

Manual on the WMO Information System

Annex VII to the WMO Technical Regulations

2012 edition

Updated in 2013



**World
Meteorological
Organization**

Weather · Climate · Water

WMO-No. 1060

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EDITORIAL NOTE

The following typographical practice has been followed: standard practices and procedures have been printed in semi-bold roman. Recommended practices and procedures have been printed in light-face roman. Notes have been printed in smaller type, light-face roman, and preceded by the indication: Note.

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.

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INTRODUCTION

Purpose and scope

1. The *Manual on the WMO Information System* (WMO-No. 1060) is designed to ensure adequate uniformity and standardization of data, information and communications practices, procedures and specifications employed among World Meteorological Organization (WMO) Members in the operation of the WMO Information System (WIS) as it supports the mission of WMO. The Manual sets out standard practices, procedures and specifications (distinguished by the term *shall*) having the status of requirements in a technical resolution, which WMO Members are required to follow or implement in accordance with Article 9 of the Convention. The Manual also sets out recommended practices, procedures and specifications (distinguished by the term *should*), with which Members are urged to comply.

2. The Manual is Annex VII to the *Technical Regulations* (WMO-No. 49), (General meteorological standards and recommended practices), in which it is stated that WIS is established and shall be operated in accordance with the practices, procedures and specifications in the Manual.

3. The WMO Information System cuts across all WMO-related discipline areas. It intersects many WMO practices, procedures and specifications that are primarily defined in publications dedicated specifically to them, for example, the *Manual on the Global Data-processing and Forecasting System* (WMO-No. 485) and the *Manual on the Global Observing System* (WMO-No. 544), among others. Other documents that are relevant to the WMO Information System are found in Appendix A.

PART I. ORGANIZATION AND RESPONSIBILITIES

1.1 Organization of WIS

1.1.1 In keeping with the *Technical Regulations* (WMO-No. 49), Volume I, Part I, section 3, centres operated by WMO Members and their collaborating organizations shall be categorized as one of the three types of WIS centres forming the core infrastructure of WIS:

- (a) Global Information System Centres (GISCs);
- (b) Data Collection or Production Centres (DCPCs);
- (c) National Centres (NCs).

The distinct functions of the three types of centres (GISC, DCPC, NC) are referred to in Part III, Functions of WIS.

1.1.2 Each Permanent Representative with WMO shall be responsible for authorizing users of WIS. The right to manage the authorization process may be delegated.

1.2 Compliance with required WIS functions

WIS centres shall comply with required WIS functions. This Manual contains instructions on practices, procedures and specifications for WIS functions. It is supplemented by additional information concerning practices, procedures and specifications for WIS functions that are set out in the *Guide to the WMO Information System* (WMO-No. 1061).

1.3 Interaction among WIS centres

GISCs shall connect to other GISCs through the WIS Core Network, which is based on the Main Telecommunication Network (MTN). Data, products and metadata shall flow to a GISC from the DCPCs and NCs that are within its area of responsibility. An Area Meteorological Data Communication Network (AMDCN) shall connect each GISC to DCPCs and NCs in the GISC area of responsibility. An AMDCN may span multiple Regional Meteorological Telecommunication Networks (RMTNs) and parts thereof.

1.4 Implementation of WIS

WIS shall be implemented in two parallel parts. One part involves the continued evolution of the WMO Global Telecommunication System (GTS), which focuses on further improving the delivery of time- and mission-critical data, products and services, including warnings. The other part extends WMO services through discovery, access and retrieval (DAR) facilities, as well as through flexible timely delivery.

1.5 Discovery, access and retrieval function

As required per the *Technical Regulations* (WMO-No. 49), Volume I, Part I, section 3, WIS shall be based on catalogues that contain metadata describing data and products available across WMO, plus metadata describing dissemination and access options. The DAR function of WIS shall be the primary means of realizing the WIS comprehensive catalogue, which is maintained collaboratively by all WIS centres.

1.6 **Robustness and reliability of components**

Highly robust and reliable WIS components are essential to the operation of WIS. Performance indicators shall be evaluated in the designation procedure for WIS centres. This evaluation shall ascertain, among other things, whether or not data content flowing via WIS network technologies fully satisfies requirements for security, authenticity and reliability. Some aspects of service levels are identified in this Manual.

1.7 **Collection and dissemination services**

1.7.1 WIS shall provide three types of collection and dissemination services:

- (a) Routine collection and dissemination service for time-and operation-critical data and products: this service is based on real-time “push” mechanisms, including multicast and broadcast; it is implemented through dedicated telecommunication means providing a guaranteed quality of service;
- (b) Discovery, access and retrieval service: this service is based on a request/reply “pull” mechanism with relevant data-management functions; it is implemented through the Internet;
- (c) Timely delivery service for data and products: this service is based on a delayed-mode “push” mechanism; it is implemented through a combination of dedicated telecommunication means and public data telecommunication networks, especially the Internet.

1.7.2 WIS shall support the WMO virtual all-hazards network, thus ensuring the fast, secure and reliable exchange of alert and warning information, including International Telecommunication Union (ITU) Recommendation X.1303 (Common Alerting Protocol).

Note: The virtual all-hazards network encompasses all the technical and operational arrangements necessary for the timely handling and delivery of alert and warning information involving WMO.

1.7.3 The goal of the WMO Integrated Global Data Dissemination Service (IGDDS) is to ensure the definition and operational implementation of efficient circulation of space-based observation data and products meeting the needs of WMO programmes in the context of WIS. IGDDS shall remain an important component of WIS, mainly for the exchange and dissemination of data and products generated by space-based observing systems.

PART II. DESIGNATION PROCEDURES FOR WIS CENTRES

2.1 General

2.1.1 The establishment and operation of WIS depend on WMO Member organizations and those more broadly related to it, such as the Intergovernmental Oceanographic Commission (IOC) and the International Council for Science (ICSU), taking on the functional roles of GISCs, DCPCs and NCs. Procedures for designating a WIS centre rely on the agreed WIS functional architecture and the WIS compliance specifications.

2.1.2 As required per the *Technical Regulations* (WMO-No. 49), Volume I, Part I, section 3, Congress and the Executive Council shall consider the designation of GISCs and DCPCs based on recommendations of the Commission for Basic Systems (CBS). The development of CBS recommendations includes consultation and coordination with the relevant technical commissions that are responsible for the WMO and related international programmes concerned, as well as with the regional associations, as appropriate.

Note: The relevant groups established by the Executive Council have a role in the GISC and DCPC designation process, in accordance with their mandate.

2.2 Procedure for designating a GISC

2.2.1 Overview

The procedure for the designation of a GISC shall consist of four steps:

- (1) Statement of WIS requirements;
- (2) Service offer by a Member for a potential GISC;
- (3) Demonstration of GISC capabilities;
- (4) Designation of a GISC.

2.2.2 Statement of WIS requirements

The WMO technical commissions and other bodies representing the participating programmes, including regional bodies, shall state their requirements for WIS services and review them periodically. The list of all relevant requirements shall be compiled and regularly reviewed by CBS, and reported to the Executive Council.

2.2.3 Service offer by a Member for a potential GISC

2.2.3.1 A WMO Member can apply for a centre to be designated as one of the GISCs forming the core infrastructure of WIS. The service offer by the Member shall include:

- (a) A statement of compliance with the required WIS functions;
- (b) A proposal regarding the area of responsibility for WIS services;
- (c) A formal commitment by the Permanent Representative of the Member that such services shall be provided on a routine basis and sustained over time.

2.2.3.2 The service offer shall be addressed to WMO. CBS, in consultation with the regional association(s) concerned, shall analyse the proposed service offer with regard to WIS requirements and compliance with GISC functions and specifications and shall formulate a recommendation.

2.2.4 ***Demonstration of GISC capabilities***

2.2.4.1 The Member offering a GISC shall demonstrate to CBS the capabilities of the proposed centre to provide WIS services of the requisite reliability and quality to accredited users. Compliance shall be demonstrated for:

- (a) Real-time functions of data and product collection and dissemination;
- (b) Non-real-time services for requests;
- (c) Storage functions for the required set of data and products and relevant up-to-date metadata catalogues;
- (d) Coordination functions with other GISCs and the planning of mutual back-up services;
- (e) Adherence to WIS standards and relevant data-exchange policies and access rights.

2.2.4.2 A formal commitment to implement the GISC and a time schedule for providing GISC services in accordance with the offer shall be given by the Permanent Representative of the Member proposing to operate the candidate GISC.

2.2.4.3 Upon the demonstration of the capabilities of the candidate GISC, CBS shall submit its recommendation on the GISC designation to Congress or the Executive Council.

2.2.5 ***Designated GISCs***

The list of GISCs as approved by Congress or the Executive Council is included in Appendix B of this Manual.

2.3 **Procedure for designating a DCPC**

2.3.1 ***Overview***

WMO has determined that all WMO and related international programmes shall be served by WIS. Each established centre shall therefore implement required WIS functions. CBS shall recommend how these centres are categorized as DCPCs within WIS.

2.3.2 ***Procedure***

The procedure for designating a DCPC shall consist of three steps:

- (1) Service offer by a potential DCPC;
- (2) Demonstration of DCPC capabilities;
- (3) Designation of a DCPC.

2.3.3 ***Service offer by a potential DCPC***

2.3.3.1 Required DCPC functions should be fulfilled by a centre that has been established under a WMO or related international programme and/or a regional association. **Accordingly, the relevant technical commission and/or regional association shall consider the service offers made by Members for potential DCPCs and shall endorse candidate DCPCs.**

2.3.3.2 The service offer of candidate DCPCs shall then be submitted to CBS, which shall analyse the compliance of the candidate with the required DCPC functions and specifications and formulate a recommendation.

2.3.4 ***Demonstration of DCPC capabilities***

2.3.4.1 The Member offering a DCPC shall be invited to demonstrate to CBS the ability of the proposed Centre to provide WIS services in compliance with the DCPC functions and responsibilities, including proper synchronization and communications with its associated GISC. Compliance shall be demonstrated, where applicable, with respect to real-time functions of data and product dissemination, non-real-time services for requests, provision of relevant up-to-date metadata catalogues, coordination and synchronization functions with the associated GISC, adherence to WIS standards and relevant data-exchange policies and access rights.

Note: An associated GISC is defined by a bilateral agreement between a centre and a GISC for the purposes of uploading or downloading data. A centre can have multiple associated GISCs but shall identify a principal GISC for uploading and managing metadata.

2.3.4.2 After the candidate DCPC has successfully demonstrated its capabilities, CBS shall recommend to Congress or the Executive Council that the candidate be approved.

2.3.5 ***Designated DCPCs***

The list of DCPCs as approved by Congress or the Executive Council is included in Appendix B to this Manual. Each DCPC entry includes the name of the associated GISC.

2.4 **Procedure for designating an NC**

2.4.1 ***Background***

As required per the *Technical Regulations* (WMO-No. 49), Volume I, Part I, section 3, each NC shall use WIS to provide data and products that are consistent with its programme responsibilities. These data and products shall be provided with associated metadata in accordance with WIS practices, procedures and specifications. Each NC shall participate as appropriate in the relevant monitoring of the performance of WIS.

2.4.2 ***Procedure***

Each WMO Member shall notify WMO of the current name and location of each of its centres that is to be designated as an NC. CBS, with the involvement of relevant regional associations and with the assistance of the WMO Secretariat, shall review the Member designations to ensure support of each NC by a GISC, DCPC or other NC.

2.4.3 ***Designated NCs***

The NCs designated by Members shall be included in the list of WIS centres in Appendix B to this Manual. Each NC entry shall include the name of the associated GISC.

PART III. FUNCTIONS OF WIS

3.1 Roles in and review of WIS functions

An ongoing process for understanding user requirements, including quality of service, shall determine the functional scope and physical size of WIS, thereby ensuring the continued responsiveness of WIS to the current and future needs of the supported programmes. All supported programmes and technical commissions shall participate in this process, which shall be part of general WMO requirement reviews.

3.2 List of WIS functions

3.2.1 WIS centres collectively support the major WIS functions listed here:

- (a) Collect observations, generate products, create metadata and archive information;
- (b) Assign user role;
- (c) Maintain and expose a catalogue of services and information;
- (d) Authorize access to information by users;
- (e) Deliver information to users (internal and external);
- (f) Manage system performance.

Note: WIS is concerned with data management and telecommunications aspects, but the actual content of data and products falls outside the scope of WIS and is a matter for the specific programme supported.

3.2.2 The required standard interfaces to these functions are described in the WIS technical specifications (Part IV of this Manual).

3.3 Functional architecture of WIS

Note: The *Guide to the WMO Information System* (WMO-No. 1061), 3.3, references the functional architecture of WIS, provided as supplementary guidance for WIS centres in a technical document.

3.4 Data flow among WIS functions

Note: The *Guide to the WMO Information System* (WMO-No. 1061), 3.4, provides as supplementary guidance for WIS centres a data-flow model of the WIS functional architecture for the required WIS functions, illustrating a possible implementation of major WIS functions.

3.5 Functional requirements of a GISC

3.5.1 General

Note: The phrase "information intended for global exchange" encompasses time- and operation-critical information (data and products). Such information includes "essential data" and part of the "additional data", as specified in WMO Resolution 25 (Cg-XIII) and Resolution 40 (Cg-XII).

3.5.2 ***Receive information from the GISC area***

3.5.2.1 Each GISC shall receive information intended for global exchange from NCs and DCPCs within its area of responsibility. This requirement also intersects the WIS DAR requirement that is noted below.

3.5.2.2 See also 4.2, WIS-TechSpec-1 (Uploading of metadata for data and products) and 4.3, WIS-TechSpec-2 (Uploading of data and products).

3.5.3 ***Exchange information with other GISCs***

3.5.3.1 Each GISC shall collect from its area information that is intended for global exchange and shall share such information with other GISCs so that all GISCs have a common holding of information available for global exchange. See also 3.5.5 (Maintain a 24-hour cache) and 3.5.8 (Coordinate telecommunications in a GISC area).

3.5.3.2 GISCs should employ the MTN and associated collaborative mechanisms to exchange the information efficiently and without detriment to the performance of any GISC.

3.5.3.3 See also 4.4, WIS-TechSpec-3 (Centralization of globally distributed data).

3.5.4 ***Disseminate information to the GISC area***

3.5.4.1 Each GISC shall disseminate information to NCs and DCPCs within its area of responsibility, including, but not limited to, the information intended for global exchange.

3.5.4.2 See also 4.11, WIS-TechSpec-10 (Downloading files via dedicated networks), 4.12, WIS-TechSpec-11 (Downloading files via non-dedicated networks) and 4.13, WIS-TechSpec-12 (Downloading files via other methods).

3.5.5 ***Maintain a 24-hour cache***

3.5.5.1 Each GISC shall hold the information intended for global exchange for at least 24 hours to support subscription services, including, but not limited to, those for the GTS, and make the information available via WMO request/reply ("pull") mechanisms. Information limited to regional or AMDCN exchange need only be held in those GISCs supporting the region or AMDCN for which the information is to be available. This requirement intersects the WIS DAR requirement (see 3.5.6).

3.5.5.2 See also 4.4, WIS-TechSpec-3 (Centralization of globally distributed data), 4.5, WIS-TechSpec-4 (Maintenance of user identification and role information) and 4.6, WIS-TechSpec-5 (Consolidated view of distributed identification and role information).

3.5.6 ***Discovery, access and retrieval***

3.5.6.1 In support of the DAR function, each GISC shall maintain and provide access to a comprehensive catalogue of information across all WMO programmes encompassed by WIS. This includes, but is not limited to, information intended for global exchange. In order to satisfy the DAR functional requirement, GISCs are required to support, in interactive and in batch modes: upload; change and deletion of metadata; user discovery of metadata; user access to metadata; and synchronization of the WIS comprehensive metadata catalogue with other GISCs.

3.5.6.2 See also 4.9, WIS-TechSpec-8 (DAR catalogue search and retrieval) and 4.10, WIS-TechSpec-9 (Consolidated view of distributed DAR metadata catalogues).

3.5.7 ***Data network connectivity of a GISC***

Each GISC shall provide around-the-clock connectivity to the public and dedicated communication networks at a capacity that is sufficient to meet its global, regional and AMDCN responsibilities. Each GISC should ensure that every telecommunication facility it employs in support of WIS has the appropriate level of availability and capacity, including, as necessary, routing and back-up arrangements. Each GISC should maintain service level agreements with the suppliers of its communication links and associated hardware.

3.5.8 ***Coordinate telecommunications in a GISC area***

Each GISC shall coordinate with the Centres in its area of responsibility to maintain a WIS telecommunications infrastructure that can meet the WIS requirements for information exchange within the area. In the case of particular global and/or regional agreements, a GISC could also support the exchange of agreed WIS time- and operation-critical information with other AMDCNs. The telecommunications infrastructure shall be implemented through various technologies and services (for example, the Internet, satellite-based data distribution, dedicated data networks) in accordance with capacity and reliability requirements.

3.5.9 ***Recovery arrangements of a GISC***

3.5.9.1 Each GISC shall implement and operate proper procedures and arrangements to provide swift recovery or back-up of its essential services in the event of an outage. Each GISC should maintain arrangements for system back-up in case of total site failure (for example, an offsite Disaster Recovery Centre) and for partial back-up in situations otherwise affecting WIS functions within the GISC.

3.5.9.2 Each GISC shall maintain arrangements with one or more back-up GISCs that include, as a minimum, the collection and dissemination of information to/from its AMDCN to be taken up by another GISC in case of an incapacitating system failure.

3.5.10 ***Performance monitoring of a GISC***

3.5.10.1 Each GISC shall participate in monitoring the performance of WIS, including monitoring the collection and distribution of data and products intended for global exchange. Each GISC shall report routinely to other GISCs, as well as to the WMO Secretariat, information concerning the status and performance of connectivity to WIS centres in its area, including capacity and technology used (for example, the Internet, satellite-based data distribution and dedicated data networks). CBS shall review and report on the status and performance of GISCs with the assistance of the WMO Secretariat.

3.5.10.2 Monitoring of the collection and dissemination of WIS information (data and products) should include, as appropriate, WIS monitoring and monitoring related to WMO Programmes.

3.5.10.3 See also 4.16, WIS-TechSpec-15 (Reporting of quality of service).

3.6 **Functional requirements of a DCPC**

3.6.1 **General**

Note: The term “information” is used in a general sense and includes data and products.

The specific performance and functional requirements of a particular DCPC shall be determined by the programme it supports. DCPCs that support programmes with mission-critical responsibilities, and especially programmes with safety-of-life missions, shall maintain a high level of operational reliability, including required telecommunications. Each DCPC shall provide metadata describing the information it makes available through the WIS comprehensive catalogue, shall provide access to that information and shall participate in monitoring the overall performance of WIS.

3.6.2 **Collect information from a DCPC area**

3.6.2.1 As appropriate to its programme role, a DCPC shall collect information intended for dissemination to NCs within its area of responsibility (that is, regional collections).

3.6.2.2 See also 4.2, WIS-TechSpec-1 (Uploading of metadata for data and products) and 4.3, WIS-TechSpec-2 (Uploading of data and products).

3.6.3 **Collect programme-related information**

3.6.3.1 As appropriate to its programme role, a DCPC shall collect the specific programme-related data and products.

3.6.3.2 See also 4.2, WIS-TechSpec-1 (Uploading of metadata for data and products) and 4.3, WIS-TechSpec-2 (Uploading of data and products).

3.6.4 **Production support of programme-related information**

3.6.4.1 As appropriate to its programme role, a DCPC shall provide data management and data communications that are adequate to support the production of regional or specialized data and products.

3.6.4.2 See also 4.2, WIS-TechSpec-1 (Uploading of metadata for data and products) and 4.3, WIS-TechSpec-2 (Uploading of data and products).

