

C A R I B B E A N

M E T E O R O L O G I C A L

O R G A N I Z A T I O N

**ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES Doc. 5**

Basseterre, ST. KITTS AND NEVIS, 14 NOVEMBER 2018

# OUTCOME/HIGHLIGHTS OF THE SEVENTIETH MEETING OF WMO EXCUTIVE COUNCIL

(Submitted by the Coordinating Director)

**Summary**

1. The seventieth session of the WMO Executive Council (EC) was held in Geneva from 20 to 29 May 2018 at the WMO headquarters building, 7 bis, avenue de la Paix.

2. The documentation for the Meeting continued in the format of resolutions and/or decisions requiring EC action.

Resolutions contained formal decisions on budgetary, regulatory and other matters requiring implementation by Members and delegated to EC by Congress; establishment of subsidiary bodies and their terms of reference. Other decisions were recorded in the form of structured and numbered decisions.

Decisions will be used to place on record instructions/directives to the Secretary-General, the President, and constituent bodies in accordance with Cg resolutions/decisions; EC subsidiary bodies and other bodies reporting to EC; EC opinion/observations on a specific topic, procedural decisions and other decisions pertaining to the internal matters of EC.

**A. WMO Constituent Body Reform**

3. The Seventeenth WMO Congress (Cg-17) in 2015 requested the Executive Council (EC) to continue to introduce specific measures for improvement of WMO processes and practices. It further requested the EC provide recommendations to the Eighteenth Congress on constituent body constructs, as appropriate, including possible new structures for TCs, RAs, EC, and also to provide recommendations on rules, procedures, processes, mechanisms, and duties of constituent bodies, WMO Officers (President, Vice-Presidents, PRAs and PTCs) and the relationship between them and the WMO Secretariat, in order to enhance the efficiency and effectiveness of the Organization and good governance.

4. At its sixty-seventh session the Executive Council charged its Working Group on Strategic and Operational Planning (EC WG-SOP) to provide:

1. Recommendations to EC on constituent body constructs, as appropriate, including possible new structures for technical commissions, regional associations and the Executive Council;
2. Recommendations on rules, procedures, processes, working mechanisms, and duties of constituent bodies, WMO Officers (President and Vice-Presidents) and the relationship between them and the WMO Secretariat;
3. Enhancement of the efficiency and effectiveness of the Organization and of good governance.

5. The EC WG-SOP made the following recommendations to the seventieth session of the Executive Council, (Geneva; June 2017), which were approved:

1. To establish two standing bodies which would report to EC:
2. A Policy Advisory Committee (PAC);
3. A Technical Coordination Committee (TCC).
4. To establish, in accordance with Article 8 (g) of the Convention, the following technical commissions for the nineteenth financial period:
   1. Commission for Earth System Observation, Infrastructure and Information (COIIS);
   2. Commission for Weather, Climate, Water and Related Environmental Services and Applications (CSA);
5. That the two technical commissions shall commence their work as early as possible in accordance with the Transition Plan;
6. That, in accordance with the final paragraph of Article 8 of the Convention, the president of each new commission and their vice-presidents will be elected by Congress, from amongst current presidents and vice presidents of technical commissions, as a one-time measure aimed at expediting the transition to the new structure of the technical commissions,
7. Upon completion of the transition period, to disband the existing technical commissions that have been active during the eighteenth financial period:
   1. Commission for Basic Systems (CBS);
   2. Commission for Instruments and Methods of Observation (CIMO);
   3. Commission for Hydrology (CHy) (pending CHy-Ext Recommendations);
   4. Commission for Atmospheric Sciences (CAS);
   5. Commission for Aeronautical Meteorology (CAeM);
   6. Commission for Agricultural Meteorology (CAgM);
   7. Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM);
   8. Commission for Climatology (CCl).

**B. WIGOS Data Quality Monitoring System (WDQMS)**

6. By Cg-18 (2019), all Members should be “WIGOS Ready” Per the Plan for the WIGOS pre-operational phase, this includes:

1. OSCAR/Surface: completed WIGOS metadata of all observing stations across all WIGOS components for which observations are exchanged internationally;
2. WIGOS metadata: compliance achieved;
3. WIGOS Station Identifiers: implemented;
4. WIGOS Data Quality Monitoring System (WDQMS): national process for acting on quality problem information received from the WDQMS in place

7. The seventieth session of the Executive Council (EC-70) was shown the results of the pilot project to demonstrate the WIGOS Data Quality Monitoring System (WDQMS). The WDQMS compares the data ingested (surface pressure and TEMP reports) into numerical weather prediction models at four centres which are the Deutscher Wetterdienst (DWD), the European Centre for Medium-Range Weather Forecasts (ECMWF), Japan Meteorological Agency (JMA) and the National Centers for Environmental Prediction (NCEP) with the Members' information, which is stored in OSCAR/Surface. The comparative results are presented as a map with the collection of the last twenty-fours as shown in Figures 1 and 2.

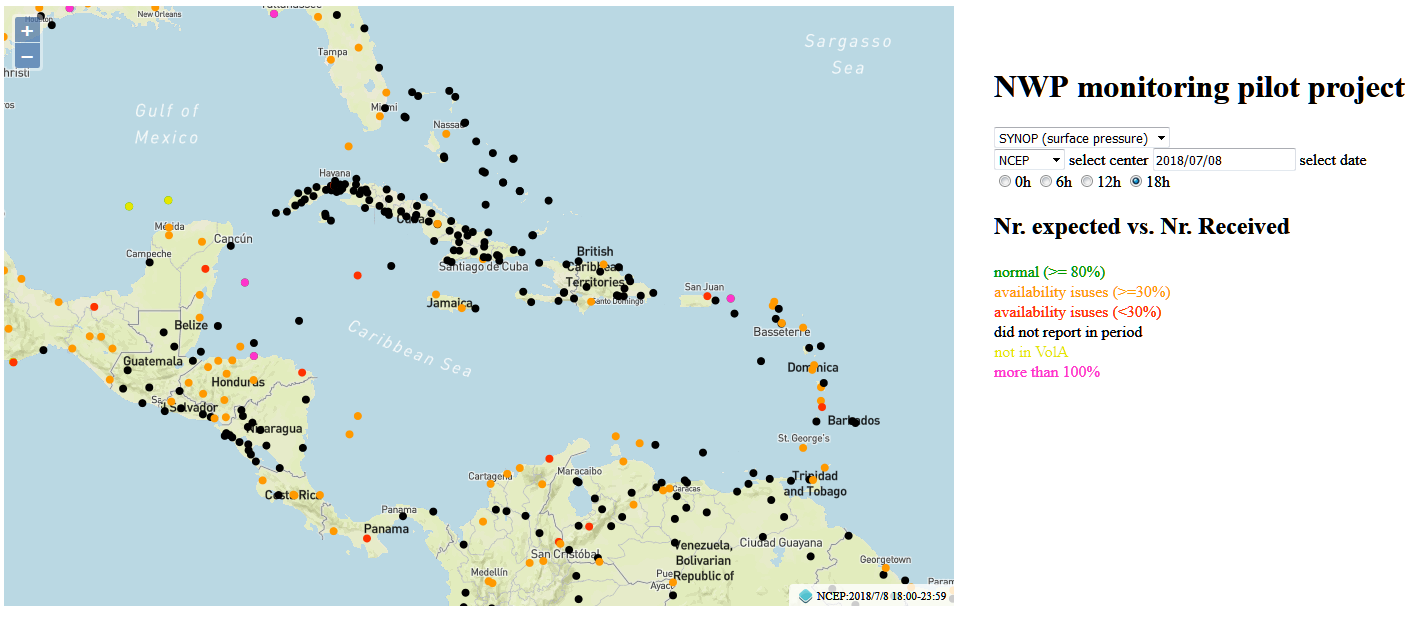


Figure 1: SYNOP (Surface pressure) comparison for the Caribbean for 1800UTC on 8th July 2018.

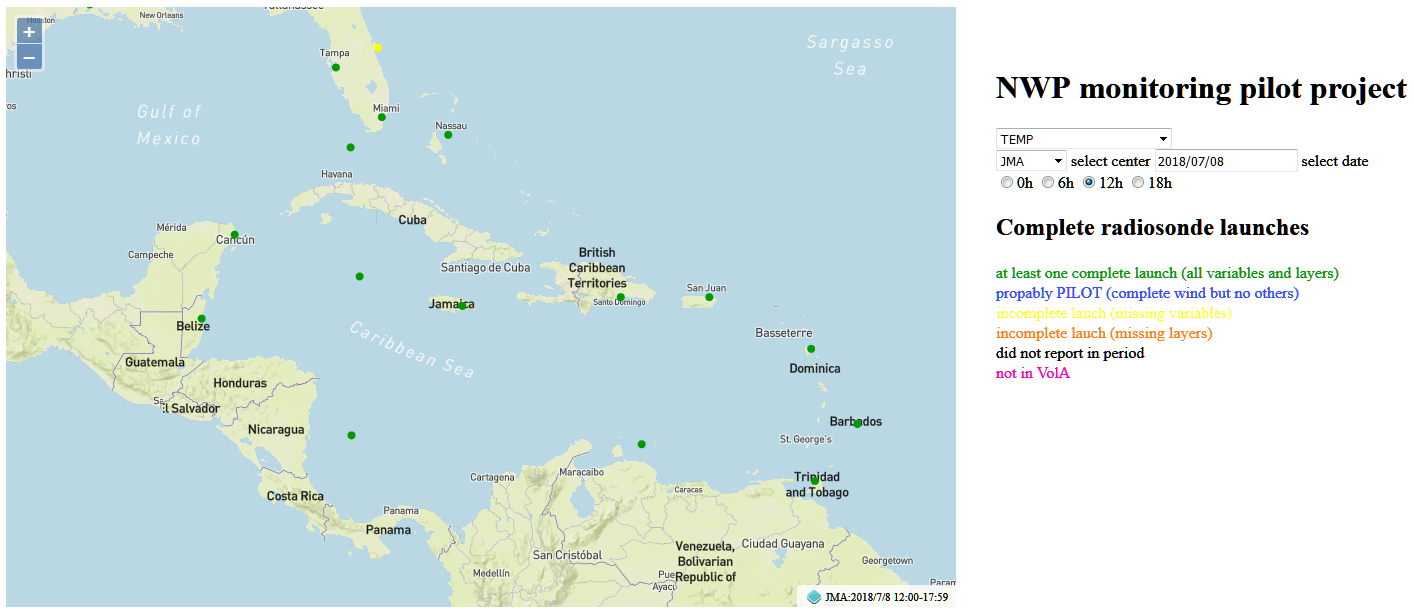


Figure 2: TEMP comparison for the Caribbean for 1200UTC on 8th July 2018.

**C. Aeronautical Meteorology**

8. EC-70 approved a Resolution which amended WMO Technical Regulation (WMO No. 49) Volume II *Meteorological Service for International Air Navigation*, which ensures its necessary alignment with Amendment 78 to Annex 3 of the ICAO Convention that will come into force in November 2018. The amendment is provided in **Annex I**.

**D. Competency Changes**

9. EC-70 approved a Resolution which amended WMO Technical Regulation (WMO No. 49) Volume I, *General Meteorological Standards and Recommended Practices, Part V*, which provided the top-level competencies for a pubic weather service forecaster. The competencies for the following forecasters are provided in **Annex II**.

1. Public Weather Forecasters;
2. Weather Broadcasters and Communicators;
3. Persons Engaged in the Development and Delivery of Meteorological and Hydrological Products and Services;
4. PWS Advisors Supporting Disaster Prevention and Mitigation and Other User Activities.

