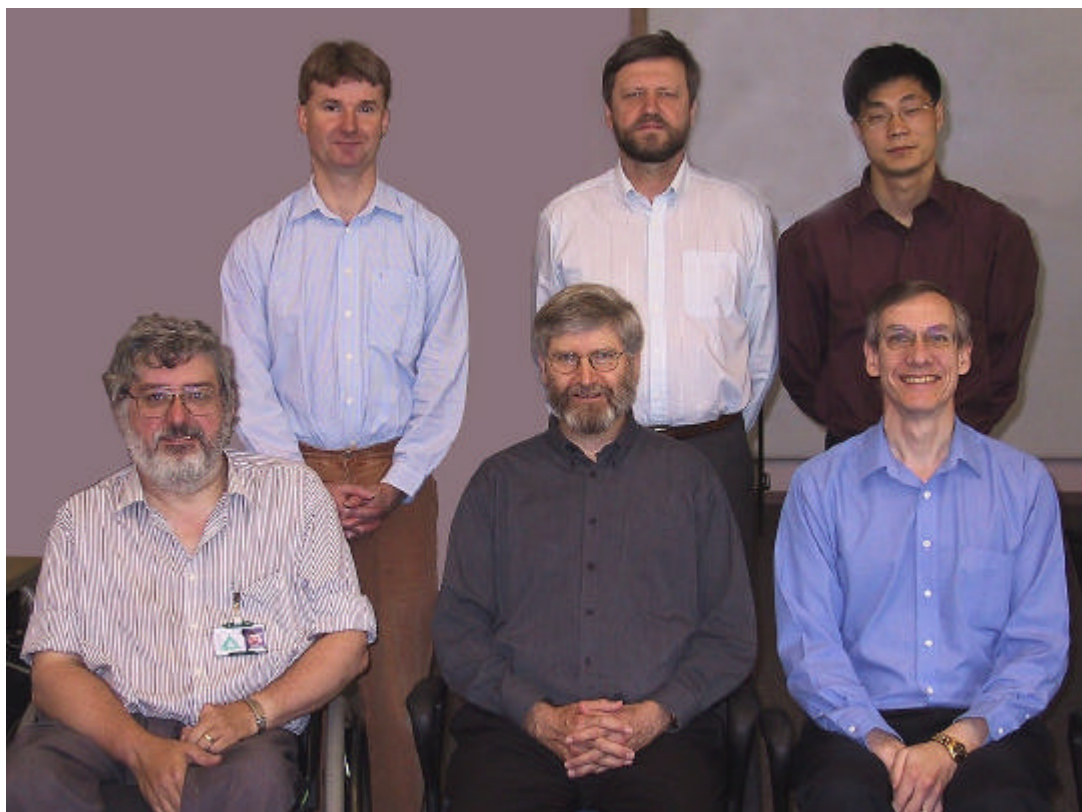


**WORLD METEOROLOGICAL ORGANIZATION  
COMMISSION FOR BASIC SYSTEMS**

**EXPERT TEAM ON INTEGRATED DATA MANAGEMENT  
SECOND MEETING  
FINAL REPORT**



**SHINFIELD PARK, READING, 13 - 16 MAY 2002**

# **DISCLAIMER**

## **Regulation 42**

Recommendations of working groups shall have no status within the Organization until they have been approved by the responsible constituent body. In the case of joint working groups the recommendations must be concurred with by the presidents of the constituent bodies concerned before being submitted to the designated constituent body.

## **Regulation 43**

In the case of a recommendation made by a working group between sessions of the responsible constituent body, either in a session of a working group or by correspondence, the president of the body may, as an exceptional measure, approve the recommendation on behalf of the constituent body when the matter is, in his opinion, urgent, and does not appear to imply new obligations for Members. He may then submit this recommendation for adoption by the Executive Council or to the President of the Organization for action in accordance with Regulation 9(5).