3.6.5 **Provide information intended for global exchange**

3.6.5.1 As appropriate to its programme role, each DCPC shall provide information intended for global exchange to its responsible GIS.

3.6.5.2 See also 4.2, WIS-TechSpec-1 (Uploading of metadata for data and products) and 4.3, WIS-TechSpec-2 (Uploading of data and products).

3.6.6 **Disseminate information**

3.6.6.1 As appropriate to its programme role, each DCPC shall disseminate information other than that intended for global exchange.

3.6.6.2 See also 4.11, WIS-TechSpec-10 (Downloading files via dedicated networks), 4.12, WIS-TechSpec-11 (Downloading files via non-dedicated networks) and 4.13, WIS-TechSpec-12 (Downloading files via other methods).

3.6.7 ***Provide access to information***

3.6.7.1 Each DCPC shall support access to its products via WMO request/reply (“pull”) mechanisms in an appropriate manner.

3.6.7.2 See also 4.5, WIS-TechSpec-4 (Maintenance of user identification and role information), 4.7, WIS-TechSpec-6 (Authentication of a user) 4.8, WIS-TechSpec-7 (Authorization of a user role).

3.6.8 ***Describe information with metadata***

3.6.8.1 Each DCPC shall describe its data and products according to an agreed WMO metadata standard, provide access to this catalogue of data and products and provide these metadata as appropriate to other centres, in particular a GISC.

3.6.8.2 See also 4.9, WIS-TechSpec-8 (DAR catalogue search and retrieval) and 4.10, WIS-TechSpec-9 (Consolidated view of distributed DAR metadata catalogues).

3.6.9 ***Recovery arrangements of a DCPC***

As appropriate to its programme role, each DCPC shall implement and operate proper procedures and arrangements to provide swift recovery or back-up of its essential services in the event of an outage.

3.6.10 ***Performance monitoring of a DCPC***

3.6.10.1 Each DCPC shall participate in monitoring the performance of WIS.

3.6.10.2 See also 4.16, WIS-TechSpec-15 (Reporting of quality of service).

3.7 ***Functional requirements of an NC***

3.7.1 ***Provide data, products and metadata***

3.7.1.1 As required per the *Technical Regulations* (WMO-No. 49), Volume I, Part I, section 3, each NC shall use WIS to provide data and products, in line with its programme responsibilities. Such data and products shall be provided together with associated metadata, in accordance with WIS practices, procedures and specifications.

3.7.1.2 See also 4.2, WIS-TechSpec-1 (Uploading of metadata for data and products) and 4.3, WIS-TechSpec-2 (Uploading of data and products).

3.7.2 ***Collect programme-related information***

3.7.2.1 As appropriate to its programme role, each NC shall collect programme-related data and products.

3.7.2.2 See also 4.2, WIS-TechSpec-1 (Uploading of metadata for data and products) and 4.3, WIS-TechSpec-2 (Uploading of data and products).

3.7.3 ***Production support of programme-related Information***

3.7.3.1 As appropriate to its programme role, each NC shall provide data management and data communications that are adequate to support the production of data and products.

3.7.3.2 See also 4.2, WIS-TechSpec-1 (Uploading of metadata for data and products) and 4.3, WIS-TechSpec-2 (Uploading of data and products).

3.7.4 ***Describe information with metadata***

3.7.4.1 Each NC shall describe its data and products according to an agreed WMO metadata standard and provide this information, as appropriate, to other Centres.

3.7.4.2 See also 4.9, WIS-TechSpec-8 (DAR catalogue search and retrieval).

3.7.5 ***Performance monitoring of an NC***

3.7.5.1 As required per the *Technical Regulations* (WMO-No. 49), Volume I, Part I, section 3, each NC shall participate in monitoring the performance of WIS.

3.7.5.2 See also 4.16, WIS-TechSpec-15 (Reporting of quality of service).

PART IV. WIS TECHNICAL SPECIFICATIONS

4.1 General

4.1.1 There are 15 technical specifications (WIS TechSpecs) that define the interfaces to the major WIS functions. The specifications for these interfaces are named and numbered as follows:

1. Uploading of metadata for data and products;
2. Uploading of data and products;
3. Centralization of globally distributed data;
4. Maintenance of user identification and role information;
5. Consolidated view of distributed identification and role information;
6. Authentication of a user;
7. Authorization of a user role;
8. DAR catalogue search and retrieval;
9. Consolidated view of distributed DAR metadata catalogues;
10. Downloading files via dedicated networks;
11. Downloading files via non-dedicated networks;
12. Downloading files via other methods;
13. Maintenance of dissemination metadata;
14. Consolidated view of distributed dissemination metadata catalogues;
15. Reporting of quality of service.

4.1.2 **NCs shall support seven of the 15 technical specifications, specifically WIS-TechSpec-1, -2, -4, -10, -11, -12 and -15.** An NC can arrange through bilateral agreements for another NC, a DCPC or a GISC to perform functions on its behalf.

4.1.3 **According to the particular requirements of a DCPC in its programme role, DCPCs shall support up to 13 of the 15 technical specifications.** DCPCs are not required to support WIS-TechSpec-3 or WIS-TechSpec-9.

4.1.4 **WIS GISCs shall support all 15 technical specifications.**

4.1.5 Any DCPC or NC is welcome to implement interfaces beyond the minimum required. Accordingly, the technical specification is mandatory wherever application of the interface is applied.

4.1.6 **The GTS file-naming convention shall be used for files and the associated metadata record whenever necessary. The GTS file-naming convention is documented in the *Manual on the Global Telecommunication System* (WMO-No. 386), Volume 1, Part II, Attachment II-15.**

Note: The *Guide to the WMO Information System* (WMO-No. 1061), 4.1, references "WIS compliance specifications for GISCs, DCPCs and NCs", provided as supplementary guidance for WIS centres.

4.2 WIS-TechSpec-1: Uploading of metadata for data products

4.2.1 **This specification requires that each metadata record uploaded shall be represented in compliance with the WMO Core Metadata Profile of ISO 19115, as specified in Part V, with a unique identifier.**

4.2.2 **Uploading shall use methods prescribed by the receiver, which is typically the host of a WIS DAR metadata catalogue.**

4.2.3 Discovery, access and retrieval metadata should be provided prior to the files or messages associated with the metadata.

4.2.4 For updating the DAR metadata catalogue, GISCs should support two kinds of maintenance facilities: a file-upload facility for batch updating (add, replace or delete metadata records treated as separate files) and an online form for changing metadata entries in the DAR metadata catalogue (add, change or delete elements in a record, as well as whole records).

4.2.5 **GISCs shall maintain the updated DAR metadata catalogue as a searchable resource (see WIS-TechSpec-8).**

4.2.6 See also sections 3.5.2 (Receive information from the GISC area), 3.6.2 (Collect information from the DCPC area), 3.6.3 (Collect programme-related information) and 3.6.4 (Production support of programme-related information).

4.3 **WIS-TechSpec-2: Uploading of data and products**

4.3.1 This specification requires that uploaded data or products shall be represented in the manner prescribed by the relevant programme, including, where appropriate, the *Manual on the Global Telecommunication System* (WMO-No. 386), Volume 1, Part II, Attachment II-2, and the *Manual on Codes* (WMO-No. 306), as well as other WMO Manuals and the GTS file-naming convention as noted in 4.1.6.

4.3.2 Data and products should be handled as specified in the *Manual on the Global Telecommunication System* (WMO-No. 386), Volume I, Part I, 1.3, Design principles of the GTS, and other WMO Manuals specific to the relevant programme.

4.3.3 See also 3.5.2 (Receive information from the GISC area), 3.6.2 (Collect information from the DCPC area), 3.6.3 (Collect programme-related information) and 3.6.4 (Production support of programme-related information).

4.4 **WIS-TechSpec-3: Centralization of globally distributed data**

4.4.1 This specification requires that the *Manual on the Global Telecommunication System* (WMO-No. 386), Volume 1, Part I, Attachment I-3, is applied, as appropriate, to the centralized copies of information intended for global exchange (described in 3.5.1).

4.4.2 **Warnings shall be transmitted end-to-end within WIS within two minutes.**

4.4.3 See also 3.5.3 (Exchange information with other GISCs) and 3.5.5 (Maintain 24-hour cache).

4.5 **WIS-TechSpec-4: Maintenance of user identification and role information**

4.5.1 **User identification and role information shall be represented and communicated using methods prescribed by the receiver, which is typically the host of an identification and role-information database.**

Note: The term "user identification" in the given context does not imply that a user is personally identifiable. Administrators of authentication and authorization at WIS centres need to share updated identification and role information as a resource that is available across WIS centres. The sharing of this information by administrators is also necessary to prevent the inappropriate disclosure of any personally identifiable information.

4.5.2 User identification and role information maintenance should satisfy timeliness requirements of the application and host centre.

4.5.3 See also 3.5.5 (Maintain 24-hour cache) and 3.6.7 (Provide access to information).

4.6 **WIS-TechSpec-5: Consolidated view of distributed identification and role information**

4.6.1 This interface for a consolidated view of distributed identification and role information is not yet required (see also Note in 4.5.1).

4.6.2 WIS centres that do exchange identification and role information should do so using data-encryption technologies.

4.6.3 See also 3.5.5 (Maintain 24-hour cache) and 3.6.7 (Provide access to information).

4.7 **WIS-TechSpec-6: Authentication of a user**

4.7.1 WIS centres should employ authentication standards, which may include public key infrastructure techniques.

Note: Commercial, off-the-shelf authentication software based on industry and/or international standards should be preferred.

4.7.2 User authentication should satisfy application-specific and host centre processing constraints, and shall provide a quality of service that meets user requirements.

4.7.3 See also 3.5.5 (Maintain 24-hour cache) and 3.6.7 (Provide access to information).

4.8 **WIS-TechSpec-7: Authorization of a user role**

4.8.1 WIS centres should employ government-endorsed standards for user authorization software, techniques and procedures.

4.8.2 User authorization should satisfy application-specific and host centre processing constraints. **User authorization shall also provide a quality of service that meets user requirements.**

4.8.3 See also 3.5.5 (Maintain 24-hour cache) and 3.6.7 (Provide access to information).

4.9 **WIS-TechSpec-8: Discovery, access and retrieval catalogue search and retrieval**

4.9.1 This specification requires that each metadata catalogue host shall support the Search and Retrieve via URL (SRU) specification of the ISO 23950 Information Search and Retrieval Protocol. A WIS-compliant SRU server shall support SRU version 1.1, the SRU searchRetrieve operation, the SRU Explain operation, the diagnostic schema for returning errors and the SRU Contextual Query Language (CQL) level 2.

4.9.2 In addition to full text search, a WIS-compliant SRU server shall search at least eight indexes as character strings (abstract, title, author, keywords, format, identifier, type and Coordinate Reference System (CRS)); at least five indexes as ordered dates (creationDate, modificationDate, publicationDate, beginningDate, endingDate); and the index "bounding" as geographic coordinates (decimal degrees and space delimited, in the following order: north, west, south, east).

4.9.3 The search service shall provide a quality of service that meets user requirements.

4.9.4 See also 3.5.6 (Discovery, access and retrieval) and 3.6.8 (Describe information with metadata).

4.10 **WIS-TechSpec-9: Consolidated view of distributed discovery access and retrieval metadata catalogues**

4.10.1 GISCs should exchange metadata catalogue updates using version 2 of the Open Archives Initiative–Protocol for Metadata Harvesting (OAI-PMH).

4.10.2 The exchange of metadata catalogue updates should satisfy the requirement for distributed instances of DAR metadata not to diverge in content by more than one day. A mechanism for rapid update on an emergency basis should also be provided.

4.10.3 See also 3.5.6 (Discovery, access and retrieval).

4.11 **WIS-TechSpec-10: Downloading files via dedicated networks**

4.11.1 This specification requires that downloaded data or products shall be represented in the manner prescribed by the relevant programme, including, where appropriate, the *Manual on the Global Telecommunication System (WMO-No. 386), Volume 1, Part II, Attachment II-2*, as well as other WMO Manuals and the GTS file-naming convention, as noted in 4.1.6.

4.11.2 Data and products should be handled as specified in the *Manual on the Global Telecommunication System (WMO-No. 386), Volume I, Part I, 1.3, Design principles of the GTS*, and other WMO Manuals that are specific to the relevant programme.

4.11.3 See also 3.5.4 (Disseminate information to the GISC area) and 3.6.5 (Provide information intended for global exchange).

4.12 **WIS-TechSpec-11: Downloading files via non-dedicated networks**

4.12.1 This specification requires that downloaded data or products shall be represented and communicated in a manner appropriate to the relevant programme.

4.12.2 Data and products should be handled as specified in the *Manual on the Global Telecommunications System (WMO-No. 386), Volume I, Part I, 1.3, Design principles of the GTS*, and other WMO Manuals that are specific to the relevant programme.

4.12.3 See also 3.5.4 (Disseminate information to the GISC area) and 3.6.5 (Provide information intended for global exchange).

4.13 **WIS-TechSpec-12: Downloading files via other methods**

4.13.1 This specification requires that downloaded data or products shall be represented and communicated in a manner appropriate to the relevant programme.

4.13.2 Data and products should be handled as specified in the *Manual on the Global Telecommunication System (WMO-No. 386), Volume I, Part I, 1.3, Design principles of the GTS*, and other WMO manuals, specific to the relevant programme.

4.13.3 See also 3.5.4 (Disseminate information to the GISC area) and 3.6.5 (Provide information intended for global exchange).

4.14 **WIS-TechSpec-13: Maintenance of dissemination metadata**

4.14.1 This specification requires that the dissemination metadata (including subscription information, such as accounts and delivery particulars) shall be represented and communicated as prescribed by the host of the database containing dissemination metadata.

4.14.2 Requests for changes to dissemination for information that are not part of the routine global exchange may be subject to the notification period for changes specified in GTS. Otherwise, changes to dissemination should apply within one day.

4.14.3 See also 3.5.6 (Discovery, access and retrieval) and 3.6.5 (Provide information intended for global exchange).

4.15 **WIS-TechSpec-14: Consolidated view of distributed dissemination metadata catalogues**

4.15.1 This interface is not yet required; however, it may be needed as part of a back-up arrangement between Centres.

4.15.2 See also 3.5.6 (Discovery, access and retrieval).

4.16 **WIS-TechSpec-15: Reporting of quality of service**

4.16.1 This specification requires that reporting of quality of service shall be represented and communicated as prescribed by the host of the centralized reporting database.

4.16.2 Reports should be sent on a schedule determined by the centralized reporting manager, based on the needs of WIS centres.

4.16.3 See also 3.5.7 (Network connectivity of GISC), 3.5.8 (Coordinate telecommunications in the GISC area), 3.5.9 (Recovery arrangements of GISC), 3.5.10 (Performance monitoring of a GISC), 3.6.9 (Recovery arrangements of a DCPC) and 3.6.10 (Performance monitoring of a DCPC).

PART V. WIS DISCOVERY METADATA

- 5.1 All information to be exchanged through the WIS shall have a WIS discovery metadata record associated with it.
- 5.2 WIS discovery metadata records shall be provided by the data custodian to the principal GISC for the centre to which the data custodian is attached. No change should be made to a WIS discovery metadata record without the express approval of the data custodian other than in the case that the principal GISC for the data custodian may alter or withdraw the WIS discovery metadata record if it is found to interfere with the correct operation of WIS, in which case an emergency change should be made and the data custodian shall be requested to provide an appropriately corrected discovery metadata record.
- 5.3 WIS discovery metadata records shall conform to the ISO 19115 Standard and, as a minimum, contain the information specified as mandatory in the WMO Core Metadata Profile of that standard as defined in Appendix C to this Manual.
- 5.4 CBS shall maintain and develop the WMO Core Metadata Profile. Changes to the WMO Core Metadata Profile shall be governed using the procedures defined in Appendix C to this Manual.
-

APPENDIX A. SELECTED WMO DOCUMENTS RELEVANT TO WIS

Policy documents

- WMO-No. 15 Basic Documents No. 1 (2011 edition)
WMO-No. 49 *Technical Regulations:*
Volume I – General Meteorological Standards and Recommended Practices
Volume II – Meteorological Services for Air Navigation
Volume III – Hydrology
Volume IV – Quality Management
WMO-No. 60 *Agreements and Working Arrangements*
WMO-No. 508 *Resolutions of Congress and the Executive Council*

International exchange of data and products

The World Meteorological Organization facilitates the free and unrestricted exchange of data and information, and products and services in real- or near-real-time on matters relating to safety and security of society, economic welfare and the protection of the environment.

- WMO-No. 837 Exchanging Meteorological Data – Guidelines on Relationships in Commercial Meteorological Activities. WMO Policy and Practice.
WMO-No. 827 Resolution 40 (Cg-XII) – WMO policy and practice for the exchange of meteorological and related data and products including guidelines on the relationships in commercial meteorological activities.
WMO-No. 902 Resolution 25 (Cg-XIII) – Exchange of hydrological data and products
Annex IV – Geneva Declaration of Thirteenth World Meteorological Congress

Manuals

- WMO-No. 9 *Weather Reporting:*
Volume A – Observing Stations
Volume C1 – Catalogue of Meteorological Bulletins
Volume C2 – Transmission Programmes
Volume D – Information for Shipping
WMO-No. 306 *Manual on Codes*
WMO-No. 386 *Manual on the Global Telecommunication System, Volumes I and II*
WMO-No. 485 *Manual on the Global Data-processing and Forecasting Systems, Volume I, Parts 1, 2 and 3*
WMO-No. 544 *Manual on the Global Observing System*

Guides

- WMO-No. 8 *Guide to Meteorological Instruments and Methods of Observation*
WMO-No. 100 *Guide to Climatological Practices*
WMO-No. 134 *Guide to Agricultural Meteorological Practices*
WMO-No. 168 *Guide to Hydrological Practices*
WMO-No. 305 *Guide on the Global Data-processing System*
WMO-No. 471 *Guide to Marine Meteorological Services*
WMO-No. 488 *Guide to the Global Observing System*
WMO-No. 636 *Guide on the Automation of Data-processing Centres*
WMO-No. 702 *Guide to Wave Analysis and Forecasting*
WMO-No. 731 *Guide on Meteorological Observation and Information Distribution Systems for Aviation Weather Services*
WMO-No. 732 *Guide to Practices for Meteorological Offices Serving Aviation*

- WMO-No. 750 *Guide to Moored Buoys and Other Ocean Data Acquisition Systems*
WMO-No. 788 *Guide on World Weather Watch Data Management*
WMO-No. 834 *Guide to Public Weather Services Practices*
WMO-No. 1061 *Guide to the WMO Information System*

Technical documents

- Guide to WMO Binary Code Form GRIB 1 – Technical Report No. 17 (WMO/TD-No. 611) – May 1994
Guide to WMO Table-Driven Code Forms: FM 94 BUFR and FM 95 CREX
Guide to FM 92 GRIB Edition 2

Miscellaneous (GTS)

- Guide on VPN via the Internet between GTS centres
Guide on IT Security
-

APPENDIX B. APPROVED WIS CENTRES

1. Global Information System Centres

Note: Per Resolution 51 (Cg-XVI) of Sixteenth World Meteorological Congress, Global Information System Centres (GISCs) in this table that are marked with an asterisk were conditionally designated as WIS GISCs, subject to their having demonstrated the pre-operational compliance requirements of CBS.

<i>WMO Member</i>	<i>Centre name</i>	<i>Region</i>
Australia	GISC Melbourne	V
Brazil	GISC Brasilia	III
China	GISC Beijing	II
France	GISC Toulouse	VI
Germany	GISC Offenbach	VI
India	GISC New Delhi	II
Iran, Islamic Republic of	GISC Tehran	II
Japan	GISC Tokyo	II
Morocco	*GISC Casablanca	I
Republic of Korea	GISC Seoul	II
Russian Federation	GISC Moscow	VI
Saudi Arabia	GISC Jeddah	II
South Africa	*GISC Pretoria	I
United Kingdom of Great Britain and Northern Ireland	GISC Exeter	VI
United States of America	GISC Washington	IV

2. Data Collection or Production Centres

Note: Per Resolution 51 (Cg-XVI), Data Collection or Production Centres (DCPCs) in this table that are marked with an asterisk were conditionally designated as WIS DCPCs, subject to their having demonstrated the pre-operational compliance requirements of CBS.

