requested that States, when being advised of the adoption of an Annex amendment, be provided with information on implementation and available guidance material, as well as an impact assessment. This is presented for your information in Attachments E and F, respectively.

12. As soon as practicable after the amendment becomes effective, on 20 July 2020, a new edition of Annex 3 incorporating Amendment 79 will be forwarded to you.

Accept, Sir/Madam, the assurances of my highest consideration.

Fang Liu
Secretary General

Enclosures:

A — Amendment to the Foreword of Annex 3
B — Form on notification of disapproval of all or part of Amendment 79 to Annex 3
C — Form on notification of compliance with or differences from Annex 3, Amendment 79
D — Note on the Notification of Differences
E — Implementation task list and outline of guidance material in relation to Amendment 79 to Annex 3
F — Impact assessment in relation to Amendment 79 to Annex 3

ATTACHMENT A to State letter AN 10/1.1-20/16

AMENDMENT TO THE FOREWORD OF ANNEX 3

Add the following at the end of Table A:

Amendment	***Source(s)***	***Subject***	***Adopted/Approved*** ***Effective*** ***Applicable***
79	Fourth meeting of the Meteorology Panel (METP/4)	SIGMET information concerning the release of radioactive material in the atmosphere; improved harmonization of SIGMET information; space weather advisory information; routine observations at aerodromes (METAR) information; tropical cyclone advisory and related SIGMET information; the ICAO Meteorological Information Exchange Model (IWXXM); the international airways volcano watch (IAVW); the world area forecast system (WAFS); special air-reports on turbulence; quality management system; dissemination of AIRMET and GAMET; and the inclusion of heavy dust storms (HVY DS) in special air-reports.	9 March 2020 20 July 2020 5 November 2020 4 November 2021

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ATTACHMENT B to State letter AN 10/1.1-20/16

NOTIFICATION OF DISAPPROVAL OF ALL OR PART OF AMENDMENT 79 TO ANNEX 3

To: The Secretary General
International Civil Aviation Organization
999 Robert-Bourassa Boulevard
Montreal, Quebec
Canada H3C 5H7

(State) _____ hereby wishes to disapprove the following parts of Amendment 79 to Annex 3:

Signature _____ Date _____

NOTES

1) If you wish to disapprove all or part of Amendment 79 to Annex 3, please dispatch this notification of disapproval to reach ICAO Headquarters by 20 July 2020. If it has not been received by that date it will be assumed that you do not disapprove of the amendment. **If you approve of all parts of Amendment 79, it is not necessary to return this notification of disapproval.**

2) This notification should not be considered a notification of compliance with or differences from Annex 3. Separate notifications on this are necessary. (See Attachment C.)

3) Please use extra sheets as required.

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ATTACHMENT C to State letter AN 10/1.1-20/16

NOTIFICATION OF COMPLIANCE WITH OR DIFFERENCES FROM ANNEX 3

(including all amendments up to and including Amendment 79)

To: The Secretary General
International Civil Aviation Organization
999 Robert-Bourassa Boulevard
Montreal, Quebec
Canada H3C 5H7

1. No differences will exist on _____ between the national regulations and/or practices of **(State)** _____ and the provisions of Annex 3, including all amendments up to and including Amendment 79.

2. The following differences will exist on _____ between the regulations and/or practices of **(State)** _____ and the provisions of Annex 3, including Amendment 79 (Please see Note 2) below.)

a) Annex Provision (Please give exact paragraph reference)	**b) Details of Difference** (Please describe the difference clearly and concisely)	**c) Remarks** (Please indicate reasons for the difference)

(Please use extra sheets as required)

3. By the dates indicated below, **(State)** _____ will have complied with the provisions of Annex 3, including all amendments up to and including Amendment 79 for which differences have been notified in 2 above.

a) **Annex Provision** (Please give exact paragraph reference)	**b)** **Date**	**c)** **Comments**

(Please use extra sheets as required)

Signature _____ Date _____

NOTES

1) If paragraph 1 above is applicable to your State, please complete paragraph 1 and return this form to ICAO Headquarters. If paragraph 2 is applicable to you, please complete paragraphs 2 and 3 and return the form to ICAO Headquarters.

2) A detailed repetition of previously notified differences, if they continue to apply, may be avoided by stating the current validity of such differences.

3) Guidance on the notification of differences is provided in the Note on the Notification of Differences and in the *Manual on Notification and Publication of Differences* (Doc 10055).

4) Please send a copy of this notification to the ICAO Regional Office accredited to your Government.

ATTACHMENT D to State letter AN 10/1.1-20/16

NOTE ON THE NOTIFICATION OF DIFFERENCES
(*Prepared and issued in accordance with instructions of the Council)*

1. *Introduction*

1.1 Article 38 of the *Convention on International Civil Aviation* ("Convention") requires that a Contracting State notify ICAO any time it does not comply with a Standard in all respects, it does not bring its regulations or practices into full accord with any Standard, or it adopts regulations or practices differing in any particular respect from the Standard.

1.2 The Assembly and the Council, when reviewing the notification of differences by Contracting States in compliance with Article 38 of the Convention, have repeatedly noted that the timeliness and currency of such notifications is not entirely satisfactory. Therefore, this note is issued to reiterate the primary purpose of Article 38 of the Convention and to facilitate the determination and notification of differences.

1.3 The primary purpose of the notification of differences is to promote safety, regularity and efficiency in air navigation by ensuring that governmental and other agencies, including operators and service providers, concerned with international civil aviation are made aware of all national regulations and practices in so far as they differ from those prescribed in the Standards contained in Annexes to the Convention.

1.4 Contracting States are, therefore, requested to give particular attention to the notification of differences with respect to Standards in all Annexes, as described in paragraph 4 b) 1) of the Resolution of Adoption.

1.5 Although differences from Recommended Practices are not notifiable under Article 38 of the Convention, the Assembly has urged Contracting States to extend the above considerations to Recommended Practices contained in Annexes to the Convention, as well.

2. *Notification of differences from Standards and Recommended Practices (SARPs)*

2.1 Guidance to Contracting States in the notification of differences to Standards and Recommended Practices (SARPs) can only be given in very general terms. Contracting States are further reminded that compliance with SARPs generally extends beyond the issuance of national regulations and requires establishment of practical arrangements for implementation, such as the provision of facilities, personnel and equipment and effective enforcement mechanisms. Contracting States should take those elements into account when determining their compliance and differences. The following categories of differences are provided as a guide in determining whether a notifiable difference exists:

a) ***A Contracting State's requirement is more exacting or exceeds a SARP (Category A)***. This category applies when the national regulation and practices are more demanding than the corresponding SARP, or impose an obligation within the scope of the Annex which is not covered by the SARP. This is of particular importance where a Contracting State requires a higher standard which affects the operation of aircraft of other Contracting States in and above its territory;

b) ***A Contracting State's requirement is different in character or the Contracting State has established other means of compliance (Category B)****. This category applies, in particular, when the national regulation and practices are different in character from the corresponding SARP, or when the national regulation and practices differ in principle, type or system from the corresponding SARP, without necessarily imposing an additional obligation; and

c) ***A Contracting State's requirement is less protective, partially implemented or not implemented (Category C)***. This category applies when the national regulation and practices are less protective than the corresponding SARP; when no national regulation has been promulgated to address the corresponding SARP, in whole or in part; or when the Contracting State has not brought its practices into full accord with the corresponding SARP.

These categories do not apply to Not Applicable SARP. Please see the paragraph below.

2.2 **Not Applicable SARP.** When a Contracting State deems a SARP concerning aircraft, operations, equipment, personnel, or air navigation facilities or services to be not applicable to the existing aviation activities of the State, notification of a difference is not required. For example, a Contracting State that is not a State of Design or Manufacture and that does not have any national regulations on the subject, would not be required to notify differences from Annex 8 provisions related to the design and construction of an aircraft.

2.3 **Differences from appendices, tables and figures.** The material comprising a SARP includes not only the SARP itself, but also the appendices, tables and figures associated with the SARP. Therefore, differences from appendices, tables and figures are notifiable under Article 38. In order to file a difference against an appendix, table or figure, States should file a difference against the SARP that makes reference to the appendix, table or figure.

2.4 **Differences from definitions.** Contracting States should notify differences from definitions. The definition of a term used in a SARP does not have independent status but is an essential part of each SARP in which the term is used. Therefore, a difference from the definition of the term may result in there being a difference from any SARP in which the term is used. To this end, Contracting States should take into consideration differences from definitions when determining compliance or differences to SARPs in which the terms are used.