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### NOTES ON THE PRESENTATION OF THE AMENDMENT 78 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 |
| 1. New text to be inserted is highlighted with grey shading. | new text to be inserted |
| 1. ~~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 |

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TEXT OF AMENDMENT 78

**TO THE**

**INTERNATIONAL STANDARDS**

**AND RECOMMENDED PRACTICES**

**METEOROLOGICAL SERVICE**

**FOR INTERNATIONAL AIR NAVIGATION**

ANNEX 3

**TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION**

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### PART I.    CORE SARPs

### CHAPTER 1. DEFINITIONS

**1.1    Definitions**

…

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

…

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

*Note. – A space weather centre is designated as global and/or regional.*

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### CHAPTER 2.   GENERAL PROVISIONS

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**2.1   Objective, determination and provision of meteorological service**

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2.1.4    Each Contracting State shall designate the authority, h**e**reinafter referred to as the meteorological authority, to provide or to arrange for the provision of meteorological service for international air navigation on its behalf. Details of the meteorological authority so designated shall be included in the State aeronautical information publication, in accordance with Annex 15, Chapter 5 ~~Appendix 1, GEN 1.1~~.

*Note.— Detailed specifications concerning presentation and contents of the aeronautical information publication is provided in PANS-AIM (Doc 10066), Appendix 2.*

2.1.5    Each Contracting State shall ensure that the designated meteorological authority complies with the requirements of the World Meteorological Organization (WMO) in respect of qualifications, ~~and~~ competencies, education and training of meteorological personnel providing service for international air navigation.

*Note.— Requirements concerning the qualifications, ~~and~~ competencies, education and training of meteorological personnel in aeronautical meteorology are given in the* Technical Regulations *(WMO‑No. 49), Volume I —* General Meteorological Standards and Recommended Practices*, Part V —* Qualifications and Competencies of Personnel Involved in the Provision of Meteorological (Weather and Climate) and Hydrological Services*,* *Part VI — Education and Training of Meteorological Personnel, and Appendix A —* Basic Instruction Packages*.*

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### CHAPTER 3. WORLD AREA FORECAST SYSTEM

**~~AND METEOROLOGICAL OFFICES~~**

**GLOBAL SYSTEMS, SUPPORTING CENTRES AND METEOROLOGICAL OFFICES**

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**3.4    Meteorological watch offices**

3.4.1    A Contracting State, having accepted the responsibility for providing air traffic services within a flight information region (FIR) or a control area (CTA), shall establish, in accordance with regional air navigation agreement, one or more MWOs, or arrange for another Contracting State to do so.

*Note.— Guidance on the bilateral or multilateral arrangements between Contracting States for the provision of meteorological watch office services, including for cooperation and delegation, can be found in the* Manual of Aeronautical Meteorological Practice (*Doc 8896*).

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**3.8    Space weather centres (SWXC)**

3.8.1 A Contracting State, having accepted the responsibility for providing a SWXC, shall arrange for that centre to monitor and provide advisory information on space weather phenomena in its area of responsibility by arranging for that centre to:

1. monitor relevant ground-based, airborne and space-based observations to detect, and predict when possible, the existence of space weather phenomena that have an impact in the following areas:
2. high frequency (HF) radio communications;
3. communications via satellite;
4. GNSS-based navigation and surveillance; and
5. radiation exposure at flight levels;
6. issue advisory information regarding the extent, severity and duration of the space weather phenomena that have an impact referred to in a);
7. supply the advisory information referred to in b) to:
8. area control centres, flight information centres and aerodrome meteorological offices in its area of responsibility which may be affected;
9. other SWXCs; and
10. international OPMET databanks, international NOTAM offices and aeronautical fixed service Internet-based services.

3.8.2 SWXC shall maintain a 24-hour watch.

3.8.3 In case of interruption of the operation of a SWXC, its functions shall be carried out by another SWXC or another centre, as designated by the SWXC Provider State concerned.

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

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### CHAPTER 9. SERVICE FOR OPERATORS

**AND FLIGHT CREW MEMBERS**

**9.1 General provisions**

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9.1.3 Meteorological information supplied to operators and flight crew members shall be up to date and include the following information, as agreed between the meteorological authority and the operators concerned:

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i) meteorological satellite images; ~~and~~

j) ground-based weather radar information~~.~~; and

k) space weather advisory information relevant to the whole route.

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**9.3 Flight documentation**

*Note.— The requirements for the use of automated pre-flight information systems in providing flight documentation are given in 9.4.*

9.3.1 Flight documentation to be made available shall comprise information listed under 9.1.3 a) 1) and 6), b), c), e), f) and, if appropriate, g) and k). However, flight documentation for flights of two hours’ duration or less, after a short stop or turnaround, shall be limited to the information operationally needed, as agreed between the meteorological authority and the operator concerned, but in all cases it shall at least comprise information on 9.1.3 b), c), e), f) and, if appropriate, g) and k).

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**9.4   Automated pre-flight information systems for briefing,**

**consultation, flight planning and flight documentation**

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9.4.2    **Recommendation**.*— Automated pre-flight information systems providing for a harmonized, common point of access to meteorological information and aeronautical information services information by operators, flight crew members and other aeronautical personnel concerned should be as agreed between the meteorological authority and the civil aviation authority or the agency to which the authority to provide service has been delegated in accordance with Annex 15, 2.1.1 c)*.

*Note.— The meteorological and aeronautical information services information concerned is specified in 9.1 to 9.3 and Appendix 8 and in ~~Annex 15, 8.1 and 8.2~~PANS-AIM, 5.5, respectively.*

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### PART II. APPENDICES AND ATTACHMENTS

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### APPENDIX 2. TECHNICAL SPECIFICATIONS RELATED TO

**~~WORLD AREA FORECAST SYSTEM~~**

**GLOBAL SYSTEMS, SUPPORTING CENTRES AND METEOROLOGICAL OFFICES**

*(See Chapter 3 of this Annex)*

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### 3.    VOLCANIC ASH ADVISORY CENTRES

**3.1 Volcanic Ash Advisory Information**

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3.1.2 **Recommendation.—***Until 4 November 2020, ~~Volcanic ash advisory centres (VAACs) should issue~~ volcanic ash advisory information should be disseminated in ~~digital~~ IWXXM GML form in addition to the issuance of this advisory information in ~~abbreviated plain language in~~ accordance with 3.1.1.*

*3.1.2* As of 5 November 2020, volcanic ash advisory information shall be disseminated in IWXXM GML form in addition to the issuance of this advisory information in accordance with 3.1.1.

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

~~3.1.3 Volcanic ash advisory information, if disseminated in digital form, shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML).~~

~~3.1.4 Volcanic ash advisory information, if disseminated in digital form, shall be accompanied by the appropriate metadata.~~

*~~Note.— Guidance on the information exchange model XML/GML and the metadata profile is provided in the~~* ~~Manual on the Digital Exchange of Aeronautical Meteorological Information~~ *~~(Doc 10003).~~*

### 5.    TROPICAL CYCLONE ADVISORY CENTRES

**5.1 Tropical Cyclone Advisory Centres**

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

5.1.3 **Recommendation.—** *Until 4 November 2020, ~~Tropical cyclone advisory centres should issue~~ tropical cyclone advisory information should be disseminated in ~~digital~~ IWXXM GML form in addition to the issuance of this advisory information in ~~abbreviated plain language in~~ accordance with 5.1.2.*

*5.1.3* As of 5 November 2020, tropical cyclone advisory centres shall disseminate tropical cyclone advisory information in IWXXM GML form in addition to the dissemination of this advisory information in abbreviated plain language in accordance with 5.1.2.

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

~~5.1.4 Tropical cyclone advisory information, if disseminated in digital form, shall be formatted in accordance with a globally interoperable information exchange model and shall use XML/GML.~~

~~5.1.5 Tropical cyclone advisory information, if disseminated in digital form, shall be accompanied by the appropriate metadata.~~

*~~Note.— Guidance on the information exchange model XML/GML and the metadata profile is provided in (Doc 10003).~~*

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| *Editorial note.— Insert* new Section 6 as follows: |

### 6. SPACE WEATHER CENTRES

**6.1    Space weather advisory information**

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

*6.1.2*  **Recommendation.—** *As of 7 November 2019 until 4 November 2020, space weather advisory information should be made available in IWXXM GML form, in addition to the dissemination of space weather advisory information in abbreviated plain language in accordance with 6.1.1.*

*6.1.2*  As of 5 November 2020, space weather advisory information shall be disseminated in IWXXM GML form, in addition to the dissemination of this advisory information in abbreviated plain language in accordance with 6.1.1.

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

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

*- HF communications (propagation, absorption) HF COM*

*- Communications via satellite (propagation, absorption) SATCOM*

*- GNSS-based navigation and surveillance (degradation) GNSS*

*- Radiation at flight levels (increased exposure) RADIATION*

6.1.4  **Recommendation.—** *The following intensities should be included in space weather advisory information, using their respective abbreviations as indicated below:*

*- moderate MOD*

*- severe SEV*

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

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

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| --- |
| End of new section. |

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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.

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*Note 4.— The numbers 1 to 1~~8~~9 are included only for clarity and they are not part of the advisory message, as shown in the example.*

| *Element* | | *Detailed content* | *Template(s)* | | | | *Examples* | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | Identification of the type of message (M) | Type of message | VA ADVISORY | | | | VA ADVISORY | | |
|  |  |  |  | | | |  | | |
| 2 | Status indicator (C)1 | Indicator of test or exercise | STATUS: | | TEST *or* EXER | | STATUS:  STATUS: | TEST  EXER | |
|  |  |  | |  |  |  | | |  | |
| ~~2~~3 | Time of origin (M) | Year, month, day, time in UTC | DTG: | | nnnnnnnn/nnnnZ | | DTG: | 20080923/0130Z | |
|  |  |  |  | |  | |  |  | |
| ~~3~~4 | Name of VAAC (M) | Name of VAAC | VAAC: | | nnnnnnnnnnnn | | VAAC: | TOKYO | |
|  |  |  |  | |  | |  |  | |
| ~~4~~5 | Name of volcano (M) | Name and IAVCEI~~1~~2 number of volcano | VOLCANO: | | nnnnnnnnnnnnnnnnnnnnnn [nnnnnn]  *or*  UNKNOWN  *or* UNNAMED | | VOLCANO:  VOLCANO: | KARYMSKY 1000-13  UNNAMED | |
|  | … | … | … | | … | | … | … | |

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| *Editorial Note.—* *Renumber* Subsequent footnotes in table A2-1. |

*Notes.—*

1. Used only when the message issued to indicate that a test or an exercise is taking place. When the word “TEST” or the abbreviation “EXER” is included, the message may contain information that should not be used operationally or will otherwise end immediately after the word "TEST". *[Applicable 7 November 2019]*

~~1~~2. International Association of Volcanology and Chemistry of the Earth’s Interior (IAVCEI).

~~2~~3. A straight line between two points drawn on a map in the Mercator projection or a straight line between two points which crosses lines of longitude at a constant angle.

~~3~~4. Up to 4 selected layers.

~~4~~5. If ash reported (e.g. AIREP) but not identifiable from satellite data.

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

Key: M = inclusion mandatory, part of every message;

C = inclusion conditional, included whenever applicable;

= = a double line indicates that the text following it should be placed on the subsequent line.