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## **AGENDA**

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3. DEFINE EXTENSIONS NEEDED FOR ISO CODE LISTS
4. FINALISE XML SCHEMA, REPRESENTATION AND EXAMPLES FOR THE WMO CORE METADATA PROFILE
5. FINALISE LIST OF KEYWORDS TO DESCRIBE WMO DATASETS
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## Executive Summary

The second meeting of the CBS Expert Team on Integrated Data Management was held 13 to 16 May 2002 at the Met Office Training College in Shinfield Park, Reading, UK.

The team finalized the proposal for a "WMO Core Metadata" profile within the context of the ISO Standard for Geographic Metadata (ISO 19115). This core provides a general definition for directory searches and exchange that should be applicable to a wide variety of WMO datasets. It does not specify how these metadata should be archived or presented to users and does not specify any particular implementation.

The core elements define a minimum set of information required to exchange data for WMO purposes and are not exhaustive. To fully meet the requirements of all WMO Programmes for metadata, application of far more comprehensive standards would be required. The team felt that development of a comprehensive WMO metadata standard would be a difficult, lengthy and expensive undertaking and the potential benefits of a such a standard would be very limited and would not justify the large commitment of resources that would be required. It suggested that each WMO Programme use the WMO Core Metadata as a starting point to develop more detailed metadata standards in response to its own requirements. These more-detailed programme-specific standards should, to the extent possible, be based on the ISO standard with any necessary extensions. Reliance on the ISO standard as a common starting point would reduce the effort required by the Programmes and would greatly enhance the compatibility between the various Programme-specific standards and with the WMO Core Metadata standard.

At its first meeting the team noted that all of the WMO core items could be accommodated within the draft ISO standard but that some WMO extensions to the ISO code lists might be required. Upon further examination the team determined that a few minor extensions were needed in order for the ISO code lists to meet WMO requirements and the proposed extensions are described in report.

There are many possible ways of representing WMO metadata and the team recommended that XML be adopted as the common language (or format) for exchange. To ensure interoperability, the experts developed a framework, as an XML Schema, for mapping the proposed metadata standard into XML.

The team also developed a number of examples to illustrate some implementations of the standard. The examples are provided in structured text format as well as XML.

The team carefully reviewed the existing WMO Guide on WWW Data Management and discussed the requirements for its revision as well as the effort that would be required to bring it up to date. It determined that some sections of the Guide are seriously out of date and in major need of revision. The team felt that the Guide was probably not worth the effort required to bring it up to date and keep it up to date as an entire package. Instead, the experts recommended that the Guide be considered primarily as an on-line document with updates applied chapter by chapter as requirements and advances in technology dictate. Furthermore, the chapters concerned with the most rapidly changing fields, such as computer graphics should be removed or replaced with references to existing on-line authorities on these topics.



## **1. ORGANIZATION OF THE MEETING (agenda item 1)**

### 1.1 Opening remarks

1.1.1 The second meeting of the CBS Expert Team on Integrated Data Management was held 13 to 16 May 2002 at the Met Office Training College in Shinfield Park, Reading, UK. Since Mr S. Foreman(UK), chair of the expert team was not able to attend the meeting, Mr Gil Ross(UK) chaired the meeting. He also opened the meeting and welcomed the participants to the Training College and the Reading area.

### 1.2 Adoption of the agenda

1.2.1 The experts adopted the agenda as reproduced at the beginning of this report.

## **2. REVIEW WMO CORE METADATA PROFILE DEVELOPED AT THE FIRST MEETING**

2.1 Recalling discussions from their first meeting, the expert team, noted that metadata means different things to different people. In general, it is the descriptive data necessary to allow us to find, process and use data, information and products. While metadata generally can describe products, services and software as well as data at different stages of manipulation, it can also be a specification. Metadata can be extensive and all-inclusive, or it can be specific to a more limited function.

2.2 WMO Programmes and Members currently maintain a tremendous volume and variety of metadata. However little of this is in a standardized form which could be used to find data, so called discovery-level metadata.

2.3 The team has been tasked to provide a metadata framework which at the highest level is applicable to all WMO tasks, but which can be extended to specific areas and to new ventures in an acceptable and standardized form. This would not be a metadata repository of the all-inclusive form, but the basis of a description which can be extended by users to cover their own unique applications. Thus, the team concentrated on a "core" set of metadata that could fulfil the requirements for discovery-level metadata while allowing for expansion and extension to meet more specific requirements.

