Manual on Codes

International Codes

Volume I.3

Annex II to the WMO Technical Regulations

Part D – Representations derived from data models

2015 edition

WEATHER CLIMATE WATER

WORLD
METEOROLOGICAL
ORGANIZATION

WMO-No. 306

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EDITORIAL NOTE

Typefaces employed in this volume do not signify standard or recommended practices, and are used solely for legibility. The word shall is used to denote practices that are required for data representation to work. The word should denotes recommended practices.

METEOTERM, the WMO terminology database, may be consulted at http://www.wmo.int/pages/prog/lsp/meteoterm_wmo_en.html. Acronyms may also be found at http://www.wmo.int/pages/themes/acronyms/index_en.html.

Readers who copy hyperlinks by selecting them in the text should be aware that there will be additional spaces immediately following http://, https://, ftp://, mailto:, and after slashes (/), dashes (-) and unbroken sequences of characters (letters and numbers). These spaces should be removed from the pasted URL. The correct URL is displayed when hovering over the link or when clicking on the link and then copying it from the browser.

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PUBLICATION REVISION TRACK RECORD

Date	*Part/chapter/ section*	*Purpose of amendment*	*Proposed by*	*Approved by*

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INTRODUCTION

Volume I of the *Manual on Codes* contains WMO international codes for meteorological data and other geophysical data relating to meteorology; it constitutes Annex II to the *Technical Regulations* (WMO-No. 49) and has therefore the status of a Technical Regulation. It is issued in three volumes: Volume I.1, containing Part A; Volume I.2, containing Part B and Part C; and Volume I.3 containing Part D.

Coded messages are used for the international exchange of meteorological information comprising observational data provided by the World Weather Watch (WWW) Global Observing System and processed data provided by the WWW Global Data-processing and Forecasting System. Coded messages are also used for the international exchange of observed and processed data required in specific applications of meteorology to various human activities and for exchanges of information related to meteorology.

The codes are composed of a set of CODE FORMS and BINARY CODES made up of SYMBOLIC LETTERS (or groups of letters) representing meteorological or, as the case may be, other geophysical elements. In messages, these symbolic letters (or groups of letters) are transcribed into figures indicating the value or the state of the elements described. SPECIFICATIONS have been defined for the various symbolic letters to permit their transcription into figures. In some cases, the specification of the symbolic letter is sufficient to permit a direct transcription into figures. In other cases, it requires the use of CODE FIGURES, the specifications of which are given in CODE TABLES. Furthermore, a certain number of SYMBOLIC WORDS and SYMBOLIC FIGURE GROUPS have been developed for use as code names, code words, symbolic prefixes or indicator groups.

Rules concerning the selection of code forms to be exchanged for international purposes, and the selection of their symbolic words, figure groups and letters, are laid down in the *Technical Regulations* (WMO-No. 49), Volume I, section 2.3 (2011 edition, updated in 2012). These code forms are contained in Volume I of the *Manual on Codes*, issued as Volume I.1 – Part A, Volume I.2 – Part B and Part C, and Volume I.3 – Part D.

Apart from these international codes, several sets of *regional codes* exist which are intended only for exchanges within a given WMO Region. These codes are contained in Volume II of the *Manual on Codes*, which also contains descriptions of the following:

– Regional coding procedures for the use of international code forms;

– National coding practices in the use of international or regional codes of which the WMO Secretariat has been informed;

– National code forms.

A number of special codes that are used in messages exchanged over the WWW Global Telecommunication System circuits, and which comprise ice and satellite ephemeris codes, are included in Volume II as an appendix.

VOLUME I.1:

Part A – Alphanumeric Codes consists of five sections. The standard coding procedures are distinguished by the use of the term “shall” in the English text, and by suitable equivalent terms in the French, Russian and Spanish texts. Where national practices do not conform with these regulations, Members concerned shall formally notify the Secretary-General of WMO for the benefit of other Members.

VOLUME I.2:

Part B – Binary Codes consists of the list of binary codes with their specifications and associated code tables.

Part C – Common Features to Binary and Alphanumeric Codes consists of table-driven alphanumeric codes and of common code tables to binary and alphanumeric codes.

VOLUME I.3:

Part D – Representations derived from data models consists of the specification of the list of standard representations derived from data models, including those using extensible markup language (XML), with their specifications and associated code tables.

This is the first edition of Volume I.3 of the *Manual on Codes* and introduces the use of XML.

PROCEDURES FOR AMENDING THE *MANUAL ON CODES*

1. GENERAL VALIDATION AND IMPLEMENTATION PROCEDURES

1.1 Proposal of amendments

Amendments to the *Manual on Codes* shall be proposed in writing to the Secretariat. The proposal shall specify the needs, purposes and requirements for the proposed amendment. A contact point for technical matters shall be identified to facilitate collaboration for the validation and drafting of a recommendation.

1.2 Drafting recommendation

The Inter-Programme Expert Team on Data Representation Maintenance and Monitoring (IPET-DRMM),[1] supported by the Secretariat, shall validate the stated requirements (unless they are consequential to an amendment to the Technical Regulations) and develop a draft recommendation to respond to the requirements, as appropriate.

1.3 Date of implementation

The IPET-DRMM should define a date of implementation in order to give sufficient time to Members to implement the amendments after the date of notification; IPET-DRMM should document the reasons to propose a time span of less than six months except for the fast-track procedure.

1.4 Procedures for approval

After a draft recommendation of IPET-DRMM is validated in accordance with the procedure given in section 6 below, depending on the type of amendments, IPET-DRMM may select one of the following procedures for the approval of the amendments:

[1] The IPET-DRMM, the ICT-ISS and the OPAG-ISS are the current bodies dealing with data representation and codes within CBS. If they were replaced by other bodies performing the same function, the same rules would apply, by replacing the names of the entities appropriately.

(a) Fast-track procedure (see section 2 below);

(b) Procedure for the adoption of amendments between sessions of the Commission for Basic Systems (CBS) (see section 3 below);

(c) Procedure for the adoption of amendments during CBS sessions (see section 4 below).

1.5 Urgent introduction

Regardless of the above procedures, as an exceptional measure, the following procedure accommodates urgent user needs to introduce new entries in BUFR/CREX tables A, B and D, code and flag tables of BUFR, CREX and GRIB edition 2 and common code tables.

(a) A draft recommendation developed by IPET-DRMM shall be validated according to 6.1, 6.2 and 6.3 below;

(b) The draft recommendation for pre-operational use, which can be used in operational data and products, shall be approved by the chairpersons of IPET-DRMM and the Open Programme Area Group on Information Systems and Services (OPAG-ISS), and the president of CBS. The list of pre-operational entries is kept online on the WMO Web server;

(c) Pre-operational entries need to be approved by one of the procedures in 1.4 for operational use.

1.6 Version number

The version number of the master table will be incremented.

1.7 Issuing the updated version

Once amendments to the *Manual on Codes* are adopted, an updated version of the relevant part of the Manual shall be issued in the four languages: English, French, Russian and Spanish. The Secretariat will inform all Members of the availability of a new updated version of that part at the date of notification mentioned in 1.3.

2. FAST-TRACK PROCEDURE

2.1 Scope

The fast-track procedure can be used for additions to BUFR or CREX Tables A, B, and D with associated code tables or flag tables, to code or flag tables or templates in GRIB and to common code tables C.

2.2 Endorsement

Draft recommendations developed by IPET-DRMM, including a date of implementation of the amendments, must be endorsed by the chairperson of OPAG-ISS.

2.3 Approval

2.3.1 *Minor adjustments*

The filling of reserved and unused entries in the existing code and flag tables and Common Code tables is considered as a minor adjustment, and will be done by the Secretary-General in consultation with the president of CBS.

2.3.2 *Other types of amendments*

For other types of amendments, the English version of the draft recommendation, including a date of implementation, should be distributed to the focal points for codes and data representation matters for comments, with a deadline of two months for the reply. It should then be submitted to the president of CBS for adoption on behalf of the Executive Council.

2.4 Frequency

The implementation of amendments approved through the fast-track procedure can be twice a year in May and November.

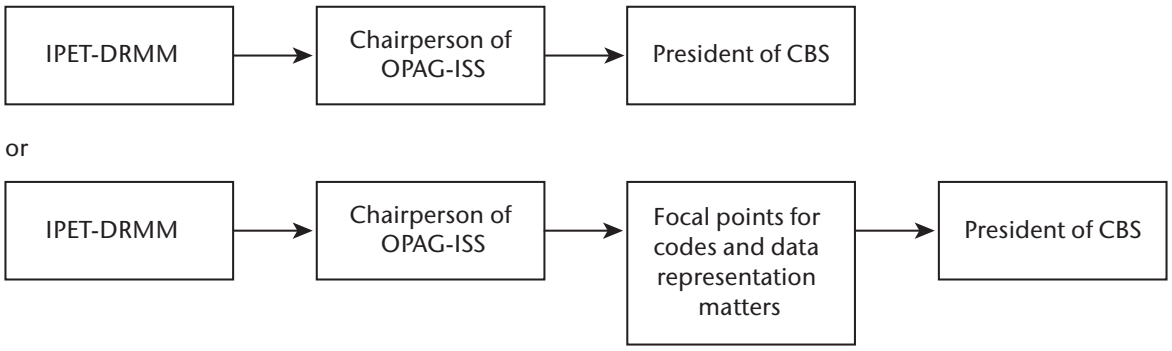

Figure 1. Adoption of amendments by fast-track procedure

3. PROCEDURE FOR THE ADOPTION OF AMENDMENTS BETWEEN CBS SESSIONS

3.1 Approval of draft recommendation

For the direct adoption of amendments between CBS sessions, the draft recommendation developed by IPET-DRMM, including a date of implementation of the amendments, shall be submitted to the chairperson of OPAG-ISS and president and vice-president of CBS for approval.

3.2 Circulation to Members

Upon approval of the president of CBS, the Secretariat sends the recommendation in the four languages (English, French, Russian and Spanish), including a date of implementation of the amendments, to all Members for comments to be submitted within two months following the dispatch of the amendments.

3.3 Agreement

Those Members not having replied within the two months following the dispatch of the amendments are implicitly considered as having agreed with the amendments.

3.4 Coordination

Members are invited to designate a focal point responsible to discuss any comments/ disagreements with IPET-DRMM. If the discussion between IPET-DRMM and the focal point cannot result in an agreement on a specific amendment by a Member, this amendment will be reconsidered by IPET-DRMM.

3.5 Notification

Once amendments are agreed by Members, and after consultation with the chairperson of OPAG-ISS and the president and vice-president of CBS, the Secretariat notifies at the same time the Members and the members of the Executive Council of the approved amendments and of the date of their implementation.

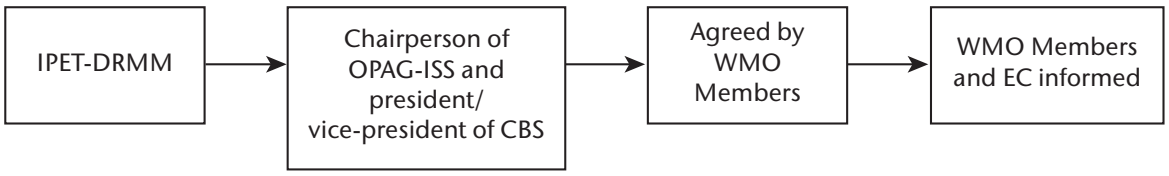

Figure 2. Adoption of amendments between CBS sessions

4. PROCEDURE FOR THE ADOPTION OF AMENDMENTS DURING CBS SESSIONS

For the adoption of amendments during CBS sessions, IPET-DRMM submits its recommendation, including a date of implementation of the amendments, to the Implementation/Coordination Team on Information Systems and Services (ICT-ISS) of OPAG-ISS. The recommendation is then submitted to a CBS session and thereafter to a session of the Executive Council.

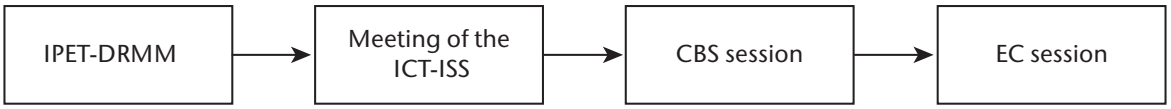

Figure 3. Adoption of amendments during a CBS session

5. PROCEDURE FOR THE CORRECTION OF EXISTING ENTRIES IN THE BUFR AND CREX TABLES

5.1 Introducing a new descriptor

If an erroneous specification of an entry is found in an operational BUFR or CREX element descriptor or sequence descriptor, a new descriptor should preferably be added to the appropriate table through the fast-track procedure or the procedure for adoption of

amendments between CBS sessions. The new descriptor should be used instead of the old one for encoding (especially if it concerns data width). An appropriate explanation shall be added to the notes of the table to clarify the practice along with the date of the change. This situation is considered a minor adjustment according to 2.3.1 above.

5.2 Correcting erroneous specification

As an exceptional measure for erroneous entries in Table B, if it is found absolutely necessary to correct an erroneous specification of an existing entry by changing its specification, the following rules shall apply:

(a) The name and unit of an element descriptor shall remain unchanged except for minor clarifications;

(b) Scale, reference value and bit width may be corrected to required values;

(c) Such a change will be submitted through the fast-track procedure.

6. VALIDATION PROCEDURE

6.1 Documentation of need and purpose

The need for, and the purpose of, the proposal for changes should be documented.

6.2 Documentation of result

This documentation must include the results of validation testing of the proposal as described below.

6.3 Testing with encoder/decoder

For new or modified WMO code and data representation forms, proposed changes should be tested by at least two centres, using two independently developed encoders and two independently developed decoders which incorporated the proposed change. Where the data originated from a necessarily unique source (for example, the data stream from an experimental satellite), the successful testing of a single encoder with at least two independent decoders would be considered adequate. Results should be made available to IPET-DRMM with a view to verifying the technical specifications.

GENERAL PROVISIONS

1. The *Technical Regulations* (WMO-No. 49) of the World Meteorological Organization are presented in four volumes:

Volume I – General meteorological standards and recommended practices
Volume II – Meteorological service for international air navigation
Volume III – Hydrology
Volume IV – Quality management

Purpose of the Technical Regulations

2. The Technical Regulations are determined by the World Meteorological Congress in accordance with Article 8 (d) of the Convention.

3. These Regulations are designed:

(a) To facilitate cooperation in meteorology and hydrology among Members;

(b) To meet, in the most effective manner, specific needs in the various fields of application of meteorology and operational hydrology in the international sphere;

(c) To ensure adequate uniformity and standardization in the practices and procedures employed in achieving (a) and (b) above.

Types of Regulations

4. The Technical Regulations comprise *standard* practices and procedures and *recommended* practices and procedures.

5. The definitions of these two types of Regulations are as follows:

The *standard* practices and procedures:

(a) Shall be the practices and procedures that Members are required to follow or implement;

(b) Shall have the status of requirements in a technical resolution in respect of which Article 9 (b) of the Convention is applicable;

(c) Shall invariably be distinguished by the use of the term *shall* in the English text, and by suitable equivalent terms in the Arabic, Chinese, French, Russian and Spanish texts.

The *recommended* practices and procedures:

(a) Shall be the practices and procedures with which Members are urged to comply;

(b) Shall have the status of recommendations to Members, to which Article 9 (b) of the Convention shall not be applied;

(c) Shall be distinguished by the use of the term *should* in the English text (except where otherwise provided by decision of Congress) and by suitable equivalent terms in the Arabic, Chinese, French, Russian and Spanish texts.

6. In accordance with the above definitions, Members shall do their utmost to implement the *standard* practices and procedures. In accordance with Article 9 (b) of the Convention and in conformity with Regulation 128 of the General Regulations, Members shall formally notify the Secretary-General, in writing, of their intention to apply the *standard* practices

and procedures of the Technical Regulations, except those for which they have lodged a specific deviation. Members shall also inform the Secretary-General, at least three months in advance, of any change in the degree of their implementation of a *standard* practice or procedure as previously notified and the effective date of the change.

7. Members are urged to comply with *recommended* practices and procedures, but it is not necessary to notify the Secretary-General of non-observance except with regard to practices and procedures contained in Volume II.

8. In order to clarify the status of the various Regulations, the *standard* practices and procedures are distinguished from the *recommended* practices and procedures by a difference in typographical practice, as indicated in the editorial note.

Status of annexes and appendices

9. The following annexes to the *Technical Regulations* (Volumes I to IV), also called Manuals, are published separately and contain regulatory material having the status of *standard* and/or *recommended* practices and procedures:

I *International Cloud Atlas* (WMO-No. 407), Volume I – Manual on the Observation of Clouds and Other Meteors, Part I; Part II: paragraphs II.1.1, II.1.4, II.1.5 and II.2.3; subparagraphs 1, 2, 3 and 4 of each paragraph from II.3.1 to II.3.10; paragraphs II.8.2 and II.8.4; Part III: paragraph III.1 and the definitions (in italics) of paragraph III.2;
II *Manual on Codes* (WMO-No. 306), Volume I;
III *Manual on the Global Telecommunication System* (WMO-No. 386);
IV *Manual on the Global Data-processing and Forecasting System* (WMO-No. 485), Volume I;
V *Manual on the Global Observing System* (WMO-No. 544), Volume I;
VI *Manual on Marine Meteorological Services* (WMO-No. 558), Volume I;
VII *Manual on the WMO Information System* (WMO-No. 1060);
VIII *Manual on the WMO Integrated Global Observing System* (WMO-No. 1160).

These annexes (Manuals) are established by decision of Congress and are intended to facilitate the application of Technical Regulations to specific fields. Annexes may contain both *standard* and *recommended* practices and procedures.

10. Texts called appendices, appearing in the *Technical Regulations* or in an annex to the *Technical Regulations*, have the same status as the Regulations to which they refer.

Status of notes and attachments

11. Certain notes (preceded by the indication "Note") are included in the *Technical Regulations* for explanatory purposes; they may, for instance, refer to relevant WMO Guides and publications. These notes do not have the status of Technical Regulations.

12. The *Technical Regulations* may also include attachments, which usually contain detailed guidelines related to *standard* and *recommended* practices and procedures. Attachments, however, do not have regulatory status.

Updating of the *Technical Regulations* and their annexes (Manuals)

13. The *Technical Regulations* are updated, as necessary, in the light of developments in meteorology and hydrology and related techniques, and in the application of meteorology. Certain principles previously agreed upon by Congress and applied in the selection of material for inclusion in the Technical Regulations are reproduced below. These principles provide guidance for constituent bodies, in particular technical commissions, when dealing with matters pertaining to the Technical Regulations:

(a) Technical commissions should not recommend that a Regulation be a standard practice unless it is supported by a strong majority;

(b) Technical Regulations should contain appropriate instructions to Members regarding implementation of the provision in question;

(c) No major changes should be made to the Technical Regulations without consulting the appropriate technical commissions;

(d) Any amendments to the Technical Regulations submitted by Members or by constituent bodies should be communicated to all Members at least three months before they are submitted to Congress.

14. Amendments to the *Technical Regulations* – as a rule – are approved by Congress.

15. If a recommendation for an amendment is made by a session of the appropriate technical commission and if the new regulation needs to be implemented before the next session of Congress, the Executive Council may, on behalf of the Organization, approve the amendment in accordance with Article 14 (c) of the Convention. Amendments to annexes to the *Technical Regulations* proposed by the appropriate technical commissions are normally approved by the Executive Council.

16. If a recommendation for an amendment is made by the appropriate technical commission and the implementation of the new regulation is urgent, the President of the Organization may, on behalf of the Executive Council, take action as provided by Regulation 9 (5) of the General Regulations.

Note: A fast-track procedure can be applied for additions to certain codes and associated code tables contained in Annex II (*Manual on Codes* (WMO-No. 306)). Application of the fast-track procedure is described in detail in Annex II.

17. After each session of Congress (every four years), a new edition of the *Technical Regulations*, including the amendments approved by Congress, is issued. With regard to the amendments between sessions of Congress, Volumes I, III and IV of the *Technical Regulations* are updated, as necessary, upon approval of changes thereto by the Executive Council. The *Technical Regulations* updated as a result of an approved amendment by the Executive Council are considered a new update of the current edition. The material in Volume II is prepared by the World Meteorological Organization and the International Civil Aviation Organization working in close cooperation, in accordance with the Working Arrangements agreed by these Organizations. In order to ensure consistency between Volume II and Annex 3 to the Convention on International Civil Aviation – *Meteorological Service for International Air Navigation*, the issuance of amendments to Volume II is synchronized with the respective amendments to Annex 3 by the International Civil Aviation Organization.

Note: Editions are identified by the year of the respective session of Congress whereas updates are identified by the year of approval by the Executive Council, for example "Updated in 2012".

WMO Guides

18. In addition to the *Technical Regulations*, appropriate Guides are published by the Organization. They describe practices, procedures and specifications which Members are invited to follow or implement in establishing and conducting their arrangements for compliance with the Technical Regulations, and in otherwise developing meteorological and hydrological services in their respective countries. The Guides are updated, as necessary, in the light of scientific and technological developments in hydrometeorology, climatology and their applications. The technical commissions are responsible for the selection of material to be included in the Guides. These Guides and their subsequent amendments shall be considered by the Executive Council

DEFINITIONS

Actual time of observation.

(1) In the case of a surface synoptic observation, the time at which the barometer is read.

(2) In the case of upper-air observations, the time at which the balloon, parachute or rocket is actually released.

All-components schema document. An XML schema document that includes, either directly, or indirectly, all the components defined and declared in a namespace.

Alpine glow. Pink or yellow colouring assumed by mountain tops opposite the Sun when it is only just below the horizon before it rises and after it sets. This phenomenon vanishes after a brief interval of blue colouring, when the Earth's shadow reaches these summits.

Anomalous propagation. Propagation of radio energy in abnormal conditions of vertical distribution of refractive index, in association with abnormal distribution of atmospheric temperature and humidity. Use of the term is mainly confined to conditions in which abnormally large distances of propagation are attained.

Application schema. A conceptual schema for data required by one or more applications. (Source: International Organization for Standardization (ISO) 19101:2002, definition 4.2)

Atmospheric – Sferic. Electromagnetic wave resulting from an electric discharge (lightning) in the atmosphere.

Automatic station. Meteorological station at which instruments make and transmit observations, the conversion to code form for international exchange being made either directly or at an editing station.

Aviation routine weather report. A statement of the observed meteorological conditions related to a specified time and location, issued on a routine basis for use in international air navigation.

BUFR – Binary universal form for the representation of meteorological data. BUFR is the name of a binary code for the exchange and storage of data.

BUFR message. A single complete BUFR entity.

Category. The lists of sequence descriptors tabulated in BUFR or CREX Table D are categorized according to their application; categories are provided for non-meteorological sequences, for various types of meteorological sequences, and for sequences which define reports, or major subsets of reports.

Class. A set of elements tabulated together in BUFR/CREX Table B.

Condensation trails (contrails). Clouds which form in the wake of an aircraft when the atmosphere at flying level is sufficiently cold and humid.

Coordinate class. Classes 0–9 inclusive in BUFR/CREX Table B define elements which assist in the definition of elements from subsequent classes; each of these classes is referred to as a coordinate class.

CREX – Character form for the representation and exchange of data. CREX is the name of a table-driven alphanumeric code for the exchange and storage of data.

Data description operator. Operators which define replication or the operations listed in BUFR or CREX Table C.

Data entity. A single data item.

Data subset. A set of data corresponding to the data description in a BUFR or CREX message; for observational data, a data subset usually corresponds to one observation.

Day darkness. Sky covered with clouds with very strong optical thickness (dark clouds) having a threatening appearance.

Descriptor. An entity entered within the Data description section to describe or define data; a descriptor may take the form of an element descriptor, a replication operator, an operator descriptor, or a sequence descriptor.

Dry thunderstorm. A thunderstorm without precipitation reaching the ground (distinct from a nearby thunderstorm with precipitation reaching the ground but not at the station at the time of observation).

Dust wall or sand wall. Front of a duststorm or sandstorm, having the appearance of a gigantic high wall which moves more or less rapidly.

Element descriptor. A descriptor containing a code figure reference to BUFR/CREX Table B; the referenced entry defines an element, together with the units, scale factor, reference value and data width to be used to represent that element as data.

Equatorial regions. For the purpose of the analysis codes, the region between 30 °N and 30 °S latitudes.

Extensible markup language (XML). A markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. It is defined in the World Wide Web Consortium (W3C) XML 1.0 Specification.

Geography markup language (GML). An XML encoding in compliance with ISO 19118 for the transport and storage of geographic information modelled in accordance with the conceptual modelling framework used in the ISO 19100 series of International Standards and including both the spatial and non-spatial properties of geographic features.

Geometric altitude. Vertical distance (Z) of a level, a point or an object considered as a point, measured from mean sea level.

Geopotential. That potential with which the Earth's gravitational field is associated. It is equivalent to the potential energy of unit mass relative to a standard level (mean sea level by convention) and is numerically equal to the work which would be done against gravity in raising the unit mass from sea level to the level at which the mass is located.

Geopotential ϕ at geometric height z is given by

$$\phi = \int_o^z g\, dz$$

where g is the acceleration of gravity.

Geopotential height. Height of a point in the atmosphere expressed in units (geopotential metres) proportional to the geopotential at that height. Geopotential height expressed in geopotential metres is approximately equal to $g/9.8$ times the geometric height expressed in (geometric) metres, g being the local acceleration of gravity.

GML application schema. An application schema written in XML schema in accordance with the rules specified in ISO 19136:2007.

GML document. An XML document with a root element that is one of the XML elements AbstractFeature, Dictionary or TopoComplex specified in the GML schema or any element of a substitution group of any of these XML elements.

GML schema. The XML schema components in the XML namespace http://www.opengis.net/gml/3.2 as specified in ISO 19136:2007.

Haboob. A strong wind and duststorm or sandstorm in northern and central Sudan. Its average duration is three hours; the average maximum wind velocity is over 15 m s^{-1}. The dust or sand forms a dense whirling wall which may be 1 000 m high; it is often preceded by isolated dust whirls. Haboobs usually occur after a few days of rising temperature and falling pressure.

Ice crust (ice slick).

(1) A type of snow crust; a layer of ice, thicker than a film crust, upon a snow surface. It is formed by the freezing of melt water or rainwater which has flowed into it.

(2) See *Ice rind*.

Ice rind. A thin but hard layer of sea ice, river ice or lake ice. Apparently this term is used in at least two ways: (a) for a new encrustation upon old ice; and (b) for a single layer of ice usually found in bays and fjords where freshwater freezes on top of slightly colder sea water.

Instrumental wave data. Data on measured characteristics relating to period and height of the wave motion of the sea surface.

Inversion (layer). Atmospheric layer, horizontal or approximately so, in which the temperature increases with increasing height.

Isothermal layer. Atmospheric layer through which there is no change of temperature with height.

Jet stream. Flat tubular current of air, quasi-horizontal, whose axis is along a line of maximum speed and which is characterized not only by great speeds but also by strong transverse gradients of speed.

Line squall. Squall which occurs along a squall line.

Lithometeor. Meteor consisting of an ensemble of particles most of which are solid and non-aqueous. The particles are more or less suspended in the air, or lifted by the wind from the ground.

Mountain waves. Oscillatory motions of the atmosphere induced by flow over a mountain; such waves are formed over and to the lee of the mountain or mountain chain.

Namespace. A collection of names, identified by a uniform resource identifier reference, which are used in XML documents as element names and attribute names.

Normals. Period averages computed for over a uniform and relatively long period comprising at least three consecutive 10-year periods.

Obscured sky. Occasions of hydrometeors or lithometeors which are so dense as to make it impossible to tell whether there is cloud above or not.

Ocean weather station. A station aboard a suitably equipped and staffed ship that endeavours to remain at a fixed sea position and that makes and reports surface and upper-air observations and may also make and report subsurface observations.

Operator descriptor. A descriptor containing a code figure reference to BUFR or CREX Table C, together with data to be used as an operand.

Past weather. Predominant characteristic of weather which had existed at the station during a given period of time.

Persistent condensation trail. Long-lived condensation trails which have spread to form clouds having the appearance of cirrus or patches of cirrocumulus or cirrostratus. It is sometimes impossible to distinguish such clouds from other cirrus, cirrocumulus or cirrostratus.

Present weather. Weather existing at the time of observation, or under certain conditions, during the hour preceding the time of observation.

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

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

Purple light. Glow with a hue varying between pink and red, which is to be seen in the direction of the Sun before it rises and after it sets and is about 3° to 6° below the horizon. It takes the form of a segment of a more or less large luminous disc which appears above the horizon.

Reference value. All data are represented within a BUFR or CREX message by positive integers; to enable negative values to be represented, suitable negative base values are specified as reference values. The true value is obtained by addition of the reference value and the data as represented.

Replication descriptor. A special descriptor is reserved to define the replication operation; it is used to enable a given number of subsequent descriptors to be replicated a given number of times.

Root element. Each XML document has exactly one root element. This element, also known as the document element, encloses all the other elements and is therefore the sole parent element to all the other elements. The root element provides the starting point for processing the document.

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

Schematron. A definition language for making assertions about patterns found in XML documents, differing in basic concept from other schema languages in that it is not based on grammars but on finding patterns in the parsed document.

Sea station. An observing station situated at sea. Sea stations include ships, ocean weather stations and stations on fixed or drifting platforms (rigs, platforms, lightships and buoys).

Section. A logical subdivision of a BUFR or CREX message, to aid description and definition.

Sequence descriptor. A descriptor used as a code figure to reference a single entry in BUFR or CREX Table D; the referenced entry contains a list of descriptors to be substituted for the sequence descriptor.

Severe line squall. Severe squall which occurs along squall line (see *Line squall*).

Snow haze. A suspension in the air of numerous minute snow particles, considerably reducing the visibility at the Earth's surface (visibility in snow haze often decreases to 50 m). Snow haze is observed most frequently in Arctic regions, before or after a snowstorm.

Squall. Atmospheric phenomenon characterized by a very large variation of wind speed: it begins suddenly, has a duration of the order of minutes and decreases rather suddenly in speed. It is often accompanied by a shower or thunderstorm.

Squall line. Fictitious moving line, sometimes of considerable extent, along which squall phenomena occur.

Sun pillar. Pillar of white light, which may or may not be continuous, which may be observed vertically above or below the sun. Sun pillars are most frequently observed near sunrise or sunset; they may extend to about 20° above the Sun, and generally end in a point. When a sun pillar appears together with a well-developed parhelic circle, a sun cross may appear at their intersection.

Synoptic hour. Hour, expressed in terms of universal time coordinated (UTC), at which, by international agreement, meteorological observations are made simultaneously throughout the globe.

Synoptic observation. A surface or upper-air observation made at standard time.

Synoptic surface observation. Synoptic observation, other than an upper-air observation, made by an observer or an automatic weather station on the Earth's surface.

Template. Description of the standardized layout of a set of data entities.

Tropical (Tropic). Pertaining to that region of the Earth's surface lying between the Tropic of Cancer and Tropic of Capricorn at 23° 30′ N and S, respectively.

Tropical cyclone. Cyclone of tropical origin of small diameter (some hundreds of kilometres) with minimum surface pressure in some cases less than 900 hPa, very violent winds and torrential rain; sometimes accompanied by thunderstorms. It usually contains a central region, known as the "eye" of the storm, with a diameter of the order of some tens of kilometres, and with light winds and more or less lightly clouded sky.

Tropical revolving storm. Tropical cyclone.

Tropopause.

(1) Upper limit of the troposphere. By convention, the "first tropopause" is defined as the lowest level at which the lapse rate decreases to 2 °C km^{-1} or less, provided also the average lapse rate between this level and all higher levels within 2 km does not exceed 2 °C km^{-1}.

(2) If, above the first tropopause, the average lapse rate between any level and all higher levels within 1 km exceeds 3 °C km^{-1}, then a "second tropopause" is defined by the same criterion as under (1). This second tropopause may be either within or above the 1-km layer.

Twilight glow. See *Purple light*.

Twilight glow in the mountains (Alpenglühen). See *Alpine glow*.

Uniform resource identifier (URI). A compact sequence of characters that identifies an abstract or physical resource. URI syntax is defined in the Internet Engineering Task Force (IETF) RFC 3986.

Unit of geopotential (H_m'). 1 standard geopotential metre = 0.980 665 dynamic metre

$$H_m' = \frac{1}{9.80665}\int_o^z g(z)dz$$

where $g(z)$ = acceleration of gravity, in m s^{-2}, as a function of geometric height;
z = geometric height, in metres;
H_m' = geopotential, in geopotential metres.

Vertical visibility. Maximum distance at which an observer can see and identify an object on the same vertical as himself, above or below

Visibility (for aeronautical purposes). Visibility for aeronautical purposes is the greater of:

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

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

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

Whiteout. Uniformly white appearance of the landscape when the ground is snow covered and the sky is uniformly covered with clouds. An atmospheric optical phenomenon of the polar regions in which the observer appears to be engulfed in a uniformly white glow. Neither shadows, horizon, nor clouds are discernible; sense of depth and orientation are lost; only very dark, nearby objects can be seen. Whiteout occurs over an unbroken snow cover and beneath a uniformly overcast sky, when, with the aid of the snowblink effect, the light from the sky is about equal to that from the snow surface. Blowing snow may be an additional cause. The phenomenon is experienced in the air as well as on the ground.

Wind (mean wind, spot wind). Air motion relative to the Earth's surface. Unless it is otherwise specified, only the horizontal component is considered.

(1) *Mean wind*: For the purpose of upper air reports from aircraft, mean wind is derived from the drift of the aircraft when flying from one fixed point to another or obtained by flying on a circuit around a fixed observed point and an immediate wind deduced from the drift of the aircraft.

(2) *Spot wind*: For the purpose of upper-air reports from aircraft, the wind velocity, observed or predicted, for a specified location, height and time.

XML attribute. A start tag delimiting an XML element may contain one or more attributes. Attributes are Name-Value pairs, with the Name in each pair referred to as the attribute name and the Value (the text between the quote delimiters, that is, ' or ") as the attribute value. The order of attribute specifications in a start-tag or empty-element tag is not significant.

XML document. A structured document conforming to the rules specified in Extensible Markup Language (XML) 1.0 (Second Edition).

XML element. Each XML document contains one or more elements, the boundaries of which are either delimited by start-tags and end-tags, or, for empty elements, by an empty-element tag. Each element has a type, identified by name, sometimes called its generic identifier (GI), and may have a set of attribute specifications. An XML element may contain other XML elements, XML attributes or character data.

XML schema. A definition language offering facilities for describing the structure and constraining the contents of XML documents. The set of definitions for describing a particular XML document structure and associated constraints is referred to as an XML schema document.

XML schema document (XSD). An XML document containing XML schema component definitions and declarations.

Zodiacal light. White or yellowish light which spreads out, in the night sky, more or less along the zodiac from the horizon on the side on which the Sun is hidden. It is observed when the sky is sufficiently dark and the atmosphere sufficiently clear.

FM SYSTEM OF NUMBERING XML MARKUP LANGUAGE APPLICATION SCHEMAS

Each XML application schema bears a number, preceded by the letters FM. This number is followed by a numeral to identify the session of the Commission for Basic Systems (CBS) that either approved the XML application schema as a new one or made the latest amendment to its previous version. An XML application schema approved or amended by correspondence after a CBS session receives the number of that session.

Furthermore, an indicator term is used to designate the XML representation colloquially and is therefore called a "code name".

Notes on nomenclature:

(a) Changes and augmentations to the structure of the XML data representation shall be identified as different “editions”. Each edition of the XML code is allocated a unique namespace. To distinguish between editions, namespaces include EITHER a year field, denoting the year in which those changes and augmentations were begun, OR a version number. For example, FM 202-15 Ext. METCE-XML has the namespace http://def.wmo.int/metce/2013 (initial year of work 2013) whilst FM 205-15 Ext. IWXXM- XML has the namespace http://icao.int/iwxxm/1.1 (version number 1.1).

(b) Changes to the content of any of the supporting tables are backward compatible. Terms used within the supporting tables may be deprecated; they will not be deleted. Once changes to the supporting tables are approved, a snapshot containing all the supporting tables required for XML codes will be published. Each snapshot is referred to as a “table version”. The current table version for XML codes is Version 1.

(c) Backward-compatible changes, including addition of new elements or attributes to supporting tables, do not require a new edition of the XML code.

(d) Further XML code editions and table versions may be generated independently of one another in the future as requirements dictate.

The following table lists XML application schemas included within the FM numbering system, together with the corresponding code names and their reference list of approval decisions of the World Meteorological Congress, the Executive Council or CBS.