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

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

*~~Note 3.— All the elements are mandatory.~~*

*Note ~~4~~3.— Inclusion of a “colon” after each element heading is mandatory.*

*Note ~~5~~4.— The numbers 1 to ~~19~~21 are included only for clarity and they are not part of the advisory message, as shown in the example.*

| *Element* | | | | *Detailed content* | | *Template(s)* | | | *Examples* | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | | Identification of the type of message (M) | | Type of message | | TC ADVISORY | |  | TC ADVISORY | |  | |
|  | |  | |  | |  | |  |  | |  | |
| 2 | | Status indicator (C)1 | | Indicator of test or exercise | | STATUS: | TEST *or* EXER | | STATUS:  STATUS: | TEST  EXER | | |
|  |  | |  | |  | | |  |  | | |  |
| ~~2~~3 | | Time of origin (M) | | Year, month, day and time in UTC of issue | | DTG: | | nnnnnnnn/nnnnZ | DTG: | | 20040925/19~~6~~00Z | |
|  | |  | |  | |  | |  |  | |  | |
| ~~3~~4 | | Name of TCAC (M) | | Name of TCAC  (location indicator *or* full name) | | TCAC: | | nnnn *or* nnnnnnnnnn | TCAC:  TCAC: | | YUFO~~1~~2  MIAMI | |
|  | |  | |  | |  | |  |  | |  | |
| ~~4~~5 | | Name of tropical cyclone (M) | | Name of tropical cyclone *or* “NN” for unnamed tropical cyclone | | TC: | | nnnnnnnnnnnn *or* NN | TC: | | GLORIA | |
|  |  | |  | |  | | |  |  | | |  |
| ~~5~~6 | | Advisory number (M) | | Advisory number: Year in full and message number (separate sequence ~~starting with “01”~~ for each cyclone) | | ADVISORY NR: | | nnnn/[n][n]nn | ADVISORY NR: | | 2004/13~~01~~ | |
|  |  | |  | |  | | |  |  | | |  |
| ~~6~~7 | | Observed p~~P~~osition of the centre (M) | | Day and time (in UTC) and p~~P~~osition of the centre of the tropical cyclone (in degrees and minutes) | | OBS PSN:: | | nn/nnnnZ  Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] | OBS PSN: | | 25/1800Z  N2706 W07306 | |
|  |  | |  | |  | | |  |  | | |  |
| 8 | | Observed CB cloud3 (C) | | Location of CB cloud (referring to latitude and longitude (in degrees and minutes)) and vertical extent (flight level) | | CB: | | WI nnnKM (*or* nnnNM) OF TC CENTRE  *or*  WI4 Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] –  Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] –  Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] –  [Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] –  Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]  TOP [ABV *or* BLW] FLnnn | CB: | | WI 250NM OF TC CENTRE TOP FL500 | |
|  |  | |  | |  | | |  |  | | |  |
| ~~7~~9 | | Direction and speed of movement (M) | | Direction and speed of movement given in sixteen compass points and km/h (*or* kt), respectively, *~~or~~* ~~moving slowly (< 6 km/h (3 kt)~~) *or* stationary (< 2 km/h (1 kt)) | | MOV: | | N nnKMH (*or* KT) *or*  NNEnnKMH (*or* KT) *or*  NE nnKMH (*or* KT) *or*  ENEnnKMH (*or* KT) *or*  E nnKMH (*or* KT) *or*  ESEnnKMH (*or* KT) *or*  SE nnKMH (*or* KT) *or*  SSEnnKMH (*or* KT) *or*  S nnKMH (*or* KT) *or*  SSWnnKMH (*or* KT) *or*  SW nnKMH (*or* KT) *or*  WSWnnKMH (*or* KT) *or*  W nnKMH (*or* KT) *or*  WNWnnKMH (*or* KT) *or*  NW nnKMH (*or* KT) *or*  NNWnnKMH (*or* KT) *or*  ~~SLW~~ *~~or~~* STNR | MOV: | | NW 20KMH | |
|  |  | |  | |  | | |  |  | | |  |
| ~~8~~10 | | Central pressure (M) | | Central pressure (in hPa) | | C: | | nnnHPA | C: | | 965HPA | |
|  |  | |  | |  | | |  |  | | |  |
| ~~9~~11 | | Maximum surface wind (M) | | Maximum surface wind near the centre (mean over 10 minutes, in  m/s (or kt)) | | MAX WIND: | | nn[n]MPS  (or nn[n]KT) | MAX WIND: | | 22MPS | |
|  |  | |  | |  | | |  |  | | |  |
| ~~10~~12 | | Forecast of centre position  (+6 HR) (M) | | Day and time (in UTC) (6 hours from the “DTG” given in Item 2);  Forecast position (in degrees and minutes) of the centre of the tropical cyclone | | FCST PSN +6 HR: | | nn/nnnnZ  Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] | FCST PSN +6 HR: | | 25/2200Z  N2748 W07350 | |
|  |  | |  | |  | | |  |  | | |  |
| ~~11~~13 | | Forecast of maximum surface wind (+6 HR) (M) | | Forecast of maximum surface wind (6 hours after the “DTG” given in Item 2) | | FCST MAX  WIND +6 HR: | | nn[n]MPS  (or nn[n]KT) | FCST MAX  WIND +6 HR: | | 22MPS | |
|  |  | |  | |  | | |  |  | | |  |
| ~~12~~14 | | Forecast of centre position  (+12 HR) (M) | | Day and time (in UTC) (12 hours from the “DTG” given in Item 2);  Forecast position (in degrees and minutes) of the centre of the tropical cyclone | | FCST PSN +12 HR: | | nn/nnnnZ  Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] | FCST PSN +12 HR: | | 26/0400Z  N2830 W07430 | |
|  |  | |  | |  | | |  |  | | |  |
| ~~13~~15 | | Forecast of maximum surface wind (+12 HR) (M) | | Forecast of maximum surface wind (12 hours after the “DTG” given in Item 2) | | FCST MAX WIND  +12 HR: | | nn[n]MPS  (or nn[n]KT) | FCST MAX WIND  +12 HR: | | 22MPS | |
|  |  | |  | |  | | |  |  | | |  |
| ~~14~~16 | | Forecast of centre position  (+18 HR) (M) | | Day and time (in UTC) (18 hours from the “DTG” given in Item 2);  Forecast position (in degrees and minutes) of the centre of the tropical cyclone | | FCST PSN +18 HR: | | nn/nnnnZ  Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] | FCST PSN +18 HR: | | 26/1000Z  N2852 W07500 | |
|  |  | |  | |  | | |  |  | | |  |
| ~~15~~17 | | Forecast of maximum surface wind (+18 HR) (M) | | Forecast of maximum surface wind (18 hours after the “DTG” given in Item 2) | | FCST MAX WIND  +18 HR: | | nn[n]MPS  (or nn[n]KT) | FCST MAX WIND  +18 HR: | | 21MPS | |
|  |  | |  | |  | | |  |  | | |  |
| ~~16~~18 | | Forecast of centre position  (+24 HR) (M) | | Day and time (in UTC) (24 hours from the “DTG” given in Item 2);  Forecast position (in degrees and minutes) of the centre of the tropical cyclone | | FCST PSN +24 HR: | | nn/nnnnZ  Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] | FCST PSN +24 HR: | | 26/1600Z  N2912 W07530 | |
|  |  | |  | |  | | |  |  | | |  |
| ~~17~~19 | | Forecast of maximum surface wind (+24 HR) (M) | | Forecast of maximum surface wind (24 hours after the “DTG” given in Item 2) | | FCST MAX WIND  +24 HR: | | nn[n]MPS  (or nn[n]KT) | FCST MAX WIND  +24 HR: | | 20MPS | |
|  |  | |  | |  | | |  |  | | |  |
| ~~18~~20 | | Remarks (M) | | Remarks, as necessary | | RMK: | | Free text up to 256 characters  or  NIL | RMK: | | NIL | |
|  |  | |  | |  | | |  |  | | |  |
| ~~19~~21 | | Expected time of issuance of next advisory (M) | | Expected year, month, day and time (in UTC) of issuance of next advisory | | NXT MSG: | | [BFR] nnnnnnnn/nnnnZ  or  NO MSG EXP | NXT MSG: | | 20040925/2000Z | |

*Notes.—*

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]*

~~1.~~2. Fictitious location.

3. In the case of CB clouds associated with a tropical cyclone covering more than one area within the area of responsibility, this element can be repeated, as necessary..

4. The number of coordinates should be kept to a minimum and should not normally exceed seven.

**. . .**

Example A2-2.    Advisory message for tropical cyclones

|  |  |
| --- | --- |
| TC ADVISORY |  |
| DTG: | 20040925/19~~6~~00Z |
| TCAC: | YUFO |
| TC: | GLORIA |
| ADVISORY NR: | 2004/13~~01~~ |
| OBS PSN: | 25/1800Z N2706 W07306 |
| CB: | WI 250NM OF TC CENTRE |
| C: | 965HPA |
| MAX WIND: | 22MPS |
| 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 |

|  |
| --- |
| *Insert* new Table A2-3, Examples A2-3, A2-4 and A2-5 as follows: |

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

Key: M = inclusion mandatory, part of every message

C = inclusion conditional, included whenever applicable

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

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

*Note 3. – Inclusion of a «colon» after each element heading is mandatory.*

*Note 4.— The numbers 1 to 14 are included only for clarity and they are not part of the advisory message, as shown in the examples.*