<i>WMO Member or contributing organization</i>	<i>Centre name</i>	<i>Centre location region/city</i>	<i>Function</i>	<i>Technical commission/ programme</i>	<i>GISC</i>
Australia	IPS (Ionospheric Prediction Service)	V Sydney	IPS	CBS	Melbourne
	National Climate Centre (NCC)	V Melbourne	NCC	CCI	Melbourne
	Regional Specialized Meteorological Centre (RSMC) Darwin	V Darwin	RSMC-Geographical	CBS	Melbourne
	World Meteorological Centre (WMC) Melbourne	V Melbourne	RTH	CBS	Melbourne
	Joint Australian Tsunami Warning Centre (JATWC)	V Melbourne	Tsunami Warning System (TWS)	JCOMM	Melbourne

<i>WMO Member or contributing organization</i>	<i>Centre name</i>	<i>Centre location region/city</i>	<i>Function</i>	<i>Technical commission/ programme</i>	<i>GISC</i>
Brazil	Regional Telecom- munication Hub (RTH)	III Brasilia	RTH	CBS	Brasilia
Bulgaria	RTH	VI Sofia	RTH	CBS	Offenbach
Canada	RSMC Montreal	IV Montreal	RSMC-Activity- atmospheric transport modelling (ATM)	CBS	Washington
China	Beijing NCC	II Beijing	RCC-RA II	CCI	Beijing
	National Satellite Meteorological Centre (NMSC)	II Beijing	NMSC	CBS	Beijing
	RSMC–Geographical Beijing (NMC)	II Beijing	RSMC- Geographical	CBS	Beijing
	RSMC–Activity-ATM (NMC)	II Beijing	RSMC-Activity- ATM	CBS	Beijing
Croatia	RTH	II Beijing	RTH	CBS	Beijing
	*Marine Meteorology Centre	VI Zagreb	Marine Meteorology Centre	JCOMM	Offenbach
Czech Republic	*RTH	VI Prague	RTH	CBS	Offenbach
ECMWF	European Centre for Medium-Range Weather Forecasts (ECMWF)	VI Reading	RSMC-Activity- Medium-Range- Forecasting	CBS	Exeter
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)	VI Darmstadt, Germany	Satellite Centre	CBS	Offenbach
Finland	*Finnish Meteorological Institute–Arctic Research Centre (FMI-ARC)	VI Sodankylä	Arctic Data Centre (ADC)	CBS	Offenbach
France	Global Producing Centre/Lead Centre for Long Range Forecast Multi- Model Ensemble (GPC/LRFMME)	VI Toulouse	GPC/LRF	CBS	Toulouse
	RCC Toulouse	VI Toulouse	Lead RA VI on LRF	CCI	Toulouse
	RSMC–Numerical Weather Prediction (NWP)	VI Toulouse	Regional NWP support	CBS	Toulouse
	RSMC– Environmental emergency response (EER)	VI Toulouse	RSMC-Activity- ATM	CBS	Toulouse

<i>WMO Member or contributing organization</i>	<i>Centre name</i>		<i>Centre location region/city</i>	<i>Function</i>	<i>Technical commission/ programme</i>	<i>GISC</i>
France (continued)	*RSMC La Réunion– Tropical Cyclone Centre	I	La Réunion	RSMC-Activity-TC	CBS	Toulouse
	RTH	VI	Toulouse	RTH	CBS	Toulouse
	Volcanic Ash Advisory Centre (VAAC)	VI	Toulouse	VAAC	CAeM	Toulouse
Germany	Global Collecting Centre (GCC)–ship observations	VI	Hamburg	GCC	JCOMM	Offenbach
	RSMC	VI	Offenbach	Global Precipitation Climatology Centre (GPCC)	CBS/CCI/ CHy	Offenbach
	Global Runoff Data Centre (GRDC)	VI	Koblenz	GRDC	CHy	Offenbach
	GCOS Reference Upper Air Network (GRUAN) Lead Centre	VI	Tauche/ Lindenberg	GRUAN-LC	CBS	Offenbach
	RCC–Offenbach	VI	Offenbach	RCC lead RA VI	CCI	Offenbach
	RSMC	VI	Offenbach	RSMC- Geographical	CBS	Offenbach
	RTH	VI	Offenbach	RTH	CBS	Offenbach
	ICSU World Data Centre for Climate	VI	Hamburg	WDCC	CCI	Offenbach
	World Data Center for Remote Sensing of the Atmosphere (WDC–RSAT)	VI	Oberpfaffen- hofen	WDC-RSAT	CAS	Offenbach
	WRMC	VI	Bremerhaven	WRMC	WCRP (GEWEX)	Offenbach
Hong Kong, China	World Weather Information Service (WWIS)	II	Hong Kong	WWIS	CBS	Beijing
India	*RSMC–Tropical Cyclones New Delhi	II	New Delhi	RSMC-Activity-TC	CBS	New Dehli
	*RTH	II	New Delhi	RTH	CBS	New Delhi
Iran, Islamic Republic of	*RTH	II	Tehran	RTH	CBS	Tehran
Italy	*RSMC–Marine and ocean products	VI	Rome	RSMC- Geographical	JCOMM	Offenbach
	*RTH	VI	Rome	RTH	CBS	Offenbach
Japan	Global Producing Centre for Long- Range Forecast (GPC/LRF)	II	Tokyo	GPC/LRF	CBS	Tokyo
	Tokyo NCC	II	Tokyo	RCC-RA II	CCI	Tokyo
	RSMC on Atmospheric Transport Modeling Products for Environmental Emergency Response and Backtracking	II	Tokyo	RSMC-Activity- ATM	CBS	Tokyo

<i>WMO Member or contributing organization</i>	<i>Centre name</i>	<i>Centre location region/city</i>	<i>Function</i>	<i>Technical commission/ programme</i>	<i>GISC</i>	
Japan (continued)	RSMC on Tropical Cyclones	II	Tokyo	RSMC-Activity-TC	CBS	Tokyo
	RSMC on Data Processing and Forecasting System	II	Tokyo	RSMC-Geographical	CBS	Tokyo
	RTH	II	Tokyo	RTH	CBS	Tokyo
	Meteorological Satellite Centre	II	Tokyo	Satellite Centre	CBS	Tokyo
	WDC for Greenhouse Gases (GHG)	II	Tokyo	WDC-GHG	CAS	Tokyo
Netherlands	*RCC-De Bilt	VI	De Bilt	RCC-Lead RA VI on climate data	CCI	Exeter
	*Satellite Centre	VI	De Bilt	Satellite Centre	CBS	Exeter
Norway	*Norwegian Institute for Air Research (NILU)	VI	Kjeller	NILU	CAS	Offenbach
Republic of Korea	Global Producing Centre/Lead Centre for LRF Multi-Model Ensemble (GPC/LRFMME)-Seoul	II	Seoul	GPC/LC-LRFMME	CBS	Seoul
	NMSC (National Meteorological Satellite Centre)	II	Jincheon	NMSC	CBS	Seoul
	WAMIS (World Agrometeorological Information Service)	II	Seoul	WAMIS	CAGM	Seoul
Russian Federation	Responsible National Oceanographic Data Centre (RNODC) and Global Data Centre (GDC)	VI	Obninsk	RNODC and GDC	JCOMM	Moscow
	RSMC-EER	VI	Obninsk	RSMC-Activity-ATM	CBS	Moscow
	RSMC	VI	Moscow	RSMC-Geographical	CBS	Moscow
	WMC Moscow	VI	Moscow	RTH	CBS	Moscow
	RTH/RSMC	II	Khabarovsk	RTH/RSMC-Geographical	CBS	Moscow
	RTH/RSMC	II	Novosibirsk	RTH/RSMC-Geographical	CBS	Moscow
	WDC (World Data Centre) Ice-St Petersburg (Global Cryosphere Watch)	VI	St Petersburg	WDC (ICE)	CBS	Moscow
Saudi Arabia	*RTH	II	Jeddah	RTH	CBS	Jeddah
Serbia	*RCC-Belgrade	VI	Belgrade	RCC-RA VI network member	CCI	Offenbach
South Africa	*RTH	I	Pretoria	RTH	CBS	Pretoria
Sweden	*IPY (International Polar Year) data repository	VI	Norrköping	ADC-IPY	CAS	Offenbach

<i>WMO Member or contributing organization</i>	<i>Centre name</i>	<i>Centre location region/city</i>	<i>Function</i>	<i>Technical commission/ programme</i>	<i>GISC</i>	
Sweden (continued)	*BALTRAD (Weather radar network for the Baltic Sea Region)	VI	Norrköping	Regional radar	CBS	Offenbach
	*RTH Norrköping	VI	Norrköping	RTH	CBS	Offenbach
United Kingdom	RSMC–Numerical Weather Prediction (NWP)	VI	Exeter	GPC/LRF	CBS	Exeter
	Marine Observations Centre	VI	Exeter	Marine Observations Centre	JCOMM	Exeter
	RSMC–EER	VI	Exeter	RSMC–Activity–ATM	CBS	Exeter
	RSMC–Global and Regional Climate Centre	VI	Exeter	RSMC–Geographical	CBS	Exeter
	RTH Exeter	VI	Exeter	RTH	CBS	Exeter
	Specialized Ocean & Wave Forecasting Centre	VI	Exeter	Specialized Ocean/wave forecasting	JCOMM	Exeter
United States of America	*Global Observing Systems Information Center (GOSIC)	IV	Asheville, NC	GOSIC	CCI	Washington
	*National Centers for Environmental Prediction (NCEP)	IV	Washington, DC	GPC/LC-LRFMME	CBS	Washington
	*National Center for Atmospheric Research (NCAR)	IV	Boulder, CO	NCAR	CBS	Washington
	*National Geophysical Data Center (NGDC)	IV	Washington, DC	NGDC	CBS	Washington
	*National Oceanographic Data Center (NODC)	IV	Washington, DC	NODC	JCOMM	Washington
	*National Environmental Satellite, Data, and Information Service (NESDIS)	IV	Washington, DC	RMSC-Geographical/NESDIS	CBS	Washington
	*Air Resources Laboratory (ARL)	IV	Washington, DC	RSMC-Activity-ATM	CBS	Washington
	*WMC Washington	IV	Washington, DC	RTH	CBS	Washington
	*World Area Forecast Centre (WAFC)	IV	Washington, DC	WAFC	CAeM	Washington

3. **National Centres**

<i>WMO Member or contributing organization</i>	<i>Centre name</i>	<i>GTS function</i>	<i>Centre Region location</i>	<i>Principal GISC</i>	<i>Constituent body</i>
Afghanistan	Afghan Meteorological Authority	NMC	II Kabul	Tehran	CBS
Albania	The Hydro-meteorological Institute	NMC	VI Tirana	TBD	CBS
Algeria	Office National de la Météorologie	NMC	I Algiers	Casablanca	CBS
Angola	Instituto Nacional de Hidrometeorología e Geofísica	NMC	I Luanda	Pretoria	CBS
Antigua and Barbuda	Antigua and Barbuda Meteorological Services	NMC	IV St John's	Washington	CBS
Argentina	Servicio Meteorológico Nacional	NMC	III Buenos Aires	Brasilia	CBS
Armenia	Armenian State Hydro-meteorological and Monitoring Service	NMC	VI Yerevan	Moscow	CBS
Australia	Bureau of Meteorology Water Division	NHS	V Canberra	Melbourne	CHy
	Cocos and Christmas Island Field Office	WSO (Christmas Island)	V Cocos Island	Melbourne	CBS
	National Meteorological and Oceanographic Centre	NMC	V Melbourne	Melbourne	CBS
Austria	Central Institute for Meteorology and Geodynamics	NMC	VI Vienna	Offenbach	CBS
Azerbaijan	National Hydro-meteorological Department	NMC	VI Baku	Moscow	CBS
Bahamas	Department of Meteorology	NMC	IV Nassau	Washington	CBS
Bahrain	Bahrain Meteorological Service	NMC	II Manama	Jeddah	CBS
Bangladesh	Bangladesh Meteorological Department	NMC	II Dhaka	New Delhi	CBS
Barbados	Meteorological Services	NMC	IV Bridgetown	Washington	CBS
Belarus	Department of Hydrometeorology	NMC	VI Minsk	Moscow	CBS
Belgium	Institut Royal Météorologique	NMC	VI Brussels	Toulouse	CBS
Belize	National Meteorological Service	NMC	IV Belize City	Washington	CBS
Benin	Service Météorologique National	NMC	I Cotonou	Casablanca	CBS
Bhutan	Council for Renewable Natural Resources Research	NMC	II Thimphu	New Delhi	CBS

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Bolivia, Plurinational State of	Servicio Nacional de Meteorología e Hidrología	NMC	III La Paz	Brasilia	CBS
Bosnia and Herzegovina	Meteorological Institute	NMC	VI Sarajevo	Offenbach	CBS
Botswana	Botswana Meteorological Services	NMC	I Gaborone	Pretoria	CBS
Brazil	Instituto Nacional de Meteorologia	NMC	III Brasilia	Brasilia	CBS
British Caribbean Territories	Caribbean Meteorological Organization (Anguilla)	WSO (Anguilla)	IV The Valley	Washington	CBS
	Caribbean Meteorological Organization (British Virgin Islands)	WSO (British Virgin Islands)	IV Road Town	Washington	CBS
	Caribbean Meteorological Organization (Cayman Islands)	NMC (Cayman Islands)	IV George Town	Washington	CBS
	Caribbean Meteorological Organization (Montserrat)	WSO (Montserrat)	IV Plymouth	Washington	CBS
	Caribbean Meteorological Organization (Turks and Caicos Islands)	WSO (Turks and Caicos Islands)	IV Cockburn Town	Washington	CBS
	Brunei Darussalam	The Brunei Meteorological Service	NMC	V Bandar Seri Begawan	Melbourne
Bulgaria	National Institute of Meteorology and Hydrology	NMC	VI Sofia	Offenbach	CBS
Burkina Faso	Direction de la Météorologie	NMC	I Ouagadougou	Casablanca	CBS
Burundi	Institut Géographique du Burundi	NMC	I Bujumbura	Casablanca	CBS
Cambodia	Department of Meteorology	NMC	II Phnom Penh	Tokyo	CBS
Cameroon	Direction de la Météorologie Nationale	NMC	I Douala	Casablanca	CBS
Canada	Meteorological Service of Canada	NMC	IV Montreal	Washington	CBS
Cabo Verde	Instituto Nacional de Meteorologia e Geofisica	NMC	I Sal	Casablanca	CBS
Central African Republic	Direction Générale de l'Aviation Civile et de la Météorologie	NMC	I Bangui	Casablanca	CBS
Chad	Direction des Ressources en Eau et de la Météorologie	NMC	I N'Djaména	Casablanca	CBS
Chile	Dirección Meteorológica de Chile	NMC	III Santiago	Brasilia	CBS

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China	China Meteorological Administration	NMC	II Beijing	Beijing	CBS
Colombia	Instituto de Hidrología, Meteorología y Estudios Ambientales	NMC	III Bogotá	Brasilia	CBS
Comoros	Direction de la Météorologie Nationale	NMC	I Moroni	Casablanca	CBS
Congo	Direction de la Météorologie Nationale	NMC	I Brazzaville	Casablanca	CBS
Cook Islands	Cook Islands Meteorological Service	NMC	V Avarua	Melbourne	CBS
Costa Rica	Instituto Meteorológico Nacional	NMC	IV San José	Washington	CBS
Côte d'Ivoire	Direction de la Météorologie Nationale	NMC	I Abidjan	Casablanca	CBS
Croatia	Meteorological and Hydrological Service	NMC	VI Zagreb	Offenbach	CBS
Cuba	Instituto de Meteorología	NMC	IV Havana	Washington	CBS
Curaçao and Sint Maarten	Meteorological Department Curaçao	NMC	IV Willemstad	Washington	CBS
Cyprus	Meteorological Service	NMC	VI Nicosia	Offenbach	CBS
Czech Republic	Czech Hydrometeorological Institute	NMC	VI Prague	Offenbach	CBS
Democratic People's Republic of Korea	State Hydrometeorological Administration	NMC	II Pyongyang	Offenbach	CBS
Democratic Republic of the Congo	Agence Nationale de Météorologie et de Télédétection par Satellite	NMC	I Kinshasa	Casablanca	CBS
Denmark	Danish Meteorological Institute	NMC	VI Copenhagen	TBD	CBS
Djibouti	Service de la Météorologie	NMC	I Djibouti	Casablanca	CBS
Dominica	Dominica Meteorological Services	NMC	IV Roseau	Washington	CBS
Dominican Republic	Instituto Nacional de Recursos Hidráulicos (INDRHI)	NHS	IV Santo Domingo	Washington	CHy
	Oficina Nacional de Meteorología	NMC	IV Santo Domingo	Washington	CBS
Ecuador	Instituto Nacional de Meteorología e Hidrología	NMC	III Quito	Brasilia	CBS
Egypt	The Egyptian Meteorological Authority	NMC	I Cairo	Casablanca	CBS
El Salvador	Servicio Nacional de Estudios Territoriales	NMC	IV San Salvador	Washington	CBS

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Equatorial Guinea	Service de la Météorologie	NMC	I	Malabo	Casablanca	CBS
Eritrea	Civil Aviation Authority	NMC	I	Asmara	Casablanca	CBS
Estonia	Estonian Meteorological and Hydrological Institute	NMC	VI	Tallinn	TBD	CBS
Ethiopia	National Meteorological Services Agency	NMC	I	Addis Ababa	Casablanca	CBS
Fiji	Fiji Meteorological Service	NMC	V	Nadi	Melbourne	CBS
Finland	Finnish Meteorological Institute	NMC	VI	Helsinki	Offenbach	CBS
France	Météo-France (Clipperton)	WSO (Clipperton)	IV	Clipperton	Toulouse	CBS
	Météo-France (French Guiana)	WSO (French Guiana)	III	French Guiana	Toulouse	CBS
	Météo-France (Guadeloupe, St Martin, St Barthélemy)	WSO (Guadeloupe, St Martin, St Barthelemy)	IV	Guadeloupe, St Martin, St Barthélemy	Toulouse	CBS
	Météo-France (Kerguelen Islands)	WSO (Kerguelen Islands)	I	Kerguelen	Toulouse	CBS
	Météo-France (La Réunion)	WSO (Reunion)	I	La Réunion	Toulouse	CBS
	Météo-France (Martinique)	WSO (Martinique)	IV	Martinique	Toulouse	CBS
	Météo-France (St Pierre and Miquelon)	WSO (St Pierre and Miquelon)	IV	St Pierre and Miquelon	Toulouse	CBS
	Météo-France (Toulouse)	NMC	VI	Toulouse	Toulouse	CBS
	Météo-France (Wallis and Futuna)	WSO (Wallis and Futuna)	V	Wallis and Futuna	Toulouse	CBS
French Polynesia	Météo-France (Polynésie française)	NMC	V	Papeete	Melbourne	CBS
Gabon	Direction de la Météorologie Nationale	NMC	I	Libreville	Casablanca	CBS
Gambia	Department of Water Resources	NMC	I	Banjul	Casablanca	CBS
Georgia	Department of Hydrometeorology	NMC	VI	Tbilisi	TBD	CBS
Germany	Deutscher Wetterdienst	NMC	VI	Offenbach	Offenbach	CBS
Ghana	Ghana Meteorological Services Department	NMC	I	Accra	Casablanca	CBS
Greece	Hellenic National Meteorological Service	NMC	VI	Athens	Offenbach	CBS
Guatemala	Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología	NMC	IV	Guatemala	Washington	CBS