FM SYSTEM OF EXTENSIBLE MARKUP LANGUAGE REPRESENTATIONS

FM 201-15 Ext. COLLECT-XML	Collection of reports that use the same XML application schemas. Resolution 32 (Cg-17)
FM 202-15 Ext. METCE-XML	Foundation Meteorological Information. *Modèle pour l’échange des informations sur le temps, le climat et l’eau* (Model for the Exchange of Information on Weather, Climate and Water). A set of foundation building blocks to support application schema in the domains of interest to WMO, notably the weather, climate, hydrology, oceanography and space weather disciplines. Resolution 32 (Cg-17)

FM 203-15 Ext. OPM-XML	Observable Property Model. Based on work by the Open Geospatial Consortium (OGC) Sensor Web Enablement Domain Working Group, this allows observable properties (also known as quantity kinds) to be aggregated into groups, and for any qualification or constraint relating to those observable properties to be described explicitly. Resolution 32 (Cg-17)
FM 204-15 Ext. SAF-XML	Simple Aeronautical Features. Allows items such as airports or runways to be described to the level of detail required for reporting weather information for international civil aviation purposes. Resolution 32 (Cg-17)
FM 205-15 Ext. IWXXM-XML	ICAO Meteorological Information Exchange Model. Defines the reports required by the International Civil Aviation Organization (ICAO) – with information content equivalent to that in the alphanumeric METAR/SPECI, TAF and SIGMET code forms – that are built from the components of the packages managed by WMO. Resolution 32 (Cg-17)

1. REPRESENTATION OF INFORMATION IN EXTENSIBLE MARKUP LANGUAGE

1.1 XML documents shall be well-formed with respect to XML 1.0 [Extensible Markup Language (XML) 1.0 (Second Edition)].

Notes:
1. The XML implementation specified in this Manual is described using the XML schema definition language (XSD) [XML Schema Part 1: Structures (Second Edition), XML Schema Part 2: Datatypes (Second Edition)] and Schematron [ISO/IEC 19757-3:2006, Information technology – Document Schema Definition Languages (DSDL) – Part 3: Rule-based validation – Schematron].
2. Within this Manual, XPath [XML Path Language (XPath) 2.0 (Second Edition)] is used to refer to particular elements and attributes within an XML document.

1.2 XML documents conforming to XML schema that have been allocated an FM identifier within this Manual shall, in addition to conforming to the Regulation for the specified code form, conform to the requirements specified in Clauses 7 to 19 of ISO 19136:2007 [ISO 19136:2007, Geographic information – Geography Markup Language (GML)].

Notes:
1. XML schema defined in this Manual are conformant to the encoding rules specified in ISO 19136:2007 and are categorized as "GML application schema". Similarly, XML documents conforming to requirements from ISO 19136:2007 are termed "GML documents".
2. Conformance tests for GML documents are provided in ISO 19136:2007, Annex A, A.3 – Abstract test suite for GML documents.
3. The Content-Type [IETF RFC 2387 MIME Multipart/Related Content-type] for GML documents is "application/gml+xml".

1.3 Information exchanged in XML using the WMO Information System (WIS) shall conform to publicly available GML application schemas.

1.4 Information that is exchanged as XML using WIS and that is capable of being represented according to the GML application schema defined in this Manual should conform to the GML application schema defined within this Manual.

1.5 Creators of GML documents conforming to the GML application schema defined in this Manual shall ensure that their GML documents are valid with respect to the associated XML schema documents (XSD).

1.6 Creators of GML documents conforming to the GML application schema defined in this Manual shall ensure that their GML documents validate against the associated Schematron schema(s) that test conformance with the specified GML application schema.

Note: It is not necessary for recipients to validate each document.

1.7 All date-time elements shall be encoded using ISO 8601 extended time format [ISO 8601:2004, Data elements and interchange formats – Information interchange – Representation of dates and times].

1.8 The value of each time element shall include a time zone definition according to the ISO 8601 standard. The time zone provided should be universal time coordinated (UTC).

Note: A time zone is specified using a signed four-digit character or a "Z" to represent Zulu or UTC according to the following regular expression: (Z|[+-]HH:MM).

1.9 All units of measure shall use the appropriate code from the Unified Code for Units of Measure (UCUM) code system. The unit of measure shall be identified by encoding the UCUM code in the "uom" attribute of the gml:MeasureType. Where no UCUM code is provided for the unit of measure, the unit of measure should be identified using a URI that resolves to an online definition that is recognized by some level of authority.

Notes:

1. The UCUM base codes are available in XML form at http://unitsofmeasure.org/ucum-essence.xml.
2. A list of units of measure appropriate to the weather, water and climate domains are provided at http://codes.wmo.int/common/unit. Each unit of measurement listed therein has a URI identifier.

1.10 Where an xlink:href attribute is used to reference a resource from within an XML document, the xlink:title attribute should not be used to provide a textual description of that resource.

2. UNIQUE IDENTIFIERS TO IDENTIFY CODE TABLE ITEMS AND DEFINITIONS

2.1 The GML application schemas defined in this Manual make extensive use of externally managed codes and vocabulary items, with the majority drawn from code tables or code lists in Volumes I.1 and I.2.

2.2 Code or vocabulary items are referenced from within XML documents using the xlink:href attribute [XML Linking Language (XLink) Version 1.1].

2.3 The target code table or vocabulary from which codes or vocabulary items shall, should or may be drawn is defined within the GML application schema using the //annotation/appinfo/vocabulary element within the XML type definition.

2.4 The level of validation applied when assessing membership of codes or vocabulary items within the target code table or vocabulary is defined within the GML application schema using the //annotation/appinfo/extensibility element within the XML type definition. The interpretation of extensibility is as follows:

(a) <extensibility> “none” indicates that codes or vocabulary items shall be drawn from the target code table or vocabulary;

(b) <extensibility> “narrower” indicates that codes or vocabulary items shall be drawn from the target code table or vocabulary, or that the code or vocabulary item used shall be derived from another term within the target code table or vocabulary using a more refined, or narrower, definition;

(c) <extensibility> “any” indicates that codes or vocabulary items may be drawn from the target code table, code list or vocabulary or any other code table or vocabulary deemed appropriate by the author.

2.5 Code or vocabulary items referenced from within GML documents should have an available online definition and have been recognized by some level of authority.

2.6 Each code list managed by WMO in support of XML application schemas shall have a unique identifier of the form: http://codes.wmo.int/<identifier>.

Notes:

1. The recommended practice for selecting <identifier> is to base it on the WMO number of the publication defining the appropriate regulation, and the table within that publication. An example of a unique identifier is http://codes.wmo.int/306/4678/BLSN.
2. WMO provides a web service that makes the unique references “resolvable”. This means that if a unique identifier, such as http://codes.wmo.int/306/4678/BLSN, is entered as a URL into a browser, the definition of the item corresponding to the unique reference is displayed.

3. TABLES AND CODE LISTS SUPPORTING THE WMO LOGICAL DATA MODEL

3.1 Application of code tables and code lists

Regulations specified in code tables or code lists in Volumes I.1 and I.2 shall apply to the corresponding entries in code tables used within the GML application schemas defined in this Manual.

3.2 Nil reasons

3.2.1 Nil reason terms from Code table D-1 shall, where permitted within the GML application schemas defined in this Manual, be used to provide an explanation for recording a missing (or void) value within a GML document.

Notes:

1. Code table D-1 is described in Appendix A.
2. Code table D-1 is published online at http://codes.wmo.int/common/nil.

3.2.2 Each nil reason term is identified with a URI [IETF RFC 3986 Uniform Resource Identifier (URI): Generic Syntax]. The URI shall comprise the "Code-space" column concatenated with the "Notation" column of Code table D-1.

3.3 Physical quantities

3.3.1 Terms from Code table D-2 shall be used within the GML application schemas defined in this Manual to describe physical quantity kinds.

3.3.2 Each physical quantity kind is identified with a URI [IETF RFC 3986 Uniform Resource Identifier (URI): Generic Syntax]. The URI shall comprise the path http://codes.wmo.int/common/quantity-kind concatenated with the value listed in the "Notation" column of Code table D-2.

4. REFERENCES

4.1 Normative references

- Extensible Markup Language (XML) 1.0 (Second Edition), W3C Recommendation (6 October 2000)
- XML Schema Part 1: Structures (Second Edition), W3C Recommendation (28 October 2004)
- XML Schema Part 2: Datatypes (Second Edition), W3C Recommendation (28 October 2004)
- Namespaces in XML 1.0 (Third Edition), W3C Recommendation (8 December 2009)
- XML Linking Language (XLink) Version 1.1, W3C Recommendation (6 May 2010)
- ISO/IEC 19757-3:2006, Information technology – Document Schema Definition Languages (DSDL) – Part 3: Rule-based validation – Schematron
- ISO 8601:2004, Data elements and interchange formats – Information interchange – Representation of dates and times
- ISO 19136:2007, Geographic information – Geography markup language (GML)
- ISO/TS 19139:2007, Geographic information – Metadata – XML schema implementation
- OGC/IS 08-094r1 SWE Common Data Model Encoding Standard 2.0
- OGC/SAP 09-146r2 GML Application Schema – Coverages 1.0.1
- OGC/IS 10-025r1 Observations and Measurements 2.0 – XML Implementation

4.2 Informative references

- XML Path Language (XPath) 2.0 (Second Edition), W3C Recommendation (14 December 2010; correction 3 January 2011)
- ISO 19103:2005 Geographic information – Conceptual schema language
- ISO 19109:2005 Geographic information – Rules for application schema
- ISO 19123:2005 Geographic information – Schema for coverage geometry and functions
- ISO 19156:2011 Geographic information – Observations and measurements
- IETF RFC 2387 MIME Multipart/Related Content-type (August 1998)
- IETF RFC 3986 Uniform Resource Identifier (URI): Generic Syntax (January 2005)

FM 201: COLLECTION OF REPORTS

FM 201-15 EXT COLLECT-XML COLLECTION OF REPORTS

201.1 Scope

COLLECT-XML shall be used to represent a collection of GML feature instances of the same type of meteorological information. The intent is to allow XML encoded meteorological information to be packaged in a way that emulates the existing data distribution practices used within the Global Telecommunication System and aeronautical fixed service (AFS).

Notes:

1. The collection of meteorological information is often referred to as a bulletin.
2. XML encodings of meteorological information are defined in this Manual; for example, FM 205-15 EXT IWXXM-XML.
3. Aggregation of meteorological information in the form of meteorological bulletins usually takes place at a station or centre originating or compiling the bulletin, as agreed internationally. A meteorological bulletin may have one or more instances of meteorological information. If meteorological reports of routine messages are not available during compilation, a NIL report of that station should be included in the published contents of the bulletin.

The requirements classes defined in COLLECT-XML are listed in Table 1.

Table 1. Requirements classes defined in COLLECT-XML

Requirements classes	
Requirements class	http://def.wmo.int/collect/2014/req/xsd-meteorological-bulletin, 201.3

201.2 XML schema for COLLECT-XML

Representations of information in COLLECT-XML shall declare the XML namespaces listed in Table 2 and Table 3.

Notes:

1. Additional namespace declarations may be required depending on the XML elements used within COLLECT-XML. In particular, the meteorological information included within the bulletin is likely to imply specific requirements regarding namespace declaration.
2. Schematron schemas providing additional constraints are provided as an external file to the XSD defining COLLECT-XML. The canonical location of this file is http://schemas.wmo.int/rule/1.1/collect.sch.

Table 2. XML namespaces defined for COLLECT-XML

XML namespace	*Default namespace prefix*	*Canonical location of all-components schema document*
http://def.wmo.int/collect/2014	collect	http://schemas.wmo.int/collect/1.1/collect.xsd

Table 3. External XML namespaces used in COLLECT-XML

Standard	*XML namespace*	*Default namespace prefix*	*Canonical location of all-components schema document*
XML schema	http://www.w3.org/2001/XMLSchema	xs	
Schematron	http://purl.oclc.org/dsdl/schematron	sch	

Standard	*XML namespace*	*Default namespace prefix*	*Canonical location of all-components schema document*
XSLT v2	http://www.w3.org/1999/XSL/Transform	xsl	
XML Linking Language	http://www.w3.org/1999/xlink	xlink	http://www.w3.org/1999/xlink.xsd
ISO 19136:2006 GML	http://www.opengis.net/gml/3.2	gml	http://schemas.opengis.net/gml/3.2.1/gml.xsd

201.3 Requirements class: Meteorological bulletin

201.3.1 This requirements class is used to describe the collection of GML feature instances of meteorological information.

201.3.2 XML elements describing a meteorological bulletin shall conform to all requirements specified in Table 4.

Table 4. Requirements class xsd-meteorological-bulletin

Requirements class	
http://def.wmo.int/collect/2014/req/xsd-meteorological-bulletin	
Target type	Data instance
Name	Meteorological bulletin
Requirement	http://def.wmo.int/collect/2014/req/xsd-meteorological-bulletin/valid The content model of this element shall have a value that matches the content model of collect:MeteorologicalBulletin.
Requirement	http://def.wmo.int/collect/2014/req/xsd-meteorological-bulletin/bulletin-identifier The value of XML element collect:MeteorologicalBulletin/bulletinIdentifier shall conform to the general file-naming convention described in the *Manual on the Global Telecommunication System* (WMO No. 386), Attachment II-15.
Requirement	http://def.wmo.int/collect/2014/req/xsd-meteorological-bulletin/meteorological-information The XML element collect:MeteorologicalBulletin shall contain one or more child elements collect:MeteorologicalBulletin/collect:meteorologicalInformation, each of which shall contain one and only one child element expressing a report of meteorological information.
Requirement	http://def.wmo.int/collect/2014/req/xsd-meteorological-bulletin/consistent-meteorological-information-type An instance of collect:MeteorologicalBulletin shall contain only one type of meteorological information reports. All child elements of XML element collect:MeteorologicalBulletin/collect:meteorologicalInformation shall be of the same type, and hence have the same qualified name.

Notes:

1. In the context of the file-naming convention, abbreviated headings are described in the *Manual on the Global Telecommunication System* (WMO No. 386), Part II, 2.3.2.
2. Meteorological information reports include METAR, SPECI, TAF and SIGMET – represented using XML elements iwxxm:METAR, iwxxm:SPECI, iwxxm:TAF and iwxxm:SIGMET.
3. The qualified name of a METAR is iwxxm:METAR, which is of type iwxxm:METARType.

FM 202: METCE

FM 202-15 EXT METCE-XML FOUNDATION METEOROLOGICAL INFORMATION

202.1 Scope

METCE-XML shall be used for the exchange in XML of meteorological information conforming to the *Modèle pour l'échange des informations sur le temps, le climat et l'eau* (METCE) application schema. METCE-XML may be used directly to encode meteorological information or incorporated as components within other XML encodings.

Note: The METCE application schema is described in the *Guidelines on Data Modelling for WMO Codes* (available in English only from http://wis.wmo.int/metce-uml).

The requirements classes defined in METCE-XML are listed in Table 5.

Table 5. Requirements classes defined in METCE-XML

Requirements classes	
Requirements class	http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement, 202.4
Requirements class	http://def.wmo.int/metce/2013/req/xsd-sampling-coverage-measurement, 202.5
Requirements class	http://def.wmo.int/metce/2013/req/xsd-sampling-observation, 202.6
Requirements class	http://def.wmo.int/metce/2013/req/xsd-volcano, 202.7
Requirements class	http://def.wmo.int/metce/2013/req/xsd-erupting-volcano, 202.8
Requirements class	http://def.wmo.int/metce/2013/req/xsd-tropical-cyclone, 202.9
Requirements class	http://def.wmo.int/metce/2013/req/xsd-process, 202.10
Requirements class	http://def.wmo.int/metce/2013/req/xsd-measurement-context, 202.11

202.2 XML schema for METCE-XML

Representations of information in METCE-XML shall declare the XML namespaces listed in Table 6 and Table 7.

Notes:

1. Additional namespace declarations may be required depending on the XML elements used within METCE-XML.
2. The XML schema is packaged in three XML schema documents (XSD) describing one XML namespace: http://def.wmo.int/metce/2013.
3. Schematron schemas providing additional constraints are embedded within the XSD defining METCE-XML.

Table 6. XML namespaces defined for METCE-XML

XML namespace	*Default namespace prefix*	*Canonical location of all-components schema document*
http://def.wmo.int/metce/2013	metce	http://schemas.wmo.int/metce/1.1/metce.xsd

Table 7. External XML namespaces used in METCE-XML

Standard	*XML namespace*	*Default namespace prefix*	*Canonical location of all-components schema document*
XML schema	http://www.w3.org/2001/XMLSchema	xs	
Schematron	http://purl.oclc.org/dsdl/schematron	sch	
XSLT v2	http://www.w3.org/1999/XSL/Transform	xsl	
XML Linking Language	http://www.w3.org/1999/xlink	xlink	http://www.w3.org/1999/xlink.xsd
ISO 19136:2006 GML	http://www.opengis.net/gml/3.2	gml	http://schemas.opengis.net/gml/3.2.1/gml.xsd
ISO/TS 19139:2007 metadata XML implementation	http://www.isotc211.org/2005/gmd	gmd	http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/gmd/gmd.xsd
OGC OMXML	http://www.opengis.net/om/2.0	om	http://schemas.opengis.net/om/2.0/observation.xsd
OGC OMXML	http://www.opengis.net/samplingSpatial/2.0	sams	http://schemas.opengis.net/samplingSpatial/2.0/spatialSamplingFeature.xsd
FM 203-15 Ext. OPM-XML	http://def.wmo.int/opm/2013	opm	http://schemas.wmo.int/opm/1.1/opm.xsd

202.3 Virtual typing

In accordance with OMXML (clause 7.2), the specialization of OM_Observation is provided through Schematron restriction. The om:type element shall be used to specify the type of OM_Observation that is being encoded using the URI for the corresponding observation type listed in Code table D-3.

Notes:

1. Code table D-3 is described in Appendix A.
2. Code table D-3 is published online at http://codes.wmo.int/common/observation-type/METCE/2013.
3. The URI for each observation type is composed by appending the *notation* to the *code-space*. As an example, the URI of ComplexSamplingMeasurement is http://codes.wmo.int/common/observation-type/METCE/2013/ComplexSamplingMeasurement.
4. Each URI will resolve to provide further information about the associated observation type.
5. The terms "observation" and "measurement" evoke a particular concept to meteorologists (for example, the measurement of a physical phenomenon using an instrument or sensor). As defined in ISO 19156:2011, Geographic information – Observations and measurements, an instance of OM_Observation is defined as an "estimate of the value of some property of some feature of interest using a specified procedure". OM_Measurement is clearly applicable to the measurement of some physical property values using an instrument or sensor but is equally applicable to the numerical simulation of physical property values using a computational model (for example, a forecast or reanalysis).

202.4 Requirements class: Complex sampling measurement

202.4.1 This requirements class restricts the content model for the XML element om:OM_Observation such that the "result" of the observation is a set of values relating to a specified location and time instant or duration, the "feature of interest" is a representative subset of the atmosphere or body of water and so forth based on a predetermined sampling regime and the "procedure" provides the set of information as specified by WMO.

Note: ComplexSamplingMeasurement (a subclass of OM_ComplexObservation) is intended for use where the observation event is concerned with the evaluation of multiple measurands at a specified location and time instant or duration. OM_ComplexObservation is used because the "result" of this class of observations is a group of measures, provided as a Record (as defined in ISO 19103:2005, Geographic information – Conceptual schema language).

202.4.2 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/common/observation-type/METCE/2013/ComplexSamplingMeasurement shall conform to all requirements specified in Table 8.

202.4.3 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/common/observation-type/METCE/2013/ComplexSamplingMeasurement shall conform to all requirements of all relevant dependencies specified in Table 8.

Note: XML implementation of metce:ComplexSamplingMeasurement is dependent on:
- OMXML [OGC/IS 10-025r1 Observations and Measurements 2.0 – XML Implementation];
- SWE Common 2.0 [OGC/IS 08-094r1 SWE Common Data Model Encoding Standard 2.0].

Table 8. Requirements class xsd-complex-sampling-measurement

Requirements class	
http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement	
Target type	Data instance
Name	Complex sampling measurement
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/observation, OMXML clause 7.3
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/complexObservation, OMXML clause 7.10
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/sampling, OMXML clause 7.14
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling, OMXML clause 7.15
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-components, SWE Common 2.0 clause 8.1
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-record-components, SWE Common 2.0 clause 8.2
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-encodings, SWE Common 2.0 clause 8.5
Dependency	http://www.opengis.net/spec/SWE/2.0/req/general-encoding-rules, SWE Common 2.0 clause 9.1
Dependency	http://www.opengis.net/spec/SWE/2.0/req/text-encoding-rules, SWE Common 2.0 clause 9.2
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xml-encoding-rules, SWE Common 2.0 clause 9.3
Requirement	http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement/xmlns-declaration-swe The OGC SWE Common 2.0 namespace http://www.opengis.net/swe/2.0 shall be declared within the XML document.
Requirement	http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement/procedure-metce-process The XML element om:procedure shall contain a child element metce:Process or any element of a substitution group of metce:Process.
Recommendation	The default namespace prefix used for http://www.opengis.net/swe/2.0 should be "swe".

Notes:
1. Dependency http://www.opengis.net/spec/OMXML/2.0/req/observation has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/observation (OMXML clause A.1).
2. Dependency http://www.opengis.net/spec/OMXML/2.0/req/complexObservation has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/complexObservation (OMXML clause A.8).

3. Dependency http://www.opengis.net/spec/OMXML/2.0/req/sampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/sampling (OMXML clause A.12).
4. Dependency http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/spatialSampling (OMXML clause A.13).
5. Dependency http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-components has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/xsd-simple-components (SWE Common 2.0 clause A.8).
6. Dependency http://www.opengis.net/spec/SWE/2.0/req/xsd-record-components has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/xsd-record-components (SWE Common 2.0 clause A.9).
7. Dependency http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-encodings has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/xsd-simple-encodings (SWE Common 2.0 clause A.12).
8. Dependency http://www.opengis.net/spec/SWE/2.0/req/general-encoding-rules has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/general-encoding-rules (SWE Common 2.0 clause A.14).
9. Dependency http://www.opengis.net/spec/SWE/2.0/req/text-encoding-rules has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/text-encoding-rules (SWE Common 2.0 clause A.15).
10. Dependency http://www.opengis.net/spec/SWE/2.0/req/xml-encoding-rules has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/xml-encoding-rules (SWE Common 2.0 clause A.16).
11. The canonical schema location for OGC SWE Common 2.0 (http://www.opengis.net/swe/2.0) is http://schemas.opengis.net/sweCommon/2.0/swe.xsd.

202.5 Requirements class: Sampling coverage measurement

202.5.1 This requirements class restricts the content model for the XML element om:OM_Observation such that the "result" of the observation is a set of values describing the variation of properties with space and/or time, the "feature of interest" is a representative subset of the atmosphere or body of water and so forth based on a predetermined sampling regime and the "procedure" provides the set of information as specified by WMO.

Notes:
1. SamplingCoverageMeasurement (a subclass of OM_DiscreteCoverageObservation) is intended for use where the observation event is concerned with the evaluation of measurands that vary with respect to space and/or time. OM_DiscreteCoverageObservation is used because the "result" of this class of observations is a discrete coverage (as defined in ISO 19123:2005 Geographic information – Schema for coverage geometry and functions).
2. SamplingCoverageMeasurement is based on the informative SamplingCoverageObservation specialization of OM_Observation outlined in ISO 19156:2011, clause D.3.4. Within METCE, additional restrictions are applied to the "procedure". Furthermore, the name is changed from SamplingCoverageObservation to SamplingCoverageMeasurement in an attempt to disambiguate the two classes and to mitigate confusion arising from use of the term observation.

202.5.2 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/common/observation-type/METCE/2013/SamplingCoverageMeasurement shall conform to all requirements specified in Table 9.

202.5.3 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/common/observation-type/METCE/2013/SamplingCoverageMeasurement shall conform to all requirements of all relevant dependencies specified in Table 9.

Note: XML implementation of metce:ComplexSamplingMeasurement is dependent on:
- OMXML [OGC/IS 10-025r1 Observations and Measurements 2.0 – XML Implementation];
- SWE Common 2.0 [OGC/IS 08-094r1 SWE Common Data Model Encoding Standard 2.0];
- GMLCOV 1.0 [OGC/SAP 09-146r2 GML Application Schema – Coverages 1.0.1].

Table 9. Requirements class xsd-sampling-coverage-measurement

Requirements class	
http://def.wmo.int/metce/2013/req/xsd-sampling-coverage-measurement	
Target type	Data instance
Name	Sampling coverage measurement
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/observation, OMXML clause 7.3

Requirements class	
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/sampling, OMXML clause 7.14
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling, OMXML clause 7.15
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-components, SWE Common 2.0 clause 8.1
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-record-components, SWE Common 2.0 clause 8.2
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-block-components, SWE Common 2.0 clause 8.4
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-encodings, SWE Common 2.0 clause 8.5
Dependency	http://www.opengis.net/spec/SWE/2.0/req/general-encoding-rules, SWE Common 2.0 clause 9.1
Dependency	http://www.opengis.net/spec/SWE/2.0/req/text-encoding-rules, SWE Common 2.0 clause 9.2
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xml-encoding-rules, SWE Common 2.0 clause 9.3
Dependency	http://www.opengis.net/spec/gmlcov/1.0/req/gml-coverage, GMLCOV 1.0 clause 6
Dependency	http://www.opengis.net/spec/gmlcov/1.0/req/gml, GMLCOV 1.0 clause 7
Requirement	http://def.wmo.int/metce/2013/req/xsd-sampling-coverage-measurement/xmlns-declaration-swe The OGC SWE Common 2.0 namespace http://www.opengis.net/swe/2.0 shall be declared within the XML document.
Requirement	http://def.wmo.int/metce/2013/req/xsd-sampling-coverage-measurement/xmlns-declaration-gmlcov The OGC GMLCOV 1.0 namespace http://www.opengis.net/gmlcov/1.0 shall be declared within the XML document.
Requirement	http://def.wmo.int/metce/2013/req/xsd-sampling-coverage-measurement/result-discrete-or-grid-coverage The XML element om:result shall contain a child element gml:DiscreteCoverage (or any element of a substitution group of gml:DiscreteCoverage), gml:GridCoverage, gml:RectifiedGridCoverage or gml:ReferenceableGridCoverage.
Requirement	http://def.wmo.int/metce/2013/req/xsd-sampling-coverage-measurement/result-coverage-gml-encoding The child element of om:result shall be represented in GML as defined in GMLCOV 1.0 clause 7. MultiPart representation and special format representation shall not be used.
Requirement	http://def.wmo.int/metce/2013/req/xsd-sampling-coverage-measurement/procedure-metce-process The XML element om:procedure shall contain a child element metce:Process or any element of a substitution group of metce:Process.
Recommendation	The default namespace prefix used for http://www.opengis.net/swe/2.0 should be "swe".
Recommendation	The default namespace prefix used for http://www.opengis.net/gmlcov/1.0 should be "gmlcov".

Notes:

1. Dependency http://www.opengis.net/spec/OMXML/2.0/req/observation has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/observation (OMXML clause A.1).
2. Dependency http://www.opengis.net/spec/OMXML/2.0/req/sampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/sampling (OMXML clause A.12).
3. Dependency http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/spatialSampling (OMXML clause A.13).
4. Dependency http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-components has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/xsd-simple-components (SWE Common 2.0 clause A.8).
5. Dependency http://www.opengis.net/spec/SWE/2.0/req/xsd-record-components has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/xsd-record-components (SWE Common 2.0 clause A.9).

6. Dependency http://www.opengis.net/spec/SWE/2.0/req/xsd-block-components has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/xsd-block-components (SWE Common 2.0 clause A.11).
7. Dependency http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-encodings has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/xsd-simple-encodings (SWE Common 2.0 clause A.12).
8. Dependency http://www.opengis.net/spec/SWE/2.0/req/general-encoding-rules has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/general-encoding-rules (SWE Common 2.0 clause A.14).
9. Dependency http://www.opengis.net/spec/SWE/2.0/req/text-encoding-rules has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/text-encoding-rules (SWE Common 2.0 clause A.15).
10. Dependency http://www.opengis.net/spec/SWE/2.0/req/xml-encoding-rules has associated conformance class http://www.opengis.net/spec/SWE/2.0/conf/xml-encoding-rules (SWE Common 2.0 clause A.16).
11. The canonical schema location for OGC SWE Common 2.0 (http://www.opengis.net/swe/2.0) is http://schemas.opengis.net/sweCommon/2.0/swe.xsd.
12. Dependency http://www.opengis.net/spec/gmlcov/1.0/req/gml-coverage has associated conformance class (GMLCOV 1.0 clause A.1)
13. Dependency http://www.opengis.net/spec/gmlcov/1.0/req/gml has associated conformance class (GMLCOV 1.0 clause A.2)
14. The canonical schema location for OGC GMLCOV 1.0 (http://www.opengis.net/gmlcov/1.0) is http://schemas.opengis.net/gmlcov/1.0/gmlcovAll.xsd.

202.6 Requirements class: Sampling observation

202.6.1 This requirements class restricts the content model for the XML element om:OM_Observation such that the "feature of interest" is a representative subset of the atmosphere or body of water and so forth based on a predetermined sampling regime and the "procedure" provides the set of information as specified by WMO.

Note: SamplingObservation (a subclass of OM_Observation) is the most flexible of the three observation specializations defined in METCE, as it adds no additional constraints on the type of "result".

202.6.2 Where the semantics of one's application are appropriate, ComplexSamplingMeasurement or SamplingCoverageMeasurement should be used in preference to SamplingObservation, as it is anticipated that software applications will be more readily able to parse and process data conforming to the former two observation types due to their more structured "result"' types.

202.6.3 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/common/observation-type/METCE/2013/SamplingObservation shall conform to all requirements specified in Table 10.

202.6.4 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/common/observation-type/METCE/2013/SamplingObservation shall conform to all requirements of all relevant dependencies specified in Table 10.

Note: XML implementation of metce:SamplingObservation is dependent on:
- OMXML [OGC/IS 10-025r1 Observations and Measurements 2.0 – XML Implementation].

Table 10. Requirements class xsd-sampling-observation

Requirements class	
http://def.wmo.int/metce/2013/req/xsd-sampling-observation	
Target type	Data instance
Name	Sampling observation
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/observation, OMXML clause 7.3
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/sampling, OMXML clause 7.14
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling, OMXML clause 7.15

Requirements class	
Requirement	http://def.wmo.int/metce/2013/req/xsd-sampling-observation/procedure-metce-process The XML element om:procedure shall contain a child element metce:Process or any element of a substitution group of metce:Process.

Notes:

1. Dependency http://www.opengis.net/spec/OMXML/2.0/req/observation has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/observation (OMXML clause A.1).
2. Dependency http://www.opengis.net/spec/OMXML/2.0/req/sampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/sampling (OMXML clause A.12).
3. Dependency http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/spatialSampling (OMXML clause A.13).

202.7 Requirements class: Volcano

202.7.1 This requirements class is used to describe the representation of a volcano. The class is targeted at providing a basic description of the volcano as a meteorological phenomenon.

Note: Representations providing more detailed information may be used if required.

202.7.2 XML elements describing volcanoes shall conform to all requirements specified in Table 11.

Table 11. Requirements class xsd-volcano

Requirements class	
http://def.wmo.int/metce/2013/req/xsd-volcano	
Target type	Data instance
Name	Volcano
Requirement	http://def.wmo.int/metce/2013/req/xsd-volcano/valid The content model of this element shall have a value that matches the content model of metce:Volcano.
Requirement	http://def.wmo.int/metce/2013/req/xsd-volcano/name The XML element metce:name shall provide an authoritative name for the given volcano as a literal character string.
Requirement	http://def.wmo.int/metce/2013/req/xsd-volcano/position The XML element metce:position shall contain a valid child element gml:Point that provides the reference location of the volcano in question.
Recommendation	http://def.wmo.int/metce/2013/req/xsd-volcano/name-as-block-caps The authoritative name for the given volcano should be expressed in block capitals.

Note: The Global Volcanism Program provides an online, searchable catalogue of volcanoes that may assist in identifying the authoritative name for a given volcano. The catalogue is accessed at http://wis.wmo.int/volcano. No guarantee is made regarding the availability of this catalogue service.

202.8 Requirements class: Erupting volcano

202.8.1 This requirements class is used to describe the representation of a currently erupting, or recently erupted, volcano, that is the source of volcanic ash or other significant meteorological phenomena described in weather reports.

Note: Representations providing more detailed information may be used if required.

202.8.2 XML elements describing volcanoes where the date of a particular eruption is deemed important shall conform to all requirements specified in Table 12.

202.8.3 XML elements describing volcanoes where the date of a particular eruption is deemed important shall conform to all requirements of all relevant dependencies specified in Table 12.

Table 12. Requirements class xsd-erupting-volcano

Requirements class	
http://def.wmo.int/metce/2013/req/xsd-erupting-volcano	
Target type	Data instance
Name	Erupting volcano
Dependency	http://def.wmo.int/metce/2013/req/xsd-volcano
Requirement	http://def.wmo.int/metce/2013/req/xsd-erupting-volcano/valid The content model of this element shall have a value that matches the content model of metce:EruptingVolcano.
Requirement	http://def.wmo.int/metce/2013/req/xsd-erupting-volcano/eruption-date The XML element metce:eruptionDate shall provide the date at which the current or recent eruption began expressed in ISO 8601 date-time format.

202.9 Requirements class: Tropical cyclone

202.9.1 This requirements class is used to describe the representation of a tropical cyclone.

Note: In this release of METCE-XML, the information expressed about a tropical cyclone is limited to the cyclone's name. Representations providing more detailed information may be used if required.

202.9.2 XML elements describing tropical cyclones shall conform to all requirements specified in Table 13.

Table 13. Requirements class xsd-tropical-cyclone

Requirements class	
http://def.wmo.int/metce/2013/req/xsd-tropical-cyclone	
Target type	Data instance
Name	Tropical cyclone
Requirement	http://def.wmo.int/metce/2013/req/xsd-tropical-cyclone/valid The content model of this element shall have a value that matches the content model of metce:TropicalCyclone.
Requirement	http://def.wmo.int/metce/2013/req/xsd-tropical-cyclone/name The XML element metce:name shall provide an authoritative name for the given tropical cyclone as a literal character string.
Recommendation	http://def.wmo.int/metce/2013/req/xsd-tropical-cyclone/name-as-block-caps The authoritative name for the given tropical cyclone should be expressed in block capitals.

202.10 Requirements class: Process

202.10.1 This requirements class is used to describe the procedures involved in generating an observation or measurement.

Notes:

1. Process provides a concrete implementation of the abstract OM_Process class.
2. An instance of Process is often an instrument or sensor (perhaps even a sensor in a given calibrated state), but it may be a human observer executing a set of repeatable instructions, a simulator or a process algorithm.

3. Process is intended to allow the provision of reference(s) to supporting documentation (for example, online documentation describing the procedure in detail) plus the resolution (for example, the smallest quantity being measured that causes a perceptible change in the corresponding indication) and measuring interval (for example, the range of values for a given quantity kind that an instrument or sensor can detect under the defined conditions) for each physical quantity kind observed.
4. Process is targeted at providing a basic process description; representations providing more detailed information may be used if required.

202.10.2 An instance of Process should provide sufficient information for one to interpret the result of an observation.

Note: The recalibration of a sensor such as an anemometer, or modifying its height above local ground, is likely to affect the values that that sensor records; a new instance of Process may be required to express such changes enabling accurate interpretation of the observation result.

202.10.3 XML elements describing procedures relating to observations or measurements shall conform to all requirements specified in Table 14.

Table 14. Requirements class xsd-process

Requirements class	
http://def.wmo.int/metce/2013/req/xsd-process	
Target type	Data instance
Name	Process
Requirement	http://def.wmo.int/metce/2013/req/xsd-process/valid The content model of this element shall have a value that matches the content model of metce:Process.
Recommendation	http://def.wmo.int/metce/2013/req/xsd-process/description A description of the procedure, or citation to some well-known description of the procedure, should be provided using the gml:description element.
Recommendation	http://def.wmo.int/metce/2013/req/xsd-process/documentation-reference Where more information about the procedure is accessible online, a reference to that information should be provided using the xlink:href attribute of the metce: documentationRef element to indicate the URL of the online documentation.
Recommendation	http://def.wmo.int/metce/2013/req/xsd-process/configuration Where more information about the procedure configuration is available, such as details of a sensor's calibration or deployment environment, that information should be included in the procedure description. For each configuration item, an XML element metce:parameter should be provided, each with a child element om: NamedValue. XML element //metce:parameter/om:NamedValue/om:name should indicate the meaning of the parameter. The parameter name should be taken from a well-governed source. Furthermore, to avoid ambiguity, there should be no more than one parameter with the same name within a given procedure description. XML element //metce:parameter/om:NamedValue/om:value provides the value of the parameter using any suitable concrete type.
Recommendation	http://def.wmo.int/metce/2013/req/xsd-process/measurement-context Where additional information about the quantity kind(s) observed or measured by the procedure, such as qualification or constraint of the quantity kind, or details of the resolution and/or range with which the procedure is able to measure a given quantity kind is available, that information should be included in the procedure description. For each quantity kind for which additional information is to be provided, an XML element metce:context should be provided, each with a child element metce:MeasurementContext (or any element of a substitution group of metce:MeasurementContext).