| *Element* | | *Detailed content* | *Template(s)* | | *Examples* | |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Identification of the type of message (M) | Type of message | SWX ADVISORY | | SWX ADVISORY | |
|  |  |  |  | |  | |
| 2 | Status indicator (C)1 | Indicator of test or exercise | STATUS: | TEST *or* EXER | STATUS:  STATUS: | TEST  EXER |
|  |  |  |  |  |  |  |
| 3 | Time of origin (M) | Year, month, day, time in UTC | DTG: | nnnnnnnn/nnnnZ | DTG: | 20161108/0100Z |
|  |  |  |  |  |  |  |
| 4 | Name of SWXC (M) | Name of SWXC | SWXC: | Nnnnnnnnnnnn | SWXC: | DONLON |
|  |  |  |  |  |  |  |
| 5 | Advisory number (M) | Advisory number: year in full and unique message number | ADVISORY NR: | nnnn/[n][n][n]n | ADVISORY NR: | 2016/1 |
|  |  |  |  |  |  |  |
| 6 | Number of advisory being replaced (C) | Number of the previously issued advisory being replaced | NR RPLC: | nnnn/[n][n][n]n | NR RPLC: | 2016/1 |
|  |  |  |  |  |  |  |
| 7 | Space weather effect and intensity (M) | Effect and intensityof the space weather phenomena | SWX EFFECT: | HF COM MOD *or* SEV  *or*  SATCOM MOD *or* SEV  *or*  GNSS MOD *o*r SEV  *or*  HF COM MOD *or* SEV AND GNSS MOD *o*r SEV  *or*  RADIATION MOD *o*r SEV | SWX EFFECT:  SWX EFFECT:  SWX EFFECT:  SWX EFFECT:  SWX EFFECT:  SWX EFFECT: | HF COM MOD  GNSS SEV  HF COM MOD AND GNSS MOD  RADIATION MOD  SATCOM SEV |
|  |  |  |  |  |  |  |
| 8 | Observed or expected extent of space weather phenomena (M) | Time: day, time in UTC;  Observed (or forecast if phenomena have yet to occur); horizontal extent 2 (latitude bands and longitude in degrees) and/or altitudeof 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  *and*  Wnnn(nn) *or* Ennn(nn) –  Wnnn(nn) *or* Ennn(nn)  *and/or*  ABV FLnnn  *or FLnnn–nnn*  *or*  Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – [Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]  *or*  NO SWX EXP | OBS SWX:  FCST SWX:  OBS SWX: | 08/0100Z DAYLIGHT SIDE  08/0100Z HNH HSH W18000 — W09000 ABV FL350  08/0100Z HNH HSH E18000-W18000 |
|  |  |  |  |  |  |  |
| 9 | Forecast of the phenomena for the next 6 hours (M) | Day, time (in UTC) (6 hours from time given in item 8, rounded to the next full hour);  Forecast extent and/or altitude of the space weather phenomena for the fixed valid time | FCST SWX +6 HR: | nn/nnnnZ  DAYLIGHT SIDE  *or*  HNH  *and/or*  MNH  *and/or*  EQN  *and/or*  EQS  *and/or*  MSH  *and/or*  HSH  *and*  Wnnn(nn) *or* Ennn(nn) –  Wnnn(nn) *or* Ennn(nn)  *and/or*  ABV FLnnn  *or FLnnn–nnn*  *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 +6 HR:  FCST SWX +6 HR:  FCST SWX +6 HR: | 08/0700Z DAYLIGHT SIDE  08/0700Z HNH HSH W18000 — W09000 ABV FL350  08/0700Z HNH HSH E18000-W18000 |
|  |  |  |  |  |  |  |
| 10 | Forecast of the phenomena for the next 12 hours (M) | Day, time (in UTC) (12 hours from time given in item 8, rounded to the next full hour);  Forecast extent and/or altitude of the space weather phenomena for the fixed valid time | FCST SWX +12 HR: | nn/nnnnZ  DAYLIGHT SIDE  *or*  HNH  *and/or*  MNH  *and/or*  EQN  *and/or*  EQS  *and/or*  MSH  *and/or*  HSH  *and*  Wnnn(nn) *or* Ennn(nn) –  Wnnn(nn) *or* Ennn(nn)  *and/or*  ABV FLnnn  *or FLnnn–nnn*  *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:  FCST SWX +12 HR:  FCST SWX +12 HR: | 08/1300Z DAYLIGHT SIDE  08/1300Z HNH HSH W18000 — W09000 ABV FL350  08/1300Z HNH HSH E18000-W18000 |
|  |  |  |  |  |  |  |
| 11 | Forecast of the phenomena for the next 18 hours (M) | Day, time (in UTC) (18 hours from time given in item 8, rounded to the next full hour);  Forecast extent and/or altitude of the space weather phenomena for the fixed valid time | FCST SWX +18 HR: | nn/nnnnZ  DAYLIGHT SIDE  *or*  HNH  *and/or*  MNH  *and/or*  EQN  *and/or*  EQS  *and/or*  MSH  *and/or*  HSH  *and*  Wnnn(nn) *or* Ennn(nn) –  Wnnn(nn) *or* Ennn(nn)  *and/or*  ABV FLnnn  *or FLnnn–nnn*  *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:  FCST SWX +18 HR:  FCST SWX +18 HR: | 08/1900Z DAYLIGHT SIDE  08/1900Z HNH HSH W18000 — W09000 ABV FL350  08/1900Z HNH HSH E18000-W18000 |
|  |  |  |  |  |  |  |
| 12 | Forecast of the phenomena for the next 24 hours (M) | Day, time (in UTC) (24 hours from time given in item 8, rounded to the next full hour);  Forecast extent and/or altitude of the space weather phenomena for the fixed valid time | FCST SWX +24 HR: | nn/nnnnZ  DAYLIGHT SIDE  *or*  HNH  *and/or*  MNH  *and/or*  EQN  *and/or*  EQS  *and/or*  MSH  *and/or*  HSH  *and*  Wnnn(nn) *or* Ennn(nn) –  Wnnn(nn) *or* Ennn(nn)  *and/or*  ABV FLnnn  *or FLnnn–nnn*  *or*  Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – [Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]  *or*  NO SWX EXP  *or*  NOT AVBL | FCST SWX +24 HR:  FCST SWX +24 HR:  FCST SWX +24 HR: | 09/0100Z DAYLIGHT SIDE  09/0100Z HNH HSH W18000 — W09000 ABV FL350  09/0100Z HNH HSH E18000-W18000 |
|  |  |  |  |  |  |  |
| 13 | Remarks (M) | Remarks, as necessary | RMK : | *Free text up to 256 characters*  *or*  NIL | RMK:  RMK:  RMK: | SWX EVENT HAS CEASED  WWW.SPACEWEATHERPROVIDER.GOV  NIL |
|  |  |  |  |  |  |  |
| 14 | Next advisory (M) | Year, month, day and time in UTC | NXT ADVISORY: | nnnnnnnn/nnnnZ  *or*  NO FURTHER ADVISORIES *or*  WILL BE ISSUED BY | NXT ADVISORY:  NXT ADVISORY: | 20161108/0700Z  NO FURTHER ADVISORIES |
|  |  |  |  |  |  |  |

*Notes.—*

1.Used only when the message issued to indicate that a test or an exercise is taking place. When the word “TEST” or the abbreviation “EXER” is included, the message may contain information that should not be used operationally or will otherwise end immediately after the word "TEST". *[Applicable 7 November 2019]*.

2.One or more latitude ranges should be included in the space weather advisory information for “GNSS” and “RADIATION”.

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

|  |  |
| --- | --- |
| SWX ADVISORY | |
| DTG: | 20161108/0100Z |
| SWXC: | DONLON\* |
| SWX EFFECT: | HF COM MOD AND GNSS MOD |
| ADVISORY NR: | 2016/2 |
| NR RPLC : | 2016/1 |
| OBS SWX: | 20161108/0100Z HNH HSH E18000 – W18000 |
| FCST SWX +6 HR: | 20121108/0700Z HNH HSH E18000 – W18000 |
| FCST SWX +12 HR: | 20161108/1300Z HNH HSH E18000 – W18000 |
| FCST SWX +18 HR: | 20161108/1900Z HNH HSH E18000 – W18000 |
| FCST SWX +24 HR: | 20161109/0100Z NO SWX EXP |
| RMK: | LOW LVL GEOMAGNETIC STORMING CAUSING INCREASED AURORAL ACT AND SUBSEQUENT MOD DEGRADATION OF GNSS AND HF COM AVBL IN THE AURORAL ZONE. THIS STORMING EXP TO SUBSIDE  IN THE FCST PERIOD. SEE WWW.SPACEWEATHERPROVIDER.WEB |
| NXT ADVISORY: | NO FURTHER ADVISORIES |

\* Fictitious location

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

|  |  |
| --- | --- |
| SWX ADVISORY | |
| DTG: | 20161108/0000Z |
| SWXC: | DONLON\* |
| SWX EFFECT: | RADIATION MOD |
| ADVISORY NR: | 2016/2 |
| NR RPLC : | 2016/1 |
| FCST SWX: | 20161108/0100Z HNH HSH E18000 – W18000 ABV FL350 |
| FCST SWX +6 HR: | 20121108/0700Z HNH HSH E18000 – W18000 ABV FL350 |
| FCST SWX +12 HR: | 20161108/1300Z HNH HSH E18000 – W18000 ABV FL350 |
| FCST SWX +18 HR: | 20161108/1900Z HNH HSH E18000 – W18000 ABV FL350 |
| FCST SWX +24 HR: | 20161109/0100Z NO SWX EXP |
| RMK: | RADIATION LVL EXCEEDED 100 PCT OF BACKGROUND LVL AT FL350 AND ABV. THE CURRENT EVENT HAS PEAKED AND LVL SLW RTN TO BACKGROUND LVL. SEE WWW.SPACEWEATHERPROVIDER.WEB |
| NXT ADVISORY: | NO FURTHER ADVISORIES |

\* Fictitious location

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

|  |  |
| --- | --- |
| SWX ADVISORY | |
| DTG: | 20161108/0100Z |
| SWXC: | DONLON\* |
| SWX EFFECT: | HF COM SEV |
| ADVISORY NR: | 2016/1 |
| OBS SWX: | 20161108/0100Z DAYLIGHT SIDE |
| FCST SWX +6 HR: | 20121108/0700Z DAYLIGHT SIDE |
| FCST SWX +12 HR: | 20161108/1300Z DAYLIGHT SIDE |
| FCST SWX +18 HR: | 20161108/1900Z DAYLIGHT SIDE |
| FCST SWX +24 HR: | 20161109/0100Z DAYLIGHT SIDE |
| RMK: | PERIODIC HF COM ABSORPTION OBS AND LIKELY TO CONT IN THE NEAR TERM. CMPL AND PERIODIC LOSS OF HF ON THE SUNLIT SIDE OF THE EARTH EXP. CONT HF COM DEGRADATION LIKELY OVER THE NXT 7 DAYS. SEE WWW.SPACEWEATHERPROVIDER.WEB |
| NXT ADVISORY: | 20161108/0700Z |

\* Fictitious location

**…**

|  |
| --- |
| End of new text. |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

### APPENDIX 3. TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL OBSERVATIONS AND REPORTS

*(See Chapter 4 of this Annex)*

### 2.    GENERAL CRITERIA RELATED TO METEOROLOGICAL REPORTS

**2.1 Format of meteorological reports**

2.1.3 **Recommendation**.— *Until 4 November 2020, METAR and SPECI should be disseminated in ~~digital~~ IWXXM GML form in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.*

*2.1.3* As of 5 November 2020, METAR and SPECI shall be disseminated in IWXXM GML form in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.

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

~~2.1.4 METAR and SPECI if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML).~~

~~2.1.5 METAR and SPECI if~~~~disseminated in digital form shall be accompanied by the appropriate metadata.~~

*~~Note.— Guidance on the information exchange model XML/GML and the metadata profile is provided in the~~* ~~Manual on the Digital Exchange of Aeronautical Meteorological Information~~ *~~(Doc 10003).~~*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

### APPENDIX 5. TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

*(See Chapter 6 of this Annex)*

### 1.    CRITERIA RELATED TO TAF

* 1. **TAF format**

1.1.2 **Recommendation**.— *Until 4 November 2020, TAF should be disseminated in ~~digital~~ IWXXM GML form in addition to the dissemination of the TAF in accordance with 1.1.1.*

*1.1.2* As of 5 November 2020, TAF shall be disseminated in IWXXM GML form in addition to the dissemination of the TAF in accordance with 1.1.1.