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Guinea	Direction Nationale de la Météorologie	NMC	I Conakry	Casablanca	CBS
Guinea Bissau	Météorologie de Guinée-Bissau	NMC	I Bissau	Casablanca	CBS
Guyana	Hydrometeorological Service	NMC	III Georgetown	Brasilia	CBS
Haiti	Centre national de la météorologie	NMC	IV Port-au-Prince	Washington	CBS
Honduras	Servicio Meteorológico Nacional	NMC	IV Tegucigalpa	Washington	CBS
Hong Kong, China	Hong Kong Observatory	NMC	II Hong Kong	Beijing	CBS
Hungary	Meteorological Service of Hungary	NMC	VI Budapest	Offenbach	CBS
Iceland	Icelandic Meteorological Office	NMC	VI Reykjavik	Exeter	CBS
India	India Meteorological Department	NMC	II New Delhi	New Delhi	CBS
Indonesia	Agency for Meteorology, Climatology and Geophysics	NMC	V Jakarta	Melbourne	CBS
Iran, Islamic Republic of	Islamic Republic of Iran Meteorological Organization	NMC	II Tehran	Tehran	CBS
Iraq	Iraqi Meteorological Organization	NMC	II Baghdad	Tehran	CBS
Ireland	Met Éireann	NMC	VI Dublin	Exeter	CBS
Israel	Israel Meteorological Service	NMC	VI Tel Aviv	Offenbach	CBS
Italy	Servizio Meteorologico	NMC	VI Rome	Offenbach	CBS
Jamaica	Meteorological Service	NMC	IV Kingston	Washington	CBS
Japan	Japan Meteorological Agency	NMC	II Tokyo	Tokyo	CBS
Jordan	Jordan Meteorological Department	NMC	VI Amman	Offenbach	CBS
Kazakhstan	Kazhydromet	NMC	II Almaty	Moscow	CBS
Kenya	Kenya Meteorological Department	NMC	I Nairobi	Offenbach	CBS
Kiribati	Kiribati Meteorological Service	NMC (Phoenix Islands)	V South Tarawa	Melbourne	CBS
Kuwait	Department of Meteorology	NMC	II Kuwait City	Jeddah	CBS
Kyrgyzstan	Main Hydrometeorological Administration	NMC	II Bishkek	Moscow	CBS
Lao People's Democratic Republic	Department of Meteorology and Hydrology	NMC	II Vientiane	Tokyo	CBS

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Latvia	Latvian Environment, Geology and Meteorology Agency	NMC	VI Riga	Offenbach	CBS
Lebanon	Service Météorologique	NMC	VI Beirut	TBD	CBS
Lesotho	Lesotho Meteorological Services	NMC	I Maseru	Pretoria	CBS
Liberia	Ministry of Transport	NMC	I Monrovia	Casablanca	CBS
Libya	Libyan National Meteorological Centre	NMC	I Tripoli	Casablanca	CBS
Lithuania	Lithuanian Hydrometeorological Service	NMC	VI Vilnius	Offenbach	CBS
Luxembourg	Administration de l'Aéroport de Luxembourg	NMC	VI Luxembourg	TBD	CBS
Macao, China	Meteorological and Geophysical Bureau	WSO	II Macao	Beijing	CBS
Madagascar	Direction de la Météorologie et de l'Hydrologie	NMC	I Antananarivo	Casablanca	CBS
Malawi	Malawi Meteorological Services	NMC	I Lilongwe	Pretoria	CBS
Malaysia	Malaysian Meteorological Department	NMC	V Kuala Lumpur	Melbourne	CBS
Maldives	Department of Meteorology	NMC	II Malé	New Delhi	CBS
Mali	Direction Nationale de la Météorologie du Mali	NMC	I Bamako	Casablanca	CBS
Malta	Meteorological Office	NMC	VI Valletta	TBD	CBS
Mauritania	Office National de la Météorologie	NMC	I Nouakchott	Casablanca	CBS
Mauritius	Mauritius Meteorological Services	NMC	I Port Louis	Casablanca	CBS
Mexico	Servicio Meteorológico Nacional	NMC	IV Mexico City	Washington	CBS
Micronesia, Federated States of	FSM Weather Station	N/A	V Palikir	Melbourne	CBS
Monaco	Mission Permanente de la Principauté de Monaco	NMC	VI Monaco	TBD	CBS
Mongolia	National Agency for Meteorology, Hydrology and Environment Monitoring	NMC	II Ulaanbaatar	Beijing	CBS
Montenegro	Hydrometeorological Institute of Montenegro	NMC	VI Podgorica	Offenbach	CBS
Morocco	Direction de la Météorologie Nationale	NMC	I Casablanca	Casablanca	CBS
Mozambique	Instituto Nacional de Meteorologia	NMC	I Maputo	Pretoria	CBS

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Myanmar	Department of Meteorology and Hydrology	NMC	II Yangon	Tokyo	CBS
Namibia	Namibia Meteorological Service	NMC	I Windhoek	Pretoria	CBS
Nepal	Department of Hydrology and Meteorology	NMC	II Kathmandu	Beijing	CBS
Netherlands	Departamento Meteorologico Aruba	NMC (Aruba)	IV Aruba	Washington	CBS
	Royal Netherlands Meteorological Institute	NMC (includes European part of Netherlands and Bonaire, St Eustatius, Saba)	VI De Bilt	Exeter	CBS
New Caledonia	Météo-France (Nouvelle Calédonie)	NMC	V Noumea	Melbourne	CBS
New Zealand	New Zealand National Meteorological Service	NMC	V Wellington	Melbourne	CBS
	New Zealand National Meteorological Service (Tokelau)	NMC (Tokelau)	V Tokelau	Melbourne	CBS
Nicaragua	Dirección General de Meteorología	NMC	IV Managua	Washington	CBS
Niger	Direction de la Météorologie Nationale	NMC	I Niamey	Casablanca	CBS
Nigeria	Nigerian Meteorological Agency	NMC	I Lagos	Casablanca	CBS
Niue	Niue Meteorological Service	NMC	V Alofi	Melbourne	CBS
Norway	Norwegian Meteorological Arctic Data Centre	Arctic Data Centre	VI Oslo	Offenbach	CBS
	Norwegian Meteorological Institute	NMC	VI Oslo	Offenbach	CBS
Oman	Department of Meteorology	NMC	II Muscat	Jeddah	CBS
Pakistan	Pakistan Meteorological Department	NMC	II Karachi	Beijing	CBS
Panama	Hidrometeorología	NMC	IV Panama City	Washington	CBS
Papua New Guinea	Papua New Guinea Meteorological Service	NMC	V Port Moresby	Melbourne	CBS
Paraguay	Dirección de Meteorología et Hidrología	NMC	III Asunción	Brasilia	CBS
Peru	Dirección Nacional de Meteorología et Hidrología	NMC	III Lima	Brasilia	CBS

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Philippines	Philippine Atmospheric Geophysical and Astronomical Services Administration	NMC	V Manila	Tokyo	CBS
Poland	Institute of Meteorology and Water Management	NMC	VI Warsaw	Offenbach	CBS
Portugal	Instituto de Meteorologia	NMC	VI Lisbon	Toulouse	CBS
	Instituto de Meteorologia (Madeira)	NMC (Madeira)	I Madeira	Toulouse	CBS
Qatar	Qatar Meteorology Department	Aviation Centre	II Doha	Jeddah	CAeM
Qatar (continued)	Qatar Meteorology Department	NMC	II Doha	Jeddah	CBS
Republic of Korea	Korea Meteorological Administration	NMC	II Seoul	Seoul	CBS
Republic of Moldova	Serviciul Hidrometeorologic de Stat Moldova	NMC	VI Kishinev	Moscow	CBS
Romania	National Meteorological Administration	NMC	VI Bucharest	Offenbach	CBS
Russian Federation	Russian Federal Service for Hydrometeorology and Environmental Monitoring	NMC	VI Moscow	Moscow	CBS
	Russian Federal Service for Hydrometeorology and Environmental Monitoring (Khabarovsk)	WSO (Khabarovsk)	II Khabarovsk	Moscow	CBS
	Russian Federal Service for Hydrometeorology and Environmental Monitoring (Novosibirsk)	WSO (Novosibirsk)	II Novosibirsk	Moscow	CBS
Rwanda	Rwanda Meteorological Service	NMC	I Kigali	Casablanca	CBS
St Kitts and Nevis	St Kitts and Nevis Meteorological Service	NMC	IV Basseterre	Washington	CBS
Saint Lucia	Saint Lucia Meteorological Service	NMC	IV Castries	Washington	CBS
Samoa	Samoa Meteorology Division	NMC	V Apia	Melbourne	CBS
Sao Tome and Principe	Instituto Nacional de Meteorologia	NMC	I Sao Tome	Casablanca	CBS
Saudi Arabia	Presidency of Meteorology and Environment	NMC	II Jeddah	Jeddah	CBS
Senegal	Direction de la Météorologie Nationale	NMC	I Dakar	Casablanca	CBS
Serbia	Republic Hydrometeorological Service of Serbia	NMC	VI Belgrade	Offenbach	CBS

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Seychelles	National Meteorological Services	NMC	I Victoria	Casablanca	CBS
Sierra Leone	Meteorological Department	NMC	I Freetown	Casablanca	CBS
Singapore	Meteorological Services Division	NMC	V Singapore	Melbourne	CBS
Slovakia	Slovak Hydrometeorological Institute	NMC	VI Bratislava	TBD	CBS
Slovenia	Meteorological Office	NMC	VI Ljubljana	Offenbach	CBS
Solomon Islands	Solomon Islands Meteorological Service	NMC	V Honiara	Melbourne	CBS
Somalia	Permanent Mission of Somalia	NMC	I Mogadishu	Casablanca	CBS
South Africa	South African Weather Service	NMC	I Pretoria	Pretoria	CBS
Spain	Agencia Estatal de Meteorología	NMC	VI Madrid	Toulouse	CBS
	Agencia Estatal de Meteorología (Canary Islands)	NMC (Canary Islands)	I Santa Cruz	Toulouse	CBS
Sri Lanka	Department of Meteorology	NMC	II Colombo	New Delhi	CBS
Sudan	Sudan Meteorological Authority	NMC	I Khartoum	Pretoria	CBS
Suriname	Meteorological Service	NMC	III Paramaribo	Brasilia	CBS
Swaziland	Swaziland Meteorological Service	NMC	I Manzini	Pretoria	CBS
Sweden	Swedish Meteorological and Hydrological Institute	NMC	VI Norrköping	Offenbach	CBS
Switzerland	MeteoSwiss	NMC	VI Zurich	Offenbach	CBS
Syrian Arab Republic	Ministry of Defence Meteorological Department	NMC	VI Damascus	Tehran	CBS
Tajikistan	Main Administration of Hydrometeorology and Monitoring of the Environment	NMC	II Dushanbe	Moscow	CBS
Thailand	Thai Meteorological Department	NMC	II Bangkok	Tokyo	CBS
The former Yugoslav Republic of Macedonia	Republic Hydrometeorological Institute	NMC	VI Skopje	Offenbach	CBS
Timor-Leste	Direcção Nacional da Meteorologia e Geofísica	NMC	V Dili	Melbourne	CBS
Togo	Direction de la Météorologie Nationale	NMC	I Lomé	Casablanca	CBS
Tonga	Tonga Meteorological Service	NMC	V Nuku'alofa	Melbourne	CBS

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Trinidad and Tobago	Meteorological Service	NMC	IV Port of Spain	Washington	CBS
Tunisia	National Institute of Meteorology	NMC	I Tunis	Casablanca	CBS
Turkey	Turkish State Meteorological Service	NMC	VI Ankara	Offenbach	CBS
Turkmenistan	Administration of Hydrometeorology	NMC	II Ashgabat	TBD	CBS
Tuvalu	Tuvalu Meteorological Service	NMC	V Funafuti	Melbourne	CBS
Uganda	Department of Meteorology	NMC	I Entebbe	Casablanca	CBS
Ukraine	Ukrainian Hydrometeorological Centre	NMC	VI Kiev	Moscow	CBS
United Arab Emirates	Meteorological Department	NMC	II Abu Dhabi	Jeddah	CBS
United Kingdom of Great Britain and Northern Ireland	Met Office (Ascension Island)	WSO (Ascension Island)	I Ascension	Exeter	CBS
	Met Office (Bermuda)	WSO (Bermuda)	IV Bermuda	Exeter	CBS
	Met Office (Exeter)	NMC	VI Exeter	Exeter	CBS
	Met Office (Gibraltar)	WSO (Gibraltar)	VI Gibraltar	Exeter	CBS
	Met Office (Pitcairn Islands)	WSO (Pitcairn Islands)	V Adamstown	Exeter	CBS
	Met Office (St Helena Island)	WSO (St Helena Island)	I Jamestown	Exeter	CBS
United Republic of Tanzania	Tanzania Meteorological Agency	NMC	I Dar es Salaam	Exeter	CBS
United States of America	National Oceanic and Atmospheric Administration, National Weather Service	NMC	IV Silver Springs	Washington	CBS
	National Oceanic and Atmospheric Administration, National Weather Service (Line Islands)	WSO (Line Islands)	V Line Islands	Washington	CBS
	National Oceanic and Atmospheric Administration, National Weather Service (Guam)	WSO (Guam)	V Guam	Washington	CBS
	National Oceanic and Atmospheric Administration, National Weather Service (Puerto Rico)	WSO (Puerto Rico)	IV Puerto Rico	Washington	CBS
Uruguay	Dirección Nacional de Meteorología	NMC	III Montevideo	Brasilia	CBS

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Uzbekistan	Uzhydromet	NMC	II Tashkent	Seoul	CBS
Vanuatu	Vanuatu Meteorological Services	NMC	V Port Vila	Melbourne	CBS
Venezuela, Bolivarian Republic of	Servicio de Meteorología de la Aviación	NMC	III Maracay	Brasilia	CBS
Viet Nam	Hydrometeorological Service	NMC	II Hanoi	Tokyo	CBS
Yemen	Yemen Meteorological Service	NMC	II Sana'a	Jeddah	CBS
Zambia	Zambia Meteorological Department	NMC	I Lusaka	Pretoria	CBS
Zimbabwe	Zimbabwe Meteorological Services Department	NMC	I Harare	Pretoria	CBS

APPENDIX C. THE WMO CORE METADATA PROFILE OF THE ISO 19115 METADATA STANDARD

1. IMPLEMENTATION OF THE WMO CORE METADATA PROFILE

1.1 The WMO Core Metadata Profile of the ISO 19115 Metadata Standard places constraints on the contents of a discovery metadata record that are additional to those in the ISO Standard. Authors of WIS discovery metadata records shall apply these constraints.

1.2 Specifications in this Manual shall take precedence over the specifications in ISO 19115.

1.3 The Secretariat shall publish guidance material to assist authors of WIS discovery metadata maintain consistency between metadata records.

1.4 WIS discovery metadata records shall be provided to GISCs conformant with ISO 19136 and ISO 19139 expressed in Geographic Markup Language (GML).

2. PROCEDURES FOR AMENDING THE WMO CORE METADATA PROFILE

2.1 General validation and implementation procedures

2.1.1 *Proposal of amendments*

Amendments to the WMO Core Metadata Profile must be proposed in writing to the WMO Secretariat. The proposal shall specify the needs, purposes and requirements and include information on a contact point for technical matters.

2.1.2 *Drafting recommendation*

The Inter-Programme Expert Team on Metadata and Data Representation Development (IPET-MDRD¹), supported by the Secretariat, shall validate the stated requirements (unless it is consequential to an amendment to the WMO Technical Regulations) and develop a draft recommendation to respond to the requirements, as appropriate.

2.1.3 *Date of implementation*

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

¹ IPET-MDRD, the Implementation/Coordination Team on Information Systems and Services (ICT-ISS) and OPAG-ISS are the bodies currently dealing with the WMO Core Metadata Profile within CBS. If they are replaced by other bodies performing the same function, the same rules shall apply, replacing the names of the entities appropriately.

2.1.4 **Procedures for approval**

After a draft recommendation of IPET-MDRD has been validated in accordance with the procedure given in 2.6 below, depending on the type of amendments, IPET-MDRD should select one of the following procedures for the approval of the amendments:

- (a) Fast-track procedure (see 2.2);
- (b) Procedure for the adoption of amendments between CBS sessions (see 2.3);
- (c) Procedure for the adoption of amendments during CBS sessions (see 2.4).

2.1.5 **Urgent introduction**

Regardless of the above procedures, and as an exceptional measure, the following procedure accommodates urgent user needs to introduce new entries in the code lists and XML schema that support the WMO Core Metadata Profile or to correct errors in the metadata validation criteria.

- (a) A draft recommendation developed by IPET-MDRD shall be validated according to 2.6.1, 2.6.2 and 2.6.3;
- (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-MDRD and OPAG-ISS and the president of CBS. The list of pre-operational entries is kept online on the WMO web server;
- (c) Preoperational entries need to be approved by one of the procedures in 2.1.4 for operational use;
- (d) The lowest level of the version number of the metadata standard shall be incremented (see 2.1.6).

2.1.6 **Issuing updated version**

Once amendments to the WMO Core Metadata Profile are adopted, an updated version of the relevant part of the Manual on WIS shall be issued in the four languages: English, French, Russian and Spanish. The Secretariat shall inform all WMO Members of the availability of a new updated version of that part at the date of notification mentioned in 2.1.3.

Version numbers of the WMO Core Metadata Profile have the form *a, b, c*, where:

- (a) *a* shall be incremented if the change requires modifications to software (for example moving to a new version of the ISO 19115 standard). This is the top level of the version number. Such changes should follow the procedure for changes during sessions in 2.4;
- (b) *b* shall be incremented if changes to conformance-checking rules or changes to code lists are introduced and are mandatory for compliant metadata records. This is the middle level of the version number. Such changes should follow the procedure for changes between sessions in 2.3;
- (c) *c* shall be incremented if the changes have no impact on existing metadata records (for example, adding a new entry to a code list or introducing a conformance-checking rule that results in a warning rather than causing a metadata record to be declared invalid). This is the lowest level of the version number. Such changes should use the fast-track procedure in 2.2.

Note: Development versions of the WMO Core Metadata Profile, not intended for operational use, are denoted by the digit 0 in the second part of the version number, for example: 2.0.1. Development versions are intended to enable the development of a new version of the WMO Core Metadata Profile requiring changes to software systems.

2.2 **Fast-track procedure**

2.2.1 **Scope**

The fast-track procedure can be used for additions to code lists and validation rules that result only in warnings.

2.2.2 **Endorsement**

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

2.2.3 **Approval**

2.2.3.1 Minor adjustments

Correcting typographical errors in descriptive text in code lists is considered a minor adjustment and shall be done by the Secretariat in consultation with the president of CBS.

Note: A code list is a list of valid entries that are permitted in a metadata field.

2.2.3.2 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 discovery metadata matters for comments, with a deadline of two months for the reply. It should then be submitted to the president of CBS for consultation with the presidents of other technical commissions and adoption on behalf of the Executive Council (EC).

2.2.4 **Frequency**

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

2.3 **Procedure for the adoption of amendments between CBS sessions**

2.3.1 **Approval of draft recommendation**

For the direct adoption of amendments between CBS sessions, the draft recommendation developed by IPET-MDRD, 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. The president of CBS shall consult with the presidents of other technical commissions.