Note: Where a procedure is common for many observations, the metce:Process describing that procedure may be published online at an accessible location and referenced from each observation using xlink:href to indicate the URL.

202.11 Requirements class: Measurement context

202.11.1 This requirements class is used to describe the additional context that may be provided for a quantity kind measured by a given procedure.

Note: The measurement context allows the resolution scale (for example, the smallest change in quantity being measured that causes a perceptible change in the corresponding indication) and/or the measuring interval (for example, the range of values that can be measured) to be defined for a given quantity kind for the associated procedure. For example, it is possible to state that a given procedure, say a thermometer, is able to measure air temperature to a resolution of 0.5 degree Celsius in the range –30 degrees Celsius to +50 degrees Celsius.

202.11.2 XML elements describing procedures relating to observations or measurements shall conform to all requirements specified in Table 15.

Table 15. Requirements class xsd-measurement-context

Requirements class	
http://def.wmo.int/metce/2013/req/xsd-measurement-context	
Target type	Data instance
Name	Measurement context
Dependency	http://def.wmo.int/opm/2013/req/xsd-observable-property, 203.3
Requirement	http://def.wmo.int/metce/2013/req/xsd-measurement-context/valid The content model of this element shall have a value that matches the content model of metce:MeasurementContext.
Requirement	http://def.wmo.int/metce/2013/req/xsd-measurement-context/measurand The quantity kind to which this element applies shall be specified via the XML element metce:measurand.
Requirement	http://def.wmo.int/metce/2013/req/xsd-measurement-context/unit-of-measure-consistent The unit of measurement specified in XML element metce:unitOfMeasure shall be consistent with the unit of measurement used to express resolution scale and/or measuring interval.
Requirement	http://def.wmo.int/metce/2013/req/xsd-measurement-context/unit-of-measure-provision Where either XML elements metce:resolutionScale or metce:measuringInterval or both are present, XML element metce:unitOfMeasure shall be provided.
Requirement	http://def.wmo.int/metce/2013/req/xsd-measurement-context/measuring-interval-range-bounds-order Where the measuring interval is specified, the lower limit of the interval, expressed via XML element //metce:measuringInterval/metce:RangeBounds/metce:rangeStart, shall be less than the upper limit of the interval, expressed via XML element //metce:measuringInterval/metce:RangeBounds/metce:rangeEnd.

Notes:

1. The XML element metce:measurand may reference a quantity kind provided by some authority using xlink:href to indicate the URI of the quantity kind, or provide a child element opm:ObservableProperty (or element within the substitution group of opm:ObservableProperty). The latter case may be useful where additional qualification or constraint relating to the quantity kind needs to be embedded within the GML document as XML element //om:OM_Observation/om:observedProperty only permits the observed quantity kind to be expressed by reference using xlink:href.
2. Units of measurement are specified in accordance with 1.9 above.

FM 203: OPM

FM 203-15 EXT OPM-XML OBSERVABLE PROPERTY MODEL

203.1 Scope

OPM-XML shall be used to represent complex observable properties (also known as quantity kinds) where individual observable properties are aggregated into groups or where the qualification and/or constraint applied to an observable property needs to be explicitly described.

Notes:
1. An "observable property" is a physical property that can be observed; typically this will be a quantitative property, such as dewpoint temperature.
2. OPM, the Observable Property Model, was developed to a draft level by the Open Geospatial Consortium Sensor Web Enablement Domain Working Group and was re-used in the INSPIRE Generic Conceptual Model. It is published by WMO to ensure that there is a stable definition of its XML schemas.
3. The Observable Property Model application schema is described in the *Guidelines on Data Modelling for WMO Codes* (available in English only from http://wis.wmo.int/metce-uml).

The requirements classes defined in OPM-XML are listed in Table 16.

Table 16. Requirements classes defined in OPM-XML

Requirements classes	
Requirements class	http://def.wmo.int/opm/2013/req/xsd-observable-property, 203.3
Requirements class	http://def.wmo.int/opm/2013/req/xsd-composite-observable-property, 203.4
Requirements class	http://def.wmo.int/opm/2013/req/xsd-qualified-observable-property, 203.5
Requirements class	http://def.wmo.int/opm/2013/req/xsd-statistical-qualifier, 203.6
Requirements class	http://def.wmo.int/opm/2013/req/xsd-constraint, 203.7
Requirements class	http://def.wmo.int/opm/2013/req/xsd-category-constraint, 203.8
Requirements class	http://def.wmo.int/opm/2013/req/xsd-scalar-constraint, 203.9
Requirements class	http://def.wmo.int/opm/2013/req/xsd-range-constraint, 203.10

203.2 XML schema for OPM-XML

Representations of information in OPM-XML shall declare the XML namespaces listed in Table 17 and Table 18.

Notes:
1. Additional namespace declarations may be required depending on the XML elements used within OPM-XML.
2. The XML schema is packaged in two XML schema documents (XSD) describing one XML namespace: http://def.wmo.int/opm/2013.
3. Schematron schemas providing additional constraints are embedded within the XSD defining OPM-XML.

Table 17. XML namespaces defined for OPM-XML

XML namespace	*Default namespace prefix*	*Canonical location of all-components schema document*
http://def.wmo.int/opm/2013	opm	http://schemas.wmo.int/opm/1.1/opm.xsd

Table 18. External XML namespaces used in OPM-XML

Standard	*XML namespace*	*Default namespace prefix*	*Canonical location of all-components schema document*
XML schema	http://www.w3.org/2001/XMLSchema	xs	
Schematron	http://purl.oclc.org/dsdl/schematron	sch	
XSLT v2	http://www.w3.org/1999/XSL/Transform	xsl	
XML Linking Language	http://www.w3.org/1999/xlink	xlink	http://www.w3.org/1999/xlink.xsd
ISO 19136:2006 GML	http://www.opengis.net/gml/3.2	gml	http://schemas.opengis.net/gml/3.2.1/gml.xsd

203.3 Requirements class: Observable property

203.3.1 This requirements class is used to describe the representation of an observable property.

Note: Representations providing more detailed information, such as composite observable property and qualified observable property (see 203.4 and 203.5), may be used if required.

203.3.2 XML elements describing observable properties shall conform to all requirements specified in Table 19.

Table 19. Requirements class xsd-observable-property

Requirements class	
http://def.wmo.int/opm/2013/req/xsd-observable-property	
Target type	Data instance
Name	Observable property
Requirement	http://def.wmo.int/opm/2013/req/xsd-observable-property/valid The content model of this element shall have a value that matches the content model of opm:AbstractObservableProperty.
Recommendation	http://def.wmo.int/opm/2013/req/xsd-observable-property/label The primary human-readable label for the observable property should be specified using the opm:label XML element.

Notes:

1. Alternative human-readable labels may be specified using one or more instances of the XML element opm:altLabel.
2. The XML element opm:notation may be used to specify a notation or code-value that is used to identify the observable property within a given context (for example, providing a local identifier).

203.4 Requirements class: Composite observable property

203.4.1 This requirements class is used to describe the representation of an aggregate set of observable properties.

203.4.2 XML elements describing composite observable properties shall conform to all requirements specified in Table 20.

203.4.3 XML elements describing composite observable properties shall conform to all requirements of all relevant dependencies specified in Table 20.

Table 20. Requirements class xsd-composite-observable-property

Requirements class	
http://def.wmo.int/opm/2013/req/xsd-composite-observable-property	
Target type	Data instance
Name	Composite observable property
Dependency	http://def.wmo.int/opm/2013/req/xsd-observable-property, 203.3
Requirement	http://def.wmo.int/opm/2013/req/xsd-composite-observable-property/valid The content model of this element shall have a value that matches the content model of opm:CompositeObservableProperty.
Requirement	http://def.wmo.int/opm/2013/req/xsd-composite-observable-property/set A composite observable property shall contain a minimum of two child observable properties.
Requirement	http://def.wmo.int/opm/2013/req/xsd-composite-observable-property/child-property For each child observable property within the composite observable property, the XML element //opm:CompositeObservableProperty/opm:property shall either contain a valid child element in the substitution group of opm:AbstractObservableProperty or provide a reference to the definition of the child observable property using the xlink:href attribute to indicate the URL where a description is located.
Requirement	http://def.wmo.int/opm/2013/req/xsd-composite-observable-property/count The XML attribute //opm:CompositeObservableProperty/@count shall specify the number of child observable properties from which the composite observable property is comprised.

Note: A child observable property specified within a composite observable property instance may itself be a composite observable property, thus allowing arbitrarily complex nesting of sets of observable properties.

203.5 Requirements class: Qualified observable property

203.5.1 This requirements class is used to describe the representation of an observable property subject to additional qualification or constraint.

Note: The observable property to which the additional qualification or constraint is applied is known as the base property.

203.5.2 XML elements describing qualified observable properties shall conform to all requirements specified in Table 21.

203.5.3 XML elements describing qualified observable properties shall conform to all requirements of all relevant dependencies specified in Table 21.

Table 21. Requirements class xsd-qualified-observable-property

Requirements class	
http://def.wmo.int/opm/2013/req/xsd-qualified-observable-property	
Target type	Data instance
Name	Qualified observable property
Dependency	http://def.wmo.int/opm/2013/req/xsd-observable-property, 203.3
Requirement	http://def.wmo.int/opm/2013/req/xsd-qualified-observable-property/valid The content model of this element shall have a value that matches the content model of opm:QualifiedObservableProperty.

Requirements class	
Requirement	http://def.wmo.int/opm/2013/req/xsd-qualified-observable-property/base-property The XML element //opm:QualifiedObservableProperty/opm:baseProperty shall either contain a valid child element opm:ObservableProperty (or element within the substitution group of opm:ObservableProperty) that describes the base property or provide a reference to the definition of the base property using the xlink:href attribute to indicate the URL where a description is located.
Requirement	http://def.wmo.int/opm/2013/req/xsd-qualified-observable-property/specified-unit-of-measure If the base property is qualified such that values of the qualified observable property are always provided using a given unit of measurement, the XML attribute //opm:QualifiedObservableProperty/opm:unitOfMeasure/@uom shall be used to specify that unit of measurement.
Requirement	http://def.wmo.int/opm/2013/req/xsd-qualified-observable-property/valid-unit-of-measure If specified, the unit of measurement referenced via XML attribute //opm:QualifiedObservableProperty/opm:unitOfMeasure/@uom shall be appropriate for the base property.
Requirement	http://def.wmo.int/opm/2013/req/xsd-qualified-observable-property/qualifier If specified, the XML element //opm:QualifiedObservableProperty/opm:qualifier shall contain a valid child element opm:StatisticalQualifier that provides details of any statistical qualification applied to the base property.
Requirement	http://def.wmo.int/opm/2013/req/xsd-qualified-observable-property/constraint If specified, the XML element //opm:QualifiedObservableProperty/opm:constraint shall contain a valid child element opm:Constraint, or element in the substitution group of opm:Constraint, that provides details of any constraint applied to the base property.
Recommendation	http://def.wmo.int/opm/2013/req/xsd-qualified-observable-property/minimal-qualification At least one of the XML elements //opm:QualifiedObservableProperty/opm:unitOfMeasure, //opm:QualifiedObservableProperty/opm:qualifier or //opm:QualifiedObservableProperty/opm:constraint should be included within a qualified observable property.

Note: Units of measurement are specified in accordance with 1.9 above.

203.6 Requirements class: Statistical qualifier

203.6.1 This requirements class is used to describe the representation of statistical qualifiers applied to an observable property.

Note: Typically, statistical qualification is based on some geometric or temporal aggregation using a given statistical function, for example, the maximum temperature in a 24-hour duration.

203.6.2 XML elements describing statistical qualification of observable properties shall conform to all requirements specified in Table 22.

Table 22. Requirements class xsd-statistical-qualifier

Requirements class	
http://def.wmo.int/opm/2013/req/xsd-statistical-qualifier	
Target type	Data instance
Name	Statistical qualifier
Requirement	http://def.wmo.int/opm/2013/req/xsd-statistical-qualifier/valid The content model of this element shall have a value that matches the content model of opm:StatisticalQualifier.

Requirements class	
Requirement	http://def.wmo.int/opm/2013/req/xsd-statistical-qualifier/statistical-function-code The XML element //opm:StatisticalQualifier/opm:statisticalFunction shall reference the function used in the statistical qualification using the xlink:href attribute to specify the URI used to identify the target statistical function.
Requirement	http://def.wmo.int/opm/2013/req/xsd-statistical-qualifier/single-qualification-domain One, and only one, of XML elements //opmStatisticalQualifier/opm:aggregationArea, //opmStatisticalQualifier/opm:aggregationLength, //opmStatisticalQualifier/opm:aggregationTimePeriod, //opmStatisticalQualifier/opm:aggregationVolume and //opmStatisticalQualifier/opm:otherAggregation shall be included within a statistical qualification.
Recommendation	http://def.wmo.int/opm/2013/req/xsd-statistical-qualifier/description A textual description of the statistical qualification applied to the observable property should be provided using the //opmStatisticalQualifier/opm:description XML element.
Recommendation	http://def.wmo.int/opm/2013/req/xsd-statistical-qualifier/statistical-function-code-online-definition The URI used to identify the statistical function should have an available online definition and have been recognized by some level of authority.
Recommendation	http://def.wmo.int/opm/2013/req/xsd-statistical-qualifier/qualification-domain-type Where the statistical qualification domain relates to geometric area, geometric length, time period or geometric volume then XML elements //opmStatisticalQualifier/opm:aggregationArea, //opmStatisticalQualifier/opm:aggregationLength, //opmStatisticalQualifier/opm:aggregationTimePeriod or //opmStatisticalQualifier/opm:aggregationVolume should be used in preference to XML element //opmStatisticalQualifier/opm:otherAggregation to describe the statistical qualification domain.

Notes:

1. Groups of statistical qualifiers may be applied to a given base property; in such a case the order of the statistical qualification is important. For example, mean daily maximum temperature over a one-month period comprises two statistical operations with respect to the base property "air temperature" – a maximum over a 24-hour duration followed by a mean over a one-month duration. A collection of statistical qualifiers can be linked using the XML element //opmStatisticalQualifier/opm:derivedFrom to establish an ordered set.
2. Terms from Volume I.2, FM 92 GRIB, Code table 4.10: Type of statistical processing, may be used to describe the statistical function. An alternative source of statistical function codes is provided in Volume I.2, FM 94 BUFR, Code table 0 08 023: First-order statistics. For convenience, these code tables have been published online at http://codes.wmo.int/grib2/codeflag/4.10 and http://codes.wmo.int/bufr4/codeflag/0-08-023, respectively.

203.7 **Requirements class: Constraint**

203.7.1 This requirements class is used to describe the representation of constraints applied to an observable property.

Notes:

1. The observable property that is used to constrain the base property is known as the constraining property. For example, the observed property "radiance" may be constrained such that one is concerned only with the radiance between wavelengths of 50 nm to 100 nm – in which case the constraining property is "wavelength".
2. Representations providing more detailed information, such as scalar constraint, range constraint or category constraint, may be used if required.

203.7.2 XML elements describing the constraint of observable properties shall conform to all requirements specified in Table 23.

Table 23. Requirements class xsd-constraint

Requirements class	
http://def.wmo.int/opm/2013/req/xsd-constraint	
Target type	Data instance
Name	Constraint
Requirement	http://def.wmo.int/opm/2013/req/xsd-constraint/valid The content model of this element shall have a value that matches the content model of opm:Constraint.
Requirement	http://def.wmo.int/opm/2013/req/xsd-constraint/constraint-property The XML element opm:constraintProperty shall either contain a valid child element opm:ObservableProperty (or element within the substitution group of opm: ObservableProperty) that describes the constraining property or provide a reference to the definition of the constraining property using the xlink:href attribute to indicate the URL where a description is located.
Recommendation	http://def.wmo.int/opm/2013/req/xsd-constraint/description A textual description of the constraint applied to the observable property should be provided using the opm:description XML element.

203.8 Requirements class: Category constraint

203.8.1 This requirements class is used to describe the representation of category-based constraints applied to an observable property.

Note: For example, where one is interested only in the cloud-base height of convective clouds, the base property is "cloud-base height", the constraining property is "cloud type" and the values of the category constraint element list the particular cloud types of interest (for example, cumulonimbus and towering cumulus.).

203.8.2 XML elements describing a category-based constraint of observable properties shall conform to all requirements specified in Table 24.

203.8.3 XML elements describing a category-based constraint of observable properties shall conform to all requirements of all relevant dependencies specified in Table 24.

Table 24. Requirements class xsd-category-constraint

Requirements class	
http://def.wmo.int/opm/2013/req/xsd-category-constraint	
Target type	Data instance
Name	Category constraint
Dependency	http://def.wmo.int/opm/2013/req/xsd-constraint, 203.7
Requirement	http://def.wmo.int/opm/2013/req/xsd-category-constraint/valid The content model of this element shall have a value that matches the content model of opm:CategoryConstraint.
Requirement	http://def.wmo.int/opm/2013/req/xsd-category-constraint/category-member One or more instances of the XML element //opm:CategoryConstraint/opm:value shall be used to specify the category members relevant to this constraint.
Requirement	http://def.wmo.int/opm/2013/req/xsd-category-constraint/category-member-appropriate-to-constraining-property Each of the category members defined using XML element //opm: CategoryConstraint/opm:value shall be appropriate to the constraining property.
Recommendation	http://def.wmo.int/opm/2013/req/xsd-category-constraint/category-value-code-space The XML attribute //opm:CategoryConstraint/opm:value/@gml:codeSpace should be provided when specifying each category member.

Requirements class	
Recommendation	http://def.wmo.int/opm/2013/req/xsd-category-constraint/category-value-online-definition Appending the content of the XML element //opm:CategoryConstraint/opm:value to the content of XML attribute //opm:CategoryConstraint/opm:value/@gml:codeSpace should create a URI that resolves to an online definition that is recognized by some authority.

203.9 Requirements class: Scalar constraint

203.9.1 This requirements class is used to describe the representation of scalar constraints applied to an observable property.

Note: For example, the base property "air temperature" may be constrained such that one is concerned only with air temperature at 1.2 metres above the local ground level (for example, a screen temperature); height above local ground level is the constraining property.

203.9.2 XML elements describing the scalar constraint of observable properties shall conform to all requirements specified in Table 25.

203.9.3 XML elements describing the scalar constraint of observable properties shall conform to all requirements of all relevant dependencies specified in Table 25.

Table 25. Requirements class xsd-scalar-constraint

Requirements class	
http://def.wmo.int/opm/2013/req/xsd-scalar-constraint	
Target type	Data instance
Name	Scalar constraint
Dependency	http://def.wmo.int/opm/2013/req/xsd-constraint, 203.7
Requirement	http://def.wmo.int/opm/2013/req/xsd-scalar-constraint/valid The content model of this element shall have a value that matches the content model of opm:ScalarConstraint.
Requirement	http://def.wmo.int/opm/2013/req/xsd-scalar-constraint/comparison-operator The XML attribute //opm:ScalarConstraint/@comparisonOperator shall specify the mathematical operator relating the scalar constraint to the supplied numeric value.
Requirement	http://def.wmo.int/opm/2013/req/xsd-scalar-constraint/comparison-operator-enumeration The value of XML attribute //opm:ScalarConstraint/@comparisonOperator shall be one of the enumeration: "ne" (not equal to), "lt" (less than), "le" (less than or equal to), "eq" (equal to), "ge" (greater than or equal to) or "gt" (greater than).
Requirement	http://def.wmo.int/opm/2013/req/xsd-scalar-constraint/unit-of-measure Unless the constraining property is dimensionless, a unit of measurement shall be indicated that is appropriate for the constraining property via XML attribute //opm:ScalarConstraint/opm:unitOfMeasure/@uom.

Note: Units of measurement are specified in accordance with 1.9 above.

203.10 Requirements class: Range constraint

203.10.1 This requirements class is used to describe the representation of constraints applied to an observable property according to a range of values.

Note: For example, the base property "radiance" may be constrained such that one is only concerned with radiance between wavelengths of 50 nm and 100 nm – "wavelength" is the constraining property and is limited to the range 50 nm to 100 nm.

203.10.2 XML elements describing the range constraint of observable properties shall conform to all requirements specified in Table 26.

203.10.3 XML elements describing the range constraint of observable properties shall conform to all requirements of all relevant dependencies specified in Table 26.

Table 26. Requirements class xsd-range-constraint

Requirements class	
http://def.wmo.int/opm/2013/req/xsd-range-constraint	
Target type	Data instance
Name	Range constraint
Dependency	http://def.wmo.int/opm/2013/req/xsd-constraint, 203.7
Requirement	http://def.wmo.int/opm/2013/req/xsd-range-constraint/valid The content model of this element shall have a value that matches the content model of opm:RangeConstraint.
Requirement	http://def.wmo.int/opm/2013/req/xsd-range-constraint/unit-of-measure Unless the constraining property is dimensionless, a unit of measurement shall be indicated that is appropriate for the constraining property via XML attribute //opm:RangeConstraint/opm:unitOfMeasure/@uom.
Requirement	http://def.wmo.int/opm/2013/req/xsd-range-constraint/value The XML element //opm:RangeConstraint/opm:value shall contain a valid child element opm:RangeBounds wherein the start and end values of the constraining property range are defined.
Requirement	http://def.wmo.int/opm/2013/req/xsd-range-constraint/valid-range The numeric value of XML element //opm:RangeConstraint/opm:value/opm:RangeBounds/rangeStart shall be less than the numeric value of XML element //opm:RangeConstraint/opm:value/opm:RangeBounds/rangeEnd.
Requirement	http://def.wmo.int/opm/2013/req/xsd-range-constraint/start-comparison The XML attribute //opm:RangeConstraint/opm:value/opm:RangeBounds/@startComparison shall specify the mathematical operator relating the range constraint to the supplied numeric value at the lower limit of the range.
Requirement	http://def.wmo.int/opm/2013/req/xsd-range-constraint/end-comparison The XML attribute //opm:RangeConstraint/opm:value/opm:RangeBounds/@endComparison shall specify the mathematical operator relating the range constraint to the supplied numeric value at the upper limit of the range.
Requirement	http://def.wmo.int/opm/2013/req/xsd-range-constraint/comparison-operator-enumeration The value of XML attributes //opm:RangeConstraint/opm:value/opm:RangeBounds/@startComparison and //opm:RangeConstraint/opm:value/opm:RangeBounds/@endComparison shall be one of the enumeration: “ne” (not equal to), “lt” (less than), “le” (less than or equal to), “eq” (equal to), “ge” (greater than or equal to) or “gt” (greater than).

Note: Units of measurement are specified in accordance with 1.9 above.

FM 204: SAF

FM 204-15 EXT SAF-XML SIMPLE AERONAUTICAL FEATURES

204.1 Scope

SAF-XML shall be used to represent features relating to the provision of meteorological services for aviation, such as aerodromes, runways, air traffic management units and flight information regions.

Note: The entities provided in SAF-XML are intended to describe only the level of detail required for reporting meteorological information for international civil aviation purposes. Representations providing more detailed information may be used if required.

The requirements classes defined in SAF-XML are listed in Table 27.

Table 27. Requirements classes defined in SAF-XML

Requirements classes	
Requirements class	http://icao.int/saf/1.1/req/xsd-unique-identification, 204.3
Requirements class	http://icao.int/saf/1.1/req/xsd-aerodrome, 204.4
Requirements class	http://icao.int/saf/1.1/req/xsd-runway, 204.5
Requirements class	http://icao.int/saf/1.1/req/xsd-runway-direction, 204.6
Requirements class	http://icao.int/saf/1.1/req/xsd-aeronautical-service-provision-units, 204.7
Requirements class	http://icao.int/saf/1.1/req/xsd-airspace-volume, 204.8
Requirements class	http://icao.int/saf/1.1/req/xsd-airspace, 204.9

204.2 XML schema for SAF-XML

Representations of information in SAF-XML shall declare XML namespaces listed in and Table 29.

Notes:
1. Additional namespace declarations may be required depending on the XML elements used within SAF-XML.
2. The XML schema is packaged into four XML schema documents (XSD) describing one XML namespace: http://icao.int/saf/1.1.
3. Schematron schemas providing additional constraints are embedded within the XSD defining SAF-XML.

Table 28. XML namespaces defined for SAF-XML

XML namespace	*Default namespace prefix*	*Canonical location of all-components schema document*
http://icao.int/saf/1.1	saf	http://schemas.wmo.int/saf/1.1/saf.xsd

Table 29. External XML namespaces used in SAF-XML

Standard	*XML namespace*	*Default namespace prefix*	*Canonical location of all-components schema document*
XML schema	http://www.w3.org/2001/XMLSchema	xs	

Standard	*XML namespace*	*Default namespace prefix*	*Canonical location of all-components schema document*
Schematron	http://purl.oclc.org/dsdl/schematron	sch	
XSLT v2	http://www.w3.org/1999/XSL/Transform	xsl	
XML Linking Language	http://www.w3.org/1999/xlink	xlink	http://www.w3.org/1999/xlink.xsd
ISO 19136:2006 GML	http://www.opengis.net/gml/3.2	gml	http://schemas.opengis.net/gml/3.2.1/gml.xsd

204.3 Requirements class: Unique identification

204.3.1 This requirements class is used to describe how the information representations of aeronautical features are identified.

Notes:

1. Examples of aeronautical features include aerodromes, air traffic management units and flight information regions.
2. To achieve consistency with the Aeronautical Information Exchange Model (AIXM 5), the method of identification defined therein is adopted here. More details may be found in the document "AIXM5 Feature Identification and Reference".
3. The identifier does not identify the real-world aeronautical feature itself; rather, it identifies the information representation about a given aeronautical feature. The originator of information about a given aeronautical feature uniquely identifies the information record it maintains within its data management systems about a given real-world aeronautical feature. The same identifier is then re-used in downstream information systems when referring to that information record. This ensures that all parties can be confident that they are working with the same information about a given aeronautical feature. Thus, if multiple systems use the same identifier for an aeronautical feature, this indicates (i) the data are from the same source, or (ii) there are processes in place to ensure the consistency of data between those systems.

204.3.2 XML elements describing aeronautical features shall conform to all requirements specified in Table 30.

Table 30. Requirements class xsd-unique-identification

Requirements class	
http://icao.int/saf/1.1/req/xsd-unique-identification	
Target type	Data instance
Name	Unique identification
Requirement	http://icao.int/saf/1.1/req/xsd-unique-identification/uniqueness An identifier scheme shall be used for assigning identity to information records that describe real-world aeronautical features, which ensures that there is a reasonable confidence that a given identifier will never be unintentionally used by anyone for anything else. Different versions of the information record describing a given aeronautical feature shall be assigned different identifiers.
Requirement	http://icao.int/saf/1.1/req/xsd-unique-identification/gml-identifier The identifier for the information record describing a real-world aeronautical feature shall be specified using the XML element //gml:identifier.
Recommendation	http://icao.int/saf/1.1/req/xsd-unique-identification/uuid The identifier scheme that should be used for assigning identity to information records that describe real-world aeronautical features is universally unique identifier (UUID) version 4 based on random number generation. The corresponding value of XML attribute //gml:identifier/@codeSpace associated with the use of UUID is "urn:uuid:".

Note: UUID generators are widely available; for example, refer to the UUID generator of the International Telecommunication Union, which can be accessed at http://www.itu.int/ITU-T/asn1/cgi-bin/uuid_generate. No guarantee is made regarding the availability of this UUID generation service.

204.4 Requirements class: Aerodrome

204.4.1 This requirements class is used to describe the representation of an aerodrome. The class is targeted at providing a basic description of the aerodrome required for reporting meteorological information for international civil aviation purposes.

Notes:

1. Representations providing more detailed information may be used if required.
2. An aerodrome is a defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft or helicopters.

204.4.2 XML elements describing aerodromes shall conform to all requirements specified in Table 31.

204.4.3 XML elements describing aerodromes shall conform to all requirements of all relevant dependencies specified in Table 31.

Table 31. Requirements class xsd-aerodrome

Requirements class	
http://icao.int/saf/1.1/req/xsd-aerodrome	
Target type	Data instance
Name	Aerodrome
Dependency	http://icao.int/saf/1.1/req/xsd-unique-identification, 204.3
Requirement	http://icao.int/saf/1.1/req/xsd-aerodrome/valid The content model of this element shall have a value that matches the content model of saf:Aerodrome.
Requirement	http://icao.int/saf/1.1/req/xsd-aerodrome/icao-location-indicator If the aerodrome has a four-letter ICAO location indicator, this shall be specified using the XML element //saf:Aerodrome/saf:locationIndicatorICAO.
Requirement	http://icao.int/saf/1.1/req/xsd-aerodrome/iata-deisgnator If the aerodrome has a three-letter International Air Transport Association (IATA) designator, this shall be specified using the XML element //saf:Aerodrome/saf:designatorIATA.
Recommendation	http://icao.int/saf/1.1/req/xsd-aerodrome/designator The XML element //saf:Aerodrome/saf:designator should be used to specify the designator code for the aerodrome. If the aerodrome has a four-letter ICAO location indicator, this should be used as the designator code. If the aerodrome does not have a four-letter ICAO location indicator but does have a three-letter IATA code, this should be used as the designator code. Alternatively, an artificially generated code should be used.
Recommendation	http://icao.int/saf/1.1/req/xsd-aerodrome/name The XML element //saf:Aerodrome/saf:name should be used to specify the primary official name of the aerodrome as designated by the appropriate authority. The name should be provided in block capitals.
Recommendation	http://icao.int/saf/1.1/req/xsd-aerodrome/field-elevation The XML element //saf:Aerodrome/saf:fieldElevation should be used to specify the vertical distance above mean sea level of the highest point of the landing area.
Recommendation	http://icao.int/saf/1.1/req/xsd-aerodrome/field-elevation-unit-of-measure If specified, the vertical distance above mean sea level of the highest point of the landing area (field elevation) should be expressed in metres using the XML attribute //saf:Aerodrome/saf:fieldElevation/@uom with value “m”.

Requirements class	
Recommendation	http://icao.int/saf/1.1/req/xsd-aerodrome/aerodrome-reference-point The XML element //saf:Aerodrome/saf:ARP should be used to specify location of the aerodrome reference point. Coordinate reference system EPSG 4326 should be used to report the location in latitude and longitude. Coordinate reference system EPSG 4979 should be used to report the location in latitude, longitude and altitude.

Notes:
1. ICAO designators are listed in *Location Indicators* (ICAO Doc 7910).
2. Units of measurement are specified in accordance with 1.9 above.

204.5 Requirements class: Runway

204.5.1 This requirements class is used to describe the representation of a runway. The class is targeted at providing a basic description of the runway required for reporting meteorological information for international civil aviation purposes.

Notes:
1. Representations providing more detailed information may be used if required.
2. A runway is a defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft. This includes the concept of final approach and take-off area (FATO) for helicopters.

204.5.2 XML elements describing a runway shall conform to all requirements specified in Table 32.

204.5.3 XML elements describing a runway shall conform to all requirements of all relevant dependencies specified in Table 32.

Table 32. Requirements class xsd-runway

Requirements class	
http://icao.int/saf/1.1/req/xsd-runway	
Target type	Data instance
Name	Runway
Dependency	http://icao.int/saf/1.1/req/xsd-unique-identification, 204.3
Dependency	http://icao.int/saf/1.1/req/xsd-aerodrome, 204.4
Requirement	http://icao.int/saf/1.1/req/xsd-runway/valid The content model of this element shall have a value that matches the content model of saf:Runway.
Recommendation	http://icao.int/saf/1.1/req/xsd-runway/associated-aerodrome The XML element //saf:Runway/saf:associatedAirportHeliport should be used to indicate the aerodrome at which the runway is situated, using a value that matches the content model of saf:Aerodrome.
Recommendation	http://icao.int/saf/1.1/req/xsd-runway/designator Where an aerodrome has more than one runway, the XML element //saf:Runway/saf:designator should be used to specify the unique identifier for the runway within the aerodrome.

204.6 Requirements class: Runway direction

204.6.1 This requirements class is used to describe the representation of one of the two landing and take-off directions of a runway.

Note: Representations providing more detailed information may be used if required.

204.6.2 XML elements describing runway direction shall conform to all requirements specified in Table 33.

204.6.3 XML elements describing runway direction shall conform to all requirements of all relevant dependencies specified in Table 33.

Table 33. Requirements class xsd-runway-direction

Requirements class	
http://icao.int/saf/1.1/req/xsd-runway-direction	
Target type	Data instance
Name	Runway direction
Dependency	http://icao.int/saf/1.1/req/xsd-unique-identification, 204.3
Dependency	http://icao.int/saf/1.1/req/xsd-runway, 204.5
Requirement	http://icao.int/saf/1.1/req/xsd-runway-direction/valid The content model of this element shall have a value that matches the content model of saf:RunwayDirection.
Recommendation	http://icao.int/saf/1.1/req/xsd-runway-direction/used-runway The XML element //saf:RunwayDirection/saf:usedRunway should be used to indicate the associated runway using a value that matches the content model of saf:Runway.
Recommendation	http://icao.int/saf/1.1/req/xsd-runway-direction/designator The textual designator for the landing and take-off direction of the associated runway should be specified using the XML element //saf:RunwayDirection/saf:designator.
Recommendation	http://icao.int/saf/1.1/req/xsd-runway-direction/true-bearing The measured angle between true north and the landing and take-off direction should be specified using the XML element //saf:RunwayDirection/saf:trueBearing.
Recommendation	http://icao.int/saf/1.1/req/xsd-runway-direction/true-bearing-unit-of-measure The measured angle between true north and the landing and take-off direction should be expressed in degrees using the XML attribute //saf:RunwayDirection/saf:trueBearing/@uom with value “deg”.
Recommendation	http://icao.int/saf/1.1/req/xsd-runway-direction/elevation The vertical distance above mean sea level of the highest point of the runway touchdown zone should be specified using the XML element //saf:RunwayDirection/saf:elevationTDZ.
Recommendation	http://icao.int/saf/1.1/req/xsd-runway-direction/elevation-unit-of-measure If specified, the vertical distance above mean sea level of the highest point of the runway touchdown zone should be expressed in metres using the XML attribute //saf:RunwayDirection/saf:elevationTDZ/@uom with value “m”.

Notes:

1. Examples of runway direction designators include “27”, “35L” and “01R”.
2. The true north is the north point at which the meridian lines meet.
3. Units of measurement are specified in accordance with 1.9 above.

204.7 Requirements class: Aeronautical service provision units

204.7.1 This requirements class is used to describe the representation of aeronautical service provision units.

Notes:

1. Aeronautical service provision units include air traffic services reporting office (ARO), air traffic control centre (ATCC), air traffic services unit (ATSU), flight information centre (FIC) and meteorological watch office (MWO).
2. Representations providing more detailed information may be used if required.

204.7.2 XML elements describing aeronautical service provision units shall conform to all requirements specified in Table 34.

204.7.3 XML elements describing aeronautical service provision units shall conform to all requirements of all relevant dependencies specified in Table 34.

Table 34. Requirements class xsd-aeronautical-service-provision-units

Requirements class	
http://icao.int/saf/1.1/req/xsd-aeronautical-service-provision-units	
Target type	Data instance
Name	Aeronautical service provision units
Dependency	http://icao.int/saf/1.1/req/xsd-unique-identification, 204.3
Requirement	http://icao.int/saf/1.1/req/xsd-aeronautical-service-provision-units/valid The content model of this element shall have a value that matches the content model of saf:Unit.
Requirement	http://icao.int/saf/1.1/req/xsd-aeronautical-service-provision-units/unit-type-enumeration If specified, the value of XML element //saf:Unit/saf:type shall be one of the enumeration: “ARO” (Air traffic services Reporting Office), “ATCC” (Air Traffic Control Centre), “ATSU” (Air Traffic Services Unit), “FIC” (Flight Information Centre) or “MWO” (Meteorological Watch Office).
Recommendation	http://icao.int/saf/1.1/req/xsd-aeronautical-service-provision-units/name The XML element //saf:Unit/saf:name should be used to specify the primary official name of the aeronautical service provision unit as designated by the appropriate authority. The name should be provided in block capitals.
Recommendation	http://icao.int/saf/1.1/req/xsd-aeronautical-service-provision-units/type The type of aeronautical service provision unit should be indicated using the XML element //saf:Unit/saf:type.
Recommendation	http://icao.int/saf/1.1/req/xsd-aeronautical-service-provision-units/designator The coded designator used to identify the aeronautical service provision unit should be indicated using the XML element //saf:Unit/saf:designator.

Notes:

1. Coded designators for aeronautical service provision units are specified in *Location Indicators* (ICAO Doc 7910).
2. The location of the aeronautical service provision unit, expressed as a reference point, may be specified using XML element //saf:Unit/saf:position.

204.8 Requirements class: Airspace volume

204.8.1 This requirements class is used to describe the geometric representation of a three-dimensional airspace volume.

Notes:

1. Representations providing more detailed information may be used if required.
2. The three-dimensional region of space is specified as a two-dimensional horizontal region with bounded vertical extent.