2.5 The notification of differences should be not only to the latest amendment but to the whole Annex, including the amendment. In other words, Contracting States that have already notified differences are requested to provide regular updates of the differences previously notified until the difference no longer exists.

2.6 Further guidance on the identification and notification of differences, examples of well-defined differences and examples of model processes and procedures for management of the

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* The expression "different in character or other means of compliance" in b) would be applied to a national regulation and practice which achieve, by other means, the same objective as that of the corresponding SARPs or for other substantive reasons so cannot be classified under a) or c).

notification of differences can be found in the *Manual on Notification and Publication of Differences* (Doc 10055).

3. *Form of notification of differences*

3.1 Differences can be notified:

a) by sending to ICAO Headquarters a form on notification of compliance or differences; or

b) through the Electronic Filing of Differences (EFOD) System at www.icao.int/usoap.

3.2 When notifying differences, the following information should be provided:

a) the number of the paragraph or subparagraph which contains the SARP to which the difference relates*;

b) the reasons why the State does not comply with the SARP, or considers it necessary to adopt different regulations or practices;

c) a clear and concise description of the difference; and

d) intentions for future compliance and any date by which your Government plans to confirm compliance with and remove its difference from the SARP for which the difference has been notified.

3.3 The differences notified will be made available to other Contracting States, normally in the terms used by the Contracting State when making the notification. In the interest of making the information as useful as possible, Contracting States are requested to ensure that:

a) statements be as clear and concise as possible and be confined to essential points;

b) the provision of extracts from national regulations not be considered as sufficient to satisfy the obligation to notify differences; and

c) general comments, unclear acronyms and references be avoided.

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* This applies only when the notification is made under 3.1 a).

ATTACHMENT E to State letter AN 10/1.1-20/16

IMPLEMENTATION TASK LIST AND OUTLINE OF GUIDANCE MATERIAL IN RELATION TO AMENDMENT 79 TO ANNEX 3

1. IMPLEMENTATION TASK LIST

1.1 Essential steps to be followed by a State in order to implement Amendment 79 to Annex 3:

a) identification of the rule-making process necessary to transpose the new and modified ICAO provisions into the national regulation;

b) establishment of a national implementation plan that takes into consideration the new and modified provisions;

c) drafting of the amendment(s) to the national requirements and means of compliance;

d) filing of State differences with ICAO, if necessary;

e) development of software modifications for disseminating METAR/SPECI, TAF, SIGMET, AIRMET, volcanic ash advisories; tropical cyclone advisories in digital form and for the improved world area forecast system (WAFS) forecasts;

f) training of operational staff in the provision and use of new information;

g) testing of software encoding, decoding and the communications infrastructure for the exchange of digital information both nationally and as part of the global exchange within regional requirements; and

h) operational acceptance of software changes.

2. STANDARDIZATION PROCESS

2.1 Effective date: 20 July 2020

2.2 Applicability date: 5 November 2020, except for provisions related to the dissemination of significant weather (SIGWX) forecasts in IWXXM GML form, which are indicated as 4 November 2021.

2.3 Embedded date(s): N/A.

3. SUPPORTING DOCUMENTATION

3.1 ICAO documentation

Title	Type (PANS/TI/Manual/Circ)	Planned publication date
Manual on Aeronautical Meteorological Practice (Doc 8896)	Manual	Q1 2020
Manual on the ICAO Meteorological Information Exchange Model (IWXXM) (Doc 10003)	Manual	Published
Manual on Space Weather Information (Doc 10100)	Manual	Published

3.2 External documentation

Title	External Organization	Publication date
Manual on Codes (WMO-No. 306)	WMO	November 2018
WMO-N0. 1100, *Guide to the Implementation of Quality Management Systems for National Meteorological and Hydrological Services and other Relevant Service Providers*	WMO	2017

4. IMPLEMENTATION ASSISTANCE TASKS

Type	Global	Regional
Workshops		IWXXM for ICAO Regions.

5. UNIVERSAL SAFETY OVERSIGHT AUDIT PROGRAMME (USOAP)

5.1 Existing protocol questions (PQs) may need amendment or new PQs may be required. This will be assessed during the next amendment cycle of the protocol questions.

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ATTACHMENT F to State letter AN 10/1.1-20/16

IMPACT ASSESSMENT IN RELATION TO AMENDMENT 79 TO ANNEX 3

1. INTRODUCTION

1.1 Amendment 79 to Annex 3 is intended to:

a) introduce changes to provisions for volcanic ash information to facilitate the reporting of volcanic ash in cases of re-suspended volcanic ash events;

b) facilitate users' access to references concerning guidance material on quality management system;

c) introduce SIGMET coordination as a recommended practice to improve the harmonization of SIGMET information;

d) improve the representation of the location and extent of volcanic ash clouds;

e) improve the world area forecast system (WAFS) forecasts by increased horizontal and vertical spatial resolution of the hazard grids for turbulence, icing and cumulonimbus (CB) cloud forecasts;

f) improve the tropical cyclone (TC) SIGMET and TC advisory messages to prevent user misinterpretation and to improve the validation and the translation of these messages from traditional alphanumerical codes (TAC) into the ICAO Meteorological Information Exchange Model (IWXXM);

g) improve space weather advisory information services to allow for more than one space weather with the same intensity to be combined in one space weather advisory and to describe all space weather effects using latitude bands;

h) update the values of eddy dissipation rate (EDR) to improve the reporting aircraft turbulence;

i) ensure that IWXXM schema can easily indicate missing and/or incorrect mandatory parameters in METAR in TAC form to avoid failures in the validation process once translated from TAC into IWXXM;

j) allow area forecasts for low level flights to be transmitted to Secure Aviation Data Information Service (SADIS) and WAFS Information File Service (WIFS) benefiting SADIS and WIFS users around the world;

k) simplify existing requirements concerning radioactive cloud (RDOACT CLD) SIGMET and AIRMET messages for consistency purposes;

l) include the reporting of heavy dust storms (HVY DS) in special air reports and to align the format and content of Special Air-reports (AIREP) in Annex 3 and the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444); and

m) introduce some minor changes to Annex 3 to facilitate the exchange of IWXXM, over the aeronautical fixed telecommunication network (AFTN).

2. IMPACT ASSESSMENT

2.1 *Safety impact*: The safety of aircraft operations is enhanced with access to improved information on current and expected atmospheric conditions. Improved information on space weather events that may affect communications, navigation and surveillance systems utilized by the aviation industry, improved world area forecast system (WAFS) forecasts and the integration of meteorological information to the system-wide information management environment will lead to improved decision-making, particularly in the planning phase.

2.2 *Financial impact:* For States and industry, these proposals are integral to the global effort in civil aviation safety and efficiency and they lay the foundation for more effective provision and use of more extensive and detailed meteorological information. The cost for States to continue the implementation of IWXXM provisions will increase, depending on their prevailing capabilities. The other components of this amendment do not have significant financial implications. For the Industry, some limited costs associated with software changes can be expected to accommodate new and modified information requirements. Significant efficiencies, however, would be expected through the operational use of the new information provided on space weather, through the improved world area forecast system (WAFS) forecasts and through the integration of meteorological information to the system-wide information management environment. Efficiency and safety enhancements will also reduce costs.

2.3 *Security impact*: No security impact with the implementation of this amendment.

2.4 *Environmental impact*: More precise planning for mitigation of hazardous meteorological conditions, as well as space weather, produces safer and more efficient routes, less fuel burn, and reduction of emissions due to fewer ground hold/delay actions and environmentally optimized routing.

2.5 *Efficiency impact*: The efficiency of aircraft operations is enhanced with more timely access to and incorporation of digital meteorological information in flight planning, flow management and aircraft management. Improved information about space weather events will improve route selection and fuel-loading decisions and minimize the need for rerouting flights due to the potential impacts of space weather events.

2.6 *Expected implementation time*: The expected implementation date of 4 November 2021 for the element concerning the provisions related to the dissemination of significant weather (SIGWX) forecasts in IWXXM GML form are intended to enable WMO to develop the supporting data models and to allow sufficient time for full implementation by States.

— END —

AMENDMENT No. 79

TO THE

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION

ANNEX 3

TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

The amendment to Annex 3 contained in this document was adopted by the Council of ICAO on **9 March 2020**. Such parts of this amendment as have not been disapproved by more than half of the total number of Contracting States on or before **20 July 2020** will become effective on that date and will become applicable on **5 November 2020** as specified in the Resolution of Adoption. (State letter AN 10/1.1-20/16 refers.)