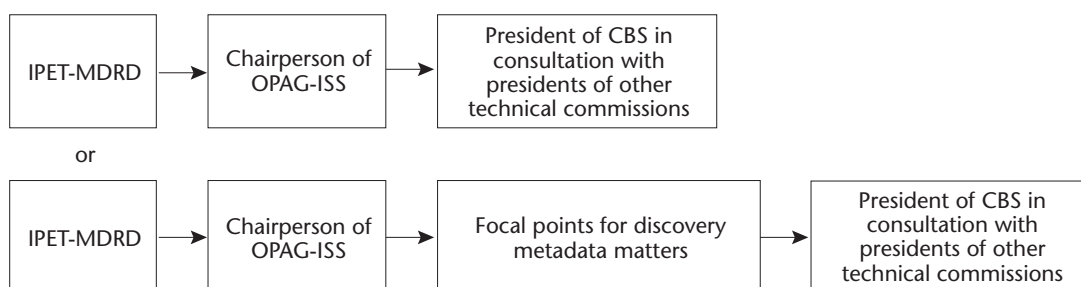


Figure 1. Adoption of amendments by the fast-track procedure

2.3.2 **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 WMO Members for comments to be submitted within two months following the dispatch of the amendments.

2.3.3 **Agreement**

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

2.3.4 **Coordination**

WMO Members are invited to designate a focal point responsible for discussing any comments/disagreements with IPET-MDRD. If discussions between IPET-MDRD and the focal point do not result in an agreement on a specific amendment by a WMO Member, this amendment shall be reconsidered by IPET-MDRD.

2.3.5 **Notification**

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

2.4 **Procedure for the adoption of amendments during CBS sessions**

For the adoption of amendments during CBS sessions, IPET-MDRD submits its recommendation, including a date of implementation of the amendments, to ICT-ISS of OPAG-ISS. The recommendation is then passed to the presidents of technical commissions for consultation and to a CBS session that shall be invited to consider comments submitted by the presidents of technical commissions. The recommendation shall then be submitted to an EC session for decision.

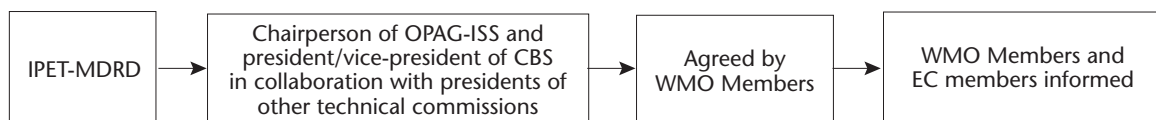


Figure 2. Adoption of amendments between CBS sessions

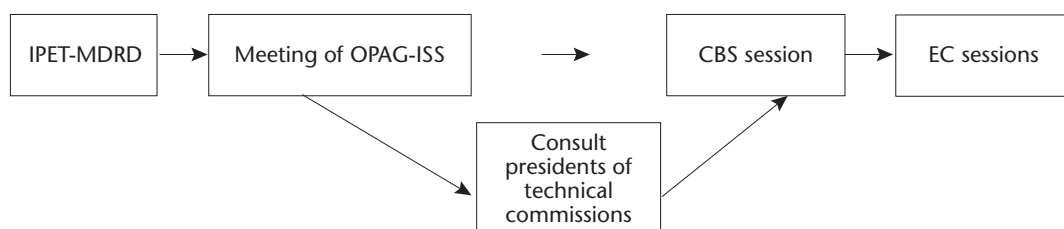


Figure 3. Adoption of amendments during CBS sessions

2.5 **Procedure for the correction of existing entries in the code lists and validation rules**

2.5.1 ***Correcting errors in the text describing a code-list entry***

Where a minor error in the specification of a code list is found (e.g. typing error or incomplete definition) the code-list entry shall be amended and re-published. The code list dictionary itself (the XML document) shall increment its version number. If, however, the error is in the meaning of the code list, then a new code list entry should be created and the existing (erroneous) entry marked as deprecated. Authors of metadata records should not use deprecated code-list items. This situation is considered a minor adjustment according to 2.2.3.1.

2.5.2 ***Correcting an error in a conformance-checking rule***

If an erroneous specification of a conformance-checking rule is found, 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 conformance-checking rule should be used instead of the old. An appropriate explanation shall be added to the description in the description of the conformance-checking rule to clarify the practice along with the date of the change.

2.5.3 ***Submission of changes to code-list entries or conformance-checking rules as a result of correcting an error***

Such changes shall be submitted through the fast-track procedure.

2.6 **Validation procedure**

2.6.1 ***Documentation of need and purpose***

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

2.6.2 ***Documentation of result***

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

2.6.3 ***Testing with WIS metadata applications***

For new or modified code-list entries and validation rules, proposed changes should be tested by the use of at least two independently developed metadata editors and two independently developed GISC catalogues which incorporated the proposed change. Results should be made available to IPET-MDRD with a view to verifying the technical specifications.

3. **CONTENTS OF THE WMO CORE METADATA PROFILE**

Each supported version of the WMO Core Metadata Profile is listed in section 4. Versions that are no longer supported by WIS are denoted as "obsolete" and their definitions should be retained on

the WMO website. Definitions of the versions of the WMO Core Metadata Profile are in Part 1 and Part 2 of this appendix.

4. **WMO CORE METADATA PROFILE VERSIONS**

Note: Versions of the WMO Core Metadata Profile before version 1.2 did not provide all the functionality required by WIS and are no longer supported.

WMO Core Metadata Profile version 1.2. This is defined at http://wis.wmo.int/2010/metadata/version_1-2

Note: Metadata created using profile version 1.2 are compatible with those created under version 1.3 other than that the records may have been completed inconsistently and therefore may fail the version 1.3 checking rules.

WMO Core Metadata Profile version 1.3. This is defined at http://wis.wmo.int/2012/metadata/version_1-3 and is described in Part 1 and Part 2 of this appendix.

PART 1. WMO CORE METADATA PROFILE VERSION 1.3 SPECIFICATION: CONFORMANCE REQUIREMENTS

1. **SCOPE**

The specification defines the content, structure and encoding of discovery metadata published within the WIS discovery, access and retrieval (DAR) catalogue.

The metadata standard defined herein is an informal category-1 profile² of the International Standard ISO 19115:2003 Geographic information – Metadata. This metadata standard shall be referred to as the WMO Core Metadata Profile.

WIS discovery metadata records shall be encoded in XML as defined by ISO/TS 19139:2007.

Part 1 of this specification defines the conformance requirements for the WMO Core Metadata Profile. Part 2 defines the abstract test suite, data dictionary and code lists. Unless otherwise stated, references to Part 1 and Part 2 are to the relevant parts of this specification.

2. **CONFORMANCE**

2.1 **Conformance requirements**

The WMO *Technical Regulations* (WMO-No. 49), Volume I, Part I, paragraph 3.3.5 states:

A.3.3.4 WIS functions and operation shall be based on catalogues that contain metadata describing data and products available across WMO, plus metadata describing dissemination and access options. [...]

² A category-1 profile places additional restrictions on the use of an International Standard to meet the more specific requirements of a given community. Profiles of International Standards may be formally registered. The WMO profile of ISO 19115 has not been registered and thus remains an “informal” profile.

In this document:

- (a) 6 describes the XML encoding requirements for the discovery metadata records published to the WIS DAR catalogue (e.g. WIS discovery metadata records).
- (b) 7 describes how compliance with this version of the WMO Core Metadata Profile is declared within a WIS discovery metadata record.
- (c) 8 and 9 describe additional constraints applying to WIS discovery metadata records. These are organized into two groups to support the following formal requirements for WIS discovery metadata:
 - Metadata uniqueness and discovery within the WIS DAR catalogue
 - Description of data for global exchange within WIS

Unified Modelling Language (UML) is used to describe the additional constraints defined in this Appendix applying to WIS discovery metadata records within the context of ISO 19115:2003/Cor. 1:2006.

Where there are inconsistencies between the text description of a requirement and the UML description, the UML version shall be considered authoritative.

Authors of discovery metadata records published within the WIS DAR catalogue are required to comply with the WMO Core Metadata Profile. Thus, WIS discovery metadata shall be compliant with:

- ISO 19115:2003 'Geographic information – Metadata';
- ISO 19115:2003/Cor. 1:2006 'Geographic information – Metadata – Corrigendum 1'; and
- Additional constraints described in this Manual.

Specifications in this Manual shall take precedence over the specifications in ISO 19115:2003 and ISO 19115:2003/Cor. 1:2006.

The Secretariat shall publish guidance material to assist authors of WIS discovery metadata in maintaining consistency between metadata records.

Note: See http://wis.wmo.int/MD_Index.

2.2 Conformance classes for WIS discovery metadata

Metadata records claiming conformance with the WMO Core Metadata Profile shall conform to the rules specified in Clauses 6–9 and pass all relevant test cases of the abstract test suite in Part 2, 2.

Depending on the characteristics of a WIS discovery metadata record, 8 conformance classes are distinguished. Table 1 lists these classes and the corresponding subclause of the abstract test suite.

Table 1. Conformance classes related to the WMO Core Metadata Profile

	<i>Conformance class</i>	<i>Reference in Part 2</i>
6.1	ISO/TS 19139:2007 compliance	2.1.1
6.2	Explicit identification of namespaces in XML	2.1.2
6.3	GML namespace	2.1.3
8.1	Unique identification of WIS discovery metadata records	2.2.1
8.2	Provision of information to support discovery within the WIS DAR	2.2.2, 2.2.3
9.1	Identifying the scope of distribution	2.3.1
9.2	Identifiers for metadata describing data published for global exchange	2.3.1
9.3	Defining WMO data policy and GTS priority for data published for global exchange	2.3.2, 2.3.3

A WIS discovery metadata record may also be validated against guidance published by the Secretariat.

Note: See http://wis.wmo.int/MD_Conform.

During such validation, a warning shall be issued for each occasion that a metadata record fails to comply with guidance.

3. **NORMATIVE REFERENCES**

The following referenced documents are indispensable for the application of this specification. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 639-2 'Code for the representation of names of languages – Part 2: Alpha-3 code'

ISO 3166 (all parts) 'Codes for the representation of names of countries and their subdivisions'

ISO 8601 'Data elements and interchange formats – Information interchange – Representation of dates and times'

ISO 19115:2003 'Geographic information – Metadata'

ISO 19115:2003/Cor. 1:2006 'Geographic information – Metadata – Corrigendum 1'

ISO/TS 19139:2007 'Geographic information – Metadata – XML schema implementation'

ISO/IEC 19757-3:2006 'Information technology – Document Schema Definition Language (DSDL) – Part 3: Rule-based validation – Schematron'

W3C XMLName 'Namespaces in XML. W3C Recommendation (14 January 1999)'

W3C XMLSchema-1 'XML Schema Part 1: Structures. W3C Recommendation (2 May 2001)'

W3C XMLSchema-2 'XML Schema Part 2: Datatypes. W3C Recommendation (2 May 2001)'

W3C XML 'Extensible Markup Language (XML) 1.0 (Second Edition). W3C Recommendation (6 October 2000)'

W3C XLink 'XML Linking Language (XLink) version 1.1. W3C Recommendation (6 May 2010)'

4. **TERMS AND DEFINITIONS**

namespace

Collection of names, identified by a uniform resource identifier (URI) reference, which are used in XML documents as element names and attribute names

WIS discovery metadata

Metadata consistent with the WMO Core Metadata Profile that is used within WIS for discovery of information shared through WIS.

5. SYMBOLS AND ABBREVIATED TERMS

5.1 Namespace abbreviations

In the list below, the item on the left describes the common namespace prefix used to describe the elements in the namespace. The second item is an English description of the namespace prefix and the item in parenthesis is the uniform resource name (URN) of the actual namespace. These URNs do not necessarily correspond to an effective location of the schemas, however. When available, an authoritative location for the schema is provided.

The WMO Core Metadata Profile does not specify a namespace as it contains no XML schema extensions.

The list below corresponds to external namespaces used by the WMO Core Metadata Profile.

gco Geographic Common extensible markup language (<http://www.isotc211.org/2005/gco>)
 gmd Geographic MetaData extensible markup language (<http://www.isotc211.org/2005/gmd>)
 gmx Geographic Metadata XML schema (<http://www.isotc211.org/2005/gmx>)
 gss Geographic Spatial Schema extensible markup language (<http://www.isotc211.org/2005/gss>)
 gsr Geographic Spatial Referencing extensible markup language (<http://www.isotc211.org/2005/gsr>)
 gts Geographic Temporal Schema extensible markup language (<http://www.isotc211.org/2005/gts>)
 srv geographic SeRVice metadata (<http://www.isotc211.org/2005/srv>)³
 gml Geography Markup Language (<http://www.opengis.net/gml/3.2>)³
 xlink XML LINKing language (<http://www.w3.org/1999/xlink>)³
 xsi W3C XML Schema Instance (<http://www.w3.org/2001/XMLSchema-instance>)³

5.2 External classes

All the model elements used within the WMO Core Metadata Profile are defined in ISO geographic information standards. By convention with ISO/TC 211, names of Unified Modelling Language (UML) classes, with the exception of basic data-type classes, include a two- or three-letter prefix that identifies the International Standard and the UML package in which the class is defined. Table 2 lists the standards and packages in which UML classes are used in the WMO Core Metadata Profile.

Table 2. Sources of UML classes

<i>Prefix</i>	<i>International Standard</i>	<i>Package</i>
CI	ISO 19115:2003	Citation Information
EX	ISO 19115:2003	Extent Information
MD	ISO 19115:2003	Metadata Entity

6. XML ENCODING

WIS implementation is predicated on the publication of metadata records as XML documents.

³ This http reference is to the identifier of the namespace and may not refer to an actual Internet link.

6.1 ISO/TS 19139:2007 compliance

Compliance with this specification requires that WIS discovery metadata records shall validate without error against the XML schemas created from the UML model of ISO 19115:2003/Cor. 1:2006 using the encoding rules defined in ISO/TS 19139:2007 'Geographic information – Metadata – XML schema implementation' Clause 9.

The WMO Core Metadata Profile requires that:

6.1.1 Each WIS discovery metadata record shall validate without error against the XML schemas defined in ISO/TS 19139:2007.

Notes:

- (1) Not all XML validation tools implement the full W3C XML Schema recommendation and not all XML validation tools interpret the W3C XML Schema recommendation in the same manner. It is recommended that a tool with strict interpretation of XML Schema and full support for the W3C XML Schema recommendation be used to ensure conformance.
- (2) WMO hosts a copy of the ISO/TS 19139:2007 XML schemas at: http://wis.wmo.int/2011/schemata/iso19139_2007/schema/. The directory structure in which the XML schemata are published mirrors that of the normative XML schema repository published by ISO at: http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/. For example, gmd.xsd can be found at http://wis.wmo.int/2011/schemata/iso19139_2007/schema/gmd/gmd.xsd.

XML 1.0 does not support the enforcement of certain types of constraints. For example, gmd:CI_ResponsibleParty shall include at least one of gmd:individualName, gmd:organisationName or gmd:positionName. As a result, it is imperative that implementers heed the constraints identified within the UML model defined in ISO 19115:2003 and the associated corrigendum. These are listed in ISO/TS 19139:2007 Annex A: 'Table A.1 – Conformance Rules not enforceable with XML Schema'.

The WMO Core Metadata Profile requires that:

6.1.2 Each WIS discovery metadata record shall validate without error against the rule-based constraints listed in ISO/TS 19139:2007 Annex A (Table A.1).

Note: WMO provides an automated test suite including validation against the constraints listed in ISO/TS 19139:2007 Annex A. These are implemented as Schematron rules (ISO/IEC 19757-3:2006 'Information technology – Document Schema Definition Language (DSDL) – Part 3: Rule-based validation – Schematron') and can be found at the following location: <http://wis.wmo.int/2012/metadata/validationTestSuite/>.

6.2 Explicit identification of namespaces in XML

To support the provision of reusable XML validation test suites, it shall be mandatory to explicitly define XML namespaces used within a WIS discovery metadata record. Use of a default (implied) namespace may lead to misinterpretation of the XML document and failure to validate.

The WMO Core Metadata Profile places the following additional restriction on ISO 19139:2007:

6.2.1 Each WIS discovery metadata record shall name explicitly all namespaces used within the record: use of default namespaces is prohibited.

6.3 GML namespace

ISO/TS 19139:2007 is dependent on ISO 19136:2007 'Geographic information – Geography Markup Language (GML)'. ISO 19136:2007 relates to GML version 3.2.1. The associated namespace URN is <http://www.opengis.net/gml/3.2>.

The WMO Core Metadata Profile places the following additional restriction on ISO 19139:2007:

- 6.3.1 Each WIS discovery metadata record shall declare the following XML namespace for GML: <http://www.opengis.net/gml/3.2>.**

7. **DECLARING COMPLIANCE WITH THE WMO CORE METADATA PROFILE**

A WIS discovery metadata record may declare compliance with this version of the WMO Core Metadata Profile as follows:

- /gmd:MD_Metadata/gmd:metadataStandardName = "WMO Core Metadata Profile of ISO 19115 (WMO Core), 2003/Cor.1:2006 (ISO 19115), 2007 (ISO/TS 19139)"
- /gmd:MD_Metadata/gmd:metadataStandardversion = "1.3"

8. **METADATA UNIQUENESS AND DISCOVERY WITHIN WIS DAR CATALOGUE**

8.1 **Unique identification of WIS discovery metadata records**

Section 4.2 of this Manual (WIS-TechSpec-1: Uploading of metadata for data and products) requires the use of the WMO Core Metadata Profile and the provision of a globally unique identifier for each WIS discovery metadata record:

- 4.2.1 This specification requires that each metadata record uploaded shall be represented in compliance with the WMO Core Metadata Profile of ISO 19115 with a unique identifier.**

A WIS discovery metadata record shall be uniquely identified using the gmd:MD_Metadata/gmd:fileIdentifier attribute.

The WMO Core Metadata Profile places the following additional restrictions on ISO 19115:2003/Cor. 1:2006 –

- 8.1.1 Each WIS discovery metadata record shall include one gmd:MD_Metadata/gmd:fileIdentifier attribute.**

- 8.1.2 The gmd:MD_Metadata/gmd:fileIdentifier attribute for each WIS discovery metadata record shall be unique within WIS.**

(i.e. the attribute is mandatory in the WMO Core Metadata Profile and must be globally unique within WIS).

Note that the gmd:MD_Metadata/gmd:fileIdentifier elements are treated as CASE-INSENSITIVE when assessing metadata records for duplication.

The WMO Core Metadata Profile recommends the use of a URI structure for gmd:fileIdentifier attributes. The URI should be structured as follows:

- Fixed string "urn:x-wmo:md:";
- Citation authority based on the Internet domain name of the data-provider organization, e.g. "int.wmo.wis", "gov.noaa", "edu.ucar.ncar", "cn.gov.cma" or "uk.gov.metoffice";
- Separator colon ":";

- Unique identifier:
 - For metadata records describing GTS products in bulletins or named according to the WMO file-naming convention P-flag = "T" or P-flag= "A", the unique identifier is "«TTAAii»«CCCC»";
 - For metadata records describing products named according to the WMO file-naming convention P-flag = "W", the unique identifier should be a truncated version of the WMO product identifier field of the associated data-files, excluding the date-stamp and any other varying elements as necessary;
 - For metadata records describing other products, the unique identifier may be assigned by the citation authority so as to be unique among the identifiers assigned by the citation authority.

The Secretariat shall maintain a list of citation authorities and the associated organization.

Each "citation authority" organization shall implement procedures that ensure that its authorized metadata authors can create unique values for the "unique identifier". Note that inclusion of "citation authority" in fileIdentifier guarantees global uniqueness, provided the organization has a procedure to ensure local uniqueness.

If the data custodian has its own methodology for assigning metadata identifiers and is able to guarantee the global uniqueness of the identifier, that identifier may be used.