2.4 At its first meeting the team agreed that ISO Geographic Metadata Standard (ISO 19115) provided the best framework for development of such as standard. It specifies a process where a community can adopt parts of the standard that it feels are relevant (including the "Core Elements") and also extend the elements, keywords and code table instances to suit that community. The team agreed that there should be a Community Core Profile which could be adopted by all of WMO, with the potential for further extensions under ISO 19115 Annex C where necessary. With this process in mind the team developed a "WMO Core Metadata" profile, which is described in the report of the first meeting.

2.5 The team noted that the WMO Core Metadata provides a general definition for directory searches and exchange that should be applicable to a wide variety of WMO datasets. It does not specify how these metadata should be archived or presented to users and does not specify any particular implementation.

2.6 The core elements listed define a minimum set of information required to exchange data for WMO purposes and are not exhaustive. To fully meet the requirements of all WMO Programmes for metadata, application of far more comprehensive standards would be required, as noted in section 6 below.

2.7 The team reviewed the WMO Core Metadata profile and suggested a few minor modifications. Most-importantly, the team improved the presentation of the WMO Core Metadata profile to make it easier to understand. The latest version of the WMO Core Metadata profile is provided in the annex to this paragraph.

## **3. EXTENSIONS NEEDED FOR ISO CODE LISTS**

3.1 At its first meeting the team noted that all of the WMO core items could be accommodated within the draft ISO standard but that some WMO extensions to the ISO code lists might be required. Upon further examination the team determined that a few extensions were indeed needed in order for the ISO

code lists to meet WMO requirements. The proposed extensions are described in the annex to this paragraph.

#### 4. XML SCHEMA, REPRESENTATION AND EXAMPLES FOR THE WMO CORE METADATA PROFILE

4.1 XML is rapidly becoming a standard for exchanging information between applications, as well as for providing information on which the formatting of data for display in a browser may be defined. Industry standards are being defined to allow the exchange of information between applications using the XML standard, with the expectation that many business transactions will use XML as their standard means of data exchange.

4.2 There are many possible ways of representing WMO metadata in XML. To ensure interoperability the experts developed a framework, as an XML Schema, for mapping the proposed metadata standard into XML. The team developed a proposed XML schema and accompanying code list for the WMO Core Metadata as given in the annex to this paragraph.

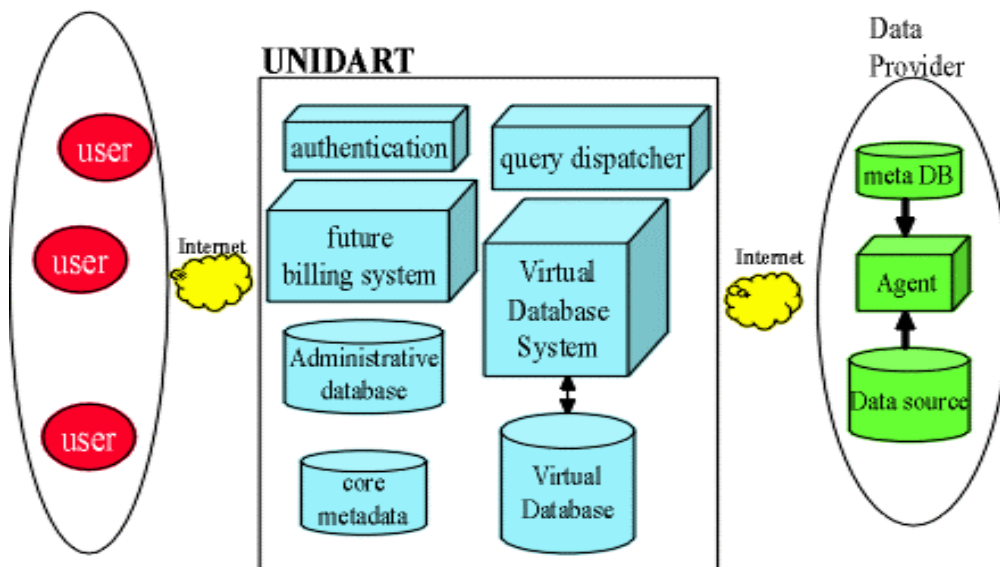
4.3 It should be noted that, although the team recommends that XML be used as the language (or format) for exchange of the WMO Core Metadata, the standard itself is quite general and does NOT depend upon XML for its implementation.