204.8.2 XML elements describing an airspace volume shall conform to all requirements specified in Table 35.

Table 35. Requirements class xsd-airspace-volume

Requirements class	
http://icao.int/saf/1.1/req/xsd-airspace-volume	
Target type	Data instance
Name	Airspace volume
Requirement	http://icao.int/saf/1.1/req/xsd-airspace-volume/valid The content model of this element shall have a value that matches the content model of saf:AirspaceVolume.
Requirement	http://icao.int/saf/1.1/req/xsd-airspace-volume/upper-limit If the upper limit of the vertical extent of the airspace is specified (using XML element //saf:AirspaceVolume/saf:upperLimit), then the XML element //saf:AirspaceVolume/saf:upperLimitReference shall be used to specify the associated vertical reference system.
Requirement	http://icao.int/saf/1.1/req/xsd-airspace-volume/lower-limit If the lower limit of the vertical extent of the airspace is specified (using XML element //saf:AirspaceVolume/saf:lowerLimit), then the XML element //saf:AirspaceVolume/saf:lowerLimitReference shall be used to specify the associated vertical reference system.
Requirement	http://icao.int/saf/1.1/req/xsd-airspace-volume/limit-type The values of XML elements //saf:AirspaceVolume/saf:upperLimitReference and //saf:AirspaceVolume/saf:lowerLimitReference specifying a vertical reference system shall be one of the enumeration: “SFC” (distance measured from the surface of the earth), “MSL” (distance measured from mean sea level), “W84” (distance measured from the WGS84 ellipsoid) or “STD” (distance measured with an altimeter set to the standard atmosphere).
Recommendation	http://icao.int/saf/1.1/req/xsd-airspace-volume/horizontal-projection The XML element //saf:Airspace/saf:horizontalProjection should be used to describe the geometry of the horizontal extent of the airspace volume.

Notes:

1. Omission of the upper limit of the vertical extent (the airspace ceiling) indicates that the airspace extends upward to, or beyond, the limit of aeronautical operations, whilst omission of the lower limit of the vertical extent (the airspace floor) indicates that the airspace extends to the land/sea surface.
2. Distance measured from mean sea level is equivalent to “altitude”.

204.9 Requirements class: Airspace

204.9.1 This requirements class is used to describe the representation of airspaces.

Notes:

1. An airspace is a defined three-dimensional region of space relevant to air traffic. Airspace types include flight information region (FIR), upper flight information region (UIR) and controlled airspace (CTA).
2. Representations providing more detailed information may be used if required.

204.9.2 XML elements describing airspaces shall conform to all requirements specified in Table 36.

204.9.3 XML elements describing airspaces shall conform to all requirements of all relevant dependencies specified in Table 36.

Table 36. Requirements class xsd-airspace

Requirements class	
http://icao.int/saf/1.1/req/xsd-airspace	
Target type	Data instance
Name	Airspace
Dependency	http://icao.int/saf/1.1/req/xsd-unique-identification, 204.3
Dependency	http:// icao.int/saf/1.1/req/xsd-airspace-volume, 204.8 , 204.8
Requirement	http://icao.int/saf/1.1/req/xsd-airspace/valid The content model of this element shall have a value that matches the content model of saf:Airspace.
Requirement	http://icao.int/saf/1.1/req/xsd-airspace/icao-designator-indication If the coded designator used to identify the airspace is an ICAO recognized designator, then the XML element //saf:Airspace/saf:designatorICAO shall have the value “true”.
Requirement	http://icao.int/saf/1.1/req/xsd-airspace/airspace-type-enumeration If specified, the value of XML element //saf:Airspace/saf:type shall be one of the enumeration: “FIR” (Flight Information Region), “UIR” (Upper Flight Information Region), “FIR_UIR” (Flight Information Region or Upper Flight Information Region) or “CTA” (Controlled Airspace).
Recommendation	http://icao.int/saf/1.1/req/xsd-airspace/type The type of airspace should be indicated using the XML element //saf:Airspace/saf:type.
Recommendation	http://icao.int/saf/1.1/req/xsd-airspace/designator The coded designator used to identify the airspace should be indicated using the XML element //saf:Airspace/saf:designator.
Recommendation	http://icao.int/saf/1.1/req/xsd-airspace/name The XML element //saf:Airspace/saf:name should be used to specify the official name of the airspace as designated by the appropriate authority. The name should be provided in block capitals.
Recommendation	http://icao.int/saf/1.1/req/xsd-airspace/geometry-component The XML element //saf:Airspace/saf:geometryComponent should be used to describe the geometric volume of the airspace using a value that matches the content model of saf:AirspaceVolume.

Notes:

1. ICAO designators are listed in *Location Indicators* (ICAO Doc 7910).
2. An airspace may comprise multiple geometry elements.

FM 205: IWXXM

FM 205-15 EXT IWXXM-XML ICAO METEOROLOGICAL INFORMATION EXCHANGE MODEL

205.1 **Scope**

205.1.1 IWXXM-XML shall be used to represent observations and forecasts, and reports thereof, for international civil aviation, as specified by the *Technical Regulations* (WMO-No. 49), Volume II – Meteorological Service for International Air Navigation.

205.1.2 IWXXM-XML includes provision for aerodrome routine meteorological reports (METAR), aerodrome special meteorological reports (SPECI), aerodrome forecast (TAF) reports and SIGMET information.

Note: SIGMET information is information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena that may affect the safety of aircraft operations.

205.1.3 The requirements classes defined in IWXXM-XML are listed in Table 37.

Table 37. Requirements classes defined in IWXXM-XML

Requirements classes	
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-cloud-layer, 205.4
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-cloud-forecast, 205.5
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state, 205.6
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-wind-shear, 205.7
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-observed-clouds, 205.8
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-visual-range, 205.9
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-sea-state, 205.10
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-horizontal-visibility, 205.11
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind, 205.12
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record, 205.13
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation, 205.14
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-trend-forecast, 205.15
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record, 205.16
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast, 205.17
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report, 205.18
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-metar, 205.19
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-speci, 205.20
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-forecast, 205.21
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-air-temperature-forecast, 205.22
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record, 205.23
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast, 205.24

Requirements classes	
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-taf, 205.25
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-evolving-meteorological-condition, 205.26
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-sigmet-evolving-condition-analysis, 205.27
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-meteorological-position, 205.28
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-meteorological-position-collection, 205.29
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-sigmet-position-analysis, 205.30
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-sigmet, 205.31
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-volcanic-ash-sigmet, 205.32
Requirements class	http://icao.int/iwxxm/1.1/req/xsd-tropical-cyclone-sigmet, 205.33

205.2 XML schema for IWXXM-XML

Representations of information in IWXXM-XML shall declare the XML namespaces listed in Table 38 and Table 39.

Notes:

1. Additional namespace declarations may be required depending on the XML elements used within IWXXM-XML.
2. The XML schema is packaged in five XML schema documents (XSD) describing one XML namespace: http://icao.int/f/1.1.
3. Schematron schemas providing additional constraints are embedded within the XSD defining IWXXM-XML.

Table 38. XML namespaces defined for IWXXM-XML

XML namespace	*Default namespace prefix*	*Canonical location of all-components schema document*
http://icao.int/iwxxm/1.1	iwxxm	http://schemas.wmo.int/iwxxm/1.1/iwxxm.xsd

Table 39. External XML namespaces used in IWXXM-XML

Standard	*XML namespace*	*Default namespace prefix*	*Canonical location of all-components schema document*
XML schema	http://www.w3.org/2001/XMLSchema	xs	
Schematron	http://purl.oclc.org/dsdl/schematron	sch	
XSLT v2	http://www.w3.org/1999/XSL/Transform	xsl	
XML Linking Language	http://www.w3.org/1999/xlink	xlink	http://www.w3.org/1999/xlink.xsd
ISO 19136:2006 GML	http://www.opengis.net/gml/3.2	gml	http://schemas.opengis.net/gml/3.2.1/gml.xsd
ISO/TS 19139:2007 metadata XML implementation	http://www.isotc211.org/2005/gmd	gmd	http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/gmd/gmd.xsd
OGC OMXML	http://www.opengis.net/om/2.0	om	http://schemas.opengis.net/om/2.0/observation.xsd
OGC OMXML	http://www.opengis.net/sampling/2.0	sam	http://schemas.opengis.net/sampling/2.0/samplingFeature.xsd
OGC OMXML	http://www.opengis.net/samplingSpatial/2.0	sams	http://schemas.opengis.net/samplingSpatial/2.0/spatialSamplingFeature.xsd

Standard	*XML namespace*	*Default namespace prefix*	*Canonical location of all-components schema document*
FM 202-15 Ext METCE-XML	http://def.wmo.int/metce/2013	metce	http://schemas.wmo.int/metce/1.1/metce.xsd
FM 203-15 Ext. OPM-XML	http://def.wmo.int/opm/2013	opm	http://schemas.wmo.int/opm/1.1/opm.xsd
FM 204-15 Ext SAF-XML	http://icao.int/saf/1.1	saf	http://schemas.wmo.int/saf/1.1/saf.xsd

205.3 Virtual typing

In accordance with OMXML (clause 7.2), the specialization of OM_Observation is provided through Schematron restriction. The om:type element shall be used to specify the type of OM_Observation that is being encoded using the URI for the corresponding observation type listed in Code table D-4.

Notes:
1. Code table D-4 is described in Appendix A.
2. Code table D-4 is published online at http://codes.wmo.int/49-2/observation-type/IWXXM/1.0.
3. The URI for each observation type is composed by appending the *notation* to the *code-space*. As an example, the URI of MeteorologicalAerodromeForecast is http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/MeteorologicalAerodromeForecast.
4. Each URI will resolve to provide further information about the associated observation type.

205.4 Requirements class: Cloud layer

205.4.1 This requirements class is used to describe the representation of a cloud layer. The class is targeted at providing a basic description of the cloud layer as required for international civil aviation purposes.

Notes:
1. Representations providing more detailed information may be used if required.
2. The requirements for reporting cloud information are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 4.5 and Appendix 5, 2.2.5 and 1.2.4.

205.4.2 XML elements describing cloud layers shall conform to all requirements specified in Table 40.

Table 40. Requirements class: xsd-cloud-layer

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-cloud-layer	
Target type	Data instance
Name	Cloud layer
Requirement	http://icao.int/iwxxm/1.1/req/xsd-cloud-layer/valid The content model of this element shall have a value that matches the content model of iwxxm:CloudLayer.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-cloud-layer/cloud-amount The XML element //iwxxm:CloudLayer/iwxxm:amount shall be used to report an amount of cloud of operational significance.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-cloud-layer/cloud-amount-code If cloud amount is reported, the value of XML attribute //iwxxm:CloudLayer/iwxxm:amount/@xlink:href shall be the URI of the valid term from Code table D-8: Cloud amount reported at aerodrome.

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-cloud-layer/cloud-base The XML element //iwxxm:CloudLayer/iwxxm:base shall indicate the height of the lowest level in the atmosphere that contains a perceptible quantity of cloud particles or the reason for not reporting the cloud base shall be expressed using the XML attribute //iwxxm:CloudLayer/iwxxm:base/@nilReason to indicate the appropriate nil-reason code. If a nil-reason code is provided, the XML attributes //iwxxm:CloudLayer/iwxxm:base/@xsi:nil and //iwxxm:CloudLayer/iwxxm:base/@uom shall have the values "true" and "N/A", respectively.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-cloud-layer/cloud-base-unit-of-measure If the cloud base is reported, then the vertical distance shall be expressed in metres or feet. The unit of measure shall be indicated using the XML attribute //iwxxm:CloudLayer/iwxxm:base/@uom with value "m" (metres) or "[ft_i]" (feet).
Requirement	http://icao.int/iwxxm/1.1/req/xsd-cloud-layer/cloud-type-code If cloud type is reported, the value of XML attribute //iwxxm:CloudLayer/iwxxm:cloudType/@xlink:href shall be the URI of the valid cloud type from Code table D-9: Significant convective cloud type.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-cloud-layer/cloud-type If reporting observed cloud, then the XML element //iwxxm:CloudLayer/iwxxm:cloudType should be used to report the most cloud of operational significance type in the layer of cloud.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-cloud-layer/nil-significant-cloud If no cloud of operational significance is reported, then the value of XML attribute //iwxxm:CloudLayer/iwxxm:amount/@nilReason should be set to http://codes.wmo.int/common/nil/nothingOfOperationalSignificance. If reporting observed cloud, then the value of XML attribute //iwxxm:CloudLayer/iwxxm:cloudType/@nilReason should also be set to http://codes.wmo.int/common/nil/nothingOfOperationalSignificance.

Notes:

1. Cloud of operational significance includes cloud below 1 500 metres or the highest minimum sector altitude, whichever is greater, and cumulonimbus whenever present.
2. Code table D-1 provides a set of nil reason codes and is published at http://codes.wmo.int/common/nil.
3. Units of measurement are specified in accordance with 1.9 above.
4. Code table D-8 is published online at http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome.
5. Code table D-9 is published online at http://codes.wmo.int/49-2/SigConvectiveCloudType.

205.5 Requirements class: Aerodrome cloud forecast

205.5.1 This requirements class is used to describe forecast cloud conditions at an aerodrome. The class is targeted at providing a basic description of the forecast cloud conditions as required for civil aviation purposes.

Notes:

1. Representations providing more detailed information may be used if required.
2. The requirements for reporting forecast cloud conditions are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, 2.2.5 and 1.2.4.

205.5.2 XML elements describing forecast cloud conditions shall conform to all requirements specified in Table 41.

205.5.3 XML elements describing forecast cloud conditions shall conform to all requirements of all relevant dependencies specified in Table 41.

Table 41. Requirements class xsd-aerodrome-cloud-forecast

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-aerodrome-cloud-forecast	
Target type	Data instance
Name	Aerodrome cloud forecast
Dependency	http://icao.int/iwxxm/1.1/req/xsd-cloud-layer, 205.4
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-cloud-forecast/valid The content model of this element shall have a value that matches the content model of iwxxm:AerodromeCloudForecast.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-cloud-forecast/vertical-visibility When cloud of operational significance is forecast, then the XML element //iwxxm:AerodromeCloudForecast/iwxxm:verticalVisibility shall be used to report the vertical visual range.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-cloud-forecast/vertical-visibility-unit-of-measure If the vertical visibility is reported, then the vertical distance shall be expressed in metres or feet. The unit of measure shall be indicated using the XML attribute //iwxxm:AerodromeCloudForecast/iwxxm:verticalVisibility/@uom with value "m" (metres) or "[ft_i]" (feet).
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-cloud-forecast/cloud-layers When cloud of operational significance is forecast, then the XML element //iwxxm:AerodromeCloudForecast/iwxxm:layer, containing a valid child element //iwxxm:AerodromeCloudForecast/iwxxm:layer/iwxxm:CloudLayer, shall be used to describe the each cloud layer.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-cloud-forecast/number-of-cloud-layers No more than four cloud layers shall be reported. If more than four significant cloud layers are forecast, then the four most significant cloud layers with respect to aviation operations shall be prioritized.

Notes:

1. Cloud of operational significance includes cloud below 1 500 metres or the highest minimum sector altitude, whichever is greater, and cumulonimbus whenever present.
2. Vertical visibility is defined as the vertical visual range into an obscuring medium.
3. Units of measurement are specified in accordance with 1.9 above.

205.6 Requirements class: Aerodrome runway state

205.6.1 This requirements class is used to describe the observed runway state.

Notes:

1. Representations providing more detailed information may be used if required.
2. The requirements for reporting runway state are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 4.8.1.5.

205.6.2 XML elements describing observed runway state shall conform to all requirements specified in Table 42.

205.6.3 XML elements describing observed runway state shall conform to all requirements of all relevant dependencies specified in Table 42.

Table 42. Requirements class xsd-aerodrome-runway-state

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state	
Target type	Data instance
Name	Aerodrome runway state

Requirements class	
Dependency	http://icao.int/saf/1.1/req/xsd-runway-direction, 204.6
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/valid The content model of this element shall have a value that matches the content model of iwxxm:AerodromeRunwayState.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/applicable-runway If XML attribute //iwxxm:AerodromeRunwayState/@allRunways is absent or has value "false", then XML element //iwxxm:AerodromeRunwayState/iwxxm:runway, with valid child element //iwxxm:AerodromeRunwayState/iwxxm:runway/saf:RunwayDirection, shall be used to indicate the runway direction to which these conditions apply.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/all-runways If XML attribute //iwxxm:AerodromeRunwayState/@allRunways has value "true", then XML element //iwxxm:AerodromeRunwayState/iwxxm:runway shall be absent.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/snow-closure If the aerodrome is closed due to an extreme deposit of snow, XML attribute //iwxxm:AerodromeRunwayState/@snowClosure shall have the value "true".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/cleared If the runway has been cleared of meteorological deposits, then XML attribute //iwxxm:AerodromeRunwayState/@cleared shall have the value "true" and XML elements //iwxxm:AerodromeRunwayState/iwxxm:depositType, //iwxxm:AerodromeRunwayState/iwxxm:contamination, //iwxxm:AerodromeRunwayState/iwxxm:depthOfDeposit and //iwxxm:AerodromeRunwayState/iwxxm:estimatedSurfaceFriction shall be absent.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/surface-friction-estimate If reported, the estimated surface friction shall be stated using the XML element //iwxxm:AerodromeRunwayState/iwxxm:estimatedSurfaceFriction and shall have numeric value greater than 0.0 and less than or equal to 0.9.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/surface-friction-estimate-unit-of-measure If reported, the estimated surface friction shall be expressed as a unitless ratio with the value of XML attribute //iwxxm:AerodromeRunwayState/iwxxm:estimatedSurfaceFriction/@uom specified as "http://www.opengis.net/def/uom/OGC/1.0/unity".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/unreliable-surface-friction-estimate If the surface friction estimate for the runway is considered to be unreliable, then XML attribute //iwxxm:AerodromeRunwayState/@estimatedSurfaceFrictionUnreliable shall have the value "true".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/unreliable-surface-friction-estimate-true If XML attribute //iwxxm:AerodromeRunwayState/@estimatedSurfaceFrictionUnreliable has value "true", then XML element //iwxxm:AerodromeRunwayState/iwxxm:estimatedSurfaceFriction shall be absent.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/deposit-type-code If deposit type is reported, then the value of XML attribute //iwxxm:AerodromeRunwayState/iwxxm:depositType/@xlink:href shall be the URI of the valid term from Volume I.2, FM 94 BUFR, Code table 0 20 086: Runway deposits.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/contamination-code If runway contamination is reported, then the value of XML attribute //iwxxm:AerodromeRunwayState/iwxxm:contamination/@xlink:href shall be the URI of the valid term from Volume I.2, FM 94 BUFR, Code table 0 20 087: Runway contamination.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/snow-closure-affects-all-runways If XML attribute //iwxxm:AerodromeRunwayState/@snowClosure has value "true", then XML //iwxxm:AerodromeRunwayState/@allRunways should also have value "true"; snow closure affects all runways at an aerodrome.

Requirements class	
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state/deposit-depth-unit-of-measure If reported, the depth of deposit should be expressed in millimetres, with the value of XML attribute //iwxxm:AerodromeRunwayState/iwxxm:depthOfDeposit/@uom specified as "mm".

Notes:

1. For convenience, FM 94 BUFR, Code table 0 20 086 from Volume I.2, is published online at http://codes.wmo.int/bufr4/codeflag/0-20-086.
2. Runway contamination is expressed as a percentage of the total runway area that is contaminated according to a predefined set of categories: less than 10%, between 11% and 25%, between 25% and 50% and more than 50%. These categories are listed in Volume I.2, FM 94 BUFR, Code table 0 20 087: Runway contamination. For convenience, this code table is published online at http://codes.wmo.int/bufr4/codeflag/0-20-087.
3. Units of measurement are specified in accordance with 1.9 above.

205.7 Requirements class: Aerodrome wind shear

205.7.1 This requirements class is used to describe the aerodrome wind shear. The class is targeted at providing a basic description of the wind shear as required for civil aviation purposes – currently limited to indicating whether a wind shear threshold has been exceeded.

Notes:

1. The information on wind shear includes, but is not necessarily limited to, wind shear of a non-transitory nature such as might be associated with low-level temperature inversions or local topography.
2. Representations providing more detailed information may be used if required.
3. The requirements for reporting aerodrome wind shear are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 4.8.1.4.

205.7.2 XML elements describing aerodrome wind shear shall conform to all requirements specified in Table 43.

205.7.3 XML elements describing aerodrome wind shear shall conform to all requirements of all relevant dependencies specified in Table 43.

Table 43. Requirements class xsd-aerodrome-wind-shear

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-aerodrome-wind-shear	
Target type	Data instance
Name	Aerodrome wind shear
Dependency	http://icao.int/saf/1.1/req/xsd-runway-direction, 204.6
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-wind-shear/valid The content model of this element shall have a value that matches the content model of iwxxm:AerodromeWindShear.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-wind-shear/applicable-runways If XML attribute //iwxxm:AerodromeWindShear/@allRunways is absent or has value "false", then one or more XML elements //iwxxm:AerodromeWindShear/iwxxm:runway, each with valid child element //iwxxm:AerodromeWindShear/iwxxm:runway/saf:RunwayDirection, shall be used to indicate the set of runway directions to which wind shear conditions apply.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-wind-shear/all-runways If XML attribute //iwxxm:AerodromeWindShear/@allRunways has value "true", then XML element //iwxxm:AerodromeWindShear/iwxxm:runway shall be absent.

205.8 Requirements class: Aerodrome observed clouds

205.8.1 This requirements class is used to describe observed cloud conditions at an aerodrome. The class is targeted at providing a basic description of the observed cloud conditions as required for civil aviation purposes.

Notes:

1. Representations providing more detailed information may be used if required.
2. The requirements for reporting observed cloud conditions are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 4.5.

205.8.2 XML elements describing observed cloud conditions shall conform to all requirements specified in Table 44.

205.8.3 XML elements describing observed cloud conditions shall conform to all requirements of all relevant dependencies specified in Table 44.

Table 44. Requirements class xsd-aerodrome-observed-clouds

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-aerodrome-observed-clouds	
Target type	Data instance
Name	Aerodrome observed clouds
Dependency	http://icao.int/iwxxm/1.1/req/xsd-cloud-layer, 205.4
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-observed-clouds/valid The content model of this element shall have a value that matches the content model of iwxxm:AerodromeObservedClouds.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-observed-clouds/amount-and-height-not-detectable-by-auto-system When an automatic observing system observes cumulonimbus clouds or towering cumulus clouds but the amount and height cannot be observed, the XML attribute //iwxxm:AerodromeObservedClouds/@ amountAndHeightUnobservableByAutoSystem shall have the value set to “true” and XML element //iwxxm:AerodromeObservedClouds/iwxxm:layer shall be absent.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-observed-clouds/either-vertical-visibility-or-cloud-layers When vertical visibility is reported, cloud layers shall not be reported. When cloud layers are reported, vertical visibility shall not be reported.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-observed-clouds/vertical-visibility When cloud of operational significance is observed but the amount and height cannot be observed, then the XML element //iwxxm:AerodromeObservedClouds/iwxxm: verticalVisibility shall be used to report the vertical visibility.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-observed-clouds/vertical-visibility-unit-of-measure If the vertical visibility is reported then the vertical distance shall be expressed in metres or feet. The unit of measure shall be indicated using the XML attribute //iwxxm:AerodromeObservedClouds/iwxxm:verticalVisibility/@uom with value “m” (metres) or “[ft_i]” (feet).
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-observed-clouds/cloud-layers When the amount and height of cloud of operational significance are observed, then the XML element //iwxxm:AerodromeObservedClouds/iwxxm:layer, containing a valid child element //iwxxm:AerodromeObservedClouds/iwxxm:layer/iwxxm: CloudLayer, shall be used to describe the each cloud layer.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-observed-clouds/number-of-cloud-layers No more than four cloud layers shall be reported. If more than four significant cloud layers are observed, then the four most significant cloud layers with respect to aviation operations shall be prioritized.

Notes:
1. Cloud of operational significance includes cloud below 1 500 metres or the highest minimum sector altitude, whichever is greater, and cumulonimbus whenever present.
2. Vertical visibility is defined as the vertical visual range into an obscuring medium.
3. Units of measurement are specified in accordance with 1.9 above.

205.9 Requirements class: Aerodrome runway visual range

205.9.1 This requirements class is used to describe runway visual range for a specific runway direction at an aerodrome.

Note: The requirements for reporting runway visual range are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 4.3.

205.9.2 XML elements describing runway visual range shall conform to all requirements specified in Table 45.

205.9.3 XML elements describing runway visual range shall conform to all requirements of all relevant dependencies specified in Table 45.

Table 45. Requirements class xsd-aerodrome-runway-visual-range

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-visual-range	
Target type	Data instance
Name	Aerodrome runway visual range
Dependency	http://icao.int/saf/1.1/req/xsd-runway-direction, 204.6
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-visual-range/valid The content model of this element shall have a value that matches the content model of iwxxm:RunwayVisualRange.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-visual-range/applicable-runway The XML element //iwxxm:AerodromeRunwayVisualRange/iwxxm:runway, with valid child element //iwxxm:AerodromeRunwayState/iwxxm:runway/saf:RunwayDirection, shall be used to indicate the runway direction to which these visual range conditions apply.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-visual-range/mean-rvr The XML element //iwxxm:AerodromeRunwayVisualRange/iwxxm:meanRVR shall be used to express the 10-minute average for observed runway visual range or, if a marked discontinuity in visual range occurs during the 10-minute period, the average runway visual range following that marked discontinuity.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-visual-range/mean-rvr-unit-of-measure The mean runway visual range shall be reported in metres. The unit of measure shall be indicated using the XML attribute //iwxxm:AerodromeRunwayVisualRange/iwxxm:meanRVR/@uom with value “m”.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-visual-range/mean-rvr-exceeds-2000m If the mean runway visual range exceeds 2 000 metres, then the numeric value of XML element //iwxxm:AerodromeRunwayVisualRange/iwxxm:meanRVR shall be set to 2000 and the XML element //iwxxm:AerodromeRunwayVisualRange/iwxxm:meanRVROperator shall have the value “ABOVE”.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-visual-range/mean-rvr-comparison-operator If present, the value of XML element //iwxxm:AerodromeRunwayVisualRange/iwxxm:meanRVROperator shall be one of the enumeration: “ABOVE” or “BELOW”.

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-visual-range/upward-or-downward-visual-range-tendency If the runway visual range values observed in the 10-minute period have shown a distinct tendency, such that the mean during the first 5 minutes varies by 100 metres or more when compared with the second 5 minutes, this shall be indicated using the XML element //iwxxm:AerodromeRunwayVisualRange/iwxxm:pastTendency with value "UPWARD" (visual range is increasing) or "DOWNWARD" (visual range is decreasing) as appropriate.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-visual-range/no-change-in-visual-range-tendency If the runway visual range values observed in the 10-minute period have not shown a distinct tendency, this should be indicated using the XML element //iwxxm:AerodromeRunwayVisualRange/iwxxm:pastTendency with value "NO_CHANGE".

Notes:

1. Units of measurement are specified in accordance with 1.9 above.
2. The absence of XML element //iwxxm:AerodromeRunwayVisualRange/iwxxm:meanRVROperator indicates that the mean runway visual range has the numeric value reported.
3. The absence of XML element //iwxxm:AerodromeRunwayVisualRange/iwxxm:pastTendency indicates that no distinct tendency in visual range has been observed.

205.10 Requirements class: Aerodrome sea state

205.10.1 This requirements class is used to describe an aggregated set of sea-state conditions reported at an aerodrome.

Note: The requirements for reporting sea state are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 4.8.1.5.

205.10.2 XML elements describing sea state shall conform to all requirements specified in Table 46.

Table 46. Requirements class xsd-aerodrome-sea-state

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-aerodrome-sea-state	
Target type	Data instance
Name	Aerodrome sea state
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-sea-state/valid The content model of this element shall have a value that matches the content model of iwxxm:AerodromeSeaState.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-sea-state/sea-surface-temperature The sea-surface temperature shall be reported in Celsius (°C) using the XML element //iwxxm:AerdromeSeaState/iwxxm:seaSurfaceTemperature. The value of the associated XML attribute //iwxxm:AerdromeSeaState/iwxxm:seaSurfaceTemperature/@uom shall be "Cel".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-sea-state/either-significant-wave-height-or-sea-state When significant wave height is reported, sea state shall not be reported. When sea state is reported, significant wave height shall not be reported.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-sea-state/significant-wave-height If reported, the observed significant wave height shall be expressed using the XML element //iwxxm:AerodromeSeaState/iwxxm:significantWaveHeight.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-sea-state/sea-state-code If sea state is reported, then the value of XML attribute //iwxxm:AerodromeSeaState/iwxxm:seaState/@xlink:href shall be the URI of the valid term from Volume I.2, FM 94 BUFR, Code table 0 22 061: State of the sea.

Requirements class	
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-sea-state/significant-wave-height-unit-of-measure The significant wave height should be reported in metres. The unit of measure should be indicated using the XML attribute //iwxxm:AerodromeSeaState/iwxxm:significantWaveHeight/@uom with value "m".

Notes:

1. Units of measurement are specified in accordance with 1.9 above.
2. The term sea-surface temperature is generally meant to be representative of the upper few metres of the ocean as opposed to the skin temperature.
3. For convenience, FM 94 BUFR, Code table 0 22 061 from Volume I.2 is published online at http://codes.wmo.int/bufr4/codeflag/0-22-061.

205.11 Requirements class: Aerodrome horizontal visibility

205.11.1 This requirements class is used to describe the horizontal visibility conditions observed at an aerodrome.

Note: The requirements for reporting horizontal visibility are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 4.2.

205.11.2 XML elements describing horizontal visibility shall conform to all requirements specified in Table 47.

Table 47. Requirements class xsd-aerodrome-horizontal-visibility

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-aerodrome-horizontal-visibility	
Target type	Data instance
Name	Aerodrome horizontal visibility
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-horizontal-visibility/valid The content model of this element shall have a value that matches the content model of iwxxm:AerodromeHorizontalVisibility.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-horizontal-visibility/prevailing-visibility The prevailing visibility shall be stated using the XML element //iwxxm:AerodromeHorizontalVisibility/iwxxm:prevailingVisibility with the unit of measure metres, indicated using the XML attribute //iwxxm:AerodromeHorizontalVisibility/iwxxm:prevailingVisibility/@uom with value "m".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-horizontal-visibility/prevailing-visibility-exceeds-10000m If the prevailing visibility exceeds 10 000 metres, then the numeric value of XML element //iwxxm:AerodromeHorizontalVisibility/iwxxm:prevailingVisibility shall be set to 10000 and the XML element //iwxxm:AerodromeHorizontalVisibility/iwxxm:prevailingVisibilityOperator shall have the value "ABOVE".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-horizontal-visibility/prevailing-visibility-comparison-operator If present, the value of XML element //iwxxm:AerodromeHorizontalVisibility/iwxxm:prevailingVisibilityOperator shall be one of the enumeration: "ABOVE" or "BELOW".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-horizontal-visibility/minimum-visibility If reported, the minimum visibility shall be expressed using XML element //iwxxm:AerodromeHorizontalVisibility/iwxxm:minimumVisibility with the unit of measure metres, indicated using the XML attribute //iwxxm:AerodromeHorizontalVisibility/iwxxm:minimumVisibility/@uom with value "m".

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-horizontal-visibility/minimum-visibility-direction If reported, the observed angle between true north and the direction of minimum visibility shall be expressed in degrees using XML element //iwxxm:AerodromeHorizontalVisibility/iwxxm:minimumVisibilityDirection, with the unit of measure indicated using the XML attribute //iwxxm:AerodromeHorizontalVisibility/iwxxm:minimumVisibilityDirection/@uom with value “deg”.

Notes:

1. Units of measurement are specified in accordance with 1.9 above.
2. Visibility for aeronautical purposes is defined as the greater of: (i) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognized when observed against a bright background; or (ii) the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background.
3. Prevailing visibility is defined as the greatest visibility value observed which is reached within at least half the horizon circle or within at least half of the surface of the aerodrome. These areas could comprise contiguous or non-contiguous sectors.
4. The absence of XML element //iwxxm:AerodromeHorizontalVisibility/iwxxm:prevailingVisibilityOperator indicates that the prevailing visibility has the numeric value reported.
5. The conditions for reporting minimum visibility are that the visibility is not the same in different directions and (i) when the lowest visibility is different from the prevailing visibility and less than 1 500 metres or less than 50% of the prevailing visibility and less than 5 000 metres, or (ii) when the visibility is fluctuating rapidly and the prevailing visibility cannot be determined.
6. When reporting minimum visibility, the general direction of the minimum visibility in relation to the aerodrome should be reported unless the visibility is fluctuating rapidly.
7. The true north is the north point at which the meridian lines meet.

205.12 Requirements class: Aerodrome surface wind

205.12.1 This requirements class is used to describe the surface wind conditions observed at an aerodrome.

Note: The requirements for reporting surface wind conditions are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 4.1.

205.12.2 XML elements describing surface wind conditions shall conform to all requirements specified in ,.

Table 48. Requirements class xsd-aerodrome-surface-wind

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind	
Target type	Data instance
Name	Aerodrome surface wind
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind/valid The content model of this element shall have a value that matches the content model of iwxxm:AerodromeSurfaceWind.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind/mean-wind-speed The mean wind speed shall be stated using the XML element //iwxxm:AerodromeSurfaceWind/iwxxm:meanWindSpeed, with the unit of measure metres per second, knots or kilometres per hour. The unit of measure shall be indicated using the XML attribute //iwxxm:AerodromeSurfaceWind/iwxxm:meanWindSpeed/@uom with value “m/s” (metres per second), “[kn_i]” (knots) or “km/h” (kilometres per hour).

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind/variable-wind-direction If the wind direction is variable, then the XML attribute //iwxxm:AerodromeSurfaceWind/@variableDirection shall have the value "true" and XML element //iwxxm:AerodromeSurfaceWind/iwxxm:meanWindDirection shall be absent.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind/steady-wind-direction If the wind direction is not variable, then: (i) The observed angle between true north and the mean direction from which the wind is blowing shall be expressed using XML element //iwxxm:AerodromeSurfaceWind/iwxxm:meanWindDirection, with the unit of measure indicated using the XML attribute //iwxxm:AerodromeSurfaceWind/iwxxm:meanWindDirection/@uom with value "deg"; (ii) The XML attribute //iwxxm:AerodromeSurfaceWind/@variableDirection shall be absent or have the value "false".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind/extreme-wind-direction If the extremes of wind direction variability are reported, then: (i) The observed angle between true north and extreme clockwise direction from which the wind is blowing shall be expressed using XML element //iwxxm:AerodromeSurfaceWind/iwxxm:extremeClockWiseWindDirection; (ii) The observed angle between true north and extreme counterclockwise direction from which the wind is blowing shall be expressed using XML element //iwxxm:AerodromeSurfaceWind/iwxxm:extremeCounterClockWiseWindDirection; (iii) The unit of measure for each extreme wind direction shall be indicated using the XML attribute @uom with value "deg".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind/gust-speed If reported, the observed gust speed shall be stated using the XML element //iwxxm:AerodromeSurfaceWind/iwxxm:windGustSpeed and expressed in metres per second, knots or kilometres per hour. The unit of measure shall be indicated using the XML attribute //iwxxm:AerodromeSurfaceWind/iwxxm:windGustSpeed/@uom with value "m/s" (metres per second), "[kn_i]" (knots) or "km/h" (kilometres per hour).

Notes:

1. The mean wind speed is the average wind speed observed over the previous 10 minutes.
2. The gust speed is the maximum wind speed observed over the previous 10 minutes.
3. Wind direction is reported as variable (VRB) if, during the 10-minute observation of mean wind speed, the variation of wind direction is (i) 180 degrees or more, or (ii) 60 degrees or more when the wind speed is less than 1.5 metres per second (3 knots).
4. Extreme directional variations of wind are reported if, during the 10-minute observation of mean wind speed, the variation of wind direction is 60 degrees or more and less than 180 degrees and the wind speed is 1.5 metres per second (3 knots) or more.
5. The absence of XML attribute //iwxxm:AerodromeSurfaceWind/@variableDirection implies a "false" value; for example, the wind direction is not variable.
6. Units of measurement are specified in accordance with 1.9 above.
7. The true north is the north point at which the meridian lines meet.

205.13 **Requirements class: Meteorological aerodrome observation record**

205.13.1 This requirements class is used to describe the aggregated set of meteorological conditions observed at an aerodrome.

205.13.2 XML elements describing the set of meteorological conditions observed at an aerodrome shall conform to all requirements specified in Table 49.

205.13.3 XML elements describing the set of meteorological conditions observed at an aerodrome shall conform to all requirements of all relevant dependencies specified in Table 49.