March 2020

INTERNATIONAL CIVIL AVIATION ORGANIZATION

AMENDMENT 79 TO THE INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

ANNEX 3 — *METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION*

RESOLUTION OF ADOPTION

The Council

Acting in accordance with the Convention on International Civil Aviation, and particularly with the provisions of Articles 37, 54 and 90 thereof,

1. *Hereby adopts* on 9 March 2020 Amendment 79 to the International Standards and Recommended Practices contained in the document entitled *International Standards and Recommended Practices, Meteorological Service for International Air Navigation* which for convenience is designated Annex 3 to the Convention;

2. *Prescribes* 20 July 2020 as the date upon which the said amendment shall become effective, except for any part thereof in respect of which a majority of the Contracting States have registered their disapproval with the council before that date;

3. *Resolves* that the said amendment or such parts thereof as have become effective shall become applicable on 5 November 2020[1];

4. *Requests the Secretary General*:

a) to notify each Contracting State immediately of the above action and immediately after 20 July 2020 of those parts of the amendment which have become effective;

b) to request each Contracting State:

1) to notify the Organization (in accordance with the obligation imposed by Article 38 of the Convention) of the differences that will exist on 5 November 2020[1] between its national regulations or practices and the provisions of the Standards in the Annex as hereby amended, such notification to be made before 5 October 2020[2], and thereafter to notify the Organization of any further differences that arise;

2) to notify the Organization before 5 October 2020[2] of the date or dates by which it will have complied with the provisions of the Standards in the Annex as hereby amended;

c) to invite each Contracting State to notify additionally any differences between its own practices and those established by the Recommended Practices, when the notification of such differences is important for the safety of air navigation, following the procedure specified in subparagraph b) above with respect to differences from Standards.

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[1] 4 November 2021 for provisions related to the dissemination of significant weather (SIGWX) forecasts in IWXXM GML form.
[2] 4 October 2021 for provisions related to the dissemination of significant weather (SIGWX) forecasts in IWXXM GML form.

NOTES ON THE PRESENTATION OF THE AMENDMENT 79 TO ANNEX 3

1. 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 replacement text which is highlighted with grey shading.	new text to replace existing text

2. The source of the amendment to Annex 3 arises from the fourth meeting of the Meteorology Panel (METP/4).

TEXT OF AMENDMENT 79

TO THE

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

METEOROLOGICAL SERVICE
FOR INTERNATIONAL AIR NAVIGATION

ANNEX 3
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

Editorial Note.— Amend, throughout Annex 3, the title of Doc 10003 to read: *Manual on the ICAO Meteorological Information Exchange Model (IWXXM)* (Doc 10003)

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PART I

CORE SARPs

CHAPTER 1. DEFINITIONS

1.1 Definitions

. . .

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

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CHAPTER 2. GENERAL PROVISIONS

. . .

2.2 Supply, use, quality management and interpretation of meteorological information

. . .

2.2.3 **Recommendation.**— *The quality system established in accordance with 2.2.2 should be in conformity with the International Organization for Standardization (ISO) 9000 series of quality assurance standards and should be certified by an approved organization.*

Note.— The ISO 9000 series of quality assurance standards provide a basic framework for the development of a quality assurance programme. The details of a successful programme are to be

formulated by each State and in most cases are unique to the State organization. Guidance on the establishment and implementation of ~~a~~ quality management systems is given in the ~~Manual on the Quality Management System for the Provision of Meteorological Service for International Air Navigation *(Doc 9873)*~~Guide to the Implementation of Quality Management Systems for National Meteorological and Hydrological Services and Other Relevant Service Providers *(WMO-No. 1100)*.

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CHAPTER 3. GLOBAL SYSTEMS, SUPPORTING CENTRES AND METEOROLOGICAL OFFICES

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Insert new text as follows:

3.4.4 **Recommendation.**— *An MWO should coordinate SIGMET with neighbouring MWO(s), especially when the en-route weather phenomenon extends or is expected to extend beyond the MWO's specified area of responsibility, in order to ensure harmonized SIGMET provision.*

Note.— Guidance on the bilateral or multilateral coordination between MWOs of Contracting States for the provision of SIGMET can be found in the Manual of Aeronautical Meteorological Practice *(Doc 8896).*

End of new text.

. . .

3.7 Tropical cyclone advisory centres

A Contracting State having accepted the responsibility for providing a tropical cyclone advisory centre (TCAC) shall arrange for that centre to:

a) monitor the development of tropical cyclones in its area of responsibility, using geostationary and polar-orbiting satellite data, radar data and other meteorological information;

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

. . .

PART II

APPENDICES AND ATTACHMENTS

APPENDIX 1. FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

(See Chapter 9 of this Annex.)

. . .

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

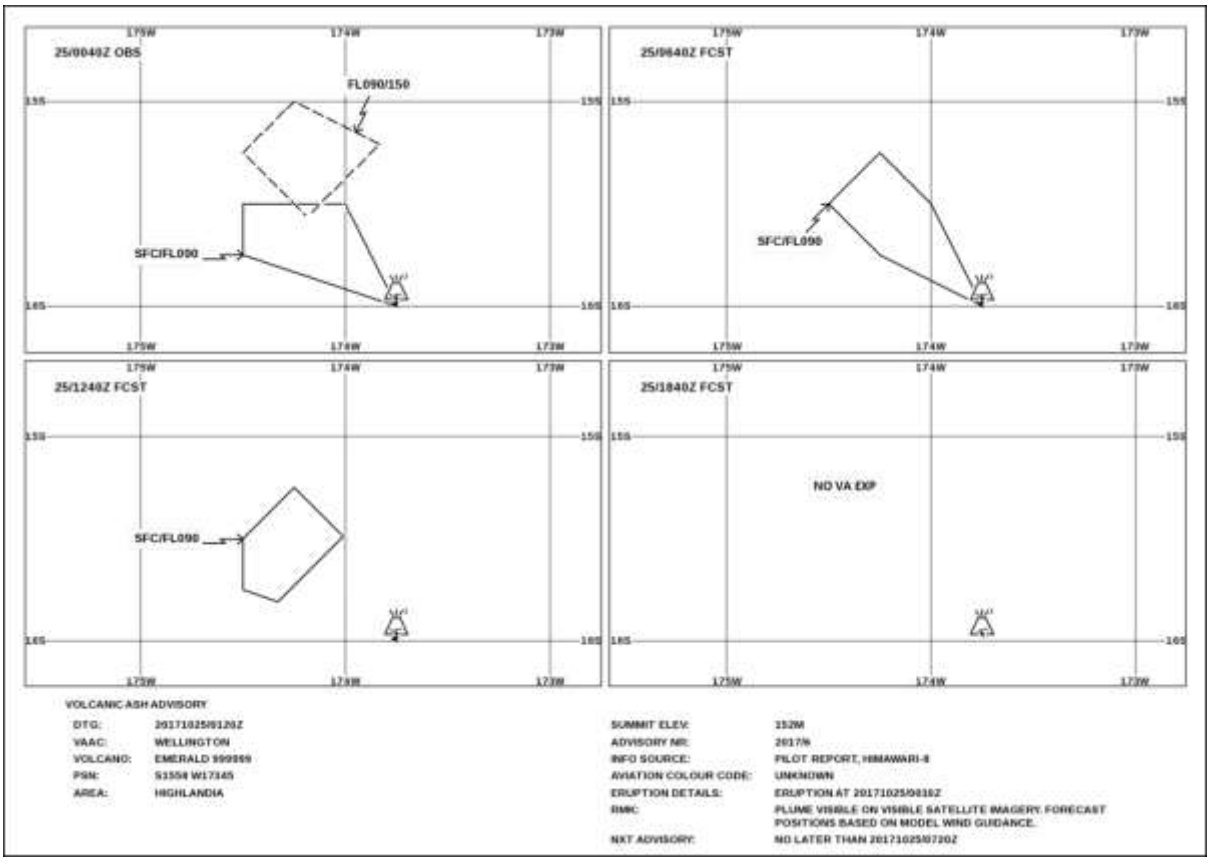
MODEL SGE SIGMET for phenomena other than tropical cyclone and volcanic ash in graphical format

MODEL SN Sheet of notations used in flight documentation

. . .