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

~~1.1.3 TAF if~~~~disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML).~~

~~1.1.4 TAF if~~~~disseminated in digital form shall be accompanied by the appropriate metadata.~~

*~~Note.— Guidance on the information exchange model XML/GML and the metadata profile is provided in the~~* ~~Manual on the Digital Exchange of Aeronautical Meteorological Information~~ *~~(Doc 10003).~~*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

*(See Chapter 7 of this Annex.)*

### 1.    SPECIFICATIONS RELATED TO SIGMET INFORMATION

* 1. **Format of SIGMET messages**

1.1.6**Recommendation.***— Until 4 November 2020, ~~Meteorological watch offices should issue~~ SIGMET information should be disseminated in ~~digital~~ IWXXM GML form~~,~~ in addition to the ~~issuance~~ dissemination of ~~this~~ SIGMET information in ~~abbreviated plain language in~~ accordance with 1.1.1.*

*1.1.6 As of 5 November 2020, SIGMET information shall be disseminated in IWXXM GML form in addition to the dissemination of SIGMET information in accordance with 1.1.1.*

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

~~1.1.7 SIGMET if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML).~~

~~1.1.8 SIGMET if disseminated in digital form shall be accompanied by the appropriate metadata.~~

*~~Note.— Guidance on the information exchange model XML/GML and the metadata profile is provided in the~~* ~~Manual on the Digital Exchange of Aeronautical Meteorological Information~~ *~~(Doc 10003).~~*



### 2.    SPECIFICATIONS RELATED TO AIRMET INFORMATION

**2.1 Format of AIRMET messages**

2.1.6**Recommendation.***— Until 4 November 2020, ~~Meteorological offices should issue~~ AIRMET information should be disseminated in ~~digital~~ IWXXM GML form~~,~~ in addition to the ~~issuance~~ dissemination of ~~this~~ AIRMET information in ~~abbreviated plain language in~~ accordance with 2.1.1.*

*2.1.6 As of 5 November 2020, AIRMET information shall be disseminated in IWXXM GML form in addition to the dissemination of AIRMET information in accordance with 2.1.1.*

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

~~2.1.7 AIRMET if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use XML/GML.~~

~~2.1.8 AIRMET if disseminated in digital form shall be accompanied by the appropriate metadata.~~

*~~Note.— Guidance on the information exchange model XML/GML and the metadata profile is provided in Doc 10003.~~*

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

…

| *Element* | | *Detailed content* | | *SIGMET template* | | *AIRMET template* | *SIGMET message examples* | | *AIRMET message examples* | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Location indicator of FIR/CTA (M)1 | ICAO location indicator of the ATS unit serving the FIR or CTA to which the SIGMET/AIRMET refers | | nnnn | | | | | YUCC2  YUDD2 | | |
| Identification (M) | Message identification and sequence number3 | | SIGMET [n][n]n | | AIRMET [n][n]n | | | SIGMET 1  SIGMET 01  SIGMET A01 | | AIRMET 9  AIRMET 19  AIRMET B19 |
| Validity period (M) | Day-time groups indicating the period of validity in UTC | | VALID nnnnnn/nnnnnn | | | | | VALID 010000/010400  VALID 221215/221600  VALID 101520/101800  VALID 251600/252200  VALID 152000/160000  VALID 192300/200300 | | |
| Location indicator of MWO (M) | Location indicator of MWO originating the message with a separating hyphen | | nnnn– | | | | | YUDO–2  YUSO–2 | | |
|  | |  | |  | |  |  | |  | |
| Name of the FIR/CTA (M) | Location indicator and name of the FIR/CTA4 for which the SIGMET/AIRMET is issued | | nnnn nnnnnnnnnn FIR~~[/UIR]~~  *or*  UIR  *or*  FIR/UIR  *or*  nnnn nnnnnnnnnn CTA | | nnnn nnnnnnnnnn  FIR[/n] | | | YUCC AMSWELL FIR2  YUDD SHANLON2  FIR/UIR2  UIR  FIR/UIR  YUDD SHANLON CTA2 | | YUCC AMSWELL FIR/22  YUDD SHANLON FIR2 |
| IF THE SIGMET OR AIRMET MESSAGE IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE. | | | | | | | | | | |
|  | |  | |  | |  |  | |  | |
| Status indicator (C)5 | | Indicator of test or exercise | | TEST *or* EXER | | TEST *or* EXER | TEST  EXER | | TEST  EXER | |
|  | |  | |  | |  |  | |  | |
| Phenomenon (M)~~5~~6 | Description of phenomenon causing the issuance of SIGMET/AIRMET | | OBSC~~6~~7 TS[GR~~7~~8]  EMBD~~8~~9 TS[GR~~7~~8]  FRQ~~9~~10 TS[GR~~7~~8]  SQL~~10~~11 TS[GR~~7~~8]  TC nnnnnnnnnnPSN Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] CB  *or* TC NN~~11~~12 PSN Nnn[nn]  *or* Snn[nn] Wnnn[nn]  *or* Ennn[nn] CB  SEV TURB~~12~~13  SEV ICE~~13~~14  SEV ICE (FZRA)~~13~~14  SEV MTW~~14~~15  HVY DS  HVY SS  [VA ERUPTION]  [MT nnnnnnnnnn]  [PSN Nnn[nn] *or* Snn[nn]  Ennn[nn] *or* Wnnn[nn]]  VA CLD  RDOACT CLD | | SFC WIND nnn/nn[n]MPS  (*or*  SFC WIND nnn/nn[n]KT)  SFC VIS [n][n]nnM (nn)~~15~~16  ISOL~~16~~17 TS[GR~~7~~8]  OCNL~~17~~18 TS[GR~~7~~8]  MT OBSC  BKN CLD  nnn/[ABV] [n]nnnM  (*or* BKN CLD  [n]nnn/[ABV] [n]nnnnFT)  *or* BKN CLD SFC/[ABV] [n]nnnM  (*or* BKN CLD  SFC/[ABV][n]nnnnFT)  OVC CLD  nnn/[ABV] [n]nnnM  (*or* OVC CLD  [n]nnn/[ABV] [n]nnnnFT)  *or* OVC CLD SFC/[ABV] [n]nnnM  (*or* OVC CLD  SFC/[ABV][n]nnnnFT)  ISOL~~16~~17 CB~~18~~19  OCNL~~17~~18 CB~~18~~19  FRQ~~9~~10 CB~~18~~19  ISOL~~16~~17 TCU~~18~~19  OCNL~~17~~18 TCU~~18~~19  FRQ~~9~~10 TCU~~18~~19  MOD TURB~~12~~13  MOD ICE~~13~~14  MOD MTW~~14~~15 | | | OBSC TS  OBSC TSGR  EMBD TS  EMBD TSGR  FRQ TS  FRQ TSGR  SQL TS  SQL TSGR  TC GLORIA PSN N10 W060 CB  TC NN PSN S2030 E06030 CB  SEV TURB  SEV ICE  SEV ICE (FZRA)  SEV MTW  HVY DS  HVY SS  VA ERUPTION MT ASHVAL2 PSN S15 E073 VA CLD  RDOACT CLD | | SFC WIND 040/40MPS  SFC WIND 310/20KT  SFC VIS 1500M (BR)  ISOL TS  ISOL TSGR  OCNL TS  OCNL TSGR  MT OBSC  BKN CLD 120/900M  BKN CLD 400/3000FT  BKN CLD 1000/5000FT  BKN CLD SFC/3000M  BKN CLD SFC/ABV 10000FT  OVC CLD 270/ABV3000M  OVC CLD 900/ABV10000FT  OVC CLD 1000/5000FT  OVC CLD SFC/3000M  OVC CLD SFC/ABV 10000FT  ISOL CB  OCNL CB  FRQ CB  ISOL TCU  OCNL TCU  FRQ TCU  MOD TURB  MOD ICE  MOD MTW |
| Observed or forecast  phenomenon (M) | Indication whether the information is observed and expected to continue, *or* forecast | | OBS [AT nnnnZ] *or*  FCST [AT nnnnZ] | | | | | OBS  OBS AT 1210Z  FCST  FCST AT 1815Z | | |
| Location (C) ~~19~~20 | | 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~~20~~21 *or* NE OF LINE~~20~~21 *or* E OF LINE~~20~~21 *or* SE OF LINE~~20~~21 *or* S OF LINE~~20~~21 *or* SW OF LINE~~20~~21 *or* W OF LINE~~20~~21 *or* NW OF LINE~~20~~21 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~~20~~21 *or* NE OF LINE~~20~~21 *or* E OF LINE~~20~~21 *or* SE OFLINE~~20~~21 *or* S OF LINE~~20~~21 *or* SW OF LINE~~20~~21 *or* W OF LINE~~20~~21 *or* NW OF LINE~~20~~21 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]]] | | | 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 | | | |
|  | |  | | *or*  WI~~20~~21, ~~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] –  Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]  *or*  APRX nnKM WID LINE~~20~~21 BTN (*or* nnNM WID LINE~~20~~21 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[/~~]UIR  *or*  ENTIRE FIR  *or*  ENTIRE FIR/UIR  *or*  ENTIRE CTA  *or*~~22~~23  WI nnnKM (*or* nnnNM) OF TC CENTRE  *or29*  WI nnKM (*or* nnNM) OF Nnn[nn] *or* Snn[nn] Wnnn[nn] or Ennn[nn] | | | ENTIRE FIR  ENTIRE UIR  ENTIRE FIR/UIR  ENTIRE CTA  WI 400KM OF TC CENTRE  WI 250NM OF TC CENTRE  WI 30KM OF N6030 E02550**[[1]](#footnote-1)†** | | | |
| Level (C) ~~19~~20, 29 | Flight level *or* altitude~~23~~ | | [SFC/]FLnnn *or*  [SFC/]nnnnM (*or* [SFC/][n]nnnnFT) *or*  FLnnn/nnn *or*  TOP FLnnn *or*  [TOP] ABV FLnnn *or* (or [TOP] ABV [n]nnnnFT)  [nnnn/]nnnnM (*or* [[n]nnnn/][n]nnnnFT) *or* [nnnnM/]FLnnn (*or* [[n]nnnnFT/]FLnnn)  *or* ~~22~~23  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) ~~19~~20, 24 | 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) ~~19~~20 | Expected changes in intensity | | INTSF *or*  WKN *or*  NC | | | | | INTSF  WKN  NC | | |
| Forecast time (C)24 | Indication of the forecast time of phenomenon | | FCST AT nnnnZ | | — | | | FCST AT 2200Z | | — |
| TC forecast position (C)23 | 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] | | — | | | TC CENTRE PSN N1030 E1600015 | | — |
| Forecast position (C) ~~19~~20, 24, 25 | | Forecast position of phenomenon at the end of the validity period of the SIGMET message | | 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~~20~~21 *or*  NE OF LINE~~20~~21 *or*  E OF LINE~~20~~21 *or*  SE OFLINE~~20~~21 *or*  S OF LINE~~20~~21 *or*  SW OF LINE~~20~~21 *or*  W OF LINE~~20~~21 *or*  NW OF LINE~~20~~21 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~~20~~21 *or*  NE OF LINE~~20~~21 *or*  E OF LINE~~20~~21 *or*  SE OFLINE~~20~~21 *or*  S OF LINE~~20~~21 *or*  SW OF LINE~~20~~21 *or*  W OF LINE~~20~~21 *or*  NW OF LINE~~20~~21 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~~20~~21, ~~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*  APRX nnKM WID LINE~~20~~21 BTN (nnNM WID LINE~~20~~21 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~~[/UIR]~~  *or*  ENTIRE UIR  *or*  ENTIRE FIR/UIR  *or*  ENTIRE CTA  *~~or~~*~~22~~  ~~TC CENTRE PSN Nnn[nn]~~ *~~or~~* ~~Snn[nn] Wnnn[nn]~~ *~~or~~* ~~Ennn[nn]~~  *or*26  NO VA EXP  *or29*  WI nnKM (*or* nnNM) OF 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  ~~TC CENTRE PSN N2740 W07345~~  NO VA EXP  WI 30KM OF N6030 E02550 **[[2]](#footnote-2)†** | | — | |
| Repetition of elements (C)27 | Repetition of elements included in a SIGMET message for volcanic ash cloud or tropical cyclone | | [AND]27 | | — | | | AND | | — |
|  | |  | |  | |  |  | |  | |
| OR | |  | |  | |  |  | |  | |
| Cancellation of SIGMET/  AIRMET (C)28 | Cancellation of SIGMET/AIRMET referring to its identification | | CNL SIGMET [n][n]n nnnnnn/nnnnnn  *or*26  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 FIR2 | | CNL AIRMET 05 151520/151800 |

*Notes.—*

1. See 4.1.

2. Fictitious location.

3. In accordance with 1.1.3 and 2.1.2.

4. See 2.1.3.

5. Used only when the message issued to indicate that a test or an exercise is taking place. When the word “TEST” or the abbreviation “EXER” is included, the message may contain information that should not be used operationally or will otherwise end immediately after the word "TEST". *[Applicable 7 November 2019]*

~~5~~6. In accordance with 1.1.4 and 2.1.4.