Table 49. Requirements class xsd-meteorological-aerodrome-observation-record

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record	
Target type	Data instance
Name	Meteorological aerodrome observation record
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-state, 205.6
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-wind-shear, 205.7
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-observed-clouds, 205.8
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-runway-visual-range, 205.9
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-sea-state, 205.10
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-horizontal-visibility, 205.11
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind, 205.12
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/valid The content model of this element shall have a value that matches the content model of iwxxm:MeteorologicalAerodromeObservationRecord.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/cavok If the conditions associated with CAVOK are observed, then: (i) The XML attribute //iwxxm:MeteorologicalAerodromeObservationRecord/@cloudAndVisibilityOK shall have the value “true”; and (ii) The following XML elements shall be absent: //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:visibility, //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:rvr, //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:presentWeather and //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:cloud.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/air-temperature The air temperature observed at the aerodrome shall be reported in Celsius (°C) using the XML element //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:airTemperature. The value of the associated XML attribute @uom shall be “Cel”.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/dew-point-temperature The dewpoint temperature observed at the aerodrome shall be reported in Celsius (°C) using the XML element //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:dewpointTemperature. The value of the associated XML attribute @uom shall be “Cel”.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/qnh The atmospheric pressure, known as QNH, observed at the aerodrome shall be reported in hectopascals (hPa) using the XML element //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:qnh. The value of the associated XML attribute @uom shall be “hPa”.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/present-weather If present weather is reported, the value of XML attribute //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:presentWeather/@xlink:href shall be the URI of a valid weather phenomenon code from Code table D-7: Aerodrome present or forecast weather.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/number-of-present-weather-codes No more than three present weather codes shall be reported.

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/recent-weather If recent weather is reported, the value of XML attribute //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:recentWeather/@xlink:href shall be the URI of a valid weather phenomenon code from Code table D-6: Aerodrome recent weather.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/number-of-recent-weather-codes No more than three recent weather codes shall be reported.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/surface-wind Surface wind conditions observed at the aerodrome shall be reported using the XML element //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:surfaceWind containing a valid child element iwxxm:AerodromeSurfaceWind.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/runway-state If reported, the surface conditions for a given runway direction shall be expressed using the XML element //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:runwayState containing a valid child element iwxxm:AerodromeRunwayState.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/wind-shear If reported, the wind shear conditions for the aerodrome shall be expressed using the XML element //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:windShear containing a valid child element iwxxm:AerodromeWindShear.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/cloud If reported, the cloud conditions observed at the aerodrome shall be expressed using the XML element //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:cloud containing a valid child element iwxxm:AerodromeObservedClouds.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/runway-visual-range If reported, the visual range conditions for a given runway direction shall be expressed using the XML element //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:rvr containing a valid child element iwxxm:AerodromeRunwayVisualRange.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/number-of-rvr-groups Visual range conditions shall be reported for no more than four runway directions.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/sea-state If reported, the sea-state conditions observed at the aerodrome shall be expressed using the XML element //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:seaState containing a valid child element iwxxm:AerodromeSeaState.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/visibility If reported, the horizontal visibility conditions observed at the aerodrome shall be expressed using the XML element //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:visibility containing a valid child element iwxxm:AerodromeHorizontalVisibility.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record/present-weather-not-observable If present weather is not observable due to sensor failure or obstruction, the value of XML attribute //iwxxm:MeteorologicalAerodromeObservationRecord/iwxxm:presentWeather/@nilReason should indicate the URI "http://codes.wmo.int/common/nil/notObservable".

Notes:

1. Units of measurement are specified in accordance with 1.9 above.

2. Cloud and visibility information is omitted when considered to be insignificant to aeronautical operations at an aerodrome. This occurs when: (i visibility exceeds 10 kilometres, (ii) no cloud is present below 1 500 metres or the minimum sector altitude, whichever is greater, and there is no cumulonimbus at any height, and (iii) there is no weather of operational significance. These conditions are referred to as CAVOK. Use of CAVOK is specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 2.2.
3. The requirements for reporting the following are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3:

(a)	Air temperature and dewpoint temperature	section 4.6
(b)	Atmospheric pressure (QNH)	section 4.7
(c)	Present weather	section 4.4
(d)	Recent weather	paragraph 4.8.1.1
(e)	Surface wind conditions	section 4.1
(f)	Runway state	paragraph 4.8.1.5
(g)	Aerodrome wind shear	paragraph 4.8.1.4
(h)	Observed cloud conditions	section 4.5
(i)	Sea state	paragraph 4.8.1.5
(j)	Horizontal visibility	section 4.2

4. Code table D-7 is published online at http://codes.wmo.int/49-2/AerodromePresentOrForecastWeather.
5. Code table D-6 is published online at http://codes.wmo.int/49-2/AerodromeRecentWeather.
6. Information on runway visual range shall be omitted if the prevailing visibility exceeds 1 500 metres. Details of the requirements for reporting runway visual range are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 4.3.

205.14 Requirements class: Meteorological aerodrome observation

205.14.1 This requirements class restricts the content model for the XML element om:OM_Observation such that the "result" of the observation describes the aggregated set of meteorological conditions observed at an aerodrome, the "feature of interest" is a representative point location within the aerodrome at which the meteorological conditions were observed and the "procedure" provides the set of information as specified by WMO.

Note: MeteorologicalAerodromeObservation is a subclass of ComplexSamplingMeasurement defined within METCE.

205.14.2 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/MeteorologicalAerodromeObservation shall conform to all requirements in Table 50.

205.14.3 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/MeteorologicalAerodromeObservation shall conform to all requirements of all relevant dependencies in Table 50 with the exception of those requirements listed as superseded in 205.14.4.

205.14.4 The requirements and dependencies inherited from requirements class http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement (as specified in 202.4) listed in Table 51 are superseded by requirements defined herein and shall no longer apply.

Note: XML implementation of iwxxm:MeteorologicalAerodromeObservation is dependent on:
- OMXML [OGC/IS 10-025r1 Observations and Measurements 2.0 – XML Implementation].

Table 50. Requirements class xsd-meteorological-aerodrome-observation

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation	
Target type	Data instance
Name	Meteorological aerodrome observation
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/observation, OMXML clause 7.3
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/sampling, OMXML clause 7.14

Requirements class	
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling, OMXML clause 7.15
Dependency	http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement, 202.4
Dependency	http://icao.int/saf/1.1/req/xsd-aerodrome, 204.4
Dependency	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-record, 205.13
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation/feature-of-interest The XML element //om:OM_Observation/om:featureOfInterest shall contain a valid child element sams:SF_SpatialSamplingFeature that describes the reference point to which the observed meteorological conditions apply. The XML element //om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:type shall have the value "http://www.opengis.net/def/samplingFeatureType/OGC-OM/2.0/SF_SamplingPoint".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation/sampled-feature The XML element //om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:sampledFeature shall contain a valid child element saf:Aerodrome that describes the aerodrome to which the observed meteorological conditions apply.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation/result If reported, the XML element //om:OM_Observation/om:result shall contain a valid child element iwxxm:MeteorologicalAerodromeObservationRecord that describes the aggregated set of meteorological conditions observed at the target aerodrome.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation/phenomenon-time The XML element //om:OM_Observation/om:phenomenonTime shall contain a valid child element gml:TimeInstant that describes the time at which the observation occurred.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation/result-time The XML element //om:OM_Observation/om:resultTime shall contain a valid child element gml:TimeInstant that describes the time at which the observation was made available for dissemination.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation/observed-property The XML attribute //om:OM_Observation/om:observedProperty/@xlink:href should have the value "http://codes.wmo.int/49-2/observable-property/MeteorologicalAerodromeObservation".
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation/procedure The value of XML element //om:OM_Observation/om:procedure/metce:Process/gml:description should be used to cite the Technical Regulations relating to meteorological aerodrome observations.

Notes:

1. Dependency http://www.opengis.net/spec/OMXML/2.0/req/observation has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/observation (OMXML clause A.1).
2. Dependency http://www.opengis.net/spec/OMXML/2.0/req/sampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/sampling (OMXML clause A.12).
3. Dependency http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/spatialSampling (OMXML clause A.13).
4. URI http://codes.wmo.int/49-2/observable-property/MeteorologicalAerodromeObservation refers to an XML document that defines the aggregate set of observable properties relevant to a meteorological aerodrome observation.
5. The Technical Regulations relating to meteorological observations may be cited as: "*Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3 – Technical specifications related to meteorological observations and reports".

6. The time at which the observation is made available for dissemination may be a few minutes after the observation occurred.
7. In the case of NIL report (for example, to indicate that an anticipated meteorological aerodrome observation report is considered to be "MISSING"), no meteorological conditions are provided. In these cases, the XML element //om:OM_Observation/om:result has no child elements and the XML attribute //om:OM_Observation/om:result/@nilReason is used to indicate why the "result" is absent.

Table 51. Superseded requirements and dependencies from xsd-complex-sampling-measurement

Superseded requirements and dependencies	
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/complexObservation, OMXML clause 7.10
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-components, SWE Common 2.0 clause 8.1
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-record-components, SWE Common 2.0 clause 8.2
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-encodings, SWE Common 2.0 clause 8.5
Dependency	http://www.opengis.net/spec/SWE/2.0/req/general-encoding-rules, SWE Common 2.0 clause 9.1
Dependency	http://www.opengis.net/spec/SWE/2.0/req/text-encoding-rules, SWE Common 2.0 clause 9.2
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xml-encoding-rules, SWE Common 2.0 clause 9.3
Requirement	http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement/xmlns-declaration-swe, 202.4

205.15 Requirements class: Aerodrome surface wind trend forecast

205.15.1 This requirements class is used to describe the surface wind conditions forecast at an aerodrome as appropriate for inclusion in a trend forecast of a routine or special meteorological aerodrome report.

Note: The requirements for reporting the surface wind conditions within a trend forecast are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, 2.2.2.

205.15.2 XML elements describing surface wind conditions within a trend forecast shall conform to all requirements specified in Table 52.

Table 52. Requirements class xsd-aerodrome-surface-wind-trend-forecast

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-trend-forecast	
Target type	Data instance
Name	Aerodrome surface wind trend forecast
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-trend-forecast/valid The content model of this element shall have a value that matches the content model of iwxxm:AerodromeSurfaceWindTrendForecast.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-trend-forecast/mean-wind-speed The forecast mean wind speed shall be stated using the XML element //iwxxm:AerodromeSurfaceWindTrendForecast/iwxxm:meanWindSpeed, with the unit of measure metres per second, knots or kilometres per hour. The unit of measure shall be indicated using the XML attribute @uom with value "m/s" (metres per second), "[kn_i]" (knots) or "km/h" (kilometres per hour).

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-trend-forecast/wind-direction If the forecast mean wind direction is reported, then the angle between true north and the mean direction from which the wind is forecast to be blowing shall be expressed using XML element //iwxxm:AerodromeSurfaceWindTrendForecast/iwxxm:meanWindDirection, with the unit of measure indicated using the XML attribute @uom with value "deg".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-trend-forecast/gust-speed If reported, the forecast gust speed shall be stated using the XML element //iwxxm:AerodromeSurfaceWindTrendForecast/iwxxm:windGustSpeed and expressed in metres per second, knots or kilometres per hour. The unit of measure shall be indicated using the XML attribute //iwxxm:AerodromeSurfaceWind/iwxxm:windGustSpeed/@uom with value "m/s" (metres per second), "[kn_i]" (knots) or "km/h" (kilometres per hour).

Notes:

1. Units of measurement are specified in accordance with 1.9 above.
2. The true north is the north point at which the meridian lines meet.

205.16 Requirements class: Meteorological aerodrome trend forecast record

205.16.1 This requirements class is used to describe the aggregated set of meteorological conditions forecast at an aerodrome as appropriate for inclusion in a trend forecast of a routine or special meteorological aerodrome report.

205.16.2 XML elements describing the set of meteorological conditions for inclusion in a trend forecast shall conform to all requirements specified in Table 53.

205.16.3 XML elements describing the set of meteorological conditions for inclusion in a trend forecast shall conform to all requirements of all relevant dependencies specified in Table 53.

Table 53. Requirements class xsd-meteorological-aerodrome-trend-forecast-record

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record	
Target type	Data instance
Name	Meteorological aerodrome trend forecast record
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-cloud-forecast, 205.5
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-trend-forecast, 205.15
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record/valid The content model of this element shall have a value that matches the content model of iwxxm:MeteorologicalAerodromeTrendForecastRecord.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record/change-indicator-nosig If no operationally significant changes to the meteorological conditions are forecast for the aerodrome, then the XML attribute //iwxxm:MeteorologicalAerodromeTrendForecastRecord/@changeIndicator shall have the value "NO_SIGNIFICANT_CHANGES".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record/change-indicator-becmg If the meteorological conditions forecast for the aerodrome are expected to reach or pass through specified values at a regular or irregular rate, then the XML attribute //iwxxm:MeteorologicalAerodromeTrendForecastRecord/@changeIndicator shall have the value "BECOMING".

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record/change-indicator-tempo If temporary fluctuations in the meteorological conditions forecast for the aerodrome are expected to occur, then the XML attribute //iwxxm:MeteorologicalAerodromeTrendForecastRecord/@changeIndicator shall have the value "TEMPORARY_FLUCTUATIONS".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record/cavok If the conditions associated with CAVOK are forecast, then: (i) The XML attribute //iwxxm:MeteorologicalAerodromeTrendForecastRecord/@cloudAndVisibilityOK shall the have value "true"; and (ii) The following XML elements shall be absent: //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:prevailingVisibility, //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:prevailingVisibilityOperator, //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:forecastWeather and //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:cloud.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record/prevailing-visiblity If reported, the prevailing visibility shall be stated using the XML element //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:prevailingVisibility with the unit of measure metres, indicated using the XML attribute //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:prevailingVisibility/@uom with value "m".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record/prevailing-visibility-exceeds-10000m If the prevailing visibility exceeds 10 000 metres, then the numeric value of XML element //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:prevailingVisibility shall be set to 10000 and the XML element //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:prevailingVisibilityOperator shall have the value "ABOVE".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record/prevailing-visibility-comparison-operator If present, the value of XML element //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:prevailingVisibilityOperator shall be one of the enumeration: "ABOVE" or "BELOW".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record/forecast-weather If forecast weather is reported, the value of XML attribute //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:forecastWeather/@xlink:href shall be the URI of a valid weather phenomenon code from Code table D-7: Aerodrome present or forecast weather.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record/number-of-forecast-weather-codes No more than three forecast weather codes shall be reported.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record/surface-wind Surface wind conditions forecast for the aerodrome shall be reported using the XML element //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:surfaceWind containing a valid child element iwxxm:AerodromeSurfaceWindTrendForecast.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record/cloud If reported, the cloud conditions forecast for the aerodrome shall be expressed using the XML element //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:cloud containing a valid child element iwxxm:AerodromeCloudForecast.

Notes:

1. Units of measurement are specified in accordance with 1.9 above.

2. Temporary fluctuations in the meteorological conditions occur when those conditions reach or pass specified values and last for a period of time less than one hour in each instance and, in the aggregate, cover less than one half the period during which the fluctuations are forecast to occur (*Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, 2.3.3).
3. The use of change groups is specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, 2.3 and Appendix 3, Table A3-3.
4. Cloud and visibility information is omitted when considered to be insignificant to aeronautical operations at an aerodrome. This occurs when: (i) visibility exceeds 10 kilometres, (ii) no cloud is present below 1 500 metres or the minimum sector altitude, whichever is greater, and there is no cumulonimbus at any height, and (iii) there is no weather of operational significance. These conditions are referred to as CAVOK. Use of CAVOK is specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 2.2.
5. Visibility for aeronautical purposes is defined as the greater of: (i) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognized when observed against a bright background; or (ii) the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background.
6. Prevailing visibility is defined as the greatest visibility value observed which is reached within at least half the horizon circle or within at least half of the surface of the aerodrome. These areas could comprise contiguous or non-contiguous sectors.
7. The requirements for reporting the following within a trend forecast are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5:

(a)	Prevailing visibility conditions	paragraph 2.2.3
(b)	Forecast weather phenomena	section 2.2.4
(c)	Surface wind conditions	paragraph 2.2.2
(d)	Cloud conditions	paragraph 2.2.5

8. The absence of XML element //iwxxm:MeteorologicalAerodromeTrendForecastRecord/iwxxm:prevailingVisibilityOperator indicates that the prevailing visibility has the numeric value reported.
9. Code table D-7 is published online at http://codes.wmo.int/49-2/AerodromePresentOrForecastWeather.

205.17 Requirements class: Meteorological aerodrome trend forecast

205.17.1 This requirements class restricts the content model for the XML element om:OM_Observation such that the "result" of the observation describes the aggregated set of meteorological conditions forecast at an aerodrome as appropriate for inclusion in a trend forecast, the "feature of interest" is a representative point location within the aerodrome for which the meteorological conditions were forecast and the "procedure' provides the set of information as specified by WMO.

Note: MeteorologicalAerodromeTrendForecast is a subclass of ComplexSamplingMeasurement defined within METCE.

205.17.2 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/MeteorologicalAerodromeTrendForecast shall conform to all requirements in Table 54.

205.17.3 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/MeteorologicalAerodromeTrendForecast shall conform to all requirements of all relevant dependencies in Table 54 with the exception of those requirements listed as superseded in 205.17.4.

205.17.4 The requirements and dependencies inherited from requirements class http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement (as specified in 202.4) listed in Table 55 are superseded by requirements defined herein and shall no longer apply.

Note: XML implementation of iwxxm:MeteorologicalAerodromeTrendForecast is dependent on:
- OMXML [OGC/IS 10-025r1 Observations and Measurements 2.0 – XML Implementation].

Table 54. Requirements class xsd-meteorological-aerodrome-trend-forecast

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast	
Target type	Data instance
Name	Meteorological aerodrome trend forecast
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/observation, OMXML clause 7.3
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/sampling, OMXML clause 7.14
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling, OMXML clause 7.15
Dependency	http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement, 202.4
Dependency	http://icao.int/saf/1.1/req/xsd-aerodrome, 204.4
Dependency	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast-record, 205.16
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast/feature-of-interest The XML element //om:OM_Observation/om:featureOfInterest shall contain a valid child element sams:SF_SpatialSamplingFeature that describes the reference point to which the forecast meteorological conditions apply. The XML element //om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:type shall have the value "http://www.opengis.net/def/samplingFeatureType/OGC-OM/2.0/SF_SamplingPoint".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast/sampled-feature The XML element //om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:sampledFeature shall contain a valid child element saf:Aerodrome that describes the aerodrome to which the forecast meteorological conditions apply.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast/result The XML element //om:OM_Observation/om:result shall contain a valid child element iwxxm:MeteorologicalAerodromeTrendForecastRecord that describes the aggregated set of meteorological conditions forecast for the target aerodrome.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast/phenomenon-time The XML element //om:OM_Observation/om:phenomenonTime shall contain a valid child element gml:TimeInstant or gml:TimePeriod that describes the time for which the trend forecast is valid.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast/result-time The XML element //om:OM_Observation/om:resultTime shall contain a valid child element gml:TimeInstant that describes the time at which the trend forecast was made available for dissemination.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast/observed-property The XML attribute //om:OM_Observation/om:observedProperty/@xlink:href should have the value "http://codes.wmo.int/49-2/observable-property/MeteorologicalAerodromeTrendForecast".
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast/procedure The value of XML element //om:OM_Observation/om:procedure/metce:Process/gml:description should be used to cite the Technical Regulations relating to trend forecasts for aerodromes.

Notes:

1. Dependency http://www.opengis.net/spec/OMXML/2.0/req/observation has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/observation (OMXML clause A.1).
2. Dependency http://www.opengis.net/spec/OMXML/2.0/req/sampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/sampling (OMXML clause A.12).

3. Dependency http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/spatialSampling (OMXML clause A.13).
4. URI http://codes.wmo.int/49-2/observable-property/MeteorologicalAerodromeTrendForecast refers to an XML document that defines the aggregate set of observable properties relevant to a trend forecast.
5. The Technical Regulations relating to trend forecasts may be cited as: "*Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, section 2 – Criteria related to trend forecasts".
6. A forecast may be provided for a specific time instant or a time period. Requirements regarding the specification of time for which the forecast is valid are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, 2.3.

Table 55. Superseded requirements and dependencies from xsd-complex-sampling-measurement

Superseded requirements and dependencies	
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/complexObservation, OMXML clause 7.10
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-components, SWE Common 2.0 clause 8.1
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-record-components, SWE Common 2.0 clause 8.2
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-encodings, SWE Common 2.0 clause 8.5
Dependency	http://www.opengis.net/spec/SWE/2.0/req/general-encoding-rules, SWE Common 2.0 clause 9.1
Dependency	http://www.opengis.net/spec/SWE/2.0/req/text-encoding-rules, SWE Common 2.0 clause 9.2
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xml-encoding-rules, SWE Common 2.0 clause 9.3
Requirement	http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement/xmlns-declaration-swe, 202.4

205.18 Requirements class: Meteorological aerodrome observation report

205.18.1 This requirements class is used to describe the report within which meteorological aerodrome observations, and optionally one or more trend forecasts, are provided.

Note: The reporting requirements for routine and special meteorological aerodrome reports are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3 and Appendix 5, section 2.

205.18.2 XML elements describing routine or special meteorological aerodrome reports shall conform to all requirements specified in Table 56.

205.18.3 XML elements describing routine or special meteorological aerodrome reports shall conform to all requirements of all relevant dependencies specified in Table 56.

Table 56. Requirements class xsd-meteorological-aerodrome-observation-report

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report	
Target type	Data instance
Name	Meteorological aerodrome observation report
Dependency	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation, 205.14
Dependency	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-trend-forecast, 205.17

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report/valid The content model of this element shall have a value that matches the content model of iwxxm:MeteorologicalAerodromeObservationReport.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report/status The status of the report shall be indicated using the XML attribute @status with the value being one of the enumeration: "NORMAL", "MISSING" or "CORRECTION".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report/automated-station If the meteorological aerodrome observation included within the report has been generated by an automated system, the value of XML attribute @automatedStation shall be set to "true".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report/observation The XML element //iwxxm:observation shall contain a valid child element om:OM_Observation of type MeteorologicalAerodromeObservation. The value of XML attribute //iwxxm:observation/om:OM_Observation/om:type/@xlink:href shall be the URI "http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/MeteorologicalAerodromeObservation".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report/trend-forecast If trend forecasts are reported, the value of XML element //iwxxm:trendForecast shall be a valid child element om:OM_Observation of type MeteorologicalAerodromeTrendForecast. For each trend forecast, the value of XML attribute //iwxxm:trendForecast/om:OM_Observation/om:type/@xlink:href shall be the URI "http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/MeteorologicalAerodromeTrendForecast".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report/number-of-trend-forecasts No more than three trend forecasts shall be reported.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report/unique-subject-aerodrome The observation and, if reported, trend forecasts shall refer to the same aerodrome. All values of XML element //om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:sampledFeature/saf:Aerodrome/gml:identifier within the meteorological aerodrome observation report shall be identical.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report/nil-report If XML attribute @status has value "MISSING", then a NIL report shall be provided: (i) XML element //iwxxm:observation/om:OM_Observation/om:result shall have no child elements and XML attribute //iwxxm:observation/om:OM_Observation/om:result/@nilReason shall provide an appropriate nil-reason; (ii) XML attribute @automatedStation shall be absent; and (iii) XML element //iwxxm:trendForecast shall be absent.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report/nosig If no change of operational significance is forecast, then a single XML element //iwxxm:trendForecast should be included with no child elements therein and the value of XML attribute //iwxxm:trendForecast/@nilReason should indicate "inapplicable".

Notes:

1. A report with status "CORRECTED" indicates that content has been amended to correct an error identified in an earlier report. The XML element //om:OM_Observation/om:resultTime/gml:TimeInstant is used to reflect the dissemination time of the corrected report.
2. A report with status "MISSING" indicates that a routine report has not been provided on the anticipated timescales. Such a report does not contain details of any observed or forecast meteorological conditions and is often referred to as a "NIL" report.

3. The requirements for reporting the use of an automated system are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 4.8.
4. If XML attribute @automatedStation is absent, then the value "false" is inferred; for example, the meteorological aerodrome observation included within the report has not been generated by an automated system.
5. Within an XML encoded meteorological aerodrome report, it is likely that only one instance of saf:Aerodrome will physically be present; subsequent assertions about the aerodrome may use xlinks to refer to the previously defined saf:Aerodrome element in order to keep the XML document size small. As such, validation of requirement http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report/unique-subject-aerodrome is applied once any xlinks, if used, have been resolved.
6. Code table D-1 provides a set of nil reason codes and is published at http://codes.wmo.int/common/nil.

205.19 Requirements class: METAR

205.19.1 This requirements class is used to describe the routine meteorological aerodrome reports (METAR).

205.19.2 XML elements describing METARs shall conform to all requirements specified in Table 57.

205.19.2 XML elements describing METARs shall conform to all requirements of all relevant dependencies specified in Table 57.

Table 57. Requirements class xsd-metar

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-metar	
Target type	Data instance
Name	METAR
Dependency	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report, 205.18
Requirement	http://icao.int/iwxxm/1.1/req/xsd-metar/valid The content model of this element shall have a value that matches the content model of iwxxm:METAR.

205.20 Requirements class: SPECI

205.20.1 This requirements class is used to describe the special meteorological aerodrome reports (SPECI).

205.20.2 XML elements describing SPECIs shall conform to all requirements specified in Table 58.

205.20.3 XML elements describing SPECIs shall conform to all requirements of all relevant dependencies specified in Table 58.

Table 58. Requirements class xsd-speci

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-speci	
Target type	Data instance
Name	SPECI
Dependency	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-observation-report, 205.18

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-speci/valid The content model of this element shall have a value that matches the content model of iwxxm:SPECI.

205.21 Requirements class: Aerodrome surface wind forecast

205.21.1 This requirements class is used to describe the surface wind conditions forecast at an aerodrome as appropriate for inclusion in an aerodrome forecast (TAF) report.

Note: The requirements for reporting the surface wind conditions within a TAF are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, 1.2.1.

205.21.2 XML elements describing surface wind conditions forecast shall conform to all requirements specified in Table 59.

205.21.3 XML elements describing surface wind conditions forecast shall conform to all requirements of all dependencies specified in Table 59.

Table 59. Requirements class xsd-aerodrome-surface-wind-forecast

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-forecast	
Target type	Data instance
Name	Aerodrome surface wind forecast
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-trend-forecast, 205.15
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-forecast/valid The content model of this element shall have a value that matches the content model of iwxxm:AerodromeSurfaceWindForecast.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-forecast/variable-wind-direction If the wind direction is variable, then the XML attribute //iwxxm:AerodromeSurfaceWindForecast/@variableWindDirection shall have the value “true” and XML element //iwxxm:AerodromeSurfaceWindForecast/iwxxm:meanWindDirection shall be absent.

Note: Wind direction is reported as variable (VRB) if is not possible to forecast a prevailing surface wind direction due to expected variability, for example, during light wind conditions (less than 3 knots) or thunderstorms.

205.22 Requirements class: Aerodrome air temperature forecast

205.22.1 This requirements class is used to describe the temperature conditions forecast at an aerodrome as appropriate for inclusion in an aerodrome forecast (TAF) report, including the maximum and minimum temperature values and their time of occurrence.

Note: The requirements for reporting the temperature conditions at an aerodrome within a TAF are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, 1.2.5.

205.22.2 XML elements describing temperature conditions at an aerodrome shall conform to all requirements specified in Table 60.

Table 60. Requirements class xsd-aerodrome-air-temperature-forecast

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-aerodrome-air-temperature-forecast	
Target type	Data instance

Requirements class	
Name	Aerodrome air temperature forecast
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-air-temperature-forecast/valid The content model of this element shall have a value that matches the content model of iwxxm:AerodromeAirTemperatureForecast.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-air-temperature-forecast/maximum-temperature The maximum air temperature anticipated during the forecast period shall be reported in Celsius (°C) using the XML element //iwxxm:AerodromeAirTemperatureForecast/iwxxm:maximumAirTemperature. The value of the associated XML attribute @uom shall be "Cel".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-air-temperature-forecast/maximum-temperature-time The XML element //iwxxm:AerodromeAirTemperatureForecast/iwxxm:maximumAirTemperatureTime shall contain a valid child element gml:TimeInstant that describes the time at which the maximum air temperature is anticipated to occur.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-air-temperature-forecast/minimum-temperature The minimum air temperature anticipated during the forecast period shall be reported in Celsius (°C) using the XML element //iwxxm:AerodromeAirTemperatureForecast/iwxxm:minimumAirTemperature. The value of the associated XML attribute @uom shall be "Cel".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-air-temperature-forecast/minimum-temperature-time The XML element //iwxxm:AerodromeAirTemperatureForecast/iwxxm:minimumAirTemperatureTime shall contain a valid child element gml:TimeInstant that describes the time at which the minimum air temperature is anticipated to occur.

Note: Units of measurement are specified in accordance with 1.9 above.

205.23 Requirements class: Meteorological aerodrome forecast record

205.23.1 This requirements class is used to describe the aggregated set of meteorological conditions forecast at an aerodrome as appropriate for inclusion in a aerodrome forecast (TAF) report.

205.23.2 XML elements describing the set of meteorological conditions for inclusion in an aerodrome forecast shall conform to all requirements specified in Table 61.

205.23.3 XML elements describing the set of meteorological conditions for inclusion in an aerodrome forecast shall conform to all requirements of all relevant dependencies specified in Table 61.

Table 61. Requirements class xsd-meterological-aerodrome-forecast-record

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record	
Target type	Data instance
Name	Meteorological aerodrome forecast record
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-cloud-forecast, 205.5
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-surface-wind-forecast, 205.21
Dependency	http://icao.int/iwxxm/1.1/req/xsd-aerodrome-air-temperature-forecast, 205.22
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/valid The content model of this element shall have a value that matches the content model of iwxxm:MeteorologicalAerodromeForecastRecord.

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/prevailing-forecast-conditions The XML attribute //iwxxm:MeteorologicalAerodromeForecastRecord/@changeIndicator shall be absent if the forecast describes the prevailing meteorological conditions.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/change-indicator-fm If the meteorological conditions forecast for the aerodrome are expected to change significantly and more or less completely to a different set of conditions, then the XML attribute //iwxxm:MeteorologicalAerodromeForecastRecord/@changeIndicator shall have the value "FROM".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/change-indicator-becmg If the meteorological conditions forecast for the aerodrome are expected to reach or pass through specified values at a regular or irregular rate, then the XML attribute //iwxxm:MeteorologicalAerodromeForecastRecord/@changeIndicator shall have the value "BECOMING".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/change-indicator-tempo If temporary fluctuations in the meteorological conditions forecast for the aerodrome are expected to occur, then the XML attribute //iwxxm:MeteorologicalAerodromeForecastRecord/@changeIndicator shall have the value "TEMPORARY_FLUCTUATIONS".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/change-indicator-prob30 If meteorological conditions forecast for the aerodrome have a 30% probability of occurring, then the XML attribute //iwxxm:MeteorologicalAerodromeForecastRecord/@changeIndicator shall have the value "PROBABILITY_30".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/change-indicator-prob30-tempo If the temporary fluctuations in meteorological conditions forecast have a 30% probability of occurring, then the XML attribute //iwxxm:MeteorologicalAerodromeForecastRecord/@changeIndicator shall have the value "PROBABILITY_30_TEMPORARY_FLUCTUATIONS".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/change-indicator-prob40 If meteorological conditions forecast for the aerodrome have a 40% probability of occurring, then the XML attribute //iwxxm:MeteorologicalAerodromeForecastRecord/@changeIndicator shall have the value "PROBABILITY_40".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/change-indicator-prob40-tempo If the temporary fluctuations in meteorological conditions forecast have a 40% probability of occurring, then the XML attribute //iwxxm:MeteorologicalAerodromeForecastRecord/@changeIndicator shall have the value "PROBABILITY_40_TEMPORARY_FLUCTUATIONS".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/cavok If the conditions associated with CAVOK are forecast, then: (i) The XML attribute //iwxxm:MeteorologicalAerodromeForecastRecord/@cloudAndVisibilityOK shall have the value "true"; and (ii) The following XML elements shall be absent: //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:prevailingVisibility, //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:prevailingVisibilityOperator, //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:weather and //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:cloud.

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/prevailing-visiblity If reported, the prevailing visibility shall be stated using the XML element //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:prevailingVisibility with the unit of measure metres, indicated using the XML attribute //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:prevailingVisibility/@uom with value "m".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/prevailing-visibility-exceeds-10000m If the prevailing visibility exceeds 10 000 metres, then the numeric value of XML element //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:prevailingVisibility shall be set to 10000 and the XML element //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:prevailingVisibilityOperator shall have the value "ABOVE".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/prevailing-visibility-comparison-operator If present, the value of XML element //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:prevailingVisibilityOperator shall be one of the enumeration: "ABOVE" or "BELOW".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/temperature If reported, the temperature conditions forecast for the aerodrome shall be expressed using the XML element //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:temperature containing a valid child element iwxxm:AerodromeAirTemperatureForecast.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/number-of-temperature-groups No more than two sets of temperature conditions shall be reported.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/cloud If reported, the cloud conditions forecast for the aerodrome shall be expressed using the XML element //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:cloud containing a valid child element iwxxm:AerodromeCloudForecast.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/forecast-weather If forecast weather is reported, the value of XML attribute //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:forecastWeather/@xlink:href shall be the URI of a valid weather phenomenon code from Code table D-7: Aerodrome present or forecast weather.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/number-of-forecast-weather-codes No more than three forecast weather codes shall be reported.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record/surface-wind Surface wind conditions forecast for the aerodrome shall be reported using the XML element //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:surfaceWind containing a valid child element iwxxm:AerodromeSurfaceWindForecast.

Notes:

1. Units of measurement are specified in accordance with 1.9 above.
2. Temporary fluctuations in the meteorological conditions occur when those conditions reach or pass specified values and last for a period of time less than one hour in each instance and, in the aggregate, cover less than one half the period during which the fluctuations are forecast to occur (*Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, 2.3.3).
3. The use of change groups and time indicators within a TAF is specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, 1.3 and Table A5-2.
4. The use of probability groups and time indicators within a TAF is specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, 1.4 and Table A5-2.
5. Cloud and visibility information is omitted when considered to be insignificant to aeronautical operations at an aerodrome. This occurs when: (i) visibility exceeds 10 kilometres, (ii) no cloud is present below 1 500 metres or the

minimum sector altitude, whichever is greater, and there is no cumulonimbus at any height, and (iii) there is no weather of operational significance. These conditions are referred to as CAVOK. Use of CAVOK is specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 2.2.

6. Visibility for aeronautical purposes is defined as the greater of: (i) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognized when observed against a bright background; or (ii) the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background.
7. Prevailing visibility is defined as the greatest visibility value observed which is reached within at least half the horizon circle or within at least half of the surface of the aerodrome. These areas could comprise contiguous or non-contiguous sectors.
8. The requirements for reporting the following within an aerodrome forecast are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5:
   (a) Prevailing visibility conditions — paragraph 1.2.2
   (b) Temperature conditions — paragraph 1.2.5
   (c) Cloud conditions — paragraph 1.2.4
   (d) Forecast weather phenomena — paragraph 1.2.3
   (e) Surface wind conditions — paragraph 1.2.1
9. The absence of XML element //iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:prevailingVisibilityOperator indicates that the prevailing visibility has the numeric value reported.
10. Code table D-7 is published online at http://codes.wmo.int/49-2/AerodromePresentOrForecastWeather.

205.24 Requirements class: Meteorological aerodrome forecast

205.24.1 This requirements class restricts the content model for the XML element om:OM_Observation such that the "result" of the observation describes the aggregated set of meteorological conditions forecast at an aerodrome as appropriate for inclusion in an aerodrome forecast (TAF) report, the "feature of interest'"' is a representative point location within the aerodrome for which the meteorological conditions were forecast and the "procedure" provides the set of information as specified by WMO.

Note: MeteorologicalAerodromeForecast is a subclass of ComplexSamplingMeasurement defined within METCE.

205.24.2 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/MeteorologicalAerodromeForecast shall conform to all requirements in Table 62.

205.24.3 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/MeteorologicalAerodromeForecast shall conform to all requirements of all relevant dependencies in Table 62 with the exception of those requirements listed as superseded in 205.24.4.

205.24.4 The requirements and dependencies inherited from requirements class http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement (as specified in 202.4) listed in Table 63 are superseded by requirements defined herein and shall no longer apply.

Note: XML implementation of iwxxm:MeteorologicalAerodromeForecast is dependent on:
- OMXML [OGC/IS 10-025r1 Observations and Measurements 2.0 – XML Implementation].