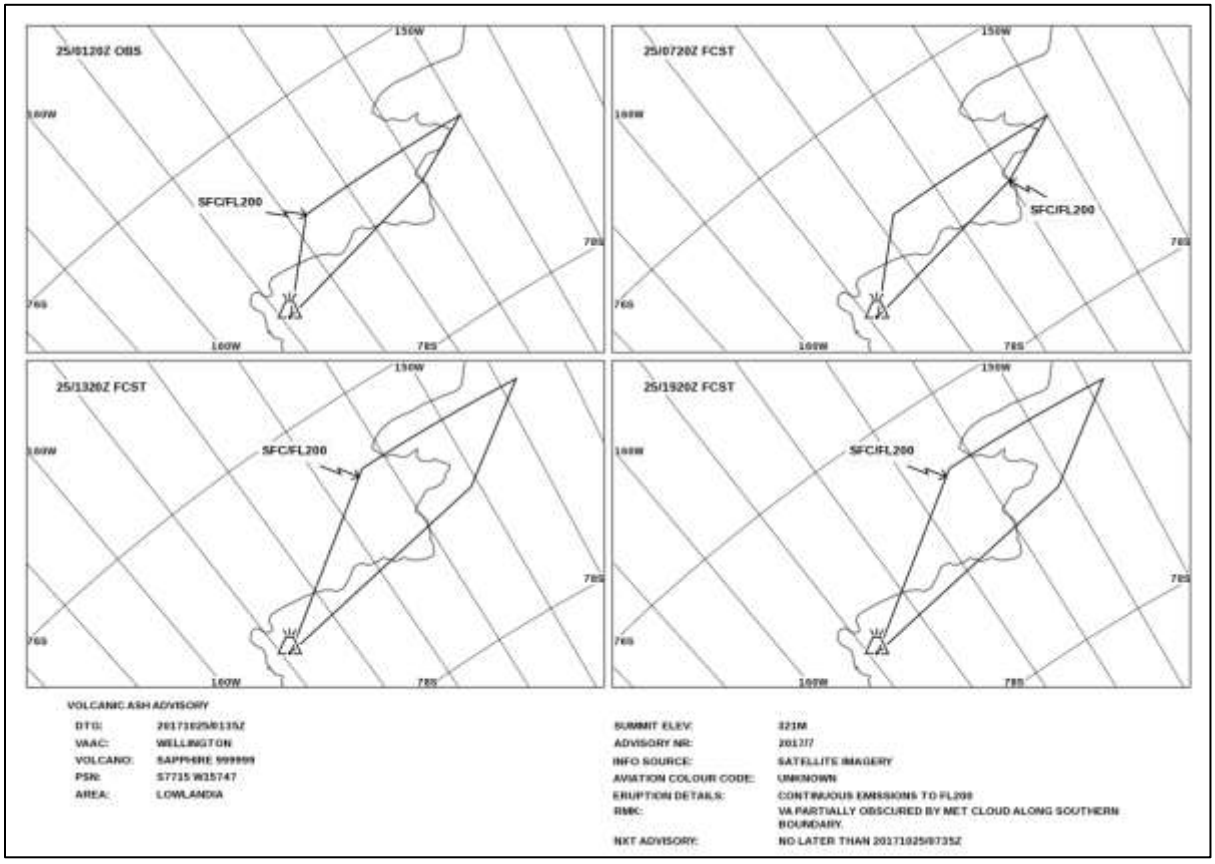
Editorial Note.— Replace the existing MODEL VAG example in *toto* by the following two new examples.

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

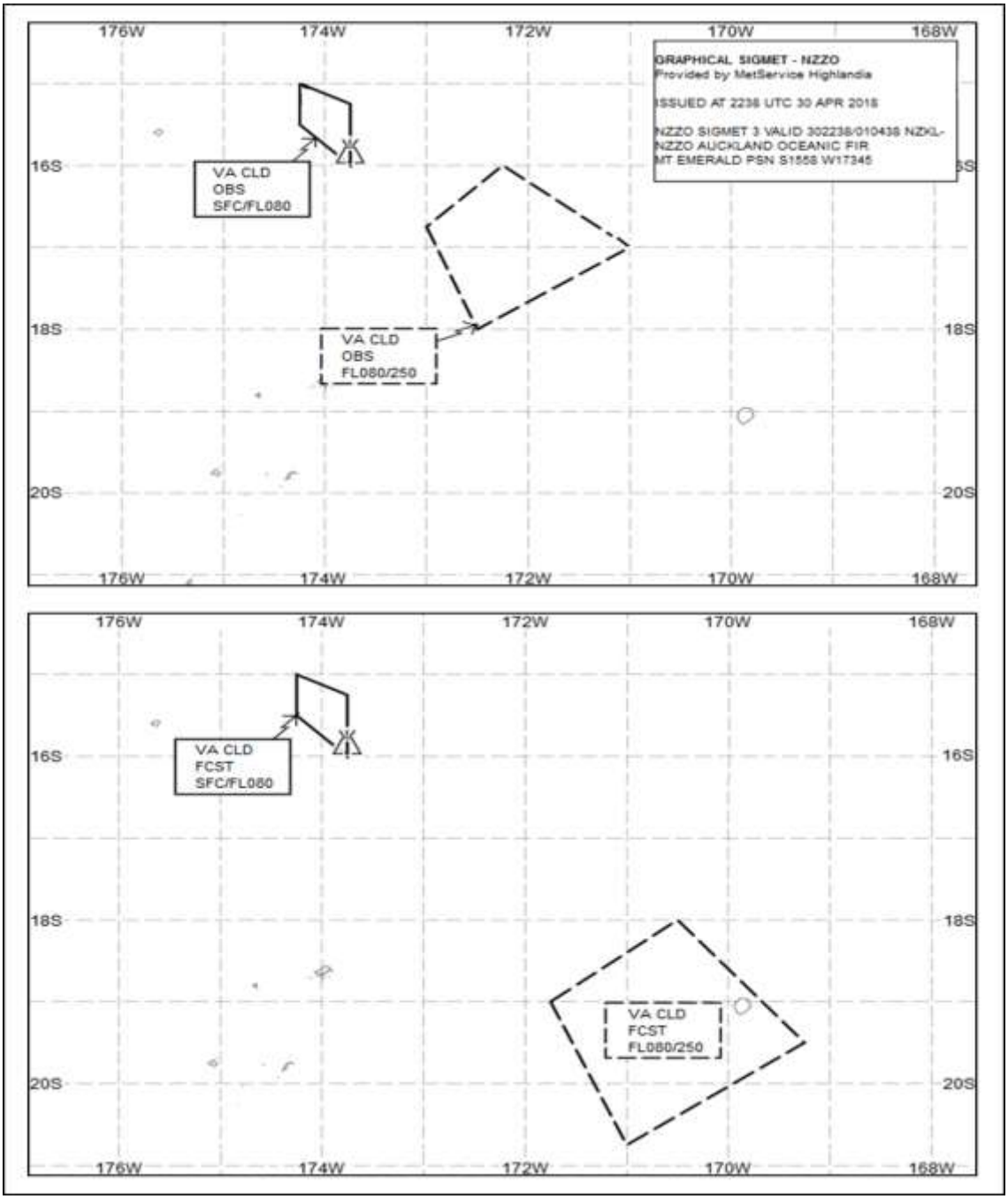


. . .