4.4 The team also developed a number of examples to illustrate some implementations of the standard, which are given in the annex to this paragraph. Examples are provided in structured text format as well as XML.

#### UNIDART

4.5 The expert team, considering how the WMO Core Metadata standard could be implemented, was pleased to note a presentation of the EUMETNET Programme UNIDART (Uniform Data Request Interface). The main goal of the UNIDART project is the development of a web-based information system that allows uniform and integrated access to heterogeneous and distributed data sources, storing meteorological data and products. The UNIDART system could be seen as a broker that provides a request/reply facility to its users. The figure below shows the principal architecture of the system. Further information about the project can be found at <http://www.dwd.de/UNIDART>.

4.6 In order to connect users to data providers, the data providers must agree to a standard format for the exchange of answers to the user requests. The UNIDART project will consider the WMO Core Metadata profile that has been developed by the team as a candidate for such a standard exchange format.





4.7 The expert team agreed that the UNIDART project provides a good opportunity for a trial implementation of the WMO Core Metadata, which could provide valuable feedback to its further refinement. The experts hoped that the project team of UNIDART would keep the ET informed concerning the progress of the project and its experiences while implementing and using the standard.

### **Report of the ETDR&C**

4.8 The ET considered the recent report from Charles Sanders, Australia, to the meeting of the Expert Team on Data Representation and Codes (Prague 22-25 April 2002), and the recommendations and observations made by the ETDR&C in their report. The Team concurred with the ETDR&C recommendations, and wished to make some additional observations and suggestions.

4.9 The team observed that although the set of XML protocols and standards were still evolving, a considerable amount of utility and functionality had already developed. There were many tools and toolkits on the market to support XML technologies supplied both from Open Source and proprietary software vendors.

4.10 There were a large number of applied XML languages for specific purposes and the paper by Mr Sanders listed a number of meteorological variants. WMO throughout its history has developed protocols, codes and procedures for the interchange of meteorological data. These protocols, codes and procedures are metadata and their development and maintenance are primary functions of WMO. The team strongly agreed with the ETDR&C that WMO must not allow control of meteorological metadata standards to become fragmented or to become the subject of rival formats and conventions, or in the worst case, perhaps to become the subject of commercial patents.

4.11 The team emphatically supported the arguments of the ETDR&C that internationalisation of the codes should remain a commitment of WMO. There are mechanisms in XML which can be used to permit multiple language versions (even with multiple character sets) of XML tags. The ET observed that while for documents, the internationalization of the tags is a minor part of the task, for data representation, the tags give identification of the element content and the ability to transform the language is very important.

### **XML "Vocabularies"**

4.12 Much is made of XML being "human-readable". In practice humans do not read XML, computers do. XML is intended to be processed by applications which render the content of the XML elements in human-readable form. After all, humans do not normally read HTML tags in documents, the tags are suppressed and only control how the content is displayed. For XML markup of data, as described above, the identification of the element content is crucial.

4.13 The utility of XML is to group, describe, identify and structure, or "markup", parts of documents and data. XML Schemas describe shared vocabularies and allow computers to carry out rules that people have defined in the schema. XML Schemas are one mechanism to describe markup tags and the allowable syntax and data types in an XML document - the rules. Where we talk about an XML vocabulary, we mean a specific set of tags and structures defined by an XML Schema.

4.14 The approach to XML vocabularies that the team has taken is that there should be a cascade, a hierarchy of vocabularies, of which the discovery vocabulary and code tables are at the top. Other discovery vocabularies, which are extensions of the discovery metadata will incorporate or "inherit" the Core Schema terms. Product vocabularies which include the metadata will also refer to the Core schema as well as the schemas developed for the product. The XML schema for the WMO Core Community Profile discovery metadata already works this way, in that the vocabulary references the code-list vocabulary.