Table 62. Requirements class xsd-meteorological-aerodrome-forecast

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast	
Target type	Data instance
Name	Meteorological aerodrome forecast
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/observation, OMXML clause 7.3
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/sampling, OMXML clause 7.14
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling, OMXML clause 7.15

Requirements class	
Dependency	http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement, 202.4
Dependency	http://icao.int/saf/1.1/req/xsd-aerodrome, 204.4
Dependency	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast-record, 205.23
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast/feature-of-interest The XML element //om:OM_Observation/om:featureOfInterest shall contain a valid child element sams:SF_SpatialSamplingFeature that describes the reference point to which the forecast meteorological conditions apply. The XML element //om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:type shall have the value "http://www.opengis.net/def/samplingFeatureType/OGC-OM/2.0/SF_SamplingPoint".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast/sampled-feature The XML element //om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:sampledFeature shall contain a valid child element saf:Aerodrome that describes the aerodrome to which the forecast meteorological conditions apply.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast/result If reported, the XML element //om:OM_Observation/om:result shall contain a valid child element iwxxm:MeteorologicalAerodromeForecastRecord that describes the aggregated set of meteorological conditions forecast for the target aerodrome.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast/phenomenon-time The XML element //om:OM_Observation/om:phenomenonTime shall contain a valid child element gml:TimeInstant or gml:TimePeriod that describes the time for which the forecast is valid.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast/result-time The XML element //om:OM_Observation/om:resultTime shall contain a valid child element gml:TimeInstant that describes the time at which the forecast was made available for dissemination.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast/observed-property The XML attribute //om:OM_Observation/om:observedProperty/@xlink:href should have the value "http://codes.wmo.int/49-2/observable-property/MeteorologicalAerodromeForecast".
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast/procedure The value of XML element //om:OM_Observation/om:procedure/metce:Process/gml:description should be used to cite the Technical Regulations relating to meteorological aerodrome forecasts.

Notes:

1. Dependency http://www.opengis.net/spec/OMXML/2.0/req/observation has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/observation (OMXML clause A.1).
2. Dependency http://www.opengis.net/spec/OMXML/2.0/req/sampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/sampling (OMXML clause A.12).
3. Dependency http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/spatialSampling (OMXML clause A.13).
4. URI http://codes.wmo.int/49-2/observable-property/MeteorologicalAerodromeForecast refers to an XML document that defines the aggregate set of observable properties relevant to an aerodrome forecast.
5. The Technical Regulations relating to forecasts may be cited as: "*Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, section 1 – Criteria related to TAF".
6. A forecast may be provided for a specific time instant or a time period. Requirements regarding the specification of time for which the forecast is valid are specified at the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, 1.3.
7. In the case of NIL report (for example, to indicate that an anticipated TAF is considered to be "MISSING"), no meteorological conditions are provided. In these cases, the XML element //om:OM_Observation/om:result has no child elements and the XML attribute //om:OM_Observation/om:result/@nilReason is used to indicate why the "result" is absent.

Table 63. Superseded requirements and dependencies from xsd-complex-sampling-measurement

Superseded requirements and dependencies	
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/complexObservation, OMXML clause 7.10
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-components, SWE Common 2.0 clause 8.1
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-record-components, SWE Common 2.0 clause 8.2
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xsd-simple-encodings, SWE Common 2.0 clause 8.5
Dependency	http://www.opengis.net/spec/SWE/2.0/req/general-encoding-rules, SWE Common 2.0 clause 9.1
Dependency	http://www.opengis.net/spec/SWE/2.0/req/text-encoding-rules, SWE Common 2.0 clause 9.2
Dependency	http://www.opengis.net/spec/SWE/2.0/req/xml-encoding-rules, SWE Common 2.0 clause 9.3
Requirement	http://def.wmo.int/metce/2013/req/xsd-complex-sampling-measurement/xmlns-declaration-swe, 202.4

205.25 Requirements class: TAF

205.25.1 This requirements class is used to describe the aerodrome forecast (TAF) report within which a base forecast, and optionally one or more change forecasts, is provided.

Note: The reporting requirements for aerodrome forecasts are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3 and Appendix 5, section 1.

205.25.2 XML elements describing TAFs shall conform to all requirements specified in Table 64.

205.25.3 XML elements describing TAFs shall conform to all requirements of all relevant dependencies specified in Table 64.

Table 64. Requirements class xsd-taf

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-taf	
Target type	Data instance
Name	TAF
Dependency	http://icao.int/iwxxm/1.1/req/xsd-meteorological-aerodrome-forecast, 205.24
Requirement	http://icao.int/iwxxm/1.1/req/xsd-taf/valid The content model of this element shall have a value that matches the content model of iwxxm:TAF.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-taf/status The status of the TAF shall be indicated using the XML attribute //iwxxm:TAF/@ status with the value being one of the enumeration: “NORMAL”, “AMENDMENT”, “CANCELLATION”, “CORRECTION” or “MISSING”.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-taf/issue-time The XML element //iwxxm:TAF/iwxxm:issueTime shall contain a valid child element gml:TimeInstant that describes the time at which the TAF was issued.

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-taf/base-forecast If the prevailing forecast conditions for the valid period of the TAF are reported, then: (i) The XML element //iwxxm:TAF/iwxxm:baseForecast shall contain a valid child element om:OM_Observation of type MeteorologicalAerodromeForecast; (ii) The value of XML attribute //iwxxm:TAF/iwxxm:baseForecast/om:OM_Observation/om:type/@xlink:href shall be the URI "http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/MeteorologicalAerodromeForecast"; and (iii) The XML attribute //iwxxm:TAF/iwxxm:baseForecast/om:OM_Observation/om:result/iwxxm:MeteorologicalAerodromeForecastRecord/@changeIndicator shall be absent.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-taf/change-forecast If change forecasts or forecasts with probability of occurrence are reported, then: (i) The XML element //iwxxm:TAF/iwxxm:changeForecast shall contain a valid child element om:OM_Observation of type MeteorologicalAerodromeForecast; (ii) The value of XML attribute //iwxxm:TAF/iwxxm:changeForecast/om:OM_Observation/om:type/@xlink:href shall be the URI "http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/MeteorologicalAerodromeForecast"; (iii) The XML element //iwxxm:TAF/iwxxm:changeForecast/om:OM_Observation/om:result/iwxxm:MeteorologicalAerodromeForecastRecord/iwxxm:temperature shall be absent; and (iv) The XML attribute //iwxxm:TAF/iwxxm:baseForecast/om:OM_Observation/om:result/iwxxm:MeteorologicalAerodromeForecastRecord/@changeIndicator shall be one of the enumeration: "BECOMING", "TEMPORARY_FLUCTUATIONS", "FROM", "PROBABILITY_30", "PROBABILITY_30_TEMPORARY_FLUCTUATIONS", "PROBABILITY_40" or "PROBABILITY_40_TEMPORARY_FLUCTUATIONS".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-taf/unique-subject-aerodrome The base forecast and, if reported, change forecasts shall refer to the same aerodrome. All values of XML element //iwxxm:TAF/*/om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:sampledFeature/saf:Aerodrome/gml:identifier within the TAF shall be identical.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-taf/status-normal If the status of the TAF is "NORMAL" (as specified by XML attribute //iwxxm:TAF/@status), then: (i) The prevailing meteorological conditions anticipated during the valid period of the TAF shall be reported using the XML element //iwxxm:TAF/iwxxm:baseForecast; (ii) The valid time period of the TAF shall be given using the XML element //iwxxm:TAF/iwxxm:validTime/gml:TimePeriod; (iii) The XML element //iwxxm:TAF/iwxxm:previousReportAerodrome shall be absent; and (iv) The XML element //iwxxm:TAF/iwxxm:previousReportValidPeriod shall be absent.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-taf/status-amendment-or-correction If the status of the TAF is "AMENDMENT" or "CORRECTION" (as specified by XML attribute //iwxxm:TAF/@status), then: (i) The prevailing meteorological conditions anticipated during the valid period of the TAF shall be reported using the XML element //iwxxm:TAF/iwxxm:baseForecast; (ii) The valid time period of the TAF shall be given using the XML element //iwxxm:TAF/iwxxm:validTime/gml:TimePeriod; and (iii) The valid time period for the TAF that has been amended or corrected shall be reported using the XML element //iwxxm:TAF/iwxxm:previousReportValidPeriod/gml:TimePeriod.

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-taf/status-cancellation If the status of the TAF is "CANCELLATION" (as specified by XML attribute //iwxxm:TAF/@status), then: (i) The XML element //iwxxm:TAF/iwxxm:baseForecast shall be absent; (ii) The XML element //iwxxm:TAF/iwxxm:changeForecast shall be absent; (iii) The time period for which TAF reports at the subject aerodrome are cancelled shall be given using the XML element //iwxxm:TAF/iwxxm:validTime/gml:TimePeriod; (iv) The aerodrome for which TAF reports are cancelled shall be reported using the XML element //iwxxm:TAF/iwxxm:previousReportAerodrome/saf:Aerodrome; and (v) The valid time period for the TAF that has been cancelled shall be reported using the XML element //iwxxm:TAF/iwxxm:previousReportValidPeriod/gml:TimePeriod.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-taf/nil-report-status-missing If the status of the TAF is "MISSING" (as specified by XML attribute //iwxxm:TAF/@status), then: (i) The XML element //iwxxm:TAF/iwxxm:baseForecast shall contain valid child element om:OM_Observation of type MeteorologicalAerodromeForecast; (ii) The value of XML element //iwxxm:TAF/iwxxm:baseForecast/om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:sampledFeature/saf:Aerodrome shall indicate the aerodrome for which the TAF is missing; (iii) The XML element //iwxxm:TAF/iwxxm:baseForecast/om:OM_Observation/om:result shall have no child elements and XML attribute //iwxxm:TAF/iwxxm:baseForecast/om:OM_Observation/om:result/@nilReason shall provide an appropriate nil-reason; (iv) The XML element //iwxxm:TAF/iwxxm:changeForecast shall be absent; (v) The XML element //iwxxm:TAF/iwxxm:validTime shall be absent; (vi) The XML element //iwxxm:TAF/iwxxm:previousReportAerodrome shall be absent; and (vii) The XML element //iwxxm:TAF/iwxxm:previousReportValidPeriod shall be absent.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-taf/number-of-change-forecasts The number of change forecasts should be kept to a minimum, and no more than five change forecasts should be reported in normal circumstances.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-taf/issue-time-matches-result-time The TAF issue time (specified by XML element //iwxxm:TAF/iwxxm:issueTime/gml:TimeInstant) should match the result time for each of the forecasts provided within the TAF (specified by XML element //iwxxm:TAF/*/om:OM_Observation/om:resultTime/gml:TimeInstant).
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-taf/valid-time-includes-all-phenomenon-times The valid times of all forecasts included in the TAF (specified by XML element //iwxxm:TAF/*/om:OM_Observation/om:phenomenonTime/*) should occur within the valid time period of the TAF (specified by XML element //iwxxm:TAF/iwxxm:validTime/gml:TimePeriod).
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-taf/status-amendment-or-correction-previous-aerodrome If the status of the TAF is "AMENDMENT" or "CORRECTION" (as specified by XML attribute //iwxxm:TAF/@status), then the aerodrome that was the subject of the TAF that has been amended or corrected should be reported using the XML element //iwxxm:TAF/iwxxm:previousReportAerodrome/saf:Aerodrome.

Notes:

1. The requirements for reporting the following are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5:
   (a) Change forecasts — section 1.3
   (b) Probability forecasts with probability of occurrence — paragraph 1.4
2. Guidance regarding the number of change forecasts or forecasts with probability of occurrence is given in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 5, 1.4.

3. A report with status "MISSING" indicates that a routine report has not been provided on the anticipated timescales. Such a report does not contain details of any forecast meteorological conditions and is often referred to as a "NIL" report
4. Within an XML encoded TAF, it is likely that only one instance of saf:Aerodrome will physically be present; subsequent assertions about the aerodrome may use xlinks to refer to the previously defined saf:Aerodrome element in order to keep the XML document size small. As such, validation of requirement http://icao.int/iwxxm/1.1/req/xsd-taf/unique-subject-aerodrome is applied once any xlinks, if used, have been resolved.
5. Code table D-1 provides a set of nil reason codes and is published at http://codes.wmo.int/common/nil.

205.26 Requirements class: Evolving meteorological condition

205.26.1 This requirements class is used to describe the presence of a specific SIGMET phenomenon such as volcanic ash or thunderstorm, along with expected changes to the intensity of the phenomenon, its speed and direction of motion. The geometric extent of the SIGMET phenomenon is specified as a two-dimensional horizontal region with bounded vertical extent.

205.26.2 XML elements describing the characteristics of a SIGMET phenomenon shall conform to all requirements specified in Table 65.

205.26.3 XML elements describing the characteristics of a SIGMET phenomenon shall conform to all requirements of all relevant dependencies specified in Table 65.

Table 65. Requirements class xsd-evolving-meteorological-condition

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-evolving-meteorological-condition	
Target type	Data instance
Name	Evolving meteorological condition
Dependency	http://icao.int/saf/1.1/req/xsd-airspace-volume, 204.8
Requirement	http://icao.int/iwxxm/1.1/req/xsd-evolving-meteorological-condition/valid The content model of this element shall have a value that matches the content model of iwxxm:EvolvingMeteorologicalCondition.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-evolving-meteorological-condition/intensity-change The anticipated change in intensity of the SIGMET phenomenon shall be indicated using the XML attribute //iwxxm:EvolvingMeteorologicalCondition/@intensityChange with the value being one of the enumeration: "NO_CHANGE", "WEAKEN" or "INTENSIFY".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-evolving-meteorological-condition/geometry The geometric extent of the SIGMET phenomenon shall be reported using the XML element //iwxxm:EvolvingMeteorologicalCondition/iwxxm:geometry with valid child element saf:AirspaceVolume.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-evolving-meteorological-condition/speed-of-motion The speed of motion of the SIGMET phenomenon shall be reported using the XML element //iwxxm:EvolvingMeteorologicalCondition/iwxxm:speedOfMotion, with the unit of measure metres per second, knots or kilometres per hour. The unit of measure shall be indicated using the XML attribute //iwxxm:EvolvingMeteorologicalCondition/iwxxm:speedOfMotion/@uom with value "m/s" (metres per second), "[kn_i]" (knots) or "km/h" (kilometres per hour).
Requirement	http://icao.int/iwxxm/1.1/req/xsd-evolving-meteorological-condition/direction-of-motion If reported, the angle between true north and the direction of motion of the SIGMET phenomenon shall be given in degrees using the XML element //iwxxm:EvolvingMeteorologicalCondition/iwxxm:directionOfMotion. The unit of measure shall be indicated using the XML attribute //iwxxm:EvolvingMeteorologicalCondition/iwxxm:directionOfMotion/@uom with value "deg".

Requirements class	
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-evolving-meteorological-condition/stationary-phenomenon If the SIGMET phenomenon is not moving (indicated by the XML element //iwxxm:EvolvingMeteorologicalCondition/iwxxm:speedOfMotion having numeric value zero), XML element //iwxxm:EvolvingMeteorologicalCondition/iwxxm:directionOfMotion should be absent.

Notes:

1. Units of measurement are specified in accordance with 1.9 above.
2. The true north is the north point at which the meridian lines meet.

205.27 Requirements class: SIGMET evolving condition analysis

205.27.1 This requirements class is used to describe the details of how the characteristics of a SIGMET phenomenon were evaluated and is based on the observation pattern from ISO 19156:2011, Geographic information – Observations and measurements. This requirements class is applicable to both the observation and forecasting of SIGMET phenomenon characteristics.

205.27.2 This requirements class restricts the content model of om:OM_Observation such that the "result" of the observation describes the characteristics of a SIGMET phenomenon (including geometric extent, expected intensity change, speed and direction of motion), the "feature of interest" is the bounded extent of the airspace for which the SIGMET report is issued and the "procedure" provides the set of information as specified by WMO.

Note: SIGMETEvolvingConditionAnalysis is a subclass of SamplingObservation defined within METCE.

205.27.3 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/SIGMETEvolvingConditionAnalysis shall conform to all requirements in Table 66.

205.27.4 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/SIGMETEvolvingConditionAnalysis shall conform to all requirements of all relevant dependencies in Table 66.

Note: XML implementation of iwxxm:SIGMETEvolvingConditionAnalysis is dependent on:
– OMXML [OGC/IS 10-025r1 Observations and Measurements 2.0 – XML Implementation].

Table 66. Requirements class xsd-sigmet-evolving-condition-analysis

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-sigmet-evolving-condition-analysis	
Target type	Data instance
Name	SIGMET evolving condition analysis
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/observation, OMXML clause 7.3
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/sampling, OMXML clause 7.14
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling, OMXML clause 7.15
Dependency	http://def.wmo.int/metce/2013/req/xsd-sampling-observation, 202.6
Dependency	http://icao.int/saf/1.1/req/xsd-airspace, 204.9
Dependency	http://icao.int/iwxxm/1.1/req/xsd-evolving-meteorological-condition, 205.26

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet-evolving-condition-analysis/feature-of-interest The XML element //om:OM_Observation/om:featureOfInterest shall contain a valid child element sams:SF_SpatialSamplingFeature that describes the horizontal extent of the airspace for which the SIGMET report is issued – a sampling surface. The XML element //om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:type shall have the value "http://www.opengis.net/def/samplingFeatureType/OGC-OM/2.0/SF_SamplingSurface".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet-evolving-condition-analysis/sampled-feature The XML element //om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:sampledFeature shall contain a valid child element saf:Airspace that describes the airspace for which the SIGMET report is issued.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet-evolving-condition-analysis/result If reported, the XML element //om:OM_Observation/om:result shall contain a valid child element iwxxm:EvolvingMeteorologicalCondition that describes the characteristics of the SIGMET phenomenon (geometric extent, expected intensity change, speed and direction of motion).
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet-evolving-condition-analysis/phenomenon-time The XML element //om:OM_Observation/om:phenomenonTime shall contain a valid child element gml:TimeInstant that describes the time at which the SIGMET phenomenon was observed or the time for which the characteristics of the SIGMET phenomenon have been forecast.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet-evolving-condition-analysis/result-time The XML element //om:OM_Observation/om:resultTime shall contain a valid child element gml:TimeInstant that describes the time at which the details of the SIGMET phenomenon were made available for dissemination.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-sigmet-evolving-condition-analysis/observed-property The XML attribute //om:OM_Observation/om:observedProperty/@xlink:href should have a value that is the URI of a valid term from Code table D-10: Significant weather phenomena.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-sigmet-evolving-condition-analysis/procedure The value of XML element //om:OM_Observation/om:procedure/metce:Process/gml:description should be used to cite the Technical Regulations relating to the provision of SIGMET reports.

Notes:

1. Dependency http://www.opengis.net/spec/OMXML/2.0/req/observation has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/observation (OMXML clause A.1).
2. Dependency http://www.opengis.net/spec/OMXML/2.0/req/sampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/sampling (OMXML clause A.12).
3. Dependency http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/spatialSampling (OMXML clause A.13).
4. Code table D-10 is published online at http://codes.wmo.int/49-2/SigWxPhenomena.
5. The Technical Regulations relating to the provision of SIGMET reports may be cited as: "*Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 6, section 1 – Specifications related to SIGMET information".
6. In the case of SIGMET cancellation, no characteristics of a SIGMET phenomenon are provided. In these cases, the XML element //om:OM_Observation/om:result has no child elements and the XML attribute //om:OM_Observation/om:result/@nilReason is used to indicate why the "result" is absent.

205.28 Requirements class: Meteorological position

205.28.1 This requirements class is used to describe the forecast position and extent of a specific SIGMET phenomenon, such as volcanic ash or thunderstorm, at the end of the valid period of the SIGMET report. The geometric extent of the SIGMET phenomenon is specified as a two-dimensional horizontal region with bounded vertical extent.

205.28.2 XML elements describing only the geometry of a SIGMET phenomenon shall conform to all requirements specified in Table 67.

205.28.3 XML elements describing only the geometry of a SIGMET phenomenon shall conform to all requirements of all relevant dependencies specified in Table 67.

Table 67. Requirements class xsd-meteorological-position

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-meteorological-position	
Target type	Data instance
Name	Meteorological position
Dependency	http://icao.int/saf/1.1/req/xsd-airspace-volume, 204.8
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-position/valid The content model of this element shall have a value that matches the content model of iwxxm:MeteorologicalPosition.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-position/geometry The geometric extent of the SIGMET phenomenon shall be reported using the XML element //iwxxm:MeteorologicalPosition/iwxxm:geometry with valid child element saf:AirspaceVolume.

205.29 Requirements class: Meteorological position collection

205.29.1 This requirements class is used to describe a collection of geometries for a specific SIGMET phenomenon, such as volcanic ash or thunderstorm, at the end of the valid period of the SIGMET report.

205.29.2 XML elements describing a collection of geometries for a SIGMET phenomenon shall conform to all requirements specified in Table 68.

205.29.3 XML elements describing a collection of geometries for a SIGMET phenomenon shall conform to all requirements of all relevant dependencies specified in Table 68.

Table 68. Requirements class xsd-meteorological-position-collection

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-meteorological-position-collection	
Target type	Data instance
Name	Meteorological position collection
Dependency	http://icao.int/iwxxm/1.1/req/xsd-meteorological-position, 205.28
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-position-collection/valid The content model of this element shall have a value that matches the content model of iwxxm:MeteorologicalPositionCollection.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-meteorological-position-collection/members If reported, the geometries for a specific SIGMET phenomenon shall be provided using the XML element //iwxxm:MeteorologicalPositionCollection/iwxxm:member with valid child element iwxxm:MeteorologicalPosition.

205.30 Requirements class: SIGMET position analysis

205.30.1 This requirements class is used to describe the details of how the forecast position of a SIGMET phenomenon at the end of the valid period of a SIGMET report was evaluated.

205.30.2 This requirements class restricts the content model of om:OM_Observation such that the “result” of the observation describes the collection of forecast positions of a specific

SIGMET phenomenon, the "feature of interest" is the bounded extent of the airspace for which the SIGMET report is issued and the "procedure" provides the set of information as specified by WMO.

Note. SIGMETPositionAnalysis is a subclass of SamplingObservation defined within METCE.

205.30.3 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/SIGMETPositionAnalysis shall conform to all requirements in Table 69.

205.30.4 Instances of om:OM_Observation with element om:type specifying http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/SIGMETPositionAnalysis shall conform to all requirements of all relevant dependencies in Table 69.

Note: XML implementation of iwxxm:SIGMETPositionAnalysis is dependent on:
– OMXML [OGC/IS 10-025r1 Observations and Measurements 2.0 – XML Implementation].

Table 69. Requirements class xsd-sigmet-position-analysis

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-sigmet-position-analysis	
Target type	Data instance
Name	SIGMET position analysis
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/observation, OMXML clause 7.3
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/sampling, OMXML clause 7.14
Dependency	http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling, OMXML clause 7.15
Dependency	http://def.wmo.int/metce/2013/req/xsd-sampling-observation, 202.6
Dependency	http://icao.int/saf/1.1/req/xsd-airspace, 204.9
Dependency	http://icao.int/iwxxm/1.1/req/xsd-meteorological-position-collection, 205.29
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet-position-analysis/feature-of-interest The XML element //om:OM_Observation/om:featureOfInterest shall contain a valid child element sams:SF_SpatialSamplingFeature that describes the horizontal extent of the airspace for which the SIGMET report is issued – a sampling surface. The XML element //om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:type shall have the value "http://www.opengis.net/def/samplingFeatureType/OGC-OM/2.0/SF_SamplingSurface".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet-position-analysis/sampled-feature The XML element //om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:sampledFeature shall contain a valid child element saf:Airspace that describes the airspace for which the SIGMET report is issued.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet-position-analysis/result The XML element //om:OM_Observation/om:result shall contain a valid child element iwxxm:MeteorologicalPositionCollection that describes the collection of forecast positions of a specific SIGMET phenomenon.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet-position-analysis/phenomenon-time The XML element //om:OM_Observation/om:phenomenonTime shall contain a valid child element gml:TimeInstant that describes the time for which the collection of positions of the SIGMET phenomenon have been forecast.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet-position-analysis/result-time The XML element //om:OM_Observation/om:resultTime shall contain a valid child element gml:TimeInstant that describes the time at which the details of the SIGMET phenomenon positions were made available for dissemination.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-sigmet-position-analysis/observed-property The XML attribute //om:OM_Observation/om:observedProperty/@xlink:href should have a value that is the URI of a valid term from Code table D-10: Significant weather phenomena.

Requirements class	
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-sigmet-position-analysis/procedure The value of XML element //om:OM_Observation/om:procedure/metce:Process/gml:description should be used to cite the Technical Regulations relating to the provision of SIGMET reports.

Notes:

1. Dependency http://www.opengis.net/spec/OMXML/2.0/req/observation has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/observation (OMXML clause A.1).
2. Dependency http://www.opengis.net/spec/OMXML/2.0/req/sampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/sampling (OMXML clause A.12).
3. Dependency http://www.opengis.net/spec/OMXML/2.0/req/spatialSampling has associated conformance class http://www.opengis.net/spec/OMXML/2.0/conf/spatialSampling (OMXML clause A.13).
4. Code table D-10 is published online at http://codes.wmo.int/49-2/SigWxPhenomena.
5. The Technical Regulations relating to the provision of SIGMET reports may be cited as: "*Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 6, section 1 – Specifications related to SIGMET information".

205.31 Requirements class: SIGMET

205.31.1 This requirements class is used to describe the SIGMET report within which the characteristics of a specific SIGMET phenomenon are described.

Note: The reporting requirements for SIGMETs are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 6, section 1.

205.31.2 XML elements describing SIGMET reports shall conform to all requirements specified in Table 70.

205.31.3 XML elements describing SIGMET reports shall conform to all requirements of all relevant dependencies specified in Table 70.

Table 70. Requirements class xsd-sigmet

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-sigmet	
Target type	Data instance
Name	SIGMET
Dependency	http://icao.int/saf/1.1/req/xsd-aeronautical-service-provision-units, 204.7
Dependency	http://icao.int/iwxxm/1.1/req/xsd-sigmet-evolving-condition-analysis, 205.27
Dependency	http://icao.int/iwxxm/1.1/req/xsd-sigmet-position-analysis, 205.30
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet/valid The content model of this element shall have a value that matches the content model of iwxxm:SIGMET.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet/status The status of the SIGMET shall be indicated using the XML attribute @status with the value being one of the enumeration: "NORMAL" or "CANCELLATION".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet/issuing-air-traffic-services-unit The air traffic services unit responsible for the subject airspace shall be indicated using the XML element //iwxxm:issuingAirTrafficServicesUnit with a valid child element saf:Unit.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet/originating-meteorological-watch-office The meteorological watch office that originated the SIGMET report shall be indicated using the XML element //iwxxm:originatingMeteorologicalWatchOffice with a valid child element saf:Unit. The value of XML element //iwxxm:issuingAirTrafficServicesUnit/saf:Unit/saf:type shall be "MWO" (Meteorological Watch Office).

Requirements class	
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet/sequence-number The sequence number of this SIGMET report shall be indicated using XML element //iwxxm:sequenceNumber.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet/valid-period The period of validity of this SIGMET report shall be indicated using XML element //iwxxm:validPeriod with valid child element gml:TimePeriod.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet/phenomenon The XML attribute //iwxxm:phenomenon/@xlink:href shall have a value that is the URI of a valid term from Code table D-10: Significant weather phenomena.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet/unique-subject-airspace All SIGMET analyses included in the report shall refer to the same airspace. All values of XML element //om:OM_Observation/om:featureOfInterest/sams:SF_SpatialSamplingFeature/sam:sampledFeature/saf:Airspace/gml:identifier within the SIGMET shall be identical.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet/analysis If reported, XML element //iwxxm:analysis shall contain a valid child element //om:OM_Observation of type SIGMETEvolvingConditionAnalysis. The value of XML attribute //iwxxm:analysis/om:OM_Observation/om:type/@xlink:href shall be the URI "http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/SIGMETEvolvingConditionAnalysis".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet/forecast-position-analysis If reported, the forecast position of the phenomenon shall be reported using the XML element //iwxxm:forecastPositionAnalysis with valid child element //om:OM_Observation of type SIGMETPositionAnalysis. The value of XML attribute //iwxxm:forecastPositionAnalysis/om:OM_Observation/om:type/@xlink:href shall be the URI "http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/SIGMETPositionAnalysis".
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet/status-normal If the status of the SIGMET is "NORMAL" (as specified by XML attribute @status), then: (i) The characteristics of the SIGMET phenomenon shall be reported using one or more of the XML element //iwxxm:analysis; (ii) Each XML element //iwxxm:analysis shall contain a valid element //iwxxm:analysis/om:OM_Observation/om:result/iwxxm:EvolvingMeteorologicalCondition within which the characteristics of the SIGMET phenomenon are described; (iii) The XML element //iwxxm:cancelledSequenceNumber shall be absent; and (iv) The XML element //iwxxm:cancelledValidPeriod shall be absent.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-sigmet/status-cancellation If the status of the SIGMET is "CANCELLATION" (as specified by XML attribute @status), then: (i) The details of the airspace for which the SIGMET has been cancelled shall be provided by a single instance of XML element //iwxxm:analysis; (ii) The XML element //iwxxm:analysis/om:OM_Observation/om:result shall have no child elements and XML attribute //iwxxm:analysis/om:OM_Observation/om:result/@nilReason shall provide an appropriate nil-reason; (iii) The value of XML element //iwxxm:cancelledSequenceNumber shall indicate the sequence number of the SIGMET that has been cancelled; and (iv) The XML element //iwxxm:cancelledValidPeriod shall contain a valid child element gml:TimePeriod that indicates the validity period of the SIGMET that has been cancelled.
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-sigmet/issuing-air-traffic-services-unit-type The value of XML element //iwxxm:SIGMET/iwxxm:issuingAirTrafficServicesUnit/saf:Unit/saf:type should be one of the enumeration: "ATSU" (Air Traffic Services Unit) or "FIC" (Flight Information Centre).
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-sigmet/valid-period-start-matches-result-time The start time of the validity period of the SIGMET report (expressed using XML element //iwxxm:validPeriod/gml:TimePeriod/gml:beginPosition) should match the result time of each SIGMET analysis included within the report (expressed using XML element //om:OM_Observation/om:resultTime/gml:TimeInstant/gml:timePosition).

Requirements class	
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-sigmet/valid-time-includes-all-phenomenon-times The observation and/or forecast times of all SIGMET analyses and, if reported, forecast position analyses included in the report (specified by XML element //om:OM_Observation/om:phenomenonTime/*) should occur within the valid time period of the SIGMET (specified by XML element //iwxxm:validPeriod/gml:TimePeriod).
Recommendation	http://icao.int/iwxxm/1.1/req/xsd-sigmet/7-point-definition-of-airspace-volume The horizontal extent of any airspace volumes enclosing a SIGMET phenomenon (reported using XML element //om:OM_Observation/om:result/*/iwxxm:geometry/saf:AirspaceVolume/saf:horizontalProjection) should use no more than seven points to define the bounding polygon.

Notes:

1. Requirements relating to sequence numbers within SIGMET reports are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 6, 1.1.3.
2. Requirements for reporting the SIGMET phenomenon are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 6, 1.1.4.
3. A forecast position may be provided for a volcanic ash cloud, the centre of a tropical cyclone or other hazardous phenomena at the end of the validity period of the SIGMET message.
4. Within an XML encoded SIGMET, it is likely that only one instance of saf:Airspace will physically be present; subsequent assertions about the airspace may use xlinks to refer to the previously defined saf:Airspace element in order to keep the XML document size small. As such, validation of requirement http://icao.int/iwxxm/1.1/req/xsd-sigmet/unique-subject-airspace is applied once any xlinks, if used, have been resolved.
5. Code table D-1 provides a set of nil reason codes and is published at http://codes.wmo.int/common/nil.
6. Code table D-10 is published online at http://codes.wmo.int/49-2/SigWxPhenomena.

205.32 Requirements class: Volcanic ash SIGMET

205.32.1 This requirements class is used to describe the volcanic ash (VA) SIGMET report, which includes additional information about the source volcano and the forecast position of the volcanic ash at the end of the validity period of the SIGMET.

205.32.2 XML elements describing VA SIGMET reports shall conform to all requirements specified in Table 71.

205.32.3 XML elements describing VA SIGMET reports shall conform to all requirements of all relevant dependencies specified in Table 71.

Table 71. Requirements class xsd-volcanic-ash-sigmet

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-volcanic-ash-sigmet	
Target type	Data instance
Name	Volcanic ash SIGMET
Dependency	http://def.wmo.int/metce/2013/req/xsd-erupting-volcano, 202.8
Dependency	http://icao.int/iwxxm/1.1/req/xsd-sigmet, 205.31
Requirement	http://icao.int/iwxxm/1.1/req/xsd-volcanic-ash-sigmet/valid The content model of this element shall have a value that matches the content model of iwxxm:VolcanicAshSIGMET.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-volcanic-ash-sigmet/source-volcano Details of the volcano that is the source of the volcanic ash shall be reported using the XML element //iwxxm:eruptingvolcano with valid child element metce:Volcano (or element in the substitution group of metce:Volcano).
Requirement	http://icao.int/iwxxm/1.1/req/xsd-volcanic-ash-sigmet/phenomenon The XML attribute //iwxxm:phenomenon/@xlink:href shall have a value that is the URI "http://codes.wmo.int/49-2/SigWxPhenomena/VA".

205.33 Requirements class: Tropical cyclone SIGMET

205.33.1 This requirements class is used to describe the tropical cyclone (TC) SIGMET report, which includes additional information about the tropical cyclone itself and the forecast position of the tropical cyclone at the end of the validity period of the SIGMET.

205.33.2 XML elements describing TC SIGMET reports shall conform to all requirements specified in Table 72.

205.33.2 XML elements describing TC SIGMET reports shall conform to all requirements of all relevant dependencies specified in Table 72.

Table 72. Requirements class xsd-tropical-cyclone-sigmet

Requirements class	
http://icao.int/iwxxm/1.1/req/xsd-tropical-cyclone-sigmet	
Target type	Data instance
Name	Tropical cyclone SIGMET
Dependency	http://def.wmo.int/metce/2013/req/xsd-tropical-cyclone, 202.9
Dependency	http://icao.int/iwxxm/1.1/req/xsd-sigmet, 205.31
Requirement	http://icao.int/iwxxm/1.1/req/xsd-tropical-cyclone-sigmet/valid The content model of this element shall have a value that matches the content model of iwxxm:TropicalCycloneSIGMET.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-tropical-cyclone-sigmet/cyclone Details of the tropical cyclone shall be reported using the XML element //iwxxm:tropicalCyclone with valid child element metce:TropicalCyclone.
Requirement	http://icao.int/iwxxm/1.1/req/xsd-tropical-cyclone-sigmet/phenomenon The XML attribute //iwxxm:phenomenon/@xlink:href shall have a value that is the URI "http://codes.wmo.int/49-2/SigWxPhenomena/TC".

APPENDIX A. CODE TABLES

CODE TABLE D-1: NIL REASONS

Nil-reason terms are used to provide an explanation for recording a missing (or void) value within a data product. Terms are drawn from authorities in addition to WMO including ISO/TC 211 (from ISO 19136:2007, Geographic Information – Geography Markup Language, clause 8.2.3.1; published on behalf of ISO by the Open Geospatial Consortium). The *code-space* indicates the authority under which the nil-reason terms are published. A URI for each nil-reason term is composed by appending the *notation* to the *code-space*. As an example, the URI of *notDetectedByAutoSystem* is http://codes.wmo.int/common/nil/notDetectedByAutoSystem. The URI is also a URL providing additional information about the associated nil-reason term. This code table is published at http://codes.wmo.int/common/nil.

Label	*Notation*	*Code-space*	*Description*
Above detection range	AboveDetectionRange	http://www.opengis.net/def/nil/OGC/0/	The value was above the detection range of the instrument used to estimate it.
Below detection range	BelowDetectionRange	http://www.opengis.net/def/nil/OGC/0/	The value was below the detection range of the instrument used to estimate it.
Inapplicable	inapplicable	http://www.opengis.net/def/nil/OGC/0/	There is no value.
Missing	missing	http://www.opengis.net/def/nil/OGC/0/	The correct value is not readily available to the sender of these data. Furthermore, a correct value may not exist.
No significant change (NOSIG)	noSignificantChange	http://codes.wmo.int/common/nil/	No significant change is expected to occur.
Nothing detected by automated system	notDetectedByAutoSystem	http://codes.wmo.int/common/nil/	The automated observing system did not detect a value (for example, no cloud detected “NCD”).
Not observable	notObservable	http://codes.wmo.int/common/nil/	A system failure, sensor failure, or sensor obstruction prevented the intended observation of the value.
Nothing of operational significance	nothingOfOperationalSignificance	http://codes.wmo.int/common/nil/	Nothing was observed or forecast of operational significance (for example, nil significant cloud “NSC”, nil significant weather “NSW”).
Template	template	http://www.opengis.net/def/nil/OGC/0/	The value will be available later.
Unknown	unknown	http://www.opengis.net/def/nil/OGC/0/	The correct value is not known to, and not computable by, the sender of the data. However, a correct value probably exists.
Withheld	withheld	http://www.opengis.net/def/nil/OGC/0/	The value is not divulged.