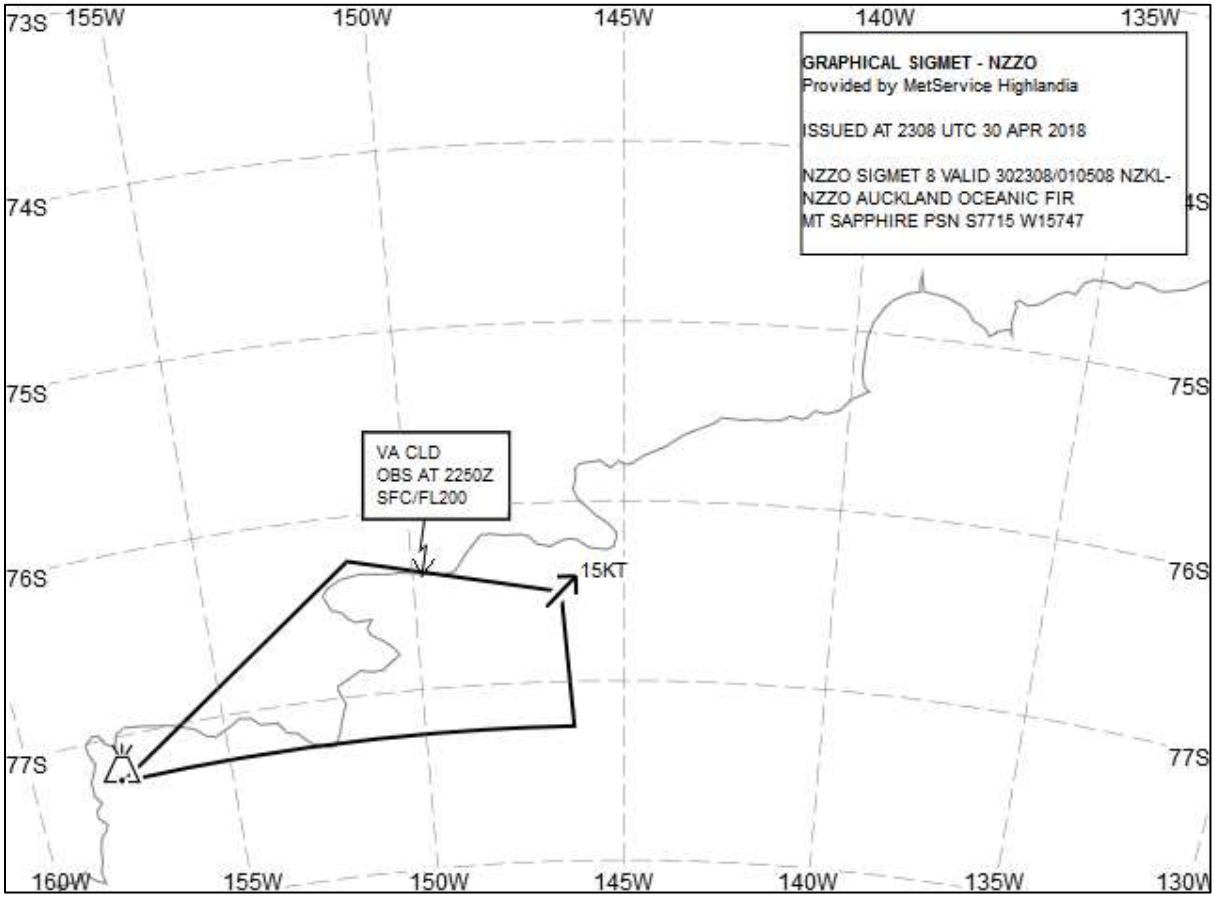
Editorial Note.— Replace the existing MODEL SVA example in *toto* by the following two new examples.

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

Example 1. Mercator projection



Example2. Polar stereographic projection



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APPENDIX 2. TECHNICAL SPECIFICATIONS RELATED TO GLOBAL SYSTEMS, SUPPORTING CENTRES AND METEOROLOGICAL OFFICES

(See Chapter 3 of this Annex.)

1. WORLD AREA FORECAST SYSTEM

1.1 Formats and codes

. . .

1.2 Upper-air gridded forecasts

1.2.1 The forecasts of upper winds; upper-air temperature; and humidity; direction, speed and flight level of maximum wind; flight level and temperature of tropopause, areas of cumulonimbus clouds, icing, ~~clear-air and in-cloud~~ turbulence, and geopotential altitude of flight levels shall be prepared four times a

day by a WAFC and shall 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. ~~The dissemination of e~~Each forecast ~~shall be in the above order and~~ shall be ~~completed~~ disseminated as soon as technically feasible but not later than ~~6~~ 5 hours after standard time of observation.

1.2.2 The grid point forecasts prepared by a WAFC shall 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);

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

g) ~~clear-air~~ 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

~~h) in-cloud turbulence for layers centred at flight levels 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa) and 300 (300 hPa); and~~

~~*Note 1. — Layers centred at a flight level referred to in f) and h) have a depth of 100 hPa.*~~

Note~~2~~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.

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

h~~i~~) 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).

Note.— The exact pressure levels (hPa) for a), d), f), g), and h) are provided in the Manual of Aeronautical Meteorological Practice *(Doc 8896).*

1.2.3 The foregoing grid point forecasts shall be issued by a WAFC in binary code form using the GRIB code form prescribed by the World Meteorological Organization (WMO).

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

1.2.4 The foregoing grid point forecasts a), b), c), d) and h) shall 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) shall be prepared by a WAFC in a regular grid with a horizontal resolution of 0.25° of latitude and longitude.

1.3 Significant weather (SIGWX) forecasts

1.3.1 General provisions

1.3.1.1 Forecasts of significant en-route weather phenomena shall be prepared as SIGWX forecasts four times a day by a WAFC and shall 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. ~~The dissemination of e~~Each forecast shall be ~~completed~~ disseminated as soon as technically feasible but not later than ~~9~~ 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 shall be issued in binary code form using the BUFR code form prescribed by WMO.

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

1.3.1.3 **Recommendation**.— *As of 4 November 2021, in addition to 1.3.1.2, SIGWX forecasts should be disseminated in IWXXM GML form.*

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

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

Editorial Note.— A similar Note concerning GML will be inserted after Notes following: Appendix 2, 3.1.2, 5.1.3, and 6.1.2; Appendix 3, 2.1.3; Appendix 5, 1.1.2; Appendix 6, 1.1.6 and 2.1.6; and Appendix 8, 2.2.2.

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2. AERODROME METEOROLOGICAL OFFICES

2.1 Use of world area forecast system (WAFS) products

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2.1.2 In order to ensure uniformity and standardization of flight documentation, the WAFS GRIB

and BUFR data received and, as of 4 November 2021, IWXXM data received, shall 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 shall not be amended

2.2 Notification of WAFC concerning significant discrepancies

Aerodrome meteorological offices using WAFS BUFR or, as of 4 November 2021, IWXXM data shall notify the WAFC concerned immediately if significant discrepancies are detected or reported in respect of WAFS SIGWX forecasts concerning:

. . .

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 should be 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 are not part of the advisory message, as shown in the example.

	Element	*Detailed content*	*Template(s)*		*Examples*	
…	…	…	…		…	
5	Name of volcano (M)	Name and IAVCEI[2] number of volcano	VOLCANO:	nnnnnnnnnnnnnnnnnnnnn [nnnnnn] *or* UNKNOWN *or* UNNAMED	VOLCANO:	KARYMSKY ~~1000-13~~300130 UNNAMED UNKNOWN
6	…	…	…		…	…
7	State *or* region (M)	State, *or* region if ash is not reported over a State	AREA:	nnnnnnnnnnnnnnnn *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	…	…	…		…	…
10	Information source (M)	Information source using free text	INFO SOURCE:	*Free text up to 32 characters*	INFO SOURCE:	~~MTSAT-1R~~HIMAWARI-8 KVERT KEMSD
11	…	…	…		…	…
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

	Element	Detailed content	Template(s)		Examples	
						NO ERUPTION – RE-SUSPENDED VA[6] UNKNOWN
…	…	…	…		…	…
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 DISPERSING VA CLD ARE EVIDENT ON SATELLITE IMAGERY RE-SUSPENDED VA[6, 7] NIL
19	…	…	…		…	…

Notes.—

. . .

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

VA ADVISORY

DTG:	20080923/0130Z
VAAC:	TOKYO
VOLCANO:	KARYMSKY ~~1000 13~~300130
PSN:	N5403 E15927
AREA:	RUSSIA
SUMMIT ELEV:	1536M
ADVISORY NR:	2008/4
INFO SOURCE:	~~MTSAT-1R~~ HIMAWARI-8 KVERT KEMSD
…	…

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 should be placed on the subsequent line.

. . .

Element		*Detailed content*	*Template(s)*		*Examples*	
1	Identification of the type of message (M)	Type of message	TC ADVISORY		TC ADVISORY	
…	…	…	…	…	…	… …
8	Observed CB cloud[3] (~~C~~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* WI[4] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – [Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] *and* TOP [ABV *or* BLW] FLnnn NIL	CB:	WI 250NM OF TC CENTRE TOP FL500 NIL
9	…	…	…	…	…	…
10	Changes in intensity (M)	Changes of maximum surface wind speed at time of observation	INTST CHANGE:	INTSF *or* WKN *or* NC	INTST CHANGE:	INTSF
Editorial Note — Renumber subsequent Elements						

Notes.—

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Example A2-2. Advisory message for tropical cyclones

TC ADVISORY

DTG:	20040925/1900Z
TCAC:	YUFO*
TC:	GLORIA
ADVISORY NR:	2004/13
OBS PSN:	25/1800Z N2706 W07306
CB:	WI 250NM OF TC CENTRE TOP FL500
MOV:	NW 20KMH
INTST CHANGE:	INTSF
C:	965HPA

MAX WIND:	25~~2~~MPS
FCST PSN +6 HR:	25/2200Z N2748 W07350
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

*Ficticious location

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

. . .