~~6~~7. In accordance with 4.2.1 a).

~~7~~8. In accordance with 4.2.4.

~~8~~9. In accordance with 4.2.1 b).

~~9~~10. In accordance with 4.2.2.

~~10~~11. In accordance with 4.2.3.

~~11~~12. Used for unnamed tropical cyclones.

~~12~~13. In accordance with 4.2.5 and 4.2.6.

~~13~~14. In accordance with 4.2.7.

~~14~~15. In accordance with 4.2.8.

~~15~~16. In accordance with 2.1.4.

~~16~~17. In accordance with 4.2.1 c).

~~17~~18. In accordance with 4.2.1 d).

~~18~~19. The use of cumulonimbus (CB) and towering cumulus (TCU) is restricted to AIRMETs in accordance with 2.1.4.

~~19~~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.

~~20~~21. 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.

~~21~~22. The number of coordinates should be kept to a minimum and should not normally exceed seven.

~~22~~23. Only for SIGMET messages for tropical cyclones.

~~23. Only for SIGMET messages for volcanic ash cloud and tropical cyclones.~~

24. The elements “forecast time” and “forecast position” are not to be used in conjunction with the element “movement or expected movement”.

25. The levels of the phenomena remain fixed throughout the forecast period.

26. Only for SIGMET messages for volcanic ash.

27. To be used for two volcanic ash clouds or two centres of tropical cyclones simultaneously affecting the FIR concerned..

28. End of the message (as the SIGMET/AIRMET message is being cancelled).

29. 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 7 November 2019].*

…

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

*(See Chapter 9 of this Annex)*

**…**

### 4. SPECIFICATIONS RELATED TO FLIGHT DOCUMENTATION

**4.1 Presentation of information**

**…**

4.1.3 METAR and SPECI (including trend forecasts as issued in accordance with regional air navigation agreement), TAF, GAMET, SIGMET~~,~~ and AIRMET, volcanic ash, ~~and~~ tropical cyclone and space weather advisory information shall be presented in accordance with the templates in Appendices 1, 2, 3, 5 and 6. Such meteorological information received from other meteorological offices shall be included in flight documentation without change.

…

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

**. . .**

### 3.   INFORMATION TO BE PROVIDED FOR AERONAUTICAL INFORMATION SERVICES UNITS

**3.1   List of information**

The following information shall be supplied, as necessary, to an aeronautical information services unit:

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

*Note.— Details of this information are given in ~~Annex 15~~PANS-AIM, Appendix ~~1~~3, Part 1, GEN 3.5 and Part 3, AD 2.2, 2.11, 3.2 and 3.11.*

1. information necessary for the preparation of NOTAM or ASHTAM including, in particular, information on:
2. the establishment, withdrawal and significant changes in operation of aeronautical meteorological services. This information is required to be provided to the aeronautical information services unit sufficiently in advance of the effective date to permit issuance of NOTAM in compliance with Annex 15, ~~5.1.1~~6.3.2.2 and ~~5.1.1.1~~6.3.2.3;

**. . .**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |
| --- |
| *Insert* new Attachment E as follows. |

**. . .**

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

*Note.— The guidance contained in this table relates to Appendix 2, 6.1 Space weather advisory information.*

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

|  |
| --- |
| End of new Attachment E. |

\_\_\_\_\_\_\_\_\_\_

**FUNDAMENTAL WMO COMPETENCY REQUIREMENTS  
FOR PUBLIC WEATHER FORECASTERS**

The competency requirements for the work of personnel engaged in operational forecasting[[3]](#footnote-3) can be divided into five top level competencies, taking into consideration the conditions (a) to (c) below:

(a) The nationally-defined PWS[[4]](#footnote-4) areas of responsibility;

(b) Meteorological and hydrological impacts on society;

(c) Meteorological and hydrological user requirements, local procedures and priorities.

A PWS Forecaster should have successfully completed the BIP-M[[5]](#footnote-5) (as defined in the revised *WMO-No. 49, Volume I*). Taking into account conditions (a) to (c) above, they should also be competent to perform the tasks defined through the five top level competencies, as follows:

(1) Analyse and continually monitor the evolving meteorological and/or hydrological situation;

(2) Forecast meteorological and hydrological phenomena and parameters;

(3) Warn of hazardous meteorological and hydrological phenomena;

(4) Communicate meteorological and hydrological information to internal and external users;

(5) Ensure the quality of meteorological and hydrological information and services.

Each of these top-level competencies is expanded into performance criteria that are expressed and structured in such a manner as to facilitate the clear application of an assessment procedure. The competencies are built upon a range of Enabling Skills (such as skills and knowledge in Numerical Weather Prediction) and also Transferrable Skills (workplace skills which are not exclusive to meteorology, such as problem-solving and people-management). Each top-level competency is also associated with a range of background knowledge and skills which are essential to the discharge of the defined duties.

**1. Analyse and continually monitor the evolving meteorological and/or hydrological situation**

***1.1 Competency description***

Observations and forecasts of meteorological/hydrological parameters and significant meteorological/hydrological phenomena are continuously analysed and monitored to determine the need for issuance, cancellation or amendment/update of forecasts and warnings according to documented thresholds, protocols and regulations.

***1.2 Performance Criteria***

(a) Analyse, interpret and diagnose data and information to identify meteorological/hydrological features pertinent to the area of forecast responsibility;

(b) Monitor meteorological/hydrological parameters and evolving significant meteorological/hydrological phenomena and validate current forecasts and warnings based on these parameters;

(c) Evaluate the need for amendments to forecasts and updates of warnings against documented criteria and thresholds;

(d) Monitor information related to impacts of recent meteorological and hydrological events.

***1.3 Background knowledge and skills***

1. Awareness of the importance of meteorological and hydrological services, and an understanding of the effects of forecasts and warnings on users and decision makers, in particular for public safety;
2. An understanding of the key elements of synoptic, dynamical, and physical meteorology and core analytical/diagnostic skills at least to the level of a BIP-M;
3. Application of the theory, methods and practices of meteorological and/or hydrological analysis and diagnosis;
4. An ability to visualize/conceptualize meteorological and/or hydrological information in multiple dimensions (spatial, temporal);
5. An appreciation of the influence of topography, land cover, and   
   (if relevant) bodies of water and/or snow fields on local meteorology;
6. Interpretation of in-situ and remote-sensed observations and data;
7. Understanding of the characteristics of meteorological and/or hydrological sensors and instruments;
8. Familiarity with the acquisition, processing and assimilation of meteorological and/or hydrological data, including quality control;
9. Understanding of procedures, standards and technical regulations relating to observations and to forecast and warning products.

**2. Forecast meteorological and hydrological phenomena and parameters**

***2.1 Competency description***

Forecasts of meteorological and/or hydrological parameters and phenomena are prepared and issued in accordance with documented requirements, priorities and deadlines.

***2.2 Performance Criteria***

(a) Forecast meteorological/hydrological phenomena and parameters as required, using appropriate tools and including forecast uncertainties;

(b) Ensure that forecasts are prepared and issued in accordance with national or regional practices, relevant codes and technical regulations on content, accuracy and timeliness;

(c) Ensure, insofar as practicable, that forecasts of meteorological/hydrological parameters and phenomena are consistent (spatially and temporally) across boundaries of the area of responsibility;

(d) Monitor forecasts issued for other regions, and liaise with adjacent regions as required.

***2.3 Background knowledge and skills***

(a) Core diagnostic and prognostic skills to a BIP-M level;

(b) Knowledge of methods used in Numerical Weather Prediction (NWP) and other forecast applications;

(c) Knowledge of the strengths, limitations and verification outputs of the NWP models used in the forecast office, and of forecast adjustments required to accommodate these;

(d) Knowledge of statistical approaches applicable to meteorological and hydrological information;

(e) Knowledge of probabilistic approaches to forecasting, such as those available through ensemble prediction systems;

(f) Critical comparison of a variety of forecast models, interpretation of observational data and climatological data, and synthesis of this information to make a reasoned estimate of the most likely evolution of the weather, of alternative evolutions, and of the uncertainties associated with each;

(g) Interpretation of model outputs at different time ranges;

(h) Judgement in determining which observational, model, contextual and impact information is most relevant, especially in very short range forecasting;

(i) Knowledge of the potential impacts of meteorological and hydrological events on users and their decision-making processes.

**3. Warn of hazardous meteorological and hydrological phenomena**

***3.1 Competency description***

Warnings are issued in a timely manner when hazardous meteorological and/or hydrological conditions are expected to occur, or when parameters are expected to reach documented threshold values or generate significant impacts, and updated or cancelled according to documented warning criteria.

***3.2 Performance Criteria***

(a) Forecast hazardous meteorological/hydrological phenomena, including spatial extent, onset/cessation, duration, intensity and temporal variations;

(b) Ensure that warnings are prepared and issued in accordance with national protocols for hazardous phenomena and their impacts;

(c) Ensure insofar as practicable, that warnings of hazardous meteorological/hydrological phenomena are consistent (spatially and temporally) across boundaries of the area of responsibility;

(d) Monitor warnings issued for other regions, and liaise with adjacent regions as required;

(e) Maintain awareness of the impacts of hazardous meteorological/hydrological phenomena which are the subject of warnings and notifications.

***3.3*** ***Background knowledge and skills***

(a) Knowledge of the specific product preparation and dissemination systems used in the forecast office;

(b) Knowledge and skill in using warning production tools;

(c) Knowledge of the policies, procedures and criteria for issuing warnings;

(d) Knowledge of the potential impacts of meteorological and hydrological events on users and their decision-making processes.

**4. Communicate meteorological and hydrological information and potential impacts to internal and external users**

***4.1 Competency description***

User requirements are fully understood and are addressed by communicating concise and complete forecasts and warnings in a manner that can be clearly understood by users.

***4.2 Performance Criteria***

(a) Ensure that all forecast and warnings are disseminated through the authorised communication means and channels to designated user groups as specified in relevant standard operating procedures;

(b) Explain meteorological/hydrological data and information, including uncertainties where required;

(c) Deliver briefings and provide consultation to meet specific user needs as required.

***4.3 Background knowledge and skills***

(a) Standards, procedures and dissemination methods for the presentation of forecast and warning information to the public across all relevant media, including impact information as required;

(b) Knowledge of protocols for presenting warning information to emergency management partners, including information on likely impacts and mitigation activities if relevant;

(c) An awareness of user’s needs for, and use of, meteorological and/or hydrological information;

(d) An awareness of the application of meteorology and hydrology to human activities and specific users.

**5. Ensure the quality of meteorological and hydrological information and services**

***5.1 Competency description***

The quality of meteorological and hydrological forecasts, warnings and related products is maintained, through the application of quality management systems processes where appropriate.

***5.2 Performance Criteria***

(a) Apply the organization's quality management system and procedures;

(b) Validate meteorological and hydrological data, products, forecasts and warnings (timeliness, completeness, accuracy);

(c) Assess the impacts of known error characteristics (bias, achievable accuracy of observations and sensing methods) ;

(d) Monitor the functioning of operational systems and take contingency actions where appropriate;

(e) Contribute to case studies and post reviews as required, including the assimilation of user feedback and impact information;

(f) Mentor junior colleagues and provide support and advice as required.

***5.3*** ***Background knowledge and skills***

(a) Knowledge of standard operating procedures and also contingency procedures;

(b) Knowledge of techniques and technology in common use in forecast offices;

(c) Knowledge of validation and verification procedures relevant to meteorological and hydrological forecasts and warnings;

(d) Understanding methods used in developing case studies and feedback to improve the quality of forecasts and warnings.