CODE TABLE D-2: PHYSICAL QUANTITY KINDS

The uniform resource identifier (URI) of each physical quantity kind is composed by the prefix http://codes.wmo.int/common/quantity-kind/ and the notation. As an example, the URI of airTemperature is http://codes.wmo.int/common/quantity-kind/airTemperature. The URI can be used in the XML code format and is also a URL providing comprehensive information regarding the physical quantity kind.

Meteorological quantities

Label	*Notation*	*Description*	*Dimensions*
Air temperature	airTemperature	The temperature indicated by a thermometer exposed to the air in a place sheltered from direct solar radiation.	Θ
Atmospheric pressure	atmosphericPressure	The atmospheric pressure on a given surface is the force per unit area exerted by virtue of the weight of the atmosphere above. The pressure is thus equal to the weight of a vertical column of air above a horizontal projection of the surface, extending to the outer limit of the atmosphere.	$ML^{-1}T^{-2}$
Dewpoint temperature	dewPointTemperature	The temperature to which a given air parcel must be cooled at constant pressure and constant water vapour content in order for saturation to occur.	Θ
Height of base of cloud	heightOfBaseOfCloud	For a given cloud or cloud layer, vertical distance (measured from local ground surface) of the lowest level in the atmosphere at which the air contains a perceptible quantity of cloud particles.	L
Horizontal visibility	horizontalVisibility	The greatest distance determined in the horizontal plane at the ground surface that prominent objects can be seen and identified by unaided, normal eyes.	L
Maximum wind gust speed	maximumWindGustSpeed	Nominal maximum speed of wind during a given period; usually determined as a mean wind speed over a short duration (for example, 1 minute) within a longer period (for example, 10 minutes).	LT^{-1}
Sea-surface temperature	seaSurfaceTemperature	Temperature of the sea water at surface.	Θ
Vertical visibility	verticalVisibility	Maximum distance at which an observer can see and identify an object on the same vertical as himself or herself, above or below.	L

Oceanographic quantities

Label	*Notation*	*Description*	*Dimensions*
Sea-surface temperature	seaSurfaceTemperature	Temperature of the sea water at surface.	Θ

Aeronautical quantities

Label	*Notation*	*Description*	*Dimensions*
Aerodrome maximum wind gust speed	aerodromeMaximumWindGustSpeed	Maximum wind speed in the 10-minute period of observation. It is reported only if it exceeds the mean speed by 5 m s^{-1} (10 knots).	LT^{-1}
Aerodrome mean wind direction	aerodromeMeanWindDirection	The mean true direction in degrees from which the wind is blowing over the 10-minute period immediately preceding the observation. When the 10-minute period includes a marked discontinuity in the wind characteristics (see Note), only data after the discontinuity shall be used for mean wind direction and variations of the wind direction, hence the time interval in these circumstances shall be correspondingly reduced.	dimensionless
Aerodrome mean wind speed	aerodromeMeanWindSpeed	The mean speed of the wind over the 10-minute period immediately preceding the observation. When the 10-minute period includes a marked discontinuity in the wind characteristics (see Note), only data after the discontinuity shall be used for obtaining mean wind speed, hence the time interval in these circumstances shall be correspondingly reduced.	LT^{-1}
Aerodrome minimum horizontal visibility	aerodromeMinimumHorizontalVisibility	The minimum horizontal visibility that is reported when the horizontal visibility is not the same in different directions and when the minimum visibility is different from the prevailing visibility, and less than 1 500 metres or less than 50% of the prevailing visibility, and less than 5 000 metres.	L
Aerodrome minimum visibility direction	aerodromeMinimumVisibilityDirection	When the minimum horizontal visibility is reported, its general direction in relation to the aerodrome reference point has to be reported and indicated by reference to one of the eight points of the compass. If the minimum visibility is observed in more than one direction, the Dv shall represent the most operationally significant direction.	dimensionless
Aeronautical prevailing horizontal visibility	aeronauticalPrevailingHorizontalVisibility	The greatest visibility value, observed in accordance with the definition of visibility, which is reached within at least half the horizon circle or within at least half of the surface of the aerodrome. These areas could comprise contiguous or non-contiguous sectors.	L
Aeronautical visibility	aeronauticalVisibility	The greater of: (a) The greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognized when observed against a bright background; (b) The greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background.	L
Altimeter setting (QNH)	altimeterSettingQnh	Altimeter setting (also known as QNH) is defined as barometric pressure adjusted to sea level. It is a pressure setting used by pilots, air traffic control (ATC) and low frequency weather beacons to refer to the barometric setting which, when set on an aircraft's altimeter, will cause the altimeter to read altitude above mean sea level within a certain defined region.	$ML^{-1}T^{-2}$

Label	*Notation*	*Description*	*Dimensions*
Depth of runway deposit	depthOfRunwayDeposit	Depth of deposit on surface of runway.	L
Runway contamination coverage	runwayContaminationCoverage	Proportion of runway that is contaminated. A runway is considered to be contaminated when more than 25% of the runway surface area (whether in isolated areas or not) within the required length and width being used is covered by the following: (a) Surface water more than 3 mm deep, or by slush or loose snow equivalent to more than 3 mm of water; (b) Snow which has been compressed into a solid mass which resists further compression and will hold together or break into lumps if picked up (compacted snow); or (c) Ice, including wet ice.	dimensionless
Runway friction coefficient	runwayFrictionCoefficient	Quantitative assessment of friction coefficient of runway surface.	dimensionless
Runway visual range (RVR)	runwayVisualRangeRvr	The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.	L

Note: A marked discontinuity occurs when there is an abrupt and sustained change in wind direction of 30° or more, with a wind speed of 5 m s^{-1} (10 KT) or more before or after the change, or a change in wind speed of 5 m s^{-1} (10 KT) or more, lasting at least two minutes.

CODE TABLE: FM 201 – COLLECT

There are no code tables that are specific to FM 201.

CODE TABLE: FM 202 – METCE

CODE TABLE D-3: METCE OBSERVATION TYPES

The items within this code table are specialized observation or measurement types defined within the *Modèle pour l'échange des informations sur le temps, le climat et l'eau* (METCE). Each observation or measurement type listed herein is specified as a class in METCE that derives from the OM_Observation class (defined in ISO 19156, Geographic information – Observations and measurements, clause 6.2) or subclass thereof. A URI for each observation type is composed by appending the *notation* to the *code-space*. As an example, the URI of ComplexSamplingMeasurement is http://codes.wmo.int/common/observation-type/METCE/2013/ComplexSamplingMeasurement. The URI is also a URL providing additional information about the associated observation type. This code table is published at http://codes.wmo.int/common/observation-type/METCE/2013.

Label	*Notation*	*Code-space*	*Description*
Complex sampling measurement	ComplexSamplingMeasurement	http://codes.wmo.int/common/observation-type/METCE/2013/	ComplexSamplingMeasurement (a subclass of OM_ComplexObservation) is intended for use where the observation event is concerned with the evaluation of multiple measurands at a specified location and time instant or duration. The result of this observation type shall refer to an entity of metatype Record (from ISO 19103). ComplexSamplingMeasurement enforces the following additional constraints: "featureOfInterest"' shall refer to an entity of type SF_SpatialSamplingFeature (from ISO 19156), or subclass thereof; and "procedure" shall refer to an entity of type Process (from METCE), or subclass thereof. The OM_ComplexObservation is used because the "result" of this class of observations is a group of measures, provided as a record. Again, this matches the WMO application domain wherein multiple phenomena are measured within a single "observation event". The term measurement is used in the name in an attempt to reduce confusion arising from the overloading of the term observation.

Label	*Notation*	*Code-space*	*Description*
Sampling coverage measurement	SamplingCoverageMeasurement	http://codes.wmo.int/common/observation-type/METCE/2013/	SamplingCoverageMeasurement (a subclass of OM_DiscreteCoverageObservation) is intended for use where the observation is concerned with the evaluation of measurands that vary with respect to space and/or time – the result of this observation type shall refer to an entity of type CV_DiscreteCoverage (from ISO 19123). ComplexSamplingMeasurement enforces the following additional constraints: "featureOfInterest" shall refer to an entity of type SF_SpatialSamplingFeature (from ISO 19156), or subclass thereof; and "procedure" shall refer to an entity of type Process (from METCE), or subclass thereof. The class "SamplingCoverageMeasurement" is based on the SamplingCoverageObservation which is defined in an informative annex of ISO 19156. The term measurement is used in the name in an attempt to reduce confusion arising from the overloading of the term observation.
Sampling observation	SamplingObservation	http://codes.wmo.int/common/observation-type/METCE/2013/	SamplingObservation (a subclass of OM_Observation) provides a general-purpose observation type. It enforces the following additional constraints: "featureOfInterest" shall refer to an entity of type SF_SpatialSamplingFeature (from ISO 19156), or subclass thereof; and "procedure" shall refer to an entity of type Process (from METCE), or subclass thereof. SamplingObservation is intended for use where measurement of physical phenomena is not the goal of the procedure. For example, the procedure executed to define SIGMET reports results in the identification of areas of turbulence, icing or other meteorological phenomena.

CODE TABLE: FM 203 – OPM

There are no code tables that are specific to FM 203.

CODE TABLE: FM 204 – SAF

There are no code tables that are specific to FM 204.

CODE TABLE: FM 205 – IWXXM

CODE TABLE D-4: IWXXM OBSERVATION TYPES

The items within this code table are specialized observation or measurement types defined within the ICAO Meteorological Information Exchange Model (IWXXM). Each observation or measurement type listed herein is specified as a class in IWXXM that derives from the OM_Observation class (defined in ISO 19156, Geographic information – Observations and measurements, clause 6.2) or subclass thereof. A URI for each observation type is composed by appending the *notation* to the *code-space*. As an example, the URI of MeteorologicalAerodromeForecast is http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/MeteorologicalAerodromeForecast. The URI is also a URL providing additional information about the associated observation type. This code table is published at http://codes.wmo.int/49-2/observation-type/IWXXM/1.0.

Label	*Notation*	*Code-space*	*Description*
Meteorological aerodrome forecast	MeteorologicalAerodromeForecast	http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/	MeteorologicalAerodromeForecast (a subclass of ComplexSamplingMeasurement from METCE) is intended for use when reporting an aggregate set of forecast meteorological conditions at an aerodrome. The result of this observation type shall refer to an entity of type MeteorologicalAerodromeForecastRecord. MeteorologicalAerodromeForecast enforces the following additional constraints: "featureOfInterest" shall refer to an entity of type SF_SamplingPoint and the associated "sampledFeature" must be an aerodrome. This class is also related but not identical to MeteorologicalAerodromeTrendForecast which is reported on a METAR/SPECI – conditions reported in trend forecasts in METAR/SPECI differ from forecast groups in a TAF. The TAF forecast group from/to variants (FM, TL, AT, etc.) are represented on the OM_Observation validTime, which is always an instance of TM_Period. When there is only an instant at which a condition occurs, the start and end times are the same.

Label	*Notation*	*Code-space*	*Description*
Meteorological aerodrome observation	MeteorologicalAerodromeObservation	http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/	MeteorologicalAerodromeObservation (a subclass of ComplexSamplingMeasurement from METCE) is intended for use when reporting an aggregate set of observed meteorological conditions at an aerodrome. The result of this observation type shall refer to an entity of type MeteorologicalAerodromeObservationRecord. MeteorologicalAerodromeObservation enforces the following additional constraints: "featureOfInterest" shall refer to an entity of type SF_SamplingPoint and the associated "sampledFeature" must be an aerodrome. MeteorologicalAerodromeObservation has a peer class for forecast information at an aerodrome: MeteorologicalAerodromeTrendForecast.
Meteorological aerodrome trend forecast	MeteorologicalAerodromeTrendForecast	http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/	MeteorologicalAerodromeTrendForecast (a subclass of ComplexSamplingMeasurement from METCE) is intended for use when reporting an aggregate set of forecast meteorological conditions at an aerodrome. The result of this observation type shall refer to an entity of type MeteorologicalAerodromeTrendForecastRecord. MeteorologicalAerodromeTrendForecast enforces the following additional constraints: "featureOfInterest" shall refer to an entity of type SF_SamplingPoint and the associated "sampledFeature" must be an aerodrome. MeteorologicalAerodromeTrendForecasts are reported in surface observation reports such as SPECI and METAR. MeteorologicalAerodromeTrendForecast has a peer class for observation information at an aerodrome (MeteorologicalAerodromeObservation) which is also reported on a METAR and SPECI for observed phenomena. This class is also related but not identical to MeteorologicalAerodromeForecast which is reported on a TAF – conditions reported in trend forecasts in METAR/SPECI differ from forecast groups in a TAF.

Label	*Notation*	*Code-space*	*Description*
SIGMET evolving condition analysis	SIGMETEvolvingConditionAnalysis	http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/	SIGMETEvolvingConditionAnalysis (a subclass of SamplingObservation from METCE) is intended for use when reporting an observed or forecast aggregate set of meteorological conditions hazardous to flight over a large airspace, including anticipated intensity change plus speed and direction of motion. The result of this observation type shall refer to a single EvolvingMeteorologicalCondition which represents a SIGMET observation or forecast of meteorological conditions. SIGMETEvolvingConditionAnalysis enforces the following additional constraints: “featureOfInterest” shall refer to an entity of type SF_SamplingSurface and the associated “sampledFeature” must be an airspace.
SIMGET position analysis	SIGMETPositionAnalysis	http://codes.wmo.int/49-2/observation-type/IWXXM/1.0/	SIGMETPositionAnalysis (a subclass of SamplingObservation from METCE) is intended for use when reporting the forecast position of meteorological conditions hazardous to flight. The result of this observation type shall refer to one or more MeteorologicalPositions which represents the forecast positions of SIGMET phenomena. SIGMETPositionAnalysis enforces the following additional constraints: “featureOfInterest” shall refer to an entity of type SF_SamplingSurface and the associated “sampledFeature”must be an airspace.

CODE TABLE D-5: IWXXM OBSERVABLE PROPERTIES

The items within this code table are composite observable properties that define the set of physical properties evaluated as a result of regulated procedures specified in the *Technical Regulations* (WMO-No. 49), Volume II – Meteorological Service for International Air Navigation. These include aerodrome observation and forecast reports (for example, METAR, SPECI and TAF). A URI for each observable property is composed by appending the *notation* to the *code-space*. As an example, the URI of MeteorologicalAerodromeForecast is http://codes.wmo.int/49-2/observable-property/MeteorologicalAerodromeForecast. The URI is also a URL providing additional information about the associated observable property. This code table is published at http://codes.wmo.int/49-2/observable-property.

Label	*Notation*	*Code-space*	*Description*
Meteorological aerodrome forecast	MeteorologicalAerodromeForecast	http://codes.wmo.int/49-2/observable-property/	The set of physical properties evaluated as a result of an aerodrome forecast (TAF), as specified in the *Technical Regulations* (WMO-No. 49), Volume II – Meteorological Service for International Air Navigation.
Meteorological aerodrome observation	MeteorologicalAerodromeObservation	http://codes.wmo.int/49-2/observable-property/	The set of physical properties evaluated as a result of the observation procedure of a routine or special aerodrome meteorological report (METAR or SPECI), as specified in the *Technical Regulations* (WMO-No. 49), Volume II – Meteorological Service for International Air Navigation.
Meteorological aerodrome trend forecast	MeteorologicalAerodromeTrendForecast	http://codes.wmo.int/49-2/observable-property/	The set of physical properties evaluated as a result of the trend forecast procedure of a routine or special aerodrome meteorological report (METAR or SPECI), as specified in the *Technical Regulations* (WMO-No. 49), Volume II – Meteorological Service for International Air Navigation.

CODE TABLE D-6: AERODROME RECENT WEATHER

The items within this code table are the weather types that may be reported within a meteorological aerodrome observation report that have occurred during the period since the last issued routine report or last hour, whichever is shorter, but are not observed at the time of the observation. Requirements for reporting recent weather at an aerodrome are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 4.8.1.1.

This code table contains the set of weather types that are permitted for reporting recent weather. These are a subset of the enumerated set of meteorologically valid combinations specified in Volume I.1, Code table 4678 comprising the following elements: intensity or proximity; descriptor; precipitation; obscuration; and/or other.

Each weather type is uniquely identified using a URI. The URI is also a URL providing additional information about the associated weather type. This code table is published at http://codes.wmo.int/49-2/AerodromeRecentWeather.

Label	*Notation*	*URI*
Blowing snow	REBLSN	http://codes.wmo.int/306/4678/BLSN
Duststorm	REDS	http://codes.wmo.int/306/4678/DS
Precipitation of drizzle	REDZ	http://codes.wmo.int/306/4678/DZ
Funnel cloud(s) (tornado or waterspout)	REFC	http://codes.wmo.int/306/4678/FC
Precipitation of freezing drizzle	REFZDZ	http://codes.wmo.int/306/4678/FZDZ
Precipitation of freezing rain	REFZRA	http://codes.wmo.int/306/4678/FZRA
Unidentified freezing precipitation	REFZUP	http://codes.wmo.int/306/4678/FZUP
Precipitation of ice pellets	REPL	http://codes.wmo.int/306/4678/PL
Precipitation of rain	RERA	http://codes.wmo.int/306/4678/RA
Precipitation of snow grains	RESG	http://codes.wmo.int/306/4678/SG
Showery precipitation of hail	RESHGR	http://codes.wmo.int/306/4678/SHGR
Showery precipitation of snow pellets/small hail	RESHGS	http://codes.wmo.int/306/4678/SHGS
Showery precipitation of rain	RESHRA	http://codes.wmo.int/306/4678/SHRA
Showery precipitation of snow	RESHSN	http://codes.wmo.int/306/4678/SHSN
Unidentified showery precipitation	RESHUP	http://codes.wmo.int/306/4678/SHUP
Precipitation of snow	RESN	http://codes.wmo.int/306/4678/SN
Sandstorm	RESS	http://codes.wmo.int/306/4678/SS
Thunderstorm	RETS	http://codes.wmo.int/306/4678/TS
Thunderstorm with precipitation of hail	RETSGR	http://codes.wmo.int/306/4678/TSGR
Thunderstorm with precipitation of snow pellets/small hail	RETSGS	http://codes.wmo.int/306/4678/TSGS
Thunderstorm with precipitation of rain	RETSRA	http://codes.wmo.int/306/4678/TSRA
Thunderstorm with precipitation of snow	RETSSN	http://codes.wmo.int/306/4678/TSSN
Thunderstorm with unidentified precipitation	RETSUP	http://codes.wmo.int/306/4678/TSUP
Unidentified precipitation	REUP	http://codes.wmo.int/306/4678/UP
Volcanic ash	REVA	http://codes.wmo.int/306/4678/VA

CODE TABLE D-7: AERODROME PRESENT OR FORECAST WEATHER

The items within this code table are the weather phenomena that may be reported as forecast to occur or have been observed at an aerodrome. Requirements for reporting present or forecast weather at an aerodrome are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, 4.4 (observation), and Appendix 5, 2.2.4 (trend forecast) and 1.2.3 (for TAF).

The weather phenomena listed here are a subset of the enumerated set of meteorologically valid combinations specified in Volume I.1, Code table 4678 comprising the following elements: intensity or proximity; descriptor; precipitation; obscuration; and/or other.

Each weather type is uniquely identified using a URI. The URI is also a URL providing additional information about the associated weather type. This code table is published at http://codes.wmo.int/49-2/AerodromePresentOrForecastWeather.

Label	*Notation*	*URI*
Light precipitation of drizzle	-DZ	http://codes.wmo.int/306/4678/-DZ
Light precipitation of rain	-RA	http://codes.wmo.int/306/4678/-RA
Light precipitation of snow	-SN	http://codes.wmo.int/306/4678/-SN
Light precipitation of snow grains	-SG	http://codes.wmo.int/306/4678/-SG
Light precipitation of ice pellets	-PL	http://codes.wmo.int/306/4678/-PL
Light unidentified precipitation	-UP	http://codes.wmo.int/306/4678/-UP
Light precipitation of drizzle and rain	-DZRA	http://codes.wmo.int/306/4678/-DZRA
Light precipitation of rain and drizzle	-RADZ	http://codes.wmo.int/306/4678/-RADZ
Light precipitation of snow and drizzle	-SNDZ	http://codes.wmo.int/306/4678/-SNDZ
Light precipitation of snow grains and drizzle	-SGDZ	http://codes.wmo.int/306/4678/-SGDZ
Light precipitation of ice pellets and drizzle	-PLDZ	http://codes.wmo.int/306/4678/-PLDZ
Light precipitation of drizzle and snow	-DZSN	http://codes.wmo.int/306/4678/-DZSN
Light precipitation of rain and snow	-RASN	http://codes.wmo.int/306/4678/-RASN
Light precipitation of snow and rain	-SNRA	http://codes.wmo.int/306/4678/-SNRA
Light precipitation of snow grains and rain	-SGRA	http://codes.wmo.int/306/4678/-SGRA
Light precipitation of ice pellets and rain	-PLRA	http://codes.wmo.int/306/4678/-PLRA
Light precipitation of drizzle and snow grains	-DZSG	http://codes.wmo.int/306/4678/-DZSG
Light precipitation of rain and snow grains	-RASG	http://codes.wmo.int/306/4678/-RASG
Light precipitation of snow and snow grains	-SNSG	http://codes.wmo.int/306/4678/-SNSG
Light precipitation of snow grains and snow	-SGSN	http://codes.wmo.int/306/4678/-SGSN
Light precipitation of ice pellets and snow	-PLSN	http://codes.wmo.int/306/4678/-PLSN
Light precipitation of drizzle and ice pellets	-DZPL	http://codes.wmo.int/306/4678/-DZPL
Light precipitation of rain and ice pellets	-RAPL	http://codes.wmo.int/306/4678/-RAPL
Light precipitation of snow and ice pellets	-SNPL	http://codes.wmo.int/306/4678/-SNPL
Light precipitation of snow grains and ice pellets	-SGPL	http://codes.wmo.int/306/4678/-SGPL
Light precipitation of ice pellets and snow grains	-PLSG	http://codes.wmo.int/306/4678/-PLSG
Light precipitation of drizzle, rain and snow	-DZRASN	http://codes.wmo.int/306/4678/-DZRASN

Label	*Notation*	*URI*
Light precipitation of drizzle, snow and rain	-DZSNRA	http://codes.wmo.int/306/4678/-DZSNRA
Light precipitation of rain, drizzle and snow	-RADZSN	http://codes.wmo.int/306/4678/-RADZSN
Light precipitation of rain, snow and drizzle	-RASNDZ	http://codes.wmo.int/306/4678/-RASNDZ
Light precipitation of snow, drizzle and rain	-SNDZRA	http://codes.wmo.int/306/4678/-SNDZRA
Light precipitation of snow, rain and drizzle	-SNRADZ	http://codes.wmo.int/306/4678/-SNRADZ
Light precipitation of drizzle, rain and snow grains	-DZRASG	http://codes.wmo.int/306/4678/-DZRASG
Light precipitation of drizzle, snow grains and rain	-DZSGRA	http://codes.wmo.int/306/4678/-DZSGRA
Light precipitation of rain, drizzle and snow grains	-RADZSG	http://codes.wmo.int/306/4678/-RADZSG
Light precipitation of rain, snow grains and drizzle	-RASGDZ	http://codes.wmo.int/306/4678/-RASGDZ
Light precipitation of snow grains, drizzle and rain	-SGDZRA	http://codes.wmo.int/306/4678/-SGDZRA
Light precipitation of snow grains, rain and drizzle	-SGRADZ	http://codes.wmo.int/306/4678/-SGRADZ
Light precipitation of drizzle, rain and ice pellets	-DZRAPL	http://codes.wmo.int/306/4678/-DZRAPL
Light precipitation of drizzle, ice pellets and rain	-DZPLRA	http://codes.wmo.int/306/4678/-DZPLRA
Light precipitation of rain, drizzle and ice pellets	-RADZPL	http://codes.wmo.int/306/4678/-RADZPL
Light precipitation of rain, ice pellets and drizzle	-RAPLDZ	http://codes.wmo.int/306/4678/-RAPLDZ
Light precipitation of ice pellets, drizzle and rain	-PLDZRA	http://codes.wmo.int/306/4678/-PLDZRA
Light precipitation of ice pellets, rain and drizzle	-PLRADZ	http://codes.wmo.int/306/4678/-PLRADZ
Light precipitation of rain, snow and snow grains	-RASNSG	http://codes.wmo.int/306/4678/-RASNSG
Light precipitation of rain, snow grains and snow	-RASGSN	http://codes.wmo.int/306/4678/-RASGSN
Light precipitation of snow, rain and snow grains	-SNRASG	http://codes.wmo.int/306/4678/-SNRASG
Light precipitation of snow, snow grains and rain	-SNSGRA	http://codes.wmo.int/306/4678/-SNSGRA
Light precipitation of snow grains, rain and snow	-SGRASN	http://codes.wmo.int/306/4678/-SGRASN
Light precipitation of snow grains, snow and rain	-SGSNRA	http://codes.wmo.int/306/4678/-SGSNRA
Light precipitation of rain, snow and ice pellets	-RASNPL	http://codes.wmo.int/306/4678/-RASNPL
Light precipitation of rain, ice pellets and snow	-RAPLSN	http://codes.wmo.int/306/4678/-RAPLSN
Light precipitation of snow, rain and ice pellets	-SNRAPL	http://codes.wmo.int/306/4678/-SNRAPL
Light precipitation of snow, ice pellets and rain	-SNPLRA	http://codes.wmo.int/306/4678/-SNPLRA

Label	*Notation*	*URI*
Light precipitation of ice pellets, rain and snow	-PLRASN	http://codes.wmo.int/306/4678/-PLRASN
Light precipitation of ice pellets, snow and rain	-PLSNRA	http://codes.wmo.int/306/4678/-PLSNRA
Light precipitation of ice pellets, snow and snow grains	-PLSNSG	http://codes.wmo.int/306/4678/-PLSNSG
Light precipitation of ice pellets, snow grains and snow	-PLSGSN	http://codes.wmo.int/306/4678/-PLSGSN
Light precipitation of snow, ice pellets and snow grains	-SNPLSG	http://codes.wmo.int/306/4678/-SNPLSG
Light precipitation of snow, snow grains and ice pellets	-SNSGPL	http://codes.wmo.int/306/4678/-SNSGPL
Light precipitation of snow grains, ice pellets and snow	-SGPLSN	http://codes.wmo.int/306/4678/-SGPLSN
Light precipitation of snow grains, snow and ice pellets	-SGSNPL	http://codes.wmo.int/306/4678/-SGSNPL
Precipitation of drizzle	DZ	http://codes.wmo.int/306/4678/DZ
Precipitation of rain	RA	http://codes.wmo.int/306/4678/RA
Precipitation of snow	SN	http://codes.wmo.int/306/4678/SN
Precipitation of snow grains	SG	http://codes.wmo.int/306/4678/SG
Precipitation of ice pellets	PL	http://codes.wmo.int/306/4678/PL
Unidentified precipitation	UP	http://codes.wmo.int/306/4678/UP
Precipitation of drizzle and rain	DZRA	http://codes.wmo.int/306/4678/DZRA
Precipitation of rain and drizzle	RADZ	http://codes.wmo.int/306/4678/RADZ
Precipitation of snow and drizzle	SNDZ	http://codes.wmo.int/306/4678/SNDZ
Precipitation of snow grains and drizzle	SGDZ	http://codes.wmo.int/306/4678/SGDZ
Precipitation of ice pellets and drizzle	PLDZ	http://codes.wmo.int/306/4678/PLDZ
Precipitation of drizzle and snow	DZSN	http://codes.wmo.int/306/4678/DZSN
Precipitation of rain and snow	RASN	http://codes.wmo.int/306/4678/RASN
Precipitation of snow and rain	SNRA	http://codes.wmo.int/306/4678/SNRA
Precipitation of snow grains and rain	SGRA	http://codes.wmo.int/306/4678/SGRA
Precipitation of ice pellets and rain	PLRA	http://codes.wmo.int/306/4678/PLRA
Precipitation of drizzle and snow grains	DZSG	http://codes.wmo.int/306/4678/DZSG
Precipitation of rain and snow grains	RASG	http://codes.wmo.int/306/4678/RASG
Precipitation of snow and snow grains	SNSG	http://codes.wmo.int/306/4678/SNSG
Precipitation of snow grains and snow	SGSN	http://codes.wmo.int/306/4678/SGSN
Precipitation of ice pellets and snow	PLSN	http://codes.wmo.int/306/4678/PLSN
Precipitation of drizzle and ice pellets	DZPL	http://codes.wmo.int/306/4678/DZPL
Precipitation of rain and ice pellets	RAPL	http://codes.wmo.int/306/4678/RAPL
Precipitation of snow and ice pellets	SNPL	http://codes.wmo.int/306/4678/SNPL
Precipitation of snow grains and ice pellets	SGPL	http://codes.wmo.int/306/4678/SGPL
Precipitation of ice pellets and snow grains	PLSG	http://codes.wmo.int/306/4678/PLSG
Precipitation of drizzle, rain and snow	DZRASN	http://codes.wmo.int/306/4678/DZRASN
Precipitation of drizzle, snow and rain	DZSNRA	http://codes.wmo.int/306/4678/DZSNRA
Precipitation of rain, drizzle and snow	RADZSN	http://codes.wmo.int/306/4678/RADZSN
Precipitation of rain, snow and drizzle	RASNDZ	http://codes.wmo.int/306/4678/RASNDZ
Precipitation of snow, drizzle and rain	SNDZRA	http://codes.wmo.int/306/4678/SNDZRA
Precipitation of snow, rain and drizzle	SNRADZ	http://codes.wmo.int/306/4678/SNRADZ

Label	*Notation*	*URI*
Precipitation of drizzle, rain and snow grains	DZRASG	http://codes.wmo.int/306/4678/DZRASG
Precipitation of drizzle, snow grains and rain	DZSGRA	http://codes.wmo.int/306/4678/DZSGRA
Precipitation of rain, drizzle and snow grains	RADZSG	http://codes.wmo.int/306/4678/RADZSG
Precipitation of rain, snow grains and drizzle	RASGDZ	http://codes.wmo.int/306/4678/RASGDZ
Precipitation of snow grains, drizzle and rain	SGDZRA	http://codes.wmo.int/306/4678/SGDZRA
Precipitation of snow grains, rain and drizzle	SGRADZ	http://codes.wmo.int/306/4678/SGRADZ
Precipitation of drizzle, rain and ice pellets	DZRAPL	http://codes.wmo.int/306/4678/DZRAPL
Precipitation of drizzle, ice pellets and rain	DZPLRA	http://codes.wmo.int/306/4678/DZPLRA
Precipitation of rain, drizzle and ice pellets	RADZPL	http://codes.wmo.int/306/4678/RADZPL
Precipitation of rain, ice pellets and drizzle	RAPLDZ	http://codes.wmo.int/306/4678/RAPLDZ
Precipitation of ice pellets, drizzle and rain	PLDZRA	http://codes.wmo.int/306/4678/PLDZRA
Precipitation of ice pellets, rain and drizzle	PLRADZ	http://codes.wmo.int/306/4678/PLRADZ
Precipitation of rain, snow and snow grains	RASNSG	http://codes.wmo.int/306/4678/RASNSG
Precipitation of rain, snow grains and snow	RASGSN	http://codes.wmo.int/306/4678/RASGSN
Precipitation of snow, rain and snow grains	SNRASG	http://codes.wmo.int/306/4678/SNRASG
Precipitation of snow, snow grains and rain	SNSGRA	http://codes.wmo.int/306/4678/SNSGRA
Precipitation of snow grains, rain and snow	SGRASN	http://codes.wmo.int/306/4678/SGRASN
Precipitation of snow grains, snow and rain	SGSNRA	http://codes.wmo.int/306/4678/SGSNRA
Precipitation of rain, snow and ice pellets	RASNPL	http://codes.wmo.int/306/4678/RASNPL
Precipitation of rain, ice pellets and snow	RAPLSN	http://codes.wmo.int/306/4678/RAPLSN
Precipitation of snow, rain and ice pellets	SNRAPL	http://codes.wmo.int/306/4678/SNRAPL
Precipitation of snow, ice pellets and rain	SNPLRA	http://codes.wmo.int/306/4678/SNPLRA
Precipitation of ice pellets, rain and snow	PLRASN	http://codes.wmo.int/306/4678/PLRASN
Precipitation of ice pellets, snow and rain	PLSNRA	http://codes.wmo.int/306/4678/PLSNRA
Precipitation of ice pellets, snow and snow grains	PLSNSG	http://codes.wmo.int/306/4678/PLSNSG
Precipitation of ice pellets, snow grains and snow	PLSGSN	http://codes.wmo.int/306/4678/PLSGSN
Precipitation of snow, ice pellets and snow grains	SNPLSG	http://codes.wmo.int/306/4678/SNPLSG
Precipitation of snow, snow grains and ice pellets	SNSGPL	http://codes.wmo.int/306/4678/SNSGPL
Precipitation of snow grains, ice pellets and snow	SGPLSN	http://codes.wmo.int/306/4678/SGPLSN
Precipitation of snow grains, snow and ice pellets	SGSNPL	http://codes.wmo.int/306/4678/SGSNPL

Label	*Notation*	*URI*
Heavy precipitation of drizzle	+DZ	http://codes.wmo.int/306/4678/+DZ
Heavy precipitation of rain	+RA	http://codes.wmo.int/306/4678/+RA
Heavy precipitation of snow	+SN	http://codes.wmo.int/306/4678/+SN
Heavy precipitation of snow grains	+SG	http://codes.wmo.int/306/4678/+SG
Heavy precipitation of ice pellets	+PL	http://codes.wmo.int/306/4678/+PL
Heavy unidentified precipitation	+UP	http://codes.wmo.int/306/4678/+UP
Heavy precipitation of drizzle and rain	+DZRA	http://codes.wmo.int/306/4678/+DZRA
Heavy precipitation of rain and drizzle	+RADZ	http://codes.wmo.int/306/4678/+RADZ
Heavy precipitation of snow and drizzle	+SNDZ	http://codes.wmo.int/306/4678/+SNDZ
Heavy precipitation of snow grains and drizzle	+SGDZ	http://codes.wmo.int/306/4678/+SGDZ
Heavy precipitation of ice pellets and drizzle	+PLDZ	http://codes.wmo.int/306/4678/+PLDZ
Heavy precipitation of drizzle and snow	+DZSN	http://codes.wmo.int/306/4678/+DZSN
Heavy precipitation of rain and snow	+RASN	http://codes.wmo.int/306/4678/+RASN
Heavy precipitation of snow and rain	+SNRA	http://codes.wmo.int/306/4678/+SNRA
Heavy precipitation of snow grains and rain	+SGRA	http://codes.wmo.int/306/4678/+SGRA
Heavy precipitation of ice pellets and rain	+PLRA	http://codes.wmo.int/306/4678/+PLRA
Heavy precipitation of drizzle and snow grains	+DZSG	http://codes.wmo.int/306/4678/+DZSG
Heavy precipitation of rain and snow grains	+RASG	http://codes.wmo.int/306/4678/+RASG
Heavy precipitation of snow and snow grains	+SNSG	http://codes.wmo.int/306/4678/+SNSG
Heavy precipitation of snow grains and snow	+SGSN	http://codes.wmo.int/306/4678/+SGSN
Heavy precipitation of ice pellets and snow	+PLSN	http://codes.wmo.int/306/4678/+PLSN
Heavy precipitation of drizzle and ice pellets	+DZPL	http://codes.wmo.int/306/4678/+DZPL
Heavy precipitation of rain and ice pellets	+RAPL	http://codes.wmo.int/306/4678/+RAPL
Heavy precipitation of snow and ice pellets	+SNPL	http://codes.wmo.int/306/4678/+SNPL
Heavy precipitation of snow grains and ice pellets	+SGPL	http://codes.wmo.int/306/4678/+SGPL
Heavy precipitation of ice pellets and snow grains	+PLSG	http://codes.wmo.int/306/4678/+PLSG
Heavy precipitation of drizzle, rain and snow	+DZRASN	http://codes.wmo.int/306/4678/+DZRASN
Heavy precipitation of drizzle, snow and rain	+DZSNRA	http://codes.wmo.int/306/4678/+DZSNRA
Heavy precipitation of rain, drizzle and snow	+RADZSN	http://codes.wmo.int/306/4678/+RADZSN
Heavy precipitation of rain, snow and drizzle	+RASNDZ	http://codes.wmo.int/306/4678/+RASNDZ
Heavy precipitation of snow, drizzle and rain	+SNDZRA	http://codes.wmo.int/306/4678/+SNDZRA
Heavy precipitation of snow, rain and drizzle	+SNRADZ	http://codes.wmo.int/306/4678/+SNRADZ
Heavy precipitation of drizzle, rain and snow grains	+DZRASG	http://codes.wmo.int/306/4678/+DZRASG