	Element	*Detailed content*	*Template(s)*		*Examples*	
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 ~~*or* HF COM MOD *or* SEV AND GNSS MOD *or* SEV~~ [AND][3] *or* RADIATION[4] MOD *or* SEV	SWX EFFECT:	HF COM MOD SATCOM SEV GNSS SEV HF COM MOD AND SATCOM MOD AND GNSS MOD RADIATION MOD SATCOM SEV
8	Observed *or* expected space weather phenomena (M)	Day and time (n UTC) of observed phenomena (*or* forecast if phenomena have yet to occur); Horizontal extent[34] (latitude bands and longitude in degrees) *and/or* altitude of space weather phenomena	OBS (*or* FCST) SWX:	nn/nnnnZ DAYLIGHT SIDE *or* HNH *and/or* MNH *and/or* EQN *and/or* EQS *and/or* MSH *and/or* HSH 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] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] *or* NO SWX EXP	OBS SWX:~~:~~	08/0100Z DAYLIGHT SIDE 08/0100Z HNH HSH E18000 – W18000 08/0100Z HNH HSH W18000 – W09000 ABV FL350 08/0100Z S2000 W17000 – S2000 W13000 – S1000 W13000 – S1000 W17000 – S2000 W17000 NO SWX EXP
9	Forecast of the phenomena (+6	Day and time (in UTC) (6 hours from the time	FCST SWX +6 HR:	nn/nnnnZ DAYLIGHT SIDE *or*	FCST SWX +6 HR:	08/0700Z DAYLIGHT SIDE

	Element	*Detailed content*	*Template(s)*		*Examples*	
	HR) (M)	given in Item 8, rounded to the next full hour); Forecast extent *and/or* altitude of the space weather phenomena for that fixed valid time		HNH *and/or* MNH *and/or* EQN *and/or* EQS *and/or* MSH *and/or* HSH 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] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] *or* NO SWX EXP *or* NOT AVBL		08/0700Z HNH HSH W18000 – W09000 ABV FL350 08/0700Z HNH HSH E18000 – W18000 NO SWX EXP NOT AVBL
10	Forecast of the phenomena (+12 HR) (M)	Day and time (in UTC) (12 hours from the time given in Item 8, rounded to the next full hour). Forecast extent *and/or* altitude of the space weather phenomena for that 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 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] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] *or* NO SWX EXP *or* NOT AVBL	FCST SWX +12 HR:	08/1300Z DAYLIGHT SIDE 08/1300Z HNH HSH W18000 – W09000 ABV FL350 08/1300Z HNH HSH E18000 – W18000 NO SWX EXP NOT AVBL
11	Forecast of the phenomena (+18 HR) (M)	Day and time (in UTC) (18 hours from the time given in Item 8, rounded to the next full hour). Forecast extent and/or altitude of the space weather phenomena for that 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 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] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] *or* NO SWX EXP *or* NOT AVBL	FCST SWX +18 HR:	08/1900Z DAYLIGHT SIDE 08/1900Z HNH HSH W18000 – W09000 ABV FL350 08/1900Z HNH HSH E18000 – W18000 NO SWX EXP NOT AVBL
12	Forecast of the phenomena (+24 HR) (M)	Day and time (in UTC) (24 hours from the time given in Item 8, rounded to the next full hour). Forecast extent and/or altitude of the space weather phenomena for that 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 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] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] *or* NO SWX EXP *or* NOT AVBL	FCST SWX +24 HR:	09/0100Z DAYLIGHT SIDE 09/0100Z HNH HSH W18000 – W09000 ABV FL350 09/0100Z HNH HSH E18000 – W18000 NO SWX EXP NOT AVBL
…	…	…	…	…	…	…
14	Next advisory (M)	Year, month, day and time in UTC	NXT ADVISORY:	nnnnnnnn/nnnnZ *or* NO FURTHER ADVISORIES	NXT ADVISORY:	20161108/0700Z NO FURTHER

Element	*Detailed content*	*Template(s)*	*Examples*
		or WILL BE ISSUED BY nnnnnnnn/nnnnZ	ADVISORIES WILL BE ISSUED BY 20210726/1800Z

Notes.—

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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 should not be used operationally or will otherwise end immediately after the word "TEST". *[Applicable 7 November 2019]*
2. Ficticious location.
3 One or more effects with the same intensity may be combined.
~~3~~4. One or more latitude ranges ~~should~~may be included in the space weather advisory information ~~for “GNSS” and “RADIATION”~~.

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APPENDIX 3. TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL OBSERVATIONS AND REPORTS

(See Chapter 4 of this Annex.)

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Table A3-2. Template for METAR and SPECI (Until 4 November 2020)

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Table A3-2. Template for METAR and SPECI (As of 5 November 2020)

. . .

Element as specified in Chapter 4	*Detailed content*	*Template(s)*				*Examples*
…	…	…				…
END OF METAR IF THE REPORT IS MISSING.						
Surface wind (M)	Wind direction (M)	nnn *or* ///[12]	VRB			24004MPS VRB01MPS ///10MPS (24008KT) (VRB02KT) 240//KT 19006MPS ////KT (19012KT) 00000MPS (00000KT) 140P49MPS (140P99KT)
	Wind speed (M)	[P]nn[n] *or* //[12]				
	Significant speed variations (C)[3]	G[P]nn[n]				12003G09MPS (12006G18KT) 24008G14MPS (24016G28KT)
	Units of measurement (M)	MPS (*or* KT)				
	Significant directional variations (C)[4]	nnnVnnn	—			02005MPS 350V070 (02010KT 350V070)
Visibility (M)	Prevailing *or* minimum visibility (M)[5]	nnnn *or* ////[12]			C A V O K	0350 //// CAVOK 7000 9999 0800
	Minimum visibility and direction of the minimum visibility (C)[6]	nnnn[N] *or* nnnn[NE] *or* nnnn[E] *or* nnnn[SE] *or* nnnn[S] *or* nnnn[SW] *or* nnnn[W] *or* nnnn[NW]				2000 1200NW 6000 2800E 6000 2800
Runway visual range (C)[7]	Name of the element (M)	R				R32/0400 R12R/1700 R10/M0050 R14L/P2000
	Runway (M)	nn[L]/*or* nn[C]/*or* nn[R]/				
	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
…	…	…	…	…		…
	…	…	…	…		…

Element as specified in Chapter 4	*Detailed content*	*Template(s)*				*Examples*
Cloud (M)[14]	Cloud amount and height of cloud base *or* vertical visibility (M)	FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn *or* FEW///[12] *or* SCT///[12] *or* BKN///[12] *or* OVC///[12] *or* ///nnn[12] *or* //////[12]	VVnnn *or* VV///[12]	NSC *or* NCD[12]		FEW015 VV005 OVC030 VV/// NSC SCT010 OVC020 BKN/// ///015
	Cloud type (C)[2]	CB *or* TCU *or* ///[12]	—			BKN009TCU NCD SCT008 BKN025CB BKN025/// //////CB ///////// BKN///TCU
Air and dew-point temperature (M)	Air and dew-point temperature (M)	[M]nn/[M]nn *or* ///[M]nn[12] *or* [M]nn///[12] *or* /////[12]				17/10 ///10 17/// ///// 02/M08 M01/M10
Pressure values (M)	Name of the element (M)	Q				Q0995 Q1009 Q1022 Q//// Q0987
	QNH (M)	~~N~~nnnn *or* ////[12]				
Supplementary information (C)	Recent weather (C)[2, 9]	RERASN *or* REFZDZ *or* REFZRA *or* REDZ *or* RE[SH]RA *or* RE[SH]SN *or* RESG *or* RESHGR *or* RESHGS *or* REBLSN *or* RESS *or* REDS *or* RETSRA *or* RETSSN *or* RETSGR *or* RETSGS *or* RETS *or* REFC *or* REVA *or* REPL *or* REUP[12] *or* REFZUP[12] *or* RETSUP[12] *or* RESHUP[12] *or RE//*[12]				REFZRA RETSRA
	Wind shear (C)[2]	WS Rnn[L] *or* WS Rnn[C] *or* WS Rnn[R] *or* WS ALL RWY				WS R03 WS ALL RWY WS R18C
	Sea-surface temperature and state of the sea *or* significant wave height (C)[15]	~~W [M]nn/Sn *or* W[M]nn/Hn[n][n]~~ W[M]nn/Sn or W///Sn or W[M]nn/S/ or W[M]nn/Hn[n][n] or W///Hn[n][n] or W[M]nn/H///				W15/S2 W12/H75 W///S3 WM01/S/ W///H104 W17/H/// W///H/// W///S/

Element as specified in Chapter 4	*Detailed content*		*Template(s)*				*Examples*
	~~State of the runway (C)[16]~~	~~Runway designator (M)~~	~~R nn[L]/ *or* Rnn[C]/ *or* Rnn[R]/~~			~~R/SNOCLO~~	~~R99/421594 R/SNOCLO~~ ~~R14L/CLRD//~~
		~~Runway deposits (M)~~	~~n *or* /~~	~~CLRD//~~			
		~~Extent of runway contamination (M)~~	~~n *or* /~~				
		~~Depth of deposit (M)~~	~~nn *or* //~~				
		~~Friction coefficient *or* braking action (M)~~	~~nn *or* //~~				
Trend forecast (O)[176]	Change indicator (M)[187]		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		C A V O K	
	Weather phenomenon: intensity (C)[10]			– *or* +	—	N S W	
	Weather phenomenon: characteristics and type (C)[2, 9, 11]			DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG		
	Cloud amount and height of cloud base *or* vertical visibility (C)[2, 14]			FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	N S C	
	Cloud type (C)[2,14]			CB *or* TCU	—		
…	…		…				… …

Notes.—

. . .