4.15 In principle, discovery metadata should be completed as far as is possible. Optional items should be included whenever they are relevant. For those items which are fairly static, (e.g. organization address), there is a mechanism in XML which allows an XML document to contain a pointer to another XML document, and this second document could include the basic organization particulars.

## **Uses of meteorological XML data**

4.16 The Team agreed with the ETDR&C that fully XML coded observations are unlikely to replace WMO codes for international exchange. Instead, they will be used to generate a variety of products that make use of different vocabularies for markup of XML documents to control how these data are processed and displayed.

4.17 XML is not used alone. Currently most browsers will only display an XML file as raw text, or will try to interpret the tags as HTML and will display nothing - because XML cannot be directly interpreted as HTML. However there are languages such as XSLT (eXtensible Stylesheet Language Transform) which with a minimum of instructions will transform the XML document into, for example an HTML or XHTML file which can be displayed. However many current browsers can be configured with a plug-in to use a default style for an XML document to display it. In future these plug-ins are likely to be incorporated into the next release of the browsers, and the user will not need to do any specific set-up task.

4.18 The applications which interpret XML and carry out the defined processing are not particularly difficult to create. Once created (in XSLT, or Java, say) they are intended to be immediately portable and useable on most other machines. This means that WMO members will be able to reuse code for XML in a very straightforward way.

## **5. KEYWORDS TO DESCRIBE WMO DATASETS**

5.1 To facilitate searches for datasets that will meet a given requirement, the proposed WMO Community Core Metadata Profile provides for keywords that describe the dataset. A standard list of keywords could help to achieve the maximum benefit from this provision and could also contribute to development of multi-lingual capabilities. A draft list of WMO keywords was developed via correspondence. The team reviewed this list and added a number of additional keywords. A copy of the list developed at the meeting is provided in the annex to this paragraph. Please note that since keywords are routinely added to this list, the most recent version is available via the Internet at <http://www.wmo.ch/web/www/metadata/WMO-keywords.html> .

5.2 Although a standard list of commonly used keywords could facilitate searches, particularly searches extending across datasets described in multiple languages, the group agreed that uncontrolled or open keywords should also be allowed. This would allow data providers to use keywords that may be unique to their own requirements or language without unnecessarily expanding the list of standard WMO keywords.

5.3 Thus two types of keywords will be allowed:

- a) standard WMO keywords, which will be listed on the WMO server in English, French, Spanish and Russian and will be included in the WMO Core Metadata XML Schema
- b) Other keywords, which can be defined by any dataset originator for their own use.

## **6. RECOMMENDATIONS ON COMPREHENSIVE WMO METADATA STANDARDS**

6.1 The various Programmes of WMO have a wide range of requirements for documentation of their datasets. Thus, it would be extremely difficult to develop a comprehensive standard for metadata that would meet the needs of all Programmes.

6.2 The team agreed that development of a comprehensive WMO metadata standard would be a difficult, lengthy and expensive undertaking and the potential benefits of a such a standard would be very limited and would not justify the large commitment of resources that would be required. The team recommended an alternative approach.

6.3 The ET has developed the WMO Community Core Metadata Profile, a subset of the larger and much more comprehensive ISO Metadata standard. It suggested that each WMO Programme use the WMO Core Metadata as a starting point for extension into more detailed metadata standards in response to its own requirements. These more-detailed standards should, to the extent possible, be based on the ISO standard with any necessary extensions. Reliance on the ISO standard as a common starting point

would reduce the effort required by the Programmes and would greatly enhance the compatibility between the various Programme-specific standards and with the WMO Core Metadata standard. Furthermore, the team recommended that all WMO Programmes consider using XML as a format for exchanging their metadata.

6.4 The team suggested that consideration be given to translating the WMO BUFR, CREX and GRIB code tables into XML. The UK Met Office was largely successful in demonstrating how to represent the BUFR code tables in XML(see Meteorological Data and XML by Gorman, Kelly, Ryan and Sanders. 2002). It was also suggested that it would be useful to develop a method, perhaps through the use of XML, to link WMO station numbers with station metadata.