Label	*Notation*	*URI*
Heavy precipitation of drizzle, snow grains and rain	+DZSGRA	http://codes.wmo.int/306/4678/+DZSGRA
Heavy precipitation of rain, drizzle and snow grains	+RADZSG	http://codes.wmo.int/306/4678/+RADZSG
Heavy precipitation of rain, snow grains and drizzle	+RASGDZ	http://codes.wmo.int/306/4678/+RASGDZ
Heavy precipitation of snow grains, drizzle and rain	+SGDZRA	http://codes.wmo.int/306/4678/+SGDZRA
Heavy precipitation of snow grains, rain and drizzle	+SGRADZ	http://codes.wmo.int/306/4678/+SGRADZ
Heavy precipitation of drizzle, rain and ice pellets	+DZRAPL	http://codes.wmo.int/306/4678/+DZRAPL
Heavy precipitation of drizzle, ice pellets and rain	+DZPLRA	http://codes.wmo.int/306/4678/+DZPLRA
Heavy precipitation of rain, drizzle and ice pellets	+RADZPL	http://codes.wmo.int/306/4678/+RADZPL
Heavy precipitation of rain, ice pellets and drizzle	+RAPLDZ	http://codes.wmo.int/306/4678/+RAPLDZ
Heavy precipitation of ice pellets, drizzle and rain	+PLDZRA	http://codes.wmo.int/306/4678/+PLDZRA
Heavy precipitation of ice pellets, rain and drizzle	+PLRADZ	http://codes.wmo.int/306/4678/+PLRADZ
Heavy precipitation of rain, snow and snow grains	+RASNSG	http://codes.wmo.int/306/4678/+RASNSG
Heavy precipitation of rain, snow grains and snow	+RASGSN	http://codes.wmo.int/306/4678/+RASGSN
Heavy precipitation of snow, rain and snow grains	+SNRASG	http://codes.wmo.int/306/4678/+SNRASG
Heavy precipitation of snow, snow grains and rain	+SNSGRA	http://codes.wmo.int/306/4678/+SNSGRA
Heavy precipitation of snow grains, rain and snow	+SGRASN	http://codes.wmo.int/306/4678/+SGRASN
Heavy precipitation of snow grains, snow and rain	+SGSNRA	http://codes.wmo.int/306/4678/+SGSNRA
Heavy precipitation of rain, snow and ice pellets	+RASNPL	http://codes.wmo.int/306/4678/+RASNPL
Heavy precipitation of rain, ice pellets and snow	+RAPLSN	http://codes.wmo.int/306/4678/+RAPLSN
Heavy precipitation of snow, rain and ice pellets	+SNRAPL	http://codes.wmo.int/306/4678/+SNRAPL
Heavy precipitation of snow, ice pellets and rain	+SNPLRA	http://codes.wmo.int/306/4678/+SNPLRA
Heavy precipitation of ice pellets, rain and snow	+PLRASN	http://codes.wmo.int/306/4678/+PLRASN
Heavy precipitation of ice pellets, snow and rain	+PLSNRA	http://codes.wmo.int/306/4678/+PLSNRA
Heavy precipitation of ice pellets, snow and snow grains	+PLSNSG	http://codes.wmo.int/306/4678/+PLSNSG
Heavy precipitation of ice pellets, snow grains and snow	+PLSGSN	http://codes.wmo.int/306/4678/+PLSGSN
Heavy precipitation of snow, ice pellets and snow grains	+SNPLSG	http://codes.wmo.int/306/4678/+SNPLSG
Heavy precipitation of snow, snow grains and ice pellets	+SNSGPL	http://codes.wmo.int/306/4678/+SNSGPL

Label	*Notation*	*URI*
Heavy precipitation of snow grains, ice pellets and snow	+SGPLSN	http://codes.wmo.int/306/4678/+SGPLSN
Heavy precipitation of snow grains, snow and ice pellets	+SGSNPL	http://codes.wmo.int/306/4678/+SGSNPL
Light showery precipitation of rain	-SHRA	http://codes.wmo.int/306/4678/-SHRA
Light showery precipitation of snow	-SHSN	http://codes.wmo.int/306/4678/-SHSN
Light showery precipitation of hail	-SHGR	http://codes.wmo.int/306/4678/-SHGR
Light showery precipitation of snow pellets/small hail	-SHGS	http://codes.wmo.int/306/4678/-SHGS
Light unidentified showery precipitation	-SHUP	http://codes.wmo.int/306/4678/-SHUP
Light showery precipitation of rain and snow	-SHRASN	http://codes.wmo.int/306/4678/-SHRASN
Light showery precipitation of snow and rain	-SHSNRA	http://codes.wmo.int/306/4678/-SHSNRA
Light showery precipitation of hail and rain	-SHGRRA	http://codes.wmo.int/306/4678/-SHGRRA
Light showery precipitation of snow pellets/small hail and rain	-SHGSRA	http://codes.wmo.int/306/4678/-SHGSRA
Light showery precipitation of rain and hail	-SHRAGR	http://codes.wmo.int/306/4678/-SHRAGR
Light showery precipitation of snow and hail	-SHSNGR	http://codes.wmo.int/306/4678/-SHSNGR
Light showery precipitation of hail and snow	-SHGRSN	http://codes.wmo.int/306/4678/-SHGRSN
Light showery precipitation of snow pellets/small hail and snow	-SHGSSN	http://codes.wmo.int/306/4678/-SHGSSN
Light showery precipitation of rain and snow pellets/small hail	-SHRAGS	http://codes.wmo.int/306/4678/-SHRAGS
Light showery precipitation of snow and snow pellets/small hail	-SHSNGS	http://codes.wmo.int/306/4678/-SHSNGS
Light showery precipitation of rain, snow and hail	-SHRASNGR	http://codes.wmo.int/306/4678/-SHRASNGR
Light showery precipitation of rain, hail and snow	-SHRAGRSN	http://codes.wmo.int/306/4678/-SHRAGRSN
Light showery precipitation of snow, rain and hail	-SHSNRAGR	http://codes.wmo.int/306/4678/-SHSNRAGR
Light showery precipitation of snow, hail and rain	-SHSNGRRA	http://codes.wmo.int/306/4678/-SHSNGRRA
Light showery precipitation of hail, rain and snow	-SHGRRASN	http://codes.wmo.int/306/4678/-SHGRRASN
Light showery precipitation of hail, snow and rain	-SHGRSNRA	http://codes.wmo.int/306/4678/-SHGRSNRA
Light showery precipitation of rain, snow and snow pellets/small hail	-SHRASNGS	http://codes.wmo.int/306/4678/-SHRASNGS
Light showery precipitation of rain, snow pellets/small hail and snow	-SHRAGSSN	http://codes.wmo.int/306/4678/-SHRAGSSN
Light showery precipitation of snow, rain and snow pellets/small hail	-SHSNRAGS	http://codes.wmo.int/306/4678/-SHSNRAGS
Light showery precipitation of snow, snow pellets/small hail and rain	-SHSNGSRA	http://codes.wmo.int/306/4678/-SHSNGSRA
Light showery precipitation of snow pellets/small hail, rain and snow	-SHGSRASN	http://codes.wmo.int/306/4678/-SHGSRASN
Light showery precipitation of snow pellets/small hail, snow and rain	-SHGSSNRA	http://codes.wmo.int/306/4678/-SHGSSNRA

Label	*Notation*	*URI*
Showery precipitation of rain	SHRA	http://codes.wmo.int/306/4678/SHRA
Showery precipitation of snow	SHSN	http://codes.wmo.int/306/4678/SHSN
Showery precipitation of hail	SHGR	http://codes.wmo.int/306/4678/SHGR
Showery precipitation of snow pellets/ small hail	SHGS	http://codes.wmo.int/306/4678/SHGS
Unidentified showery precipitation	SHUP	http://codes.wmo.int/306/4678/SHUP
Showery precipitation of rain and snow	SHRASN	http://codes.wmo.int/306/4678/SHRASN
Showery precipitation of snow and rain	SHSNRA	http://codes.wmo.int/306/4678/SHSNRA
Showery precipitation of hail and rain	SHGRRA	http://codes.wmo.int/306/4678/SHGRRA
Showery precipitation of snow pellets/ small hail and rain	SHGSRA	http://codes.wmo.int/306/4678/SHGSRA
Showery precipitation of rain and hail	SHRAGR	http://codes.wmo.int/306/4678/SHRAGR
Showery precipitation of snow and hail	SHSNGR	http://codes.wmo.int/306/4678/SHSNGR
Showery precipitation of hail and snow	SHGRSN	http://codes.wmo.int/306/4678/SHGRSN
Showery precipitation of snow pellets/ small hail and snow	SHGSSN	http://codes.wmo.int/306/4678/SHGSSN
Showery precipitation of rain and snow pellets/small hail	SHRAGS	http://codes.wmo.int/306/4678/SHRAGS
Showery precipitation of snow and snow pellets/small hail	SHSNGS	http://codes.wmo.int/306/4678/SHSNGS
Showery precipitation of rain, snow and hail	SHRASNGR	http://codes.wmo.int/306/4678/SHRASNGR
Showery precipitation of rain, hail and snow	SHRAGRSN	http://codes.wmo.int/306/4678/SHRAGRSN
Showery precipitation of snow, rain and hail	SHSNRAGR	http://codes.wmo.int/306/4678/SHSNRAGR
Showery precipitation of snow, hail and rain	SHSNGRRA	http://codes.wmo.int/306/4678/SHSNGRRA
Showery precipitation of hail, rain and snow	SHGRRASN	http://codes.wmo.int/306/4678/SHGRRASN
Showery precipitation of hail, snow and rain	SHGRSNRA	http://codes.wmo.int/306/4678/SHGRSNRA
Showery precipitation of rain, snow and snow pellets/small hail	SHRASNGS	http://codes.wmo.int/306/4678/SHRASNGS
Showery precipitation of rain, snow pellets/small hail and snow	SHRAGSSN	http://codes.wmo.int/306/4678/SHRAGSSN
Showery precipitation of snow, rain and snow pellets/small hail	SHSNRAGS	http://codes.wmo.int/306/4678/SHSNRAGS
Showery precipitation of snow, snow pellets/small hail and rain	SHSNGSRA	http://codes.wmo.int/306/4678/SHSNGSRA
Showery precipitation of snow pellets/ small hail, rain and snow	SHGSRASN	http://codes.wmo.int/306/4678/SHGSRASN
Showery precipitation of snow pellets/ small hail, snow and rain	SHGSSNRA	http://codes.wmo.int/306/4678/SHGSSNRA
Heavy showery precipitation of rain	+SHRA	http://codes.wmo.int/306/4678/+SHRA
Heavy showery precipitation of snow	+SHSN	http://codes.wmo.int/306/4678/+SHSN
Heavy showery precipitation of hail	+SHGR	http://codes.wmo.int/306/4678/+SHGR
Heavy showery precipitation of snow pellets/small hail	+SHGS	http://codes.wmo.int/306/4678/+SHGS
Heavy unidentified showery precipitation	+SHUP	http://codes.wmo.int/306/4678/+SHUP
Heavy showery precipitation of rain and snow	+SHRASN	http://codes.wmo.int/306/4678/+SHRASN

Label	*Notation*	*URI*
Heavy showery precipitation of snow and rain	+SHSNRA	http://codes.wmo.int/306/4678/+SHSNRA
Heavy showery precipitation of hail and rain	+SHGRRA	http://codes.wmo.int/306/4678/+SHGRRA
Heavy showery precipitation of snow pellets/small hail and rain	+SHGSRA	http://codes.wmo.int/306/4678/+SHGSRA
Heavy showery precipitation of rain and hail	+SHRAGR	http://codes.wmo.int/306/4678/+SHRAGR
Heavy showery precipitation of snow and hail	+SHSNGR	http://codes.wmo.int/306/4678/+SHSNGR
Heavy showery precipitation of hail and snow	+SHGRSN	http://codes.wmo.int/306/4678/+SHGRSN
Heavy showery precipitation of snow pellets/small hail and snow	+SHGSSN	http://codes.wmo.int/306/4678/+SHGSSN
Heavy showery precipitation of rain and snow pellets/small hail	+SHRAGS	http://codes.wmo.int/306/4678/+SHRAGS
Heavy showery precipitation of snow and snow pellets/small hail	+SHSNGS	http://codes.wmo.int/306/4678/+SHSNGS
Heavy showery precipitation of rain, snow and hail	+SHRASNGR	http://codes.wmo.int/306/4678/+SHRASNGR
Heavy showery precipitation of rain, hail and snow	+SHRAGRSN	http://codes.wmo.int/306/4678/+SHRAGRSN
Heavy showery precipitation of snow, rain and hail	+SHSNRAGR	http://codes.wmo.int/306/4678/+SHSNRAGR
Heavy showery precipitation of snow, hail and rain	+SHSNGRRA	http://codes.wmo.int/306/4678/+SHSNGRRA
Heavy showery precipitation of hail, rain and snow	+SHGRRASN	http://codes.wmo.int/306/4678/+SHGRRASN
Heavy showery precipitation of hail, snow and rain	+SHGRSNRA	http://codes.wmo.int/306/4678/+SHGRSNRA
Heavy showery precipitation of rain, snow and snow pellets/small hail	+SHRASNGS	http://codes.wmo.int/306/4678/+SHRASNGS
Heavy showery precipitation of rain, snow pellets/small hail and snow	+SHRAGSSN	http://codes.wmo.int/306/4678/+SHRAGSSN
Heavy showery precipitation of snow, rain and snow pellets/small hail	+SHSNRAGS	http://codes.wmo.int/306/4678/+SHSNRAGS
Heavy showery precipitation of snow, snow pellets/small hail and rain	+SHSNGSRA	http://codes.wmo.int/306/4678/+SHSNGSRA
Heavy showery precipitation of snow pellets/small hail, rain and snow	+SHGSRASN	http://codes.wmo.int/306/4678/+SHGSRASN
Heavy showery precipitation of snow pellets/small hail, snow and rain	+SHGSSNRA	http://codes.wmo.int/306/4678/+SHGSSNRA
Thunderstorm with light precipitation of rain	-TSRA	http://codes.wmo.int/306/4678/-TSRA
Thunderstorm with light precipitation of snow	-TSSN	http://codes.wmo.int/306/4678/-TSSN
Thunderstorm with light precipitation of hail	-TSGR	http://codes.wmo.int/306/4678/-TSGR
Thunderstorm with light precipitation of snow pellets/small hail	-TSGS	http://codes.wmo.int/306/4678/-TSGS
Thunderstorm with light unidentified precipitation	-TSUP	http://codes.wmo.int/306/4678/-TSUP
Thunderstorm with light precipitation of rain and snow	-TSRASN	http://codes.wmo.int/306/4678/-TSRASN

Label	*Notation*	*URI*
Thunderstorm with light precipitation of snow and rain	-TSSNRA	http://codes.wmo.int/306/4678/-TSSNRA
Thunderstorm with light precipitation of hail and rain	-TSGRRA	http://codes.wmo.int/306/4678/-TSGRRA
Thunderstorm with light precipitation of snow pellets/small hail and rain	-TSGSRA	http://codes.wmo.int/306/4678/-TSGSRA
Thunderstorm with light precipitation of rain and hail	-TSRAGR	http://codes.wmo.int/306/4678/-TSRAGR
Thunderstorm with light precipitation of snow and hail	-TSSNGR	http://codes.wmo.int/306/4678/-TSSNGR
Thunderstorm with light precipitation of hail and snow	-TSGRSN	http://codes.wmo.int/306/4678/-TSGRSN
Thunderstorm with light precipitation of snow pellets/small hail and snow	-TSGSSN	http://codes.wmo.int/306/4678/-TSGSSN
Thunderstorm with light precipitation of rain and snow pellets/small hail	-TSRAGS	http://codes.wmo.int/306/4678/-TSRAGS
Thunderstorm with light precipitation of snow and snow pellets/small hail	-TSSNGS	http://codes.wmo.int/306/4678/-TSSNGS
Thunderstorm with light precipitation of rain, snow and hail	-TSRASNGR	http://codes.wmo.int/306/4678/-TSRASNGR
Thunderstorm with light precipitation of rain, hail and snow	-TSRAGRSN	http://codes.wmo.int/306/4678/-TSRAGRSN
Thunderstorm with light precipitation of snow, rain and hail	-TSSNRAGR	http://codes.wmo.int/306/4678/-TSSNRAGR
Thunderstorm with light precipitation of snow, hail and rain	-TSSNGRRA	http://codes.wmo.int/306/4678/-TSSNGRRA
Thunderstorm with light precipitation of hail, rain and snow	-TSGRRASN	http://codes.wmo.int/306/4678/-TSGRRASN
Thunderstorm with light precipitation of hail, snow and rain	-TSGRSNRA	http://codes.wmo.int/306/4678/-TSGRSNRA
Thunderstorm with light precipitation of rain, snow and snow pellets/small hail	-TSRASNGS	http://codes.wmo.int/306/4678/-TSRASNGS
Thunderstorm with light precipitation of rain, snow pellets/small hail and snow	-TSRAGSSN	http://codes.wmo.int/306/4678/-TSRAGSSN
Thunderstorm with light precipitation of snow, rain and snow pellets/small hail	-TSSNRAGS	http://codes.wmo.int/306/4678/-TSSNRAGS
Thunderstorm with light precipitation of snow, snow pellets/small hail and rain	-TSSNGSRA	http://codes.wmo.int/306/4678/-TSSNGSRA
Thunderstorm with light precipitation of snow pellets/small hail, rain and snow	-TSGSRASN	http://codes.wmo.int/306/4678/-TSGSRASN
Thunderstorm with light precipitation of snow pellets/small hail, snow and rain	-TSGSSNRA	http://codes.wmo.int/306/4678/-TSGSSNRA
Thunderstorm with precipitation of rain	TSRA	http://codes.wmo.int/306/4678/TSRA
Thunderstorm with precipitation of snow	TSSN	http://codes.wmo.int/306/4678/TSSN
Thunderstorm with precipitation of hail	TSGR	http://codes.wmo.int/306/4678/TSGR
Thunderstorm with precipitation of snow pellets/small hail	TSGS	http://codes.wmo.int/306/4678/TSGS
Thunderstorm with unidentified precipitation	TSUP	http://codes.wmo.int/306/4678/TSUP
Thunderstorm with precipitation of rain and snow	TSRASN	http://codes.wmo.int/306/4678/TSRASN
Thunderstorm with precipitation of snow and rain	TSSNRA	http://codes.wmo.int/306/4678/TSSNRA

Label	*Notation*	*URI*
Thunderstorm with precipitation of hail and rain	TSGRRA	http://codes.wmo.int/306/4678/TSGRRA
Thunderstorm with precipitation of snow pellets/small hail and rain	TSGSRA	http://codes.wmo.int/306/4678/TSGSRA
Thunderstorm with precipitation of rain and hail	TSRAGR	http://codes.wmo.int/306/4678/TSRAGR
Thunderstorm with precipitation of snow and hail	TSSNGR	http://codes.wmo.int/306/4678/TSSNGR
Thunderstorm with precipitation of hail and snow	TSGRSN	http://codes.wmo.int/306/4678/TSGRSN
Thunderstorm with precipitation of snow pellets/small hail and snow	TSGSSN	http://codes.wmo.int/306/4678/TSGSSN
Thunderstorm with precipitation of rain and snow pellets/small hail	TSRAGS	http://codes.wmo.int/306/4678/TSRAGS
Thunderstorm with precipitation of snow and snow pellets/small hail	TSSNGS	http://codes.wmo.int/306/4678/TSSNGS
Thunderstorm with precipitation of rain, snow and hail	TSRASNGR	http://codes.wmo.int/306/4678/TSRASNGR
Thunderstorm with precipitation of rain, hail and snow	TSRAGRSN	http://codes.wmo.int/306/4678/TSRAGRSN
Thunderstorm with precipitation of snow, rain and hail	TSSNRAGR	http://codes.wmo.int/306/4678/TSSNRAGR
Thunderstorm with precipitation of snow, hail and rain	TSSNGRRA	http://codes.wmo.int/306/4678/TSSNGRRA
Thunderstorm with precipitation of hail, rain and snow	TSGRRASN	http://codes.wmo.int/306/4678/TSGRRASN
Thunderstorm with precipitation of hail, snow and rain	TSGRSNRA	http://codes.wmo.int/306/4678/TSGRSNRA
Thunderstorm with precipitation of rain, snow and snow pellets/small hail	TSRASNGS	http://codes.wmo.int/306/4678/TSRASNGS
Thunderstorm with precipitation of rain, snow pellets/small hail and snow	TSRAGSSN	http://codes.wmo.int/306/4678/TSRAGSSN
Thunderstorm with precipitation of snow, rain and snow pellets/small hail	TSSNRAGS	http://codes.wmo.int/306/4678/TSSNRAGS
Thunderstorm with precipitation of snow, snow pellets/small hail and rain	TSSNGSRA	http://codes.wmo.int/306/4678/TSSNGSRA
Thunderstorm with precipitation of snow pellets/small hail, rain and snow	TSGSRASN	http://codes.wmo.int/306/4678/TSGSRASN
Thunderstorm with precipitation of snow pellets/small hail, snow and rain	TSGSSNRA	http://codes.wmo.int/306/4678/TSGSSNRA
Thunderstorm with heavy precipitation of rain	+TSRA	http://codes.wmo.int/306/4678/+TSRA
Thunderstorm with heavy precipitation of snow	+TSSN	http://codes.wmo.int/306/4678/+TSSN
Thunderstorm with heavy precipitation of hail	+TSGR	http://codes.wmo.int/306/4678/+TSGR
Thunderstorm with heavy precipitation of snow pellets/small hail	+TSGS	http://codes.wmo.int/306/4678/+TSGS
Thunderstorm with heavy precipitation of unidentified precipitation	+TSUP	http://codes.wmo.int/306/4678/+TSUP
Thunderstorm with heavy precipitation of rain and snow	+TSRASN	http://codes.wmo.int/306/4678/+TSRASN
Thunderstorm with heavy precipitation of snow and rain	+TSSNRA	http://codes.wmo.int/306/4678/+TSSNRA

Label	*Notation*	*URI*
Thunderstorm with heavy precipitation of hail and rain	+TSGRRA	http://codes.wmo.int/306/4678/+TSGRRA
Thunderstorm with heavy precipitation of snow pellets/small hail and rain	+TSGSRA	http://codes.wmo.int/306/4678/+TSGSRA
Thunderstorm with heavy precipitation of rain and hail	+TSRAGR	http://codes.wmo.int/306/4678/+TSRAGR
Thunderstorm with heavy precipitation of snow and hail	+TSSNGR	http://codes.wmo.int/306/4678/+TSSNGR
Thunderstorm with heavy precipitation of hail and snow	+TSGRSN	http://codes.wmo.int/306/4678/+TSGRSN
Thunderstorm with heavy precipitation of snow pellets/small hail and snow	+TSGSSN	http://codes.wmo.int/306/4678/+TSGSSN
Thunderstorm with heavy precipitation of rain and snow pellets/small hail	+TSRAGS	http://codes.wmo.int/306/4678/+TSRAGS
Thunderstorm with heavy precipitation of snow and snow pellets/small hail	+TSSNGS	http://codes.wmo.int/306/4678/+TSSNGS
Thunderstorm with heavy precipitation of rain, snow and hail	+TSRASNGR	http://codes.wmo.int/306/4678/+TSRASNGR
Thunderstorm with heavy precipitation of rain, hail and snow	+TSRAGRSN	http://codes.wmo.int/306/4678/+TSRAGRSN
Thunderstorm with heavy precipitation of snow, rain and hail	+TSSNRAGR	http://codes.wmo.int/306/4678/+TSSNRAGR
Thunderstorm with heavy precipitation of snow, hail and rain	+TSSNGRRA	http://codes.wmo.int/306/4678/+TSSNGRRA
Thunderstorm with heavy precipitation of hail, rain and snow	+TSGRRASN	http://codes.wmo.int/306/4678/+TSGRRASN
Thunderstorm with heavy precipitation of hail, snow and rain	+TSGRSNRA	http://codes.wmo.int/306/4678/+TSGRSNRA
Thunderstorm with heavy precipitation of rain, snow and snow pellets/small hail	+TSRASNGS	http://codes.wmo.int/306/4678/+TSRASNGS
Thunderstorm with heavy precipitation of rain, snow pellets/small hail and snow	+TSRAGSSN	http://codes.wmo.int/306/4678/+TSRAGSSN
Thunderstorm with heavy precipitation of snow, rain and snow pellets/small hail	+TSSNRAGS	http://codes.wmo.int/306/4678/+TSSNRAGS
Thunderstorm with heavy precipitation of snow, snow pellets/small hail and rain	+TSSNGSRA	http://codes.wmo.int/306/4678/+TSSNGSRA
Thunderstorm with heavy precipitation of snow pellets/small hail, rain and snow	+TSGSRASN	http://codes.wmo.int/306/4678/+TSGSRASN
Thunderstorm with heavy precipitation of snow pellets/small hail, snow and rain	+TSGSSNRA	http://codes.wmo.int/306/4678/+TSGSSNRA
Light precipitation of freezing drizzle	-FZDZ	http://codes.wmo.int/306/4678/-FZDZ
Light precipitation of freezing rain	-FZRA	http://codes.wmo.int/306/4678/-FZRA
Light unidentified freezing precipitation	-FZUP	http://codes.wmo.int/306/4678/-FZUP
Light precipitation of freezing drizzle and rain	-FZDZRA	http://codes.wmo.int/306/4678/-FZDZRA
Light precipitation of freezing rain and drizzle	-FZRADZ	http://codes.wmo.int/306/4678/-FZRADZ
Precipitation of freezing drizzle	FZDZ	http://codes.wmo.int/306/4678/FZDZ
Precipitation of freezing rain	FZRA	http://codes.wmo.int/306/4678/FZRA
Unidentified freezing precipitation	FZUP	http://codes.wmo.int/306/4678/FZUP
Precipitation of freezing drizzle and rain	FZDZRA	http://codes.wmo.int/306/4678/FZDZRA
Precipitation of freezing rain and drizzle	FZRADZ	http://codes.wmo.int/306/4678/FZRADZ
Heavy precipitation of freezing drizzle	+FZDZ	http://codes.wmo.int/306/4678/+FZDZ

Label	*Notation*	*URI*
Heavy precipitation of freezing rain	+FZRA	http://codes.wmo.int/306/4678/+FZRA
Heavy unidentified freezing precipitation	+FZUP	http://codes.wmo.int/306/4678/+FZUP
Heavy precipitation of freezing drizzle and rain	+FZDZRA	http://codes.wmo.int/306/4678/+FZDZRA
Heavy precipitation of freezing rain and drizzle	+FZRADZ	http://codes.wmo.int/306/4678/+FZRADZ
Duststorm	DS	http://codes.wmo.int/306/4678/DS
Heavy duststorm	+DS	http://codes.wmo.int/306/4678/+DS
Duststorm in the vicinity	VCDS	http://codes.wmo.int/306/4678/VCDS
Sandstorm	SS	http://codes.wmo.int/306/4678/SS
Heavy sandstorm	+SS	http://codes.wmo.int/306/4678/+SS
Sandstorm in the vicinity	VCSS	http://codes.wmo.int/306/4678/VCSS
Fog	FG	http://codes.wmo.int/306/4678/FG
Funnel cloud(s) (tornado or waterspout)	FC	http://codes.wmo.int/306/4678/FC
Well-developed funnel cloud(s) (tornado or waterspout)	+FC	http://codes.wmo.int/306/4678/+FC
Dust/sand whirls (dust devils)	PO	http://codes.wmo.int/306/4678/PO
Volcanic ash	VA	http://codes.wmo.int/306/4678/VA
Fog in the vicinity	VCFG	http://codes.wmo.int/306/4678/VCFG
Funnel cloud(s) (tornado or waterspout) in the vicinity	VCFC	http://codes.wmo.int/306/4678/VCFC
Dust/sand whirls (dust devils) in the vicinity	VCPO	http://codes.wmo.int/306/4678/VCPO
Volcanic ash in the vicinity	VCVA	http://codes.wmo.int/306/4678/VCVA
Thunderstorm	TS	http://codes.wmo.int/306/4678/TS
Thunderstorm in the vicinity	VCTS	http://codes.wmo.int/306/4678/VCTS
Shower(s) in the vicinity	VCSH	http://codes.wmo.int/306/4678/VCSH
Blowing sand in the vicinity	VCBLSA	http://codes.wmo.int/306/4678/VCBLSA
Blowing dust in the vicinity	VCBLDU	http://codes.wmo.int/306/4678/VCBLDU
Blowing snow in the vicinity	VCBLSN	http://codes.wmo.int/306/4678/VCBLSN
Blowing sand	BLSA	http://codes.wmo.int/306/4678/BLSA
Blowing dust	BLDU	http://codes.wmo.int/306/4678/BLDU
Blowing snow	BLSN	http://codes.wmo.int/306/4678/BLSN
Low drifting sand	DRSA	http://codes.wmo.int/306/4678/DRSA
Low drifting dust	DRDU	http://codes.wmo.int/306/4678/DRDU
Low drifting snow	DRSN	http://codes.wmo.int/306/4678/DRSN
Sand	SA	http://codes.wmo.int/306/4678/SA
Dust	DU	http://codes.wmo.int/306/4678/DU
Shallow fog	MIFG	http://codes.wmo.int/306/4678/MIFG
Partial fog (covering part of the aerodrome)	PRFG	http://codes.wmo.int/306/4678/PRFG
Patches of fog	BCFG	http://codes.wmo.int/306/4678/BCFG
Freezing fog	FZFG	http://codes.wmo.int/306/4678/FZFG
Mist	BR	http://codes.wmo.int/306/4678/BR
Haze	HZ	http://codes.wmo.int/306/4678/HZ
Smoke	FU	http://codes.wmo.int/306/4678/FU
Squalls	SQ	http://codes.wmo.int/306/4678/SQ

CODE TABLE D-8: CLOUD AMOUNT REPORTED AT AERODROME

The items within this code table are the cloud amount categories of operational significance for aviation as specified in the *Technical Regulations* (WMO-No 49), Volume II – Meteorological Service for International Air Navigation.

This code table contains a subset of the cloud amount categories defined in Volume I.2, FM 94 BUFR, Code table 0 20 008. Each code item is uniquely identified using a URI. The URI is also a URL providing additional information about the associated cloud amount category. This code table is published at http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome.

Label	*Notation*	*URI*	*Description*
Broken	BKN	http://codes.wmo.int/bufr4/codeflag/0-20-008/3	Broken (5–7 oktas).
Embedded	EMBD	http://codes.wmo.int/bufr4/codeflag/0-20-008/16	Embedded. Applicable only to cumulonimbus (CB).
Few	FEW	http://codes.wmo.int/bufr4/codeflag/0-20-008/1	Few (1–2 oktas).
Frequent	FRQ	http://codes.wmo.int/bufr4/codeflag/0-20-008/12	Frequent. Applicable only to cumulonimbus (CB).
Isolated	ISOL	http://codes.wmo.int/bufr4/codeflag/0-20-008/8	Isolated. Applicable only to cumulonimbus (CB).
Layers	LYR	http://codes.wmo.int/bufr4/codeflag/0-20-008/14	Layers. Applicable only to cumulonimbus (CB).
Occasional	OCNL	http://codes.wmo.int/bufr4/codeflag/0-20-008/10	Occasional. Applicable only to cumulonimbus (CB).
Overcast	OVC	http://codes.wmo.int/bufr4/codeflag/0-20-008/4	Overcast (8 oktas).
Scattered	SCT	http://codes.wmo.int/bufr4/codeflag/0-20-008/2	Scattered (3–4 oktas).
Sky clear	SKC	http://codes.wmo.int/bufr4/codeflag/0-20-008/0	Sky clear (0 oktas).

CODE TABLE D-9: SIGNIFICANT CONVECTIVE CLOUD TYPE

The items within this code table are the cloud types of operational significance for aviation as specified in the *Technical Regulations* (WMO-No. 49), Volume II – Meteorological Service for International Air Navigation. This code table contains a subset of the cloud types defined in Volume I.2, FM 94 BUFR, Code table 0 20 012. Each cloud type is uniquely identified using a URI. The URI is also a URL providing additional information about the associated cloud type. This code table is published at http://codes.wmo.int/49-2/SigConvectiveCloudType.

Label	*Notation*	*URI*	*Description*
Cumulonimbus	CB	http://codes.wmo.int/bufr4/codeflag/0-20-012/9	A principal cloud type, exceptionally dense and vertically developed, occurring either as isolated clouds or as a line or wall of clouds with separated upper portions.
Towering cumulus	TCU	http://codes.wmo.int/bufr4/codeflag/0-20-012/32	Cumulus mediocris or congestus, towering cumulus (TCU), with or without cumulus of species fractus or humilis or stratocumulus, all having their bases at the same level.

CODE TABLE D-10: SIGNIFICANT WEATHER PHENOMENA

The items within this code table are the types of weather phenomena of significance to aeronautical operations – as used in SIGMET and AIRMET reports and specified in the *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 6, 1.1.4. Each weather phenomenon type is uniquely identified using a URI. The URI is also a URL providing additional information about the associated weather phenomena type. This code table is published at http://codes.wmo.int/49-2/SigWxPhenomena.

Label	*Notation*	*URI*	*Description*
Embedded thunderstorm	EMBD_TS	http://codes.wmo.int/49-2/SigWxPhenomena/EMBD_TS	
Embedded thunderstorm with hail	EMBD_TSGR	http://codes.wmo.int/49-2/SigWxPhenomena/EMBD_TSGR	
Frequent thunderstorm	FRQ_TS	http://codes.wmo.int/49-2/SigWxPhenomena/FRQ_TS	
Frequent thunderstorm with hail	FRQ_TSGR	http://codes.wmo.int/49-2/SigWxPhenomena/FRQ_TSGR	
Heavy duststorm	HVY_DS	http://codes.wmo.int/49-2/SigWxPhenomena/HVY_DS	
Heavy sandstorm	HVY_SS	http://codes.wmo.int/49-2/SigWxPhenomena/HVY_SS	
Obscured thunderstorm	OBSC_TS	http://codes.wmo.int/49-2/SigWxPhenomena/OBSC_TS	
Obscured thunderstorm with hail	OBSC_TSGR	http://codes.wmo.int/49-2/SigWxPhenomena/OBSC_TSGR	
Radioactive cloud	RDOACT_CLD	http://codes.wmo.int/49-2/SigWxPhenomena/RDOACT_CLD	
Severe airframe icing	SEV_ICE	http://codes.wmo.int/49-2/SigWxPhenomena/SEV_ICE	
Severe airframe icing from freezing rain	SEV_ICE_FZRA	http://codes.wmo.int/49-2/SigWxPhenomena/SEV_ICE_FZRA	
Severe mountain wave	SEV_MTW	http://codes.wmo.int/49-2/SigWxPhenomena/SEV_MTW	
Severe turbulence	SEV_TURB	http://codes.wmo.int/49-2/SigWxPhenomena/SEV_TURB	
Squall line	SQL_TS	http://codes.wmo.int/49-2/SigWxPhenomena/SQL_TS	
Squall line with hail	SQL_TSGR	http://codes.wmo.int/49-2/SigWxPhenomena/SQL_TSGR	
Tropical cyclone	TC	http://codes.wmo.int/49-2/SigWxPhenomena/TC	
Volcanic ash	VA	http://codes.wmo.int/49-2/SigWxPhenomena/VA	

APPENDIX B. DEFINITION OF SCHEMAS

1. **COLLECT-XML**

1.1 http://schemas.wmo.int/collect/1.1/collect.xsd

2. **METCE-XML *(MODÈLE POUR L'ÉCHANGE DES INFORMATIONS SUR LE TEMPS, LE CLIMAT ET L'EAU)***

2.1 http://schemas.wmo.int/metce/1.1/metce.xsd

2.2 http://schemas.wmo.int/metce/1.1/procedure.xsd

2.3 http://schemas.wmo.int/metce/1.1/phenomena.xsd

3. **OPM-XML (OBSERVABLE PROPERTY MODEL)**

3.1 http://schemas.wmo.int/opm/1.1/opm.xsd

3.2 http://schemas.wmo.int/opm/1.1/observable-property.xsd

4. **SAF-XML (SIMPLE AERONAUTICAL FEATURES)**

4.1 http://schemas.wmo.int/saf/1.1/saf.xsd

4.2 http://schemas.wmo.int/saf/1.1/dataTypes.xsd

4.3 http://schemas.wmo.int/saf/1.1/features.xsd

4.4 http://schemas.wmo.int/saf/1.1/measures.xsd

5. **IWXXM-XML (ICAO METEOROLOGICAL INFORMATION EXCHANGE MODEL)**

5.1 http://schemas.wmo.int/iwxxm/1.1/iwxxm.xsd

5.2 http://schemas.wmo.int/iwxxm/1.1/common.xsd

5.3 http://schemas.wmo.int/iwxxm/1.1/metarSpeci.xsd

5.4 http://schemas.wmo.int/iwxxm/1.1/taf.xsd

5.5 http://schemas.wmo.int/iwxxm/1.1/sigmet.xsd

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