12. ~~For automated reports only~~. 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.

…

~~16. To be included in accordance with 4.8.1.5 b) until 4 November 2020.~~

176. To be included in accordance with Chapter 6, 6.3.2.

187. Number of change indicators to be kept to a minimum in accordance with Appendix 5, 2.2.1, normally not exceeding three groups.

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APPENDIX 4. TECHNICAL SPECIFICATIONS RELATED TO AIRCRAFT OBSERVATIONS AND REPORTS

(See Chapter 5 of this Annex.)

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2.6 Turbulence

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

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

2.6.1 Routine air-reports

The turbulence shall be reported during the en-route phase of the flight and shall refer to the 15-minute period immediately preceding the observation. Both the average and peak value of turbulence, together with the time of occurrence of the peak value to the nearest minute, shall be observed. The average and peak values shall be reported in terms ~~of the cube root~~ of EDR. The time of occurrence of the peak value shall be reported as indicated in Table A4-2. The turbulence shall be reported during the climb-out phase for the first 10 minutes of the flight and shall refer to the 30-second period immediately preceding the observation. The peak value of turbulence shall be observed.

2.6.2 Interpretation of the turbulence report

Turbulence shall be considered:

a) severe when the peak value ~~of the cube root~~ of EDR equals or exceeds ~~0.7~~0.45;

b) moderate when the peak value ~~of the cube root~~ of EDR is equal to or above ~~0.4~~0.20 and below ~~or equal to 0.7~~0.45;

c) light when the peak value ~~of the cube root~~ of EDR is above 0.10 and below ~~or equal to 0.4~~0.20; and

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

~~*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 above describe the severity levels for a medium-sized transport aircraft under typical en-route conditions (i.e. altitude, airspeed and weight).*~~

2.6.3 Special air-reports

Special air-reports on turbulence shall be made during any phase of the flight whenever the peak value ~~of the cube root~~ of EDR equals or exceeds ~~0.4~~0.20. The special air-report on turbulence shall be made with reference to the 1-minute period immediately preceding the observation. Both the average and peak value of turbulence shall be observed. The average and peak values shall be reported in terms ~~of the cube root~~ of EDR. Special air-reports shall be issued every minute until such time as the peak values ~~of the cube root~~ of EDR fall below ~~0.4~~0.20.

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

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

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

Element as specified in Chapter 5	*Detailed content*	*Template(s)*	*Examples*
Message type designator (M)	Type of air-report (M)	ARS	ARS
...	…	…	…
DATA BLOCK 1			
Latitude (M)	Latitude in degrees and minutes (M)	Nnnnn *or* Snnnn	S4506
…	…	…	…
DATA BLOCK 2			
Wind direction (M)	Wind direction in degrees true (M)	nnn/	262/
...	…	…	…
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* HVY DS[4] *or* HVY SS[4] *or* VA CLD [FLnnn/nnn] *or* VA[5] [MT nnnnnnnnnnnnnnnnnnnn] *or* MOD TURB [EDRnnn][2] *or* MOD ICE	SEV TURB EDR076 VA CLD FL050/100

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APPENDIX 5. TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

(See Chapter 6 of this Annex.)

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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 shall 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 **Recommendation.**—*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 should be disseminated to the aeronautical fixed service Internet-based services.*

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

(See Chapter 7 of this Annex.)

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

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4.2.6 Turbulence shall be considered:

a) severe when~~ever~~ the peak value ~~of the cube root~~ of EDR equals or exceeds ~~0.7~~0.45; and

b) moderate when the peak value ~~of the cube root~~ of EDR is equal to or above ~~0.4~~0.20 and below ~~or equal to 0.7~~0.45.

. . .

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

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

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

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 should not be included.

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message examples*
…	…	…		… …	
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
…	…	…	…	…	…
Observed or forecast phenomenon (M)[20, 21]	Indication whether the information is observed and expected to continue, *or* forecast	OBS [AT nnnnZ] *or* FCST [AT nnnnZ]		OBS OBS AT 1210Z FCST FCST AT 1815Z	

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message examples*
Location (C)[20, 21, 33]	Location (referring to latitude and longitude (in degrees and minutes))	Nnn[nn] Wnnn[nn] *or* Nnn[nn] Ennn[nn] *or* Snn[nn] Wnnn[nn] *or* Snn[nn] Ennn[nn] *or* N OF Nnn[nn] *or* S OF Nnn[nn] *or* N OF Snn[nn] *or* S OF Snn[nn] [AND] W OF Wnnn[nn] *or* E OF Wnnn[nn] *or* W OF Ennn[nn] *or* E OF Ennn[nn] *or* N OF Nnn[nn] *or* N OF Snn[nn] AND S OF Nnn[nn] *or* S OF Snn[nn] *or* W OF Wnnn[nn] *or* W OF Ennn[nn] AND E OF Wnnn[nn] *or* E OF Ennn[nn] *or* N OF LINE[21,22] *or* NE OF LINE[21,22] *or* E OF LINE[21,22] *or* SE OF LINE[21,22] *or* S OF LINE[21,22] *or* SW OF LINE[21,22] *or* W OF LINE[21,22] *or* NW OF LINE[21,22] 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[21,22] *or* NE OF LINE[21,22] *or* E OF LINE[21,22] *or* SE OF LINE[21,22] *or* S OF LINE[21,22] *or* SW OF LINE[21,22] *or* W OF LINE[21,22] *or* NW OF LINE[21,22] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]] *or* WI[21,22, 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[21,22] BTN (*or* nnNM WID LINE[21,22] 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*[22,24] WI nnnKM (*or* nnnNM) OF TC CENTRE *or*[24,25] WI nnKM (*or* nnNM) OF Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]		N2020 W07005 N48 E010 S60 W160 S0530 E16530 N OF N50 S OF N5430 N OF S10 S OF S4530 W OF W155 E OF W45 W OF E15540 E OF E09015 N OF N1515 AND W OF E13530 S OF N45 AND N OF N40 N OF LINE S2520 W11510 – S2520 W12010 SW OF LINE N50 W005 – N60 W020 SW OF LINE N50 W020 – N45 E010 AND NE OF LINE N45 W020 – N40 E010 WI N6030 E02550 – N6055 E02500 – N6050 E02630 – N6030 E02550 APRX 50KM WID LINE BTN N64 W017 – N60 W010 – N57 E010 ENTIRE FIR ENTIRE UIR ENTIRE FIR/UIR ENTIRE CTA WI 400KM OF TC CENTRE WI 250NM OF TC CENTRE WI 30KM OF N6030 E02550[‡]	