Amendments to a WIS discovery metadata record shall not change the gmd:MD_Metadata/gmd:fileIdentifier attribute. Each amendment shall be published with an updated gmd:MD_Metadata/gmd:dateStamp attribute indicating the date of publication of the amended version of the metadata record.

gmd:MD_Metadata/gmd:dateStamp shall be specified using a single date as specified by ISO 8601 in the extended date format (YYYY-MM-DD), where YYYY is the year, MM is the month and DD is the day. Time (hh:m_mm_m:s_ss_s, where hh is the hour, m_mm_m the minutes and s_ss_s the seconds) may be added if required, separated from the day by "T".

A set of WIS discovery metadata records with the same gmd:MD_Metadata/gmd:fileIdentifier shall be considered to be versions of the same WIS discovery metadata record. The sequence (time-order) of these records shall be determined from the gmd:MD_Metadata/gmd:dateStamp.

8.2 **Provision of information to support discovery within the WIS DAR catalogue**

Section 4.9 of this Manual (WIS-TechSpec-8: DAR catalogue search and retrieval) outlines the mechanisms by which WIS DAR catalogue content may be searched according to indexed metadata attributes.

Search within the WIS DAR catalogue is based on terms from SRU, ISO 23950:1998.

As a minimum, for text-based searches, these shall include:

- i. subject
- ii. abstract
- iii. title
- iv. author
- v. keywords
- vi. format
- vii. identifier
- viii. type
- ix. crs (coordinate reference system)

For date-based searches, these shall include:

- i. creationDate
- ii. modificationDate
- iii. publicationDate
- iv. beginningDate
- v. endingDate

Finally, geographic search shall also be provided:

- i. bounding box (specified in decimal degrees, north, west, south and east)

Table 3 provides a mapping of SRU terms to ISO 19115 attributes (defined via XPath).

Table 3. Mapping from SRU search terms to ISO 19115 attributes

<i>SRU term</i>	<i>ISO 19115 attribute</i>
subject	/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords//gmd:keyword
abstract	/gmd:MD_Metadata/gmd:identificationInfo//gmd:abstract
title	/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:title
author	/gmd:MD_Metadata/gmd:contact
keywords	/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords//gmd:keyword
format	/gmd:MD_Metadata/gmd:distributionInfo//gmd:distributionFormat//gmd:name
identifier	/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:identifier
type	/gmd:MD_Metadata/gmd:identificationInfo//spatialRepresentationType
crs	/gmd:MD_Metadata//gmd:referenceSystemInfo/gmd:MD_ReferenceSystem/gmd:referenceSystemIdentifier/gmd:RS_Identifier/gmd:code
creationDate	/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date//gmd:date /gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date//gmd:dateType="creation"
modificationDate	/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date//gmd:date /gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date//gmd:dateType="revision"
publicationDate	/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date//gmd:date /gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date//gmd:dateType="publication"
beginningDate	/gmd:MD_Metadata/gmd:identificationInfo//gmd:extent//gmd:temporalElement/gmd:extent
endingDate	/gmd:MD_Metadata/gmd:identificationInfo//gmd:extent//gmd:temporalElement/gmd:extent
boundingBox	/gmd:MD_Metadata/gmd:identificationInfo//gmd:extent//gmd:geographicElement/gmd:EX_GeographicBoundingBox/gmd:northBoundLatitude /gmd:MD_Metadata/gmd:identificationInfo//gmd:extent//gmd:geographicElement/gmd:EX_GeographicBoundingBox/gmd:westBoundLatitude /gmd:MD_Metadata/gmd:identificationInfo//gmd:extent//gmd:geographicElement/gmd:EX_GeographicBoundingBox/gmd:southBoundLatitude /gmd:MD_Metadata/gmd:identificationInfo//gmd:extent//gmd:geographicElement/gmd:EX_GeographicBoundingBox/gmd:eastBoundLatitude

The following elements from Table 3 are declared mandatory in ISO 19115:2003/Cor. 1:2006:

- [abstract]
/gmd:MD_Metadata/gmd:identificationInfo//gmd:abstract
- [title]
/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:title
- [creationDate, modificationDate]
/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date
- [author]
/gmd:MD_Metadata/gmd:contact

CI_ResponsibleParty entity /gmd:MD_Metadata/gmd:contact element should use the CI_RoleCode "pointOfContact"; e.g./gmd:MD_Metadata/gmd:contact//gmd:role = "pointOfContact"

Note that the abstract should provide a clear and concise statement that enables the reader to understand the content of the dataset. For guidance when completing the abstract, consider these points:

- (a) State what the "things" are that are recorded.
- (b) State the key aspects recorded about these things.
- (c) State what form the data takes.
- (d) State any other limiting information, such as time period of validity of the data.
- (e) Add purpose of data resource where relevant (e.g. for survey data).
- (f) Aim to be understood by non-experts.
- (g) Do not include general background information.
- (h) Avoid jargon and unexplained abbreviations.

It is recommended that /gmd:MD_Metadata/gmd:identificationInfo//gmd:pointOfContact should provide a minimum of a name and an e-mail address.

In order to improve the consistency of WIS discovery metadata records with regard to search and discovery within the WIS DAR catalogue, the keyword and boundingBox attributes are mandatory within the WMO Core Metadata Profile.

The WMO Core Metadata Profile places the following additional restrictions on ISO 19115:2003/Cor. 1:2006:

- 8.2.1 Each WIS discovery metadata record shall include at least one keyword from the WMO_CategoryCode code list.**
- 8.2.2 Keywords from the WMO_CategoryCode code list shall be defined as keyword type "theme".**
- 8.2.3 All keywords sourced from a particular keyword thesaurus shall be grouped into a single instance of the MD_Keywords class.**
- 8.2.4 Each WIS discovery metadata record describing geographic data shall include the description of at least one geographic bounding box defining the spatial extent of the data.**

A new code-list dictionary is published as part of this specification, defining the set of permissible values for WMO_CategoryCode (see Part 2, Table 16). Keywords from WMO_CategoryCode shall be of type "theme".

The GeographicBoundingBox is determined by four coordinates.

Bounding boxes that cross the 180 degree meridian can be differentiated from bounding boxes that do not by the following rule:

In a dataset that does not cross the 180 degree meridian, the westernmost longitude shall always be less than the easternmost longitude. Conversely, if a bounding box crosses the 180 degree meridian, then the westernmost longitude shall be greater than the easternmost longitude.

Other constraints on geographic bounding boxes:

- (a) The total longitudinal span shall be greater than zero, and less than, or equal to, 360 degrees.
- (b) Geographic points shall be designated with the northernmost and southernmost latitudes equal and the westernmost and easternmost longitudes equal.
- (c) The northernmost latitude shall always be greater than, or equal to, the southernmost latitude.
- (d) Longitude and latitude shall be recorded in a coordinate reference system that has the same axes, units and prime meridian as WGS84.

Attribute `/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date//gmd:date` shall be expressed as an ISO 8601 compliant date. The extended date format (YYYY-MM-DD) should be used, where YYYY is the year, MM is the month and DD is the day. Time (hh:m_mm_m:s_ss_s, where hh is the hour, m_mm_m the minutes and s_ss_s the seconds) may be added if required, separated from the day by "T".

The remaining elements from Table 3 are optional in this version of the WMO Core Metadata Profile:

- [format]
- [identifier]
- [type]
- [crs]
- [beginningDate]
- [endingDate]

Note: Further guidance on the use of these elements is published by the Secretariat at http://wis.wmo.int/MD_OptElt.

The primary language used in metadata conforming to the WMO Core Metadata Profile is English. Translations of English elements within the record may also be included.

8.2.5 All information contained within a metadata record shall, as a minimum, be provided in English within the metadata record.

Translations of all or part of the English content may also be included.

9. DESCRIPTION OF DATA FOR GLOBAL EXCHANGE WITHIN WIS

Within WIS, it is important for GISCs to be able to identify which data are published for global exchange. This determines whether the data are incorporated into the GISC cache. The WIS discovery metadata record describing a given dataset may identify whether that dataset is published for global exchange within WIS.

9.1 Identifying the scope of distribution

The scope of distribution for a dataset (whether it is published for global exchange within WIS) may be specified using a keyword:

- `/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords//gmd:keyword`

The semantics of a keyword are inferred from a specified keyword thesaurus. The thesaurus relating to a particular keyword may be cited using the following element:

- `/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords//gmd:thesaurusName`

The scope of distribution for data within WIS shall be expressed using the following controlled vocabulary: "GlobalExchange", "RegionalExchange" and "OriginatingCentre".

A new code-list dictionary is published as part of this specification defining the set of permissible values for specifying the scope of distribution within WIS: WMO_DistributionScopeCode. Part 2, Table 17 refers.

The type of keyword may be specified using the following element:

- `/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords//gmd:type`

The keyword type associated with WMO_DistributionScopeCode thesaurus shall be "dataCentre". Keyword type "dataCentre" is taken from the MD_KeywordTypeCode class described in ISO/DIS 19115-1:2013.

The WMO Core Metadata Profile places the following additional restriction on ISO 19115:2003/Cor. 1:2006:

9.1.1 A WIS discovery metadata record describing data for global exchange via WIS shall indicate the scope of distribution using the keyword "GlobalExchange" of type "dataCentre" from thesaurus WMO_DistributionScopeCode.

9.2 Identifiers for metadata describing data published for global exchange

The identifier (`gmd:MD_Metadata/gmd:fileIdentifier`) for a WIS discovery metadata record that describes data published for global exchange via WIS shall be formatted as follows:

- `gmd:MD_Metadata/gmd:fileIdentifier = "urn:x-wmo:md:int.wmo.wis::{uid}"`

where {uid} is a unique identifier derived from the GTS bulletin or file name.

Unique identifiers ({uid}) for globally exchanged data shall be defined as follows:

- If a GTS «TTAAii» and «CCCC» is allocated for the product (i.e. where the datasets described by the metadata record employ the WMO file-naming convention P-flag = "T" or P-flag = "A") use «TTAAii»«CCCC» for the unique identifier; or
- If a WMO product identifier is allocated for the product (i.e. WMO file-naming convention P-flag = "W") use a truncated WMO product-identifier field of the associated data-files, excluding the date-stamp and any other varying elements as necessary.

The WMO Core Metadata Profile places the following additional restriction on ISO 19115:2003/Cor. 1:2006:

9.2.1 A WIS discovery metadata record describing data for global exchange via WIS shall have a `gmd:MD_Metadata/gmd:fileIdentifier` attribute formatted as follows (where {uid} is a unique identifier derived from the GTS bulletin or file name).

Note: To assist readers, the following are examples of `gmd:fileIdentifier` attributes for data globally exchanged via WIS:

- `urn:x-wmo:md:int.wmo.wis::FCUK31EGRR`
- `urn:x-wmo:md:int.wmo.wis::FR-meteofrance-toulouse,GRIB,ARPEGE-75N10N-60W65E_C_LFPW`

9.3 **Defining WMO data policy and GTS priority for data published for global exchange**

WMO data policy pertaining to Resolution 40 (Cg-XII) and Resolution 25 (Cg-XIII) and other regulations (e.g. ICAO Annex 3 – Meteorological Services for International Air Navigation) shall be expressed using the following controlled vocabulary: “WMOEssential”, “WMOAdditional” and “WMOOther”.

A new code-list dictionary is published as part of this specification defining the set of permissible values for specifying the WMO data policy: WMO_DataLicenseCode. Part 2, Table 14 refers.

WMO data policy is considered to be a legal constraint applying to both usage and access.

Note: More details on WMO data policy (WMO Resolution 25 (Cg-XIII) and Resolution 40 (Cg-XII)) are described at http://www.wmo.int/pages/about/exchangingdata_en.html.

WMO data policy shall be defined using the following element:

- /gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints//gmd:otherConstraints

The presence of more than one WMO data-policy statement in a single metadata record yields an ambiguous state; a WIS discovery metadata record describing data for global exchange shall declare only a single WMO data policy.

The WMO Core Metadata Profile places the following additional restriction on ISO 19115:2003/Cor. 1:2006:

9.3.1 A WIS discovery metadata record describing data for global exchange via WIS shall indicate the WMO data license as legal constraint (type: “otherConstraints”) using one and only one term from the WMO_DataLicenseCode code list.

Notes:

- (1) Only exact matches to the terms from the code list are acceptable: “wmo-essential”, “WMO Essential” or “WmOaDdiTiOnaL” will all fail to validate.
- (2) Where WMO data policies “WMOAdditional” or “WMOOther” are cited, a more precise definition of the additional access or usage restrictions may be provided by the data publisher.
- (3) Guidance on the provision of alternative data policies and access or usage restrictions is provided at: http://wis.wmo.int/MD_DataPolicy.

GTS priority (also known as GTS product category code) shall be expressed using the following controlled vocabulary: “GTSPriority1”, “GTSPriority2”, “GTSPriority3” and “GTSPriority4”.

A new code-list dictionary is published as part of this specification defining the set of permissible values for specifying WMO data policy: WMO_GTSPriorityCode. Part 2, Table 15 refers.

GTS priority is considered to be a legal constraint applying to both usage and access.

GTS priority shall be defined using the following element:

- /gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints//gmd:otherConstraints

The presence of more than one GTS priority statement in a single metadata record yields an ambiguous state; a WIS discovery metadata record describing data for global exchange shall declare only a single GTS priority.

The WMO Core Metadata Profile places the following additional restriction on ISO 19115:2003/Cor. 1:2006:

9.3.2 A WIS discovery metadata record describing data for global exchange via WIS shall indicate GTS priority as legal constraint (type: "otherConstraints") using one and only one term from the WMO_GTSProductCategoryCode code list.

Note: Only exact matches to the terms from the code list are acceptable: "gts-priority-4", "GTS Priority 4", or "GtsPriority4" will all fail to validate.

The absence of both gmd:accessConstraints and gmd:useConstraints shall be interpreted such that the terms expressed in gmd:otherConstraints (e.g. WMO data policy and GTS priority) apply to both access and use.

However, this should be made explicit by expressing:

gmd:MD_LegalConstraints/gmd:accessConstraints and
gmd:MD_LegalConstraints/gmd:useConstraints using
gmd:MD_RestrictionCode "otherRestrictions".

Note: Example

```
<gmd:resourceConstraints>
  <gmd:MD_LegalConstraints>
    <gmd:accessConstraints>
      <gmd:MD_RestrictionCode
        codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/
          ISO_19139_Schemas/resources/Codelist/gmxCodelists.xml#MD_RestrictionCode"
        codeListValue="otherRestrictions">
          otherRestrictions
      </gmd:MD_RestrictionCode>
    </gmd:accessConstraints>
    <gmd:useConstraints>
      <gmd:MD_RestrictionCode
        codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/
          ISO_19139_Schemas/resources/Codelist/gmxCodelists.xml#MD_RestrictionCode"
        codeListValue="otherRestrictions">
          otherRestrictions
      </gmd:MD_RestrictionCode>
    </gmd:useConstraints>
    <gmd:otherConstraints>
      <gco:CharacterString>WMOEssential</gco:CharacterString>
    </gmd:otherConstraints>
    <gmd:otherConstraints>
      <gco:CharacterString>GTSPriority3</gco:CharacterString>
    </gmd:otherConstraints>
  </gmd:MD_LegalConstraints>
</gmd:resourceConstraints>
```

All statements regarding constraints originating from a single source should be grouped into a single gmd:resourceConstraints element.

Note: This practice aims to ensure forward compatibility with ISO 19115-1:2013 (currently in Draft International Standard status) where the amended gmd:MD_Constraints class is expected to include information about the source of a (set of) constraint(s).

10. SUMMARY OF ADDITIONAL RESTRICTIONS

The requirements defined in this specification are summarized in Table 4, Table 5 and Table 6. They are grouped according to the encoding requirements expressed in section 6 and the formal requirements expressed in sections 8 and 9.

Table 4. XML encoding (6)

<i>Encoding rule</i>		<i>Description</i>
1	ISO/TS 19139:2007 compliance	6.1.1 [MANDATORY obligation] Each WIS discovery metadata record shall validate without error against the XML schemas defined in ISO/TS 19139:2007.
		6.1.2 [MANDATORY obligation] Each WIS discovery metadata record shall validate without error against the rule-based constraints listed in ISO/TS 19139:2007 Annex A (Table A.1).
2	Explicit identification of namespaces in XML	6.2.1 [MANDATORY obligation] Each WIS discovery metadata record shall explicitly name all namespaces used within the record; use of default namespaces is prohibited.
3	Specification of GML namespace	6.3.1 [MANDATORY obligation] Each WIS discovery metadata record shall declare the following XML namespace for GML: http://www.opengis.net/gml/3.2 .

Table 5. Metadata uniqueness and discovery within the WIS DAR catalogue (8)

<i>Target element(s)</i>		<i>Description</i>
4	gmd:MD_Metadata/gmd:fileIdentifier	8.1.1 [MANDATORY obligation] Each WIS discovery metadata record shall include one gmd:MD_Metadata/gmd:fileIdentifier attribute.
		8.1.2 [MANDATORY obligation] The gmd:MD_Metadata/gmd:fileIdentifier attribute for each WIS discovery metadata record shall be unique within WIS.
5	gmd:MD_Metadata/gmd:identificationInfo/ ↘gmd:MD_Identification/gmd:descriptiveKeywords	8.2.1 [MANDATORY obligation] Each WIS discovery metadata record shall include at least one keyword from the WMO_CategoryCode code list.
		8.2.2 [MANDATORY obligation] Keywords from WMO_CategoryCode code list shall be defined as keyword type "theme".
		8.2.3 [MANDATORY obligation] All keywords sourced from a particular keyword thesaurus shall be grouped into a single instance of the MD_Keywords class.
6	gmd:MD_Metadata/gmd:identificationInfo/ ↘gmd:MD_DataIdentification/gmd:extent/ ↘gmd:EX_Extent/gmd:geographicExtent/	8.2.4 [CONDITIONAL obligation: geographic data only] Each WIS discovery metadata record describing geographic data shall include the description of at least one geographic bounding box defining the spatial extent of the data.

Table 6. Description of data for global exchange via WIS (9)

	<i>Target element(s)</i>		<i>Description</i>
7	gmd:MD_Metadata/gmd:identificationInfo/ ↳gmd:MD_Identification/gmd:descriptiveKeywords	9.1.1	[MANDATORY obligation] A WIS discovery metadata record describing data for global exchange via WIS shall indicate the scope of distribution using the keyword "GlobalExchange" of type "dataCentre" from thesaurus WMO_DistributionScopeCode.
8	gmd:MD_Metadata/gmd:fileIdentifier	9.2.1	[CONDITIONAL obligation: data globally exchanged via WIS only] A WIS discovery metadata record describing data for global exchange via WIS shall have a gmd:MD_Metadata/gmd:fileIdentifier attribute formatted as follows: urn:x-wmo:md:int.wmo.wis::{uid} (where {uid} is a unique identifier derived from the GTS bulletin or file name)
9	gmd:MD_Metadata/gmd:identificationInfo/ ↳gmd:MD_DataIdentification/ ↳gmd:resourceConstraints/ ↳gmd:MD_LegalConstraints/gmd:otherConstraints	9.3.1	[CONDITIONAL obligation: data globally exchanged via WIS only] A WIS discovery metadata record describing data for global exchange via WIS shall indicate the WMO data license as legal constraint (type: "otherConstraints") using one and only one term from the WMO_DataLicenseCode code list.
		9.3.2	[CONDITIONAL obligation: data globally exchanged via WIS only] A WIS discovery metadata record describing data for global exchange via WIS shall indicate the GTS priority as legal constraint (type: "otherConstraints") using one and only one term from the WMO_GTSPriorityCode code list.

11. AMENDMENTS TO CODE LISTS/NEW CODE LISTS

Table 7 lists the modifications and additions to the code lists defined in ISO 19115:2003. Please refer to Part 2, 4, for more information on code-list extensions.