**Competency Requirements for Weather Broadcasters  
AND COMMUNICATORS**

These competency requirements are for personnel who specialize in media work and routinely present weather information on radio or television, prepare material for weather websites and/or social media, conduct media liaison and are active in education/outreach. They build upon, and should be read in conjunction with the fundamental WMO competency requirements for personnel engaged in operational forecasting, although it is recognized that some people engaged in these activities may not come from a forecasting background.

The competency requirements for the work of personnel engaged in weather broadcasting and communication can be divided into four top level competencies. Taking into consideration the conditions (a) to (c) below:

(a) The geographical areas of responsibility;

(b) Meteorological and hydrological impacts on society;

(c) Meteorological and hydrological user requirements, local procedures and priorities.

Weather broadcasters and communicators should be able to perform the work indicated in the top level competencies below:

(a) Maintain awareness of the evolving meteorological and/or hydrological situation, updated forecasts and warnings, and impacts of anticipated conditions;

(b) Assemble meteorological and hydrological information that meet user needs for communication and delivery;

(c) Communicate meteorological and hydrological information and potential impacts via broadcast and other media;

(d) Ensure the quality of meteorological and hydrological information and services.

Each of these top-level competencies is expanded into performance criteria that are expressed and structured in such a manner as to facilitate the clear application of assessment procedures. The competencies are built upon a range of Enabling Skills (such as skills and knowledge in Numerical Weather Prediction) and also Transferrable Skills (workplace skills which are not exclusive to meteorology, such as problem-solving and people-management). Each top-level competency is also associated with a range of background knowledge and skills which are essential to the discharge of the defined duties.

**1. Maintain awareness of the evolving meteorological and/or hydrological situation, updated forecasts and warnings, and impacts of anticipated conditions**

***1.1 Competency description***

Observations, forecasts, warnings and impacts of meteorological/hydrological parameters and significant meteorological/hydrological phenomena are continuously monitored to inform the content of weather broadcasts, disseminated products, briefings and other communications.

***1.2 Performance Criteria***

(a) Monitor meteorological/hydrological parameters and evolving significant meteorological/hydrological phenomena;

(b) Monitor amendments to forecasts and updates of warnings;

(c) Monitor information related to impacts of recent meteorological and hydrological events.

***1.3 Background knowledge and skills***

(a) An understanding of the key elements of synoptic, dynamical, and physical meteorology;

(b) An appreciation of the influence of topography, land cover, and (if relevant) bodies of water and/or snow fields on local meteorology;

(c) Interpretation of in-situ and remote-sensed observations and data;

(d) Knowledge of the routine dissemination schedule of forecasts and warnings from the meteorological service provider;

(e) Knowledge of the thresholds and protocols associated with the issue of weather warnings by the relevant NMHSs;

(f) Knowledge and understanding of the likely impacts on society of hazardous meteorological and hydrological phenomena.

**2. Assemble meteorological and hydrological information that meet user needs for communication and delivery**

***2.1 Competency description***

Observations, forecasts, warnings and impacts of meteorological/hydrological parameters and significant meteorological/hydrological phenomena are assembled and synthesised into coherent narratives and products for dissemination to users.

***2.2 Performance Criteria***

(a) Articulate the weather story in a manner appropriate to the meteorological/hydrological situation, user expectations and needs;

(b) Articulate the weather story in a manner appropriate to the communications medium employed;

(c) Prepare graphics that visually support the communication of the meteorological/hydrological story and situation;

(d) Apply routine production protocols appropriate to the service provision environment.

***2.3 Background knowledge and skills***

(a) Knowledge of the range of users / audience who will access the weather communication;

(b) Appreciation of the strengths and weaknesses of the communication medium employed;

(c) Skills in oral and written language as appropriate to the communication medium employed;

(d) Knowledge of, and skills, in the operation of the weather graphics software or other IT facilities used to prepare graphical images and IT related media for the communication of meteorological and hydrological information;

(e) Knowledge of the function and operation of the different technological resources (PCs, servers, mixers, amplifiers, cameras etc.) commonly employed in weather broadcasting, where relevant.

**3. Communicate meteorological and hydrological information and potential impacts via broadcast and other media.**

***3.1 Competency description***

Observations, forecasts, warnings and impacts of meteorological/hydrological parameters and significant meteorological/hydrological phenomena are disseminated to users in a manner appropriate to the communications medium and to the needs of users.

***3.2 Performance Criteria***

(a) Identify the key points in a weather story and/or high impact meteorological/hydrological hazards and develop these into a coherent narrative or presentation;

(b) Explain and communicate the scope and limitations of forecasts and warnings, including the concept of forecast uncertainty, to users;

(c) Present warnings of meteorological and hydrological hazards, including information on possible mitigating actions where appropriate;

(d) Implement the “Single Authoritative Voice” concept in respect to warnings of severe weather and other public safety messages;

(e) Create and deliver presentations on meteorological and hydrological topics to external agencies and to the public;

(f) Deliver meteorological and hydrological information in accordance with broadcast schedules and/or other appropriate media protocols;

(g) Develop and present new graphical representations of meteorological and hydrological information in alignment with editorial policy.

***3.3 Background knowledge and skills***

(a) Knowledge of the likely impact of upcoming meteorological and hydrological events at different time scales, and skill in judging the relative importance of these;

(b) Knowledge of the likely uncertainty attached to forecasts at different time scales;

(c) Knowledge and understanding of the likely impacts on society of hazardous meteorological and hydrological phenomena;

(d) Knowledge of the policies, procedures and criteria for issuing warnings;

(e) Knowledge of the mitigating actions associated with the likely impacts of hazardous meteorological and hydrological phenomena;

(f) Knowledge of the authoritative sources of meteorological, hydrological, impact and mitigating information relevant to hazardous phenomena;

(g) Skill in the use of presentation and visualisation software to support lectures, seminars and other public engagements;

(h) Knowledge of broadcast schedules, deadlines and other appropriate media protocols.

**4. Ensure the quality of meteorological and hydrological information and services**

***4.1 Competency description***

The quality of meteorological and hydrological broadcasts and other communication products is maintained, by the application of approved quality management processes where appropriate.

***4.2 Performance Criteria***

(a) Apply the organization's quality management system and procedures;

(b) Apply agreed editorial policy to weather broadcasting and other meteorological and hydrological communications;

(c) Ensure, insofar as possible, that all meteorological and hydrological information available to users is consistent, current and up-to-date;

(d) Monitor and assess the effectiveness of the communication of meteorological and hydrological information through user-based metrics;

(e) Develop improvements in the communication of meteorological and hydrological information based on user feedback;

(f) Mentor junior colleagues and provide support and advice as required.

***4.3 Background knowledge and skills***

(a) Knowledge of standard operating procedures;

(b) Knowledge of contingency procedures appropriate to system failure;

(c) Knowledge of the editorial policy relevant to weather broadcasting and other meteorological and hydrological communications;

(d) Knowledge of techniques and technology commonly used in the dissemination of meteorological and hydrological information;

(e) Knowledge of the various user-based metrics relevant to the assessment of the effectiveness of communication of meteorological and hydrological information.

**Competency Requirements for Persons Engaged in the DEVELOPMENT AND DELIVERY of Meteorological and hydrological Products and Services**

These competency requirements are primarily aimed at personnel who are engaged in the area of innovation, improvement, and delivery of meteorological and hydrological services and products. They should be read in conjunction with the competency requirements for personnel engaged in operational forecasting, although it is recognized that many people engaged in these aspects of work may not come from a forecasting background.

These competency requirements are divided into four top level competencies. Taking into consideration the conditions (a) to (c) below:

(a) The nationally-defined PWS areas of responsibility;

(b) Meteorological and hydrological impacts on society;

(c) Meteorological and hydrological user requirements, local procedures and priorities.

Persons engaged in the development and delivery of meteorological and hydrological products and service should be competent to perform the tasks defined through the four top level competencies, as follows:

(1) Maintain awareness of developments in technology, and science which facilitate the development and improvement of products and services to meet user requirements;

(2) Develop applications, products and services that meet user requirements;

(3) Develop and manage relationships with users and other stakeholders, in particular through providing documentation and delivering training on new products and services;

(4) Ensure the quality of meteorological and hydrological information and services.

Each of these top-level competencies is expanded into performance criteria that are expressed and structured in such a manner as to facilitate the clear application of an assessment procedure. The competencies are built upon a range of Enabling Skills (such as skills and knowledge in Numerical Weather Prediction) and also Transferrable Skills (workplace skills which are not exclusive to meteorology, such as problem-solving and people-management). Each top-level competency is also associated with a range of background knowledge and skills which are essential to the discharge of the defined duties.

**1. Maintain awareness of developments in technology and science which facilitate the development and improvement of services and products to meet user requirements.**

***1.1 Competency description***

The needs of users for products based on meteorological and hydrological information is monitored, as are the available technologies and techniques relevant to the development of products and services and their dissemination.

***1.2 Performance Criteria***

(a) Maintain awareness of users' current and future requirements for meteorological and hydrological products and services;

(b) Maintain awareness of scientific developments supporting the development and improvement of meteorological and hydrological products and services;

(c) Maintain awareness of developments in communication and information technologies, standards and protocols relevant to the creation and dissemination of meteorological and hydrological products and services.

***1.3 Background knowledge and skills***

(a) An understanding of the key elements of synoptic, dynamical, and physical meteorology;

(b) Knowledge of the range of available in-situ and remote-sensed observations and data;

(c) Knowledge of meteorological and hydrological information available through Numerical Weather Prediction, statistical outputs and other appropriate sources, and of their potential value for users;

(d) Knowledge of the relevant technologies available for the development of products based on meteorological and hydrological information, and their dissemination.

**2. Develop applications, products and services that meet user requirements.**

***2.1 Competency description***

Products and services based on meteorological and hydrological information are developed and improved in line with the needs of users and the capabilities of the available technologies and techniques.

***2.2 Performance Criteria***

(a) Develop, test and implement applications and products, including relevant uncertainties, in support of user-focused services;

(b) Develop applications for the visualization and display of meteorological and hydrological information, including forecast uncertainty;

(c) Optimise systems used to produce and disseminate meteorological and hydrological products and services;

(d) Implement changes to applications, products and services consequent on evolving user needs and/or changing technologies;

(e) Document applications and products and their implementation processes to aid users and support maintenance and continuity of service.

***2.3 Background knowledge and skills***

(a) Knowledge of the range of users / audience who will access the meteorological and hydrological products, and of their requirements;

(b) Knowledge of statistical methods and techniques commonly used in processing and visualising meteorological and hydrological information;

(c) Knowledge of the characteristics and capabilities of visualisation and display systems used for meteorological and hydrological information;

(d) Knowledge of probabilistic approaches to forecasting and representation (including especially graphical representation) of uncertainty in forecast products, such as those based on ensemble systems;

(e) Knowledge of the characteristics and capabilities of the dissemination media employed;

(f) Knowledge of and skill in the operation of IT facilities used to prepare graphical images for the communication of meteorological and hydrological information;

(g) Knowledge of procedures for documenting and keeping record of software applications development.

**3. Develop and manage relationships with users and other stakeholders, in particular through providing documentation and delivering training on new products and services.**

***3.1 Competency description***

Relationships with users are developed and maintained to support the ready identification of user needs and requirements and changes to these over time. Relationships with users are formalised through appropriate agreements where necessary.