[‡] ~~Applicable as of 7 November 2019~~

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message examples*
Level (C)[20, 21, 24]	Flight level *or* altitude	[SFC/]FLnnn *or* [SFC/]nnnnM (*or* [SFC/][n]nnnnFT) *or* FLnnn/nnn *or* TOP FLnnn *or* [TOP] ABV FLnnn (*or* [TOP] ABV [n]nnnnFT) [nnnn/]nnnnM (*or* [[n]nnnn/][n]nnnnFT) *or* [nnnnM/]FLnnn (*or* [[n]nnnnFT/]FLnnn) *or*[23, 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, 25, 26, 34]	Movement *or* expected movement (direction and speed) with reference to one of the sixteen points of compass, *or* stationary	MOV N [nnKMH] *or* MOV NNE [nnKMH] *or* MOV NE [nnKMH] *or* MOV ENE [nnKMH] *or* MOV E [nnKMH] *or* MOV ESE [nnKMH] *or* MOV SE [nnKMH] *or* MOV SSE [nnKMH] *or* MOV S [nnKMH] *or* MOV SSW [nnKMH] *or* MOV SW [nnKMH] *or* MOV WSW [nnKMH] *or* MOV W [nnKMH] *or* MOV WNW [nnKMH] *or* MOV NW [nnKMH] *or* MOV NNW [nnKMH] (*or* MOV N [nnKT] *or* MOV NNE [nnKT] *or* MOV NE [nnKT] *or* MOV ENE [nnKT] *or* MOV E [nnKT] *or* MOV ESE [nnKT] *or* MOV SE [nnKT] *or* MOV SSE [nnKT] *or* MOV S [nnKT] *or* MOV SSW [nnKT] *or* MOV SW [nnKT] *or* MOV WSW [nnKT] *or* MOV W [nnKT] *or* MOV WNW [nnKT] *or* MOV NW [nnKT] *or* MOV NNW [nnKT]) *or* STNR		MOV SE MOV NNW MOV E 40KMH MOV E 20KT MOV WSW 20KT STNR	
Changes in intensity (C)[20]	Expected changes in intensity	INTSF *or* WKN *or* NC		INTSF WKN NC	
Forecast time (C)[20, 21, 25, 26]	Indication of the forecast time of phenomenon	FCST AT nnnnZ	—	FCST AT 2200Z	—
TC forecast position (C)[23, 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 E16015 TC CENTRE PSN N1015 E15030~~600015~~ CB	—

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message examples*
Forecast position (C)[20, 21, ~~25, 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 E OF Wnnn[nn] *or* E OF Ennn[nn] *or* N OF LINE[21,22] *or* NE OF LINE[21,22] *or* E OF LINE[21,22] *or* SE OF LINE[21,22] *or* S OF LINE[21,22] *or* SW OF LINE[21,22] *or* W OF LINE[21,22] *or* NW OF LINE[21,22] 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[21,22] *or* E OF LINE[21,22] *or* SE OF LINE[21,22] *or* S OF LINE[21,22] *or* SW OF LINE[21,22] *or* W OF LINE[21,22] *or* NW OF LINE[21,22] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]]	—	N30 W170 N OF N30 S OF S50 AND W OF E170 S OF N46 AND N OF N39 NE OF LINE N35 W020 – N45 W040 SW OF LINE N48 W020 – N43 E010 AND NE OF LINE N43 W020 – N38 E010 WI N20 W090 – N05 W090 – N10 W100 – N20 W100 – N20 W090 APRX 50KM WID LINE BTN N64 W017 – N57 W005 – N55 E010 – N55 E030 ENTIRE FIR ENTIRE UIR ENTIRE FIR/UIR ENTIRE CTA NO VA EXP WI 30KM OF N6030 E02550‡ WI 150NM OF TC CENTRE	—

‡ ~~Applicable as of 7 November 2019~~

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message examples*
		or WI[21, 22, 23] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] *or* APRX nnKM WID LINE[2122] BTN (nnNM WID LINE[2122] 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*[2728] NO VA EXP *or*[2425] 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)[2829]	Repetition of elements included in a SIGMET message for volcanic ash cloud or tropical cyclone	[AND][2829]	—	AND	—
OR					
Cancellation of SIGMET/ AIRMET (C)[2930]	Cancellation of SIGMET/AIRMET referring to its identification	CNL SIGMET [n][n]n nnnnnn/nnnnnn *or*[2728] CNL SIGMET [n][n]n nnnnnn/nnnnnn VA MOV TO nnnn FIR	CNL AIRMET [n][n]n nnnnnn/nnnnnn	CNL SIGMET 2 101200/101600 CNL SIGMET A13 251030/251430 VA MOV TO YUDO FIR[2]	CNL AIRMET 05 151520/151800

Notes.—

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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.
~~21~~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.
~~22~~23. The number of coordinates ~~should~~are to be kept to a minimum and should not normally exceed seven.
~~23~~24. Only for SIGMET messages for tropical cyclones.
~~24~~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 ~~may~~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 from 7 November 2019 until 4 November 2020]*
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 ~~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. [Applicable 5 November 2020]
~~25~~26. The elements "forecast time" and "forecast position" are not to be used in conjunction with the element "movement or expected movement".
~~26~~27. The levels of the phenomena remain fixed throughout the forecast period.
~~27~~28. Only for SIGMET messages for volcanic ash.
~~28~~29. To be used for ~~two~~ more than one volcanic ash clouds or ~~two centres of tropical cyclones~~ cumulonimbus clouds associated with a tropical cyclone simultaneously affecting the FIR concerned.~~:~~
~~29~~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".

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 should be 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
Aircraft identification (M)	Aircraft radiotelephony call sign	nnnnnn	VA812[3]
Observed phenomenon (M)	Description of observed phenomenon causing the issuance of the special air-report[4]	TS TSGR SEV TURB SEV ICE SEV MTW HVY DS HVY SS VA CLD VA [MT nnnnnnnnnn]	TS TSGR SEV TURB SEV ICE SEV MTW HVY DS HVY SS VA CLD VA

Element	*Detailed content*	*Template*[1,2]	*Examples*
		MOD TURB MOD ICE	VA MT ASHVAL[5] MOD TURB MOD ICE
Observation time (M)	Time of observation of observed phenomenon	OBS AT nnnnZ	OBS AT 1210Z
Observed Location (C)	Location (referring to latitude and longitude (in degrees and minutes)) of observed phenomenon	NnnnnWnnnnn *or* NnnnnEnnnnn *or* SnnnnWnnnnn *or* SnnnnEnnnnn	N2020W07005 S4812E01036
Observed Level (C)	Flight level *or* altitude of observed phenomenon	FLnnn *or* FLnnn/nnn *or* nnnnM (*or* [n]nnnnFT)	FL390 FL180/210 3000M 12000FT

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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 ~~S5000 W14000 – S5000 W13800 – S5200 W13800 – S5200 W14000 – S5000 W14000 SFC/FL100 WKN FCST AT 1600Z WI S5200 W14000 – S5200 W13800 – S5300 W13800 – S5300 W14000 – S5200 W14000~~

Meaning:

The second SIGMET message issued for the AMSWELL* flight information region (identified by YUCC 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~~an area bounded by 50 degrees 0 minutes south 140 degrees 0 minutes west to 50 degrees 0 minutes south 138 degrees 0 minutes west to 52 degrees 0 minutes south 138 degrees 0 minutes west to 52 degrees 0 minutes south 140 degrees 0 minutes west to 50 degrees 0 minutes south 140 degrees 0 minutes west and between the surface and flight level 100; the radioactive cloud is expected to weaken in intensity; at 1600 UTC the radioactive cloud is forecast to be located within an area bounded by 52 degrees 0 minutes south 140 degrees 0 minutes west to 52 degrees 0 minutes south 138 degrees 0 minutes west to 53 degrees 0 minutes south 138 degrees 0 minutes west to 53 degrees 0 minutes south 140 degrees 0 minutes west to 52 degrees 0 minutes south 140 degrees 0 minutes west~~.

* Fictitious location

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

(See Chapter 9 of this Annex.)

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

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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 replanning shall be in the BUFR code form.

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

2.2.2 **Recommendation**.— *As of 4 November 2021, in addition to 2.2.1, information on significant weather supplied by WAFCs for pre-flight planning and in-flight replanning should be in IWXXM GML form.*

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

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

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4.2 Charts in flight documentation

4.2.1 Characteristics of charts

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

. . .

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

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

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

(See Chapter 11 of this Annex.)

1. SPECIFIC REQUIREMENTS FOR COMMUNICATIONS

1.1 Required transit times of operational meteorological information

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

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2.1.4 ~~Structure~~Transmission of bulletins containing operational meteorological information

Meteorological bulletins containing operational meteorological information ~~to~~shall be transmitted via the ~~AFTN~~aeronautical fixed service (AFS) ~~shall be encapsulated in the text part of the AFTN message format~~.

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

(See Appendix 2, 6.1 of this Annex.)

Element to be forecast	*Range*	*Resolution*
Flight level affected by radiation	250 – 600	~~3~~10
Longitudes for advisories (degrees)	000 – 180	15
Latitudes for advisories (degrees)	00 – 90	10
… …	…	…

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— END —

Appendix B

Monitoring table of Implementation of Amendment 79 to ICAO Annex 3

Implementation of Amendment 79 to Annex 3 of ICAO- SAM Region			
State	**Action implemented by the Authority**	**Action implemented by the Service Provider**	**Probable full implementation date**
Argentina			
Bolivia			
Brazil			
Chile			
Colombia			
Ecuador			
Guyana			
French Guyana			
Panama			
Paraguay			
Peru			
Suriname			
Uruguay			
Venezuela			