Table 7. Modifications and additions to the ISO 19115:2003 code lists

	<i>Target code list</i>	<i>Change</i>	<i>Description</i>
1	CI_DateTypeCode	Amendment	Additional term «reference» [004] See Part 2, Table 8.
2	MD_KeywordTypeCode	Amendment	Additional term «dataCentre» [006] – from ISO/DIS 19115-1:2013. See Part 2, Table 10.
3	WMO_DataLicenseCode	New	WMO data license applied to the data resource – derived from WMO Resolution 40 (Cg-XII) and Resolution 25 (Cg-XIII) (http://www.wmo.int/pages/about/exchangingdata_en.html) See Part 2, Table 14.
4	WMO_GTSProductCategoryCode	New	Product category used for prioritizing messages over the WMO GTS See Part 2, Table 15.
5	WMO_CategoryCode	New	Additional topic categories for the WMO community See Part 2, Table 16.
6	WMO_DistributionScopeCode	New	Scope of distribution of data within the WIS See Part 2, Table 17.

12. WMO CORE METADATA PROFILE UML MODEL

Metadata records compliant with the WMO Core Metadata Profile shall contain as a minimum the information defined in Figure 1. These are the “mandatory” elements of the record.

The WMO Core Metadata Profile specification defines a further set of elements that shall be included in a WIS discovery metadata record under certain conditions. These are illustrated in Figure 2.

Details of the UML classes and attributes are provided in Part 2, 3.

Note: For reference, the normative UML model for ISO 19115:2003/Cor. 1:2006 is published by ISO/TC 211 at: <http://www.isotc211.org/hmmg/HTML/index.htm>.

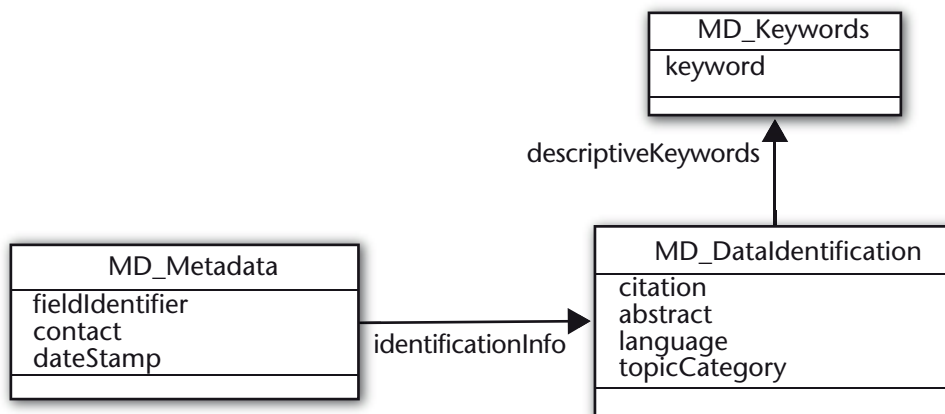


Figure 1. Mandatory contents of a WIS discovery metadata record

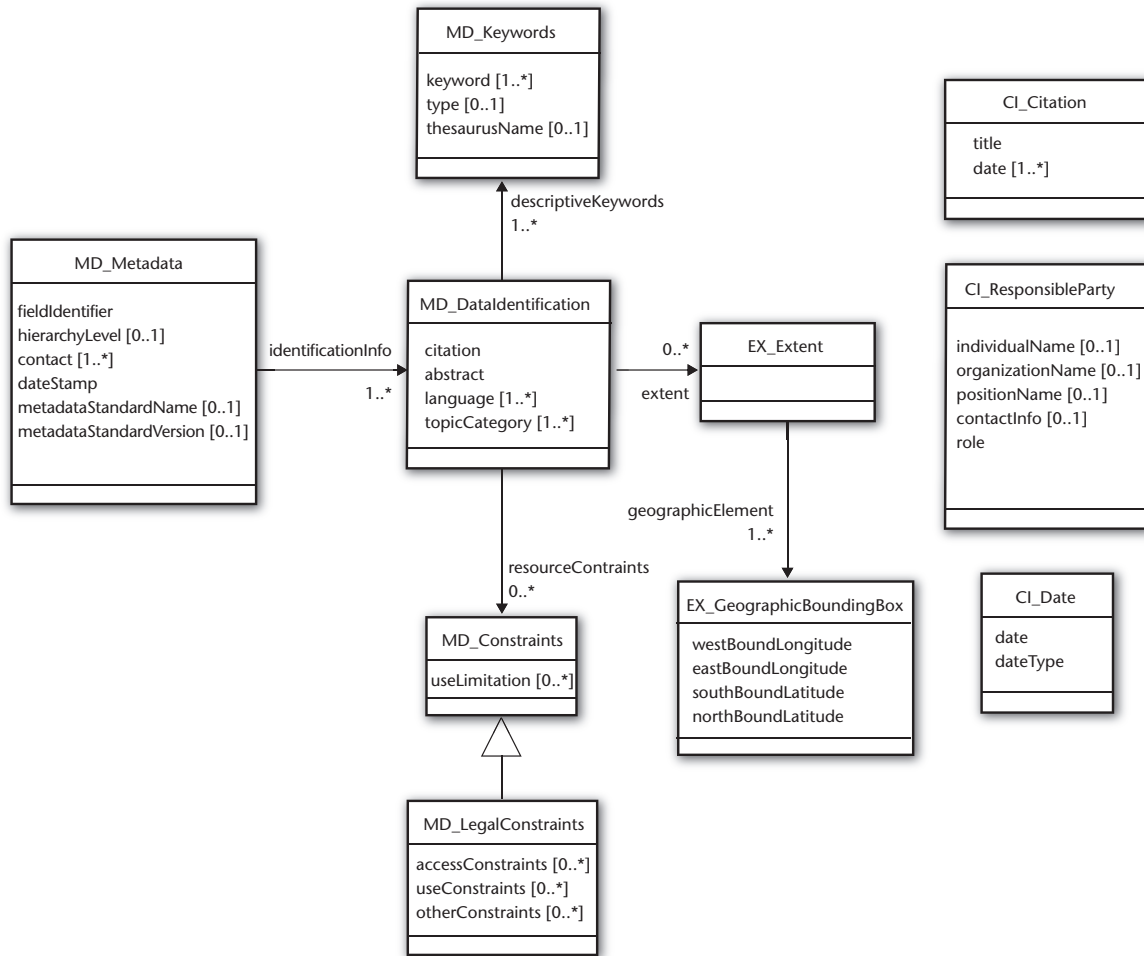


Figure 2. Full specification of the WMO Core Metadata Profile, including both optional and mandatory items

PART 2. WMO CORE METADATA PROFILE VERSION 1.3 SPECIFICATION: ABSTRACT TEST SUITE, DATA DICTIONARY AND CODE LISTS

1. SCOPE

The specification defines the content, structure and encoding of discovery metadata published within the WIS DAR catalogue.

The metadata standard defined herein is an informal category-1 profile⁴ of the International Standard ISO 19115:2003 ‘Geographic information – Metadata’. This metadata standard shall be referred to as the WMO Core Metadata Profile.

WIS discovery metadata records shall be encoded in XML as defined by ISO/TS 19139:2007.

Part 1 of this specification defines the conformance requirements for the WMO Core Metadata Profile. Part 2 defines the abstract test suite, data dictionary and code lists. Unless otherwise stated, references to Part 1 and Part 2 are to the relevant parts of this specification.

⁴ A category-1 profile places additional restrictions on the use of an International Standard to meet the more specific requirements of a given community. Profiles of International Standards may be formally registered. The WMO profile of ISO 19115 has not been registered and thus remains an “informal” profile.

2. ABSTRACT TEST SUITE (NORMATIVE)

Notes:

- (1) Automated test suites for validating XML metadata records against both formal requirements and guidance can be found from the WIS wiki: http://wis.wmo.int/MD_Conform.
- (2) An authoritative copy of the automated test suite for validating against the formal requirements described in this specification can be found at: <http://wis.wmo.int/2012/metadata/validationTestSuite/>.

2.1 Abstract tests for XML encoding

2.1.1 ISO/TS 19139:2007 compliance

Test id: <http://wis.wmo.int/2012/metadata/conf/ISO-TS-19139-2007-xml-schema-validation>

Test purpose: **Requirement 6.1.1:** Each WIS discovery metadata record shall validate without error against the XML schemas defined in ISO/TS 19139:2007.

Test method: Using a tool with strict interpretation of XML schema and full support for the W3C XML schema, validate the instance document under test against the XML schemas created from the UML model of ISO 19115:2003/Cor. 1:2006 using the encoding rules defined in ISO/TS 19139:2007 'Geographic information – Metadata – XML schema implementation' Clause 9. The normative location for these XML schemas are hosted by ISO at: http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/.
A reference copy of these XML schemas is hosted by WMO at: http://wis.wmo.int/2011/schemata/iso19139_2007/schema/.

Test id: <http://wis.wmo.int/2012/metadata/conf/ISO-TS-19139-2007-rule-based-validation>

Test purpose: **Requirement 6.1.2:** Each WIS discovery metadata record shall validate without error against the rule-based constraints listed in ISO/TS 19139:2007 Annex A (Table A.1).

Test method: Using a tool that supports Schematron (ISO/IEC 19757-3:2006 'Information technology – Document Schema Definition Language (DSDL) – Part 3: Rule-based validation – Schematron'), validate the instance document under test against the rule-based constraints listed in ISO/TS 19139:2007 Annex A (Table A.1). A reference set of Schematron rules for this purpose is hosted by WMO at: <http://wis.wmo.int/2012/metadata/validationTestSuite/>.

2.1.2 Explicit identification of namespaces in XML

Test id: <http://wis.wmo.int/2012/metadata/conf/explicit-xml-namespace-identification>

Test purpose: **Requirement 6.2.1:** Each WIS discovery metadata record shall explicitly name all namespaces used within the record; use of default namespaces is prohibited.

Test method: In the instance document under test inspect all "xmlns" declarations to ensure that an XML namespace is provided, for example:
<gmd:MD_Metadata xmlns:gmd="http://www.isotc211.org/2005/gmd" ... >

The following "xmlns" declaration is not permitted:

<MD_Metadata xmlns="http://www.isotc211.org/2005/gmd" ... >

2.1.3 Specification of GML namespace

Test id: <http://wis.wmo.int/2012/metadata/conf/gml-namespace-specification>

Test purpose: **Requirement 6.3.1:** Each WIS discovery metadata record shall declare the following XML namespace for GML: <http://www.opengis.net/gml/3.2>.

Test method: In the instance document under test inspect all “xmlns” declarations to ensure that the GML namespace is specified as <http://www.opengis.net/gml/3.2>, for example:
 xmlns:gml="http://www.opengis.net/gmd/3.2"

2.2 **Abstract tests for metadata uniqueness and discovery within the WIS DAR catalogue**

2.2.1 **Unique gmd:fileIdentifier attribute**

Test id: <http://wis.wmo.int/2012/metadata/conf/fileIdentifier-cardinality>
 Test purpose: **Requirement 8.1.1:** Each WIS discovery metadata record shall include one gmd:MD_Metadata/gmd:fileIdentifier attribute.
 Test method: In the instance document under test, validate that there is one and only one instance of the element identified by the following XPath:
 /gmd:MD_Metadata/gmd:fileIdentifier

Note: There is no abstract test for **Requirement 8.1.2:** The gmd:MD_Metadata/gmd:fileIdentifier attribute for each WIS discovery metadata record shall be unique within WIS.

2.2.2 **Mandatory WMO_CategoryCode keyword**

Test id: http://wis.wmo.int/2012/metadata/conf/WMO_CategoryCode-keyword-cardinality
 Test purpose: **Requirement 8.2.1:** Each WIS discovery metadata record shall include at least one keyword from the WMO_CategoryCode code list.
 Test method: (i) Inspect the instance document under test to assess whether the WMO_CategoryCode code list is specified as a keyword thesaurus within an instance of gmd:MD_Keywords using the following XPath:
 /gmd:MD_Metadata/gmd:identificationInfo/gmd:descriptiveKeywords/
 ↘gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title// =
 "WMO_CategoryCode"
 A gmx:Anchor element may be used to specify the location of the code list, e.g.
 /gmd:MD_Metadata/gmd:identificationInfo/gmd:descriptiveKeywords/
 ↘gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title/
 ↘gmx:Anchor/@xlink:href = "http://wis.wmo.int/2012/codelists/WMOCodeLists.xml#WMO_CategoryCode"
 (ii) Inspect the associated gmd:MD_Keywords element to ensure that at least one instance of a keyword from the WMO_CategoryCode code list is present. A normative version of the WMO_CategoryCode code list is published by WMO at: <http://wis.wmo.int/2012/codelists/WMOCodeLists.xml>. Instances of keyword are identified by the following XPath:
 /gmd:MD_Metadata/gmd:identificationInfo/gmd:descriptiveKeywords/
 ↘gmd:MD_Keywords/gmd:keyword

Test id: http://wis.wmo.int/2012/metadata/conf/WMO_CategoryCode-keyword-theme
 Test purpose: **Requirement 8.2.2:** Keywords from WMO_CategoryCode code list shall be defined as keyword type “theme”.
 Test method: (i) Inspect the instance document under test to assess whether the WMO_CategoryCode code list is specified as a keyword thesaurus within an instance of gmd:MD_Keywords using the following XPath:
 /gmd:MD_Metadata/gmd:identificationInfo/gmd:descriptiveKeywords/
 ↘gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title// =
 "WMO_CategoryCode"
 A gmx:Anchor element may be used to specify the location of the code list, e.g.

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  \gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title/
  \gmx:Anchor/@xlink:href = "http://wis.wmo.int/2012/codelists/WMOCodeLists.
  xml#WMO_CategoryCode"
```

(ii) Inspect the associated gmd:MD_Keywords element to ensure that the keyword type is specified as "theme" from the MD_KeywordTypeCode code list, e.g.

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  \gmd:MD_Keywords/gmd:type/gmd:MD_KeywordTypeCode = "theme"
```

Test id: <http://wis.wmo.int/2012/metadata/conf/keyword-grouping>
 Test purpose: **Requirement 8.2.3:** All keywords sourced from a particular keyword thesaurus shall be grouped into a single instance of the MD_Keywords class.
 Test method: Inspect the instance document under test to assess whether each keyword thesaurus is specified once and once only. Keyword thesaurus title is specified using the following XPath:

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  \gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title//
```

2.2.3 **Geographic data extent specification with bounding box**

Test id: <http://wis.wmo.int/2012/metadata/conf/geographic-bounding-box>
 Test purpose: **Requirement 8.2.4:** Each WIS discovery metadata record describing geographic data shall include the description of at least one geographic bounding box defining the spatial extent of the data.
 Test method: (i) Inspect the instance document under test to assess whether the metadata record is describing geographic data, e.g.

```
/gmd:MD_Metadata/gmd:hierarchyLevel/gmd:MD_ScopeCode !=
  "nonGeographicDataset"
```

 (ii) Inspect the instance document under test to assess whether the geographic extent is specified using a bounding box. Abstract test <http://wis.wmo.int/2012/metadata/conf/ISO-TS-19139-2007-rule-based-validation> shall ensure that the bounding box is correctly specified. Geographic extent bounding box is specified using the following XPath:

```
/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/
  gmd:extent/
  \gmd:EX_Extent/gmd:geographicExtent/gmd:EX_GeographicBoundingBox
```

Note: There is no abstract test for **Requirement 8.2.5:** All information within a metadata record shall, as a minimum, be provided in English within the metadata record.

2.3 **Description of data for global exchange via WIS**

2.3.1 **Identification of data for global exchange via WIS**

Test id: <http://wis.wmo.int/2012/metadata/conf/identification-of-globally-exchanged-data>
 Test purpose: **Requirement 9.1.1:** A WIS discovery metadata record describing data for global exchange via the WIS shall indicate the scope of distribution using the keyword "GlobalExchange" of type "dataCenter" from thesaurus WMO_DistributionScopeCode.
 Test method: (i) Inspect the instance document under test to assess whether the WMO_DistributionScopeCode code list is specified as a keyword thesaurus within an instance of gmd:MD_Keywords using the following XPath:

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  \gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title// =
  "WMO_DistributionScopeCode"
```

A gmx:Anchor element may be used to specify the location of the Code List; e.g.

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  \gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title/
  \gmx:Anchor/@xlink:href = "http://wis.wmo.int/2012/codelists/WMOCodeLists.
  xml#WMO_DistributionScopeCode"
```

(ii) Inspect the associated gmd:MD_Keywords element to ensure that the keyword type is specified as "dataCentre" from the (amended) MD_KeywordTypeCode code list, e.g.

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  \gmd:MD_Keywords/gmd:type/gmd:MD_KeywordTypeCode = "dataCentre"
```

(iii) Inspect the associated gmd:MD_Keywords element to assess whether the keyword "GlobalExchange" from the WMO_DistributionScopeCode code list is present; e.g.