***3.2 Performance Criteria***

(a) Participate in the assessment of the needs of users, in collaboration with relevant experts;

(b) Establish and maintain working relationships at operational and technical levels with users and other stakeholders;

(c) Develop partnership agreements at operational and technical levels with users and other stakeholders;

(d) Develop and make available adequate background documentation on new products and services;

(e) Develop and deliver training to users and stakeholders on products and services as required.

***3.3 Background knowledge and skills***

(a) Knowledge of the methodologies for the understanding and development of user requirements;

(b) Knowledge of the methodologies for the development of partnerships, memoranda of understanding, service level agreements etc. with users of meteorological and hydrological information and products;

(c) Understanding of the operational systems and working priorities of relevant users;

(d) Knowledge of the training methods and techniques appropriate to users and other stakeholders;

(e) Understanding of the vulnerabilities of various users and how these may be impacted by meteorological and hydrological events.

**4. Ensure the quality of meteorological and hydrological information and services**

***4.1 Competency description***

The quality of products and services based on meteorological and hydrological information is maintained, through the application of quality management systems processes where appropriate.

***4.2 Performance Criteria***

(a) Apply the organization's quality management system and procedures;

(b) Support the implementation and ongoing validation of automated meteorological and hydrological products and services;

(c) Support training in the access, use and interpretation of products and applications related to meteorological and hydrological services.

***4.3 Background knowledge and skills***

(a) Knowledge of standard operating procedures;

(b) Knowledge of contingency procedures appropriate to system failure;

(c) Knowledge of techniques and technology commonly used in the dissemination of meteorological and hydrological information;

(d) Knowledge of the various user-based metrics relevant to the accessibility and understanding of meteorological and hydrological information through products and applications;

(e) Knowledge of procedures for documenting and keeping record of software applications development;

(f) Knowledge of appropriate methods and techniques for user training.

**Competency Requirements for PWS ADVISORS SUPPORTING Disaster Prevention and Mitigation AND OTHER USER ACTIVITIES**

These competency requirements are for PWS advisors who work in the area of Disaster Prevention and Mitigation (DPM) and engagement with the Emergency Management (EM) community and other relevant users (such as those involved in health, transportation, energy, food safety). They build upon, and should be read in conjunction with, the fundamental WMO competency requirements for personnel engaged in operational forecasting, although it is recognized that some people engaged in liaison and outreach in EM may not come from a forecasting background. In such cases, the PWS Advisor needs to work closely with operational forecasters to develop the products and services indicated in the following sections, taking into consideration the conditions (a) to (c) below:

(a) The nationally-defined PWS areas of responsibility;

(b) Meteorological and hydrological impacts on society;

(c) Meteorological and hydrological societal requirements, local procedures and priorities.

A PWS Advisor should be able to perform the work (in close association with the PWS forecaster if need be) indicated by the five top level competencies below:

(1) Monitor continually the evolving meteorological and/or hydrological situation, updated forecasts and warnings, and impacts of anticipated conditions;

(2) Develop and adopt procedures and services to meet user needs and facilitate impact assessments;

(3) Develop and manage relationships with DPM users and other stakeholders;

(4) Communicate meteorological and/or hydrological information and potential impacts to internal and external users and engage in outreach activities;

(5) Ensure the quality of meteorological and hydrological information and services.

Each of these top-level competencies is expanded into performance criteria that are expressed and structured in such a manner as to facilitate the clear application of an assessment procedure. The competencies are built upon a range of Enabling Skills (such as skills and knowledge in Numerical Weather Prediction) and also Transferrable Skills (workplace skills which are not exclusive to meteorology, such as problem-solving and people-management). Each top-level competency is also associated with a range of background knowledge and skills which are essential to the discharge of the defined duties.

**1. Monitor continually the evolving meteorological and/or hydrological situation, updated forecasts and warnings, and impacts of anticipated conditions.**

***1.1 Competency description***

Observations and forecasts of meteorological/hydrological parameters and significant meteorological/hydrological phenomena are continuously analysed and monitored, together with amendments/updates of forecasts and warnings, and assessments of the likely impacts of anticipated conditions are developed and updated as required.

***1.2 Performance Criteria***

(a) Monitor meteorological/hydrological parameters and evolving significant meteorological/hydrological phenomena, and validate current forecast and warnings based on these parameters;

(b) Monitor information relating to impacts of meteorological and hydrological events.

***1.3 Background knowledge and skills***

(a) An understanding of the key elements of synoptic, dynamical, and physical meteorology and core analytical/diagnostic skills;

(b) Application of the theory, methods and practices of meteorological and/or hydrological analysis and diagnosis;

(c) The ability to visualize/conceptualize meteorological and/or hydrological information in multiple dimensions (spatial, temporal);

(d) The appreciation of the influence of topography, land cover, and   
(if relevant) bodies of water and/or snow fields on local meteorology;

(e) Interpretation of in-situ and remote-sensed observations and data;

(f) Understanding of the characteristics of meteorological and hydrological sensors and instruments;

(g) Familiarity with the acquisition, processing and assimilation of meteorological and hydrological data, including quality control;

(h) Understanding of procedures, standards and technical regulations regarding observations and forecast products;

(i) Understanding of sector specific activities and vulnerabilities impacted by meteorological and hydrological events.

**2. Develop procedures and services to meet user needs and facilitate impact assessments.**

***2.1 Competency description***

Procedures and services which facilitate impact assessment based on meteorological and hydrological information are developed and improved in line with the needs of users, making full use of impact modelling and other techniques where these are available

***2.2 Performance Criteria***

(a) Identify the meteorological and/or hydrological information requirements of the disaster management and civil protection community, and other users as required;

(b) Tailor weather warning services for emergency management decision-makers and other users;

(c) Ensure that warning dissemination schedules and related services meet the decision-making needs of emergency managers and other users;

(d) Contribute to the development of very short-range forecasting and nowcasting services tailored to the emergency management community;

(e) Contribute to the development of probabilistic forecast products tailored to the needs of disaster managers and other users;

(f) Contribute to the development of impact-based forecast and warning products;

(g) Apply new technology and scientific research in contributing to the development of Multi-Hazard Early Warning Systems (MHEWS).

***2.3 Background knowledge and skills***

(a) Knowledge of meteorological and hydrological information, products and services available to support disaster management, the civil protection community and other users;

(b) Knowledge of the methodologies for the understanding and development of user requirements;

(c) Knowledge of risk assessments and how they apply to various sectors;

(d) An understanding of how meteorological and hydrological risks may have an impact of various sectors as a function of vulnerability and exposure factors;

(e) Skill in adapting usual meteorological and hydrological products and services into value-added services for disaster management and other users;

(f) Knowledge of the strengths and limitations of NWP models;

(g) Knowledge of developments and innovations in Numerical Weather Prediction and how these may apply to meteorological and hydrological impact-based services.

**3. Develop and manage relationships with DPM users and other stakeholders.**

***3.1 Competency description***

Relationships with users in the Emergency Management and related communities are developed and maintained to support the ready identification of user needs and requirements and changes to these over time. Relationships with users are formalised through appropriate agreements where necessary.

***3.2 Performance Criteria***

(a) Establish and maintain working relationships at strategic, operational and technical levels with the emergency management community;

(b) Develop and implement partnership agreements at operational and technical levels with relevant agencies;

(c) Build and maintain relationships with the media to facilitate communication of warnings and information prior to, during and after high impact meteorological and hydrological events;

(d) Build and maintain relationships between the NMHS and relevant agencies to improve emergency planning, preparedness, and response to high impact meteorological and hydrological events, including specific urban needs where appropriate;

(e) Contribute to the development of response advice and call-to-action statements based on the potential impact of hazards, in close coordination with relevant agencies as appropriate;

(f) Participate in the assessment of the socio-economic impact of meteorological and hydrological events, in collaboration with relevant experts.

***3.3 Background knowledge and skills***

(a) Knowledge of the methodologies for the development of partnerships and memoranda of understanding;

(b) Knowledge of meteorological and hydrological information, products and services available to support disaster management, the civil protection community and other users;

(c) Understanding of the priorities and operational systems of relevant agencies;

(d) Understanding of the principles of communication relating to the development of advice and statements addressing potential impacts of hazards;

(e) Understanding of the vulnerabilities of various sectors and how these may be impacted by meteorological and hydrological events.

**4. Communicate meteorological and hydrological information and potential impacts to internal and external users and engage in outreach activities.**

***4.1 Competency description***

User requirements are fully understood and are addressed by communicating concise and relevant meteorological information and impact assessments in a manner that can be clearly understood by users. Preparedness of user communities is addressed through training and other outreach initiatives

***4.2 Performance Criteria***

(a) Contribute to dissemination of warning information through utilization of current and emerging communication technologies;

(b) Communicate meteorological and hydrological information to users, in particular disaster management decision-makers and media, including the scope and limitations of forecasts and warnings, the concept of forecast uncertainty, and information on potential impacts;

(c) Contribute to the development of a communication strategy to ensure credibility of, and effective response to, warnings of high impact meteorological and hydrological events;

(d) Promote community awareness and preparedness for high impact meteorological and hydrological events through public education and outreach.

***4.3 Background knowledge and skills***

(a) Knowledge of protocols for presenting and communicating warning information to emergency management partners and media, including information on likely impacts and mitigation activities if relevant;

(b) Knowledge of standards, procedures and dissemination platforms for the presentation of forecast and warning information to end users across all relevant media, including impact information as required;

(c) Knowledge of the authoritative sources of meteorological, hydrological, impact and mitigating information relevant to hazardous phenomena;

(d) An awareness of the application of meteorology and/or hydrology to human activities and to specific users;

(e) An awareness of user’s needs for, and use of, meteorological and/or hydrological information;

(f) Awareness of social science research and findings relevant to the communication of warnings and impact-based meteorological and/or hydrological information;

(g) An appreciation of the strengths and weaknesses of the communication media employed.

**5. Ensure the quality of information, services and procedures.**

***5.1 Competency description***

The quality of meteorological and hydrological forecasts, warnings, impact assessments, and related products is maintained, through the application of quality management systems processes where appropriate.

***5.2 Performance Criteria***

(a) Apply the organization's quality management system and procedures;

(b) Monitor and assess the effectiveness of warnings of high impact meteorological and hydrological events through user-based feedback;

(c) Work with disaster management agencies and others to strengthen the role of NMHSs as the “Single Authoritative Voice” for warnings of high impact meteorological and hydrological events;

(d) Contribute to the development of documentation and archiving systems for meteorological and hydrological hazard and impact data, including quality assurance and data management;

(e) Collaborate with disaster management agencies and others in the development of post-events assessments of high impact meteorological and hydrological events;

(f) Contribute to outreach and training initiatives particularly those relevant to DPM activities.

***5.3 Background knowledge and skills***

(a) Knowledge of quality management system processes;

(b) Knowledge of methodologies for the creation, delivery and assessment of user-feedback surveys;

(c) Knowledge of documentation and archiving systems protocols;

(d) Knowledge of verification processes;

(e) Knowledge of operating and contingency procedures of NMHS and relevant agencies;

(f) Understanding metrics and methods used in developing post assessments/case studies and verification.

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1. † Applicable 7 November 2019. [↑](#footnote-ref-1)
2. † Applicable 7 November 2019. [↑](#footnote-ref-2)
3. Personnel engaged in operational forecasting may work across a variety of specializations including aviation, marine and public weather services. [↑](#footnote-ref-3)
4. For the purpose of forecaster competencies the term PWS forecasters is used to describe forecasters responsible for the preparation and delivery of public weather forecasts and warnings. [↑](#footnote-ref-4)
5. BIP-M: Basic Instruction Package for Meteorologists [↑](#footnote-ref-5)