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  \gmd:MD_Keywords/gmd:keyword = "GlobalExchange"
```

- Test id: <http://wis.wmo.int/2012/metadata/conf/fileIdentifier-for-globally-exchanged-data>
- Test purpose: **Requirement 9.2.1:** A WIS discovery metadata record describing data for global exchange via the WIS shall have a gmd:MD_Metadata/gmd:fileIdentifier attribute formatted as follows: urn:x-wmo:md:int.wmo.wis::{uid} (where {uid} is a unique identifier derived from the GTS bulletin or file name).
- Test method: In the instance document under test, validate that the gmd:fileIdentifier element conforms to the following regular expression:
/gmd:MD_Metadata/gmd:fileIdentifier// = "urn:x-wmo:md:int.wmo.wis::"

2.3.2 **Specification of WMO data policy for globally exchanged data**

- Test id: <http://wis.wmo.int/2012/metadata/conf/WMO-data-policy-for-globally-exchanged-data>
- Test purpose: **Requirement 9.3.1:** A WIS discovery metadata record describing data for global exchange via the WIS shall indicate the WMO data license as legal constraint (type: "otherConstraints") using one and only one term from the WMO_DataLicenseCode code list.
- Test method: Inspect the instance document under test to assess whether one and only one instance of a term from the WMO_DataLicenseCode code list is specified using the following XPath:
/gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints/
 \gmd:MD_LegalConstaints/gmd:otherConstraints//
A normative version of the WMO_DataLicenseCode code list is published by WMO at: <http://wis.wmo.int/2012/codelists/WMOCodeLists.xml>.
A gmx:Anchor element may be used to specify the location of the code list, e.g.
/gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints/
 \gmd:MD_LegalConstaints/gmd:otherConstraints/gmx:Anchor/@xlink:href =
 "http://wis.wmo.int/2012/codelists/WMOCodeLists.xml#WMO_DataLicenseCode"

2.3.3 **Specification of GTS product category (GTS priority) for globally exchanged data**

- Test id: <http://wis.wmo.int/2012/metadata/conf/GTS-priority-for-globally-exchanged-data>
- Test purpose: **Requirement 9.3.2:** A WIS discovery metadata record describing data for global exchange via the WIS shall indicate the GTS priority as legal constraint (type: "otherConstraints") using one and only one term from the WMO_GTSProductCategoryCode code list.

Test method: Inspect the instance document under test to assess whether one and only one instance of a term from the WMO_GTSPProductCategoryCode code list is specified using the following XPath:
 /gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints/
 ↘gmd:MD_LegalConstaints/gmd:otherConstraints//
 A normative version of the WMO_GTSPProductCategoryCode code list is published by WMO at: <http://wis.wmo.int/2012/codelists/WMOCodeLists.xml>.
 A gmx:Anchor element may be used to specify the location of the code list, for example:
 /gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints/
 ↘gmd:MD_LegalConstaints/gmd:otherConstraints/gmx:Anchor/@xlink:href =
 "http://wis.wmo.int/2012/codelists/WMOCodeLists.xml#WMO_GTSPProductCategoryCode"

3. **WMO CORE METADATA PROFILE DATA DICTIONARY**

This data dictionary includes only mandatory elements from ISO 19115:2003 and associated corrigendum and elements explicitly mentioned within this specification. Other elements are omitted. Please refer to ISO 19115:2003 and ISO 19115:2003/Cor. 1:2006 for further information. Note that additional guidance for metadata authors is provided at http://wis.wmo.int/MD_Index.

Table 1 to Table 7 are tabular representations of the UML diagrams for the section of the UML diagrams for the WMO Core Metadata Profile. Items marked with "M" in the "Obligation/Condition" column shall be present in a valid WMO Core Metadata Profile record. Those entries marked with "O" should be present if they are applicable. Entries marked "C" shall be present if the associated condition is met.

Line numbers match those defined in ISO 19115:2003 and the associated corrigendum.

Table 1. Metadata entity set information

	Name/role name	Definition	Obligation/ Condition	Maximum occurrence	Data type	Domain
1	MD_Metadata	root entity which defines metadata about a resource or resources	M	1	Class	Lines 2-22
2	fileIdentifier	unique identifier for this metadata file	M	1	CharacterString	Free text See Part 1, 8.1 and 9.2.
6	hierarchyLevel	scope to which the metadata applies	O	1	Class	MD_ScopeCode «CodeList» See Table 12.
8	contact	party responsible for the metadata	M	N	Class	CI_ResponsibleParty «DataType» See Table 6.
9	dateStamp	date that the metadata was created or revised	M	1	Class	Date
10	metadataStandardName	name of the metadata standard (including profile name) used	O	1	CharacterString	Free text
11	metadataStandardVersion	version of the metadata standard (version of the profile) used	O	1	CharacterString	Free text See Part 1, 7.
15	Role name: identificationInfo	basic information about the resource(s) to which the metadata applies	M	N	Association	MD_DataIdentification See Table 2.

Table 2. Identification information (includes data identification)

Name/role name	Definition	Obligation/Condition	Maximum occurrence	Data type	Domain
23 MD_Identification	basic information required to uniquely identify a resource or resources	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated class (MD_Metadata) «Abstract»	Lines 24-35.1
24 citation	information about citing the resource(s)	M	1	Class	CI_Citation«DataType» See Table 6.
25 abstract	brief narrative summary of the content of the resource(s)	M	1	CharacterString	Free text
33 Role name: descriptiveKeywords	provides category keywords, their type, and reference source	M	N	Association	MD_Keywords See Table 3
35 Role name: resourceConstraints	provides information about constraints which apply to the resource(s)	O	N	Association	See Part 1, 8.2 and 9.1. MD_Constraints See Table 4. See Part 1, 9.3.
36 MD_DataIdentification	basic information required to uniquely identify a dataset	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_Identification)	Lines 37-46 and 24-35.1
39 language	language(s) used within the dataset	M	N	CharacterString	ISO 639-2 recommended
41 topicCategory	main theme(s) of the dataset	M	N	Class	MD_TopicCategoryCode«Enumeration» See Table 13.
45 extent	extent information including the bounding box, bounding polygon, vertical and temporal extent of the dataset	C	N	Association	EX_Extent«DataType» See Table 5 See Part 1, 8.2.

Table 3. Keyword information

Name/role name	Definition	Obligation/Condition	Maximum occurrence	Data type	Domain
52 MD_Keywords	Keywords, their type and source	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated class (MD_Identification)	Lines 53-55
53 keyword	commonly used word(s) or formalized word(s) or phrase(s) used to describe the subject	M	N	CharacterString	Free text See Part 1, 8.2 and Part 1, 9.1.
54 type	subject matter used to group similar keywords	O	1	Class	MD_KeywordTypeCode «CodeList» See Table 10. See Part 1, 8.2 and Part 1, 9.1.
55 thesaurusName	name of a formally registered thesaurus or a similar authoritative source of keywords	O	1	Class	CI_Citation «DataType» See Table 6 See Part 1, 8.2 and Part 1, 9.1.

Table 4. Constraint information (includes legal)

Name/Role name	Definition	Obligation/Condition	Maximum occurrence	Data type	Domain
67 MD_Constraints	restrictions on the access and use of a resource or metadata	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated class (MD_Metadata and MD_Identification)	Line 68
68 useLimitation	limitation affecting the fitness for use of the resource or metadata. Example, "not to be used for navigation"	O	N	CharacterString	Free text
69 MD_LegalConstraints	restrictions and legal prerequisites for accessing and using the resource or metadata	Use obligation from referencing object	N	Specialized class (MD_Constraints)	Lines 70-72 and 68
70 accessConstraints	access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations or warnings on obtaining the resource or metadata	O	N	Class	MD_RestrictionCode «CodeList» See Table 11.

<i>Name/Role name</i>	<i>Definition</i>	<i>Obligation/Condition</i>	<i>Maximum occurrence</i>	<i>Data type</i>	<i>Domain</i>
71 useConstraints	constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations or warnings on using the resource or metadata	O	N	Class	MD_RestrictionCode «CodeList» See Table 11.
72 otherConstraints	other restrictions and legal prerequisites for accessing and using the resource or metadata	C /accessConstraints or useConstraints equal "otherRestrictions"	N	CharacterString	Free text or code table See Part 1, 9.3.

Table 5. Extent information

<i>Name/role name</i>	<i>Definition</i>	<i>Obligation/ Condition</i>	<i>Maximum occurrence</i>	<i>Data type</i>	<i>Domain</i>
334 EX_Extent	information about horizontal,vertical and temporal extent	Use obligation from referencing object	Use maximum occurrence from referencing object	Class «DataType»	Lines 335-338
336 Role name: geographicElement	provides geographic component of the extent of the referring object	C	N	Association	EX_GeographicExtent «Abstract» See Table 5. See Part 1, 8.2.
339 EX_GeographicExtent	geographic area of the dataset	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (EX_Extent and EX_SpatialTemporalExtent) «Abstract»	Line 340
343 EX_GeographicBoundingBox	geographic position of the dataset NOTE This is only an approximate reference so specifying the coordinate reference system is unnecessary	C See Subclause 8.2 (Part 1)	Use maximum occurrence from referencing object	Specialized class (EX_GeographicExtent)	Lines 344-347 and 340
344 westBoundLongitude	westernmost coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	M	1	Class	Angle -180,0 ≤ West Bounding Longitude Value ≤180,0 See Part 1, 8.2.

Name/role name	Definition	Obligation/ Condition	Maximum occurrence	Data type	Domain
345 eastBoundLongitude	easternmost coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	M	1	Class	Angle $-180,0 \leq$ East Bounding Longitude Value $\leq 180,0$ See Part 1, 8.2.
346 southBoundLatitude	southernmost coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)	M	1	Class	$-90,0 \leq$ South Bounding Latitude Value $\leq 90,0$; South Bounding Latitude Value \leq North bounding Latitude Value See Part 1, 8.2.
347 northBoundLatitude	northernmost, coordinate of the limit of the dataset extent expressed in latitude in decimal degrees (positive north)	M	1	Class	$-90,0 \leq$ North Bounding Latitude Value $\leq 90,0$; North Bounding Latitude Value \geq South Bounding Latitude Value See Part 1, 8.2.

Table 6. Citation and responsible party information

Name/role name	Definition	Obligation/ Condition	Maximum occurrence	Data type	Domain
359 CI_Citation	standardized resource reference object	Use obligation/condition from referencing object	Use maximum occurrence from referencing	Class «DataType»	Lines 360-373
360 title	name by which the cited resource is known	M	1	CharacterString	Free text
362 date	reference date for the cited resource	M	N	Class	CI_Date «DataType» See Table 7.
374 CI_ResponsibleParty	identification of, and means of communication with, person(s) and organizations associated with the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class «DataType»	Lines 375-379

<i>Name/role name</i>	<i>Definition</i>	<i>Obligation/ Condition</i>	<i>Maximum occurrence</i>	<i>Data type</i>	<i>Domain</i>
375 individualName	name of the responsible person surname, given name, title separated by a delimiter	C /organisationName and positionName not documented?	1	CharacterString	Free text
376 organisationName	name of the responsible organization	C /individualName and positionName not documented?	1	CharacterString	Free text
377 positionName	role or position of the responsible person	C /individualName and organisationName not documented?	1	CharacterString	Free text
378 contactInfo	contact information for the responsible party	O	1	Class	CI_Contact «DataType»
379 role	function performed by the responsible party	M	1	Class	CI_RoleCode «CodeList» See Table 9.

Table 7. Date information

<i>Name/role name</i>	<i>Definition</i>	<i>Obligation/ Condition</i>	<i>Maximum occurrence</i>	<i>Data type</i>	<i>Domain</i>
393 CI_Date	reference date and event used to describe it	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class «DataType»	Lines 119-120
394 date	reference date for the cited resource	M	1	Class	Date
395 dateType	event used for the reference date	M	1	Class	CI_DateTypeCode «CodeList» See Table 8.

4. CODE LISTS AND ENUMERATIONS

Table 8 to Table 13 describe the code lists defined in ISO 19115:2003 and ISO 19115:2003/Cor. 1:2006 that are referenced in the WMO Core Metadata Profile Specification – including amendments for WMO Core Metadata Profile in bold.

Table 14 to Table 17 describe the new code lists defined in WMO Core Metadata Profile. A GML code-list dictionary implementation of the new and amended code lists is published at: <http://wis.wmo.int/2012/codelists/WMOCodeLists.xml>.

Table 8. CI_DateTypeCode «CodeList» (including amendment)

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
1.	CI_DateTypeCode	DateTypCd	identification of when a given event occurred
2.	creation	001	date identifies when the resource was brought into existence
3.	publication	002	date identifies when the resource was issued
4.	revision	003	date identifies when the resource was examined and improved or amended
5.	reference	004	date identifies when the resource was referenced or accessed

Table 9. CI_RoleCode «CodeList»

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
1.	CI_RoleCode	RoleCd	function performed by the responsible party
2.	resourceProvider	001	party that supplies the resource
3.	custodian	002	party that accepts accountability and responsibility for the data and ensures appropriate care and maintenance of the resource
4.	owner	003	party that owns the resource
5.	user	004	party who uses the resource
6.	distributor	005	party who distributes the resource
7.	originator	006	party who created the resource
8.	pointOfContact	007	party who can be contacted for acquiring knowledge about or acquisition of the resource
9.	principallInvestigator	008	key party responsible for gathering information and conducting research
10.	processor	009	party who has processed the data in a manner such that the resource has been modified
11.	publisher	010	party who published the resource
12.	author	011	party who authored the resource

Table 10. MD_KeywordTypeCode «CodeList» (including amendment)

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
1.	MD_KeywordTypeCode	KeyTypCd	methods used to group similar keywords
2.	discipline	001	keyword identifies a branch of instruction or specialised learning
3.	place	002	keyword identifies a location
4.	stratum	003	keyword identifies layer(s) of any deposited substance
5.	temporal	004	keyword identifies a time period related to the dataset
6.	theme	005	keyword identifies a particular subject or topic
7.	dataCentre	006	keyword identifies a repository or archive that manages and distributes data (from ISO/DIS 19115-1:2013)

Table 11. MD_RestrictionCode «CodeList»

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
1.	MD_RestrictionCode	RestrictCd	limitation(s) placed upon access or use of the data
2.	copyright	001	exclusive right to the publication, production, or sale of the rights to a literary, dramatic, musical or artistic work, or to the use of a commercial print or label, granted by law for a specified period of time to an author, composer, artist or distributor
3.	patent	002	government has granted exclusive right to make, sell, use or license an invention or discovery
4.	patentPending	003	produced or sold information awaiting a patent
5.	trademark	004	a name, symbol, or other device identifying a product, officially registered and legally restricted to the use of the owner or manufacturer
6.	license	005	formal permission to do something
7.	intellectualPropertyRights	006	Rights to financially benefit from and control of distribution of non-tangible property that is the result of creativity
8.	restricted	007	Withheld from general circulation or disclosure
9.	otherRestrictions	008	limitation not listed

Table 12. MD_ScopeCode «CodeList»

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
1.	MD_ScopeCode	ScopeCd	class of information to which the referencing entity applies
2.	attribute	001	information applies to the attribute class
3.	attributeType	002	information applies to the characteristic of a feature
4.	collectionHardware	003	information applies to the collection hardware class
5.	collectionSession	004	information applies to the collection session
6.	dataset	005	information applies to the dataset
7.	series	006	information applies to the series
8.	nonGeographicDataset	007	information applies to non-geographic data
9.	dimensionGroup	008	information applies to a dimension group
10.	feature	009	information applies to a feature
11.	featureType	010	information applies to a feature type
12.	propertyType	011	information applies to a property type

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
13.	fieldSession	012	information applies to a field session
14.	software	013	information applies to a computer programme or routine
15.	service	014	information applies to a capability which a service provider entity makes available to a service user entity through a set of interfaces that define a behaviour, such as a use case
16.	model	015	information applies to a copy or imitation of an existing or hypothetical object
17.	tile	016	information applies to a tile, a spatial subset of geographic data

Table 13. MD_TopicCategoryCode «Enumeration»

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
1.	MD_TopicCategoryCode	TopicCatCd	high-level geographic data thematic classification to assist in the grouping and search of available geographic data sets, Can be used to group keywords as well. Listed examples are not exhaustive. NOTE It is understood there are overlaps between general categories and the user is encouraged to select the one most appropriate.
2.	farming	001	rearing of animals and/or cultivation of plants Examples: agriculture, plantations, herding, pests and diseases affecting crops and livestock
3.	biota	002	flora and/or fauna in natural environment Examples: wildlife, vegetation, biological sciences, ecology, sea-life, habitat
4.	boundaries	003	legal land descriptions Examples: political and administrative boundaries
5.	climatologyMeteorologyAtmosphere	004	processes and phenomena of the atmosphere Examples: weather, climate, atmospheric conditions, climate change, precipitation
6.	economy	005	economic activities, conditions and employment Examples: production, labour, revenue, commerce, industry, tourism and ecotourism, forestry, fisheries, commercial or subsistence hunting, exploration and exploitation of resources such as minerals, oil and gas
7.	elevation	006	height above or below sea level Examples: altitude, bathymetry, digital elevation models, slope, derived products
8.	environment	007	environmental resources, protection and conservation Examples: environmental pollution, waste storage and treatment, environmental impact assessment, monitoring environmental risk, nature reserves, landscape

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
9.	geoscientificInformation	008	information pertaining to earth sciences Examples: geophysical features and processes, geology, minerals, sciences dealing with the composition, structure and origin of the earth's rocks, risks of earthquakes, volcanic activity, landslides, gravity information, soils, permafrost, hydrogeology, erosion
10.	health	009	health, health services, human ecology, and safety Examples: disease and illness, factors affecting health, hygiene, substance abuse, mental and physical health, health services
11.	imageryBaseMapsEarthCover	010	base maps Examples: land cover, topographic maps, imagery, unclassified images, annotations
12.	intelligenceMilitary	011	military bases, structures, activities Examples: barracks, training grounds, military transportation, information collection
13.	inlandWaters	012	inland water features, drainage systems and their characteristics Examples: rivers and glaciers, salt lakes, water utilization plans, dams, currents, floods, water quality, hydrographic charts
14.	location	013	positional information and services Examples: addresses, geodetic networks, control points, postal zones and services, place names
15.	oceans	014	features and characteristics of salt water bodies (excluding inland waters) Examples: tides, tidal waves, coastal information, reefs
16.	planningCadastre	015	information used for appropriate actions for future use of the land Examples: land use maps, zoning maps, cadastral surveys, land ownership
17.	society	016	characteristics of society and cultures Examples: settlements, anthropology, archaeology, education, traditional beliefs, manners and customs, demographic data, recreational areas and activities, social impact assessments, crime and justice, census information
18.	structure	017	man-made construction Examples: buildings, museums, churches, factories, housing, monuments, shops, towers
19.	transportation	018	means and aids for conveying persons and/or goods Examples: roads, airports/airstrips, shipping routes, tunnels, nautical charts, vehicle or vessel location, aeronautical charts, railways
20.	utilitiesCommunication	019	energy, water and waste systems and communications infrastructure and services Examples: hydroelectricity, geothermal, solar and nuclear sources of energy, water purification and distribution, sewage collection and disposal, electricity and gas distribution, data communication, telecommunication, radio, communication networks

Table 14. WMO_DataLicenseCode «CodeList»

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
1.	WMO_DataLicenseCode	WMODatLicCd	WMO data license applied to the data resource – derived from WMO Resolution 40 (Cg-XII) and Resolution 25 (Cg-XIII) (http://www.wmo.int/pages/about/exchangingdata_en.html)
2.	WMOEssential	001	WMO Essential Data: free and unrestricted international exchange of basic meteorological data and products
3.	WMOAdditional	002	WMO Additional Data: free and unrestricted access to data and products exchanged under the auspices of WMO to the research and education communities for non-commercial activities. A more precise definition of the data policy may be additionally supplied within the metadata. In all cases it shall be the responsibility of the data consumer to ensure that they understand the data policy specified by the data provider – which may necessitate dialogue with the data publisher for confirmation of terms and conditions.
4.	WMOOther	003	Data identified for global distribution via WMO infrastructure (GTS/WIS) that is not covered by WMO Resolution 40 (Cg-XII) and Resolution 25 (Cg-XIII), e.g. aviation OPMET data. Data marked with “WMOOther” data policy shall be treated like “WMOAdditional” where a more precise definition of the data policy may be additionally supplied within the metadata. In all cases it shall be the responsibility of the data consumer to ensure that they understand the data policy specified by the data provider – which may necessitate dialogue with the data publisher for confirmation of terms and conditions.

Table 15. WMO_GTSPriorityCode «CodeList»

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
1.	WMO_ GTSPriorityCode	WMOGTSCatCd	Product category used for prioritizing messages over the WMO GTS
2.	GTSPriority1	001	GTS Priority 1 – highest priority products
3.	GTSPriority2	002	GTS Priority 2
4.	GTSPriority3	003	GTS Priority 3
5.	GTSPriority4	004	GTS Priority 4

Table 16. WMO_CategoryCode «CodeList»

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
1.	WMO_CategoryCode	WMOCatCd	additional topic categories for WMO community
2.	weatherObservations	001	weather observations
3.	weatherForecasts	002	weather forecasts
4.	meteorology	003	Meteorology
5.	hydrology	004	Hydrology
6.	climatology	005	Climatology
7.	landMeteorologyClimate	006	land meteorology and climate

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
8.	synopticMeteorology	007	synoptic meteorology
9.	marineMeteorology	008	marine meteorology
10.	agriculturalMeteorology	009	agricultural meteorology
11.	aerology	010	Aerology
12.	marineAerology	011	marine aerology
13.	oceanography	012	Oceanography
14.	landHydrology	013	land hydrology
15.	rocketSounding	014	rocket sounding
16.	pollution	015	Pollution
17.	waterPollution	016	water pollution
18.	landWaterPollution	017	land water pollution
19.	seaPollution	018	sea pollution
20.	landPollution	019	land pollution
21.	airPollution	020	air pollution
22.	glaciology	021	Glaciology
23.	actinometry	022	Actinometry
24.	satelliteObservation	023	satellite observation
25.	airplaneObservation	024	airplane observation
26.	observationPlatform	025	observation platform

Table 17. WMO_DistributionScopeCode «CodeList»

	<i>Name</i>	<i>Domain code</i>	<i>Definition</i>
1.	WMO_DistributionScopeCode	WMODisScoCd	Scope of distribution for data published for exchange within WIS
2.	GlobalExchange	001	Data are published for global exchange via WIS. Data shall be incorporated into the GISC cache.
3.	RegionalExchange	002	Data are published for regional exchange via a GISC.
4.	OriginatingCentre	003	Data are published for exchange directly via the originating centre.

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