## **7. REQUIRED MODIFICATIONS TO THE GUIDE ON WWW DATA MANAGEMENT**

7.1 CBS requested that the team advise on reorganization of the Guide on WWW Data Management and coordinate the development of the WMO Guide on Data Management, including preparation of the sections relating to the WMO metadata standards. The team carefully reviewed the existing Guide and discussed the requirements for its revision as well as the effort that would be required to bring it up to date.

7.2 The ET determined that some sections of the Guide are seriously out of date and in major need of revision. The document was written in the years preceding 1993, and over the past decade, the wider world of Information Technology has taken enormous strides and off-the-shelf solutions now dominate all but the most specialized of WMO processes. While some sections are still relevant, many are obsolete. With so much out of date material, the Guide cannot be updated as it stands. Instead it would require a wholesale redesign.

7.3 The experts discussed the target audience for the Guide, how and where it would be used and how it could be kept up to date while dealing with a field as dynamic as information technology. They noted that new documents have recently been written on some topics of particular interest and relevance to WMO, such as binary representation forms and the use of the Internet and that these have been published as separate documents, outside of the Guide. The team agreed that this is probably the preferred approach to keeping the material in the Guide relevant and up to date. If such material were to be included within a revised Guide, some sections would be in danger of becoming obsolete before the revised Guide were even completed.

7.4 Although the Guide contains some sections that deal with the rapidly changing field of information technology, it also contains material of use as general background information or as an introduction to basic data management concepts. Such basic information does not go out of date quickly.

7.5 The team noted the set of requirements that were defined in the Guide and was impressed that they were well written and quite forward looking. In fact, many of the stated requirements remain worthy goals, more than 10 years after they were written.

7.6 With these considerations in mind the team felt that the Guide was probably not worth the effort required to bring it up to date and keep it up to date as an entire printed package. Some sections could remain relevant for many years, while others become obsolete so quickly that a printed copy is of little use. Instead, the experts recommended that the Guide be considered primarily as an on-line document with updates applied chapter by chapter as requirements and advances in technology dictate. Furthermore, the chapters concerned with the most rapidly changing fields, such as computer graphics should be removed or replaced with references to existing on-line authorities on these topics.

## **8. FUTURE WORK PROGRAMME**

8.1 Having addressed all of the tasks assigned to it by CBS, the only outstanding work is the preparation of a document describing the WMO Core Metadata Standard for the consideration of the Commission at its extraordinary session in December 2002. The team felt that the description defined at the meeting is at a level of detail appropriate for consideration by the Commission. Thus, the preparation of the formal document should be a simple and straightforward task.

**9. CLOSURE OF THE MEETING**

9.1 The meeting closed on Thursday 16 May 2002.

## Annex to Paragraph 2.7

### WMO Core Metadata

Notes: The following table provides an overview of the WMO Community Core Metadata Profile suitable for use by decision makers and users - NOT implementers. To implement this standard the ISO DIS 19115 document, which describes the complete ISO standard, must be consulted.

This standard provides a general definition for directory searches and exchange that should be applicable to a wide variety of WMO datasets. It does not specify how these metadata should be archived or presented to users. It also does not specify any particular implementation and could be implemented as a database, a flat file, or any other suitable mechanism. However, XML is recommended as the standard for exchange. The comprehensive and technical details required for implementation of this standard in XML are provided in the WMO Core Metadata XML Schema, which is given in the annex to paragraph 4.2 below. In the XML Schema, Class names (such as MD\_Metadata) are reserved for data types. These data type names do not appear in the XML instance. Instead the classes are referenced by the name of an object (e.g. metadata) which is an instance of the class (MD\_Metadata).

Of the core elements listed, those in **bold** are required, with all others being optional.

It must be remembered that this list defines a minimum set of information to describe data for WMO exchange and is not exhaustive. To fully meet the requirements of WMO Programmes for metadata, application of far more comprehensive standards would be required. The development of these comprehensive standards should be pursued by the individual programmes.

Generic Name	ISO Field/Class Name and Reference Lines	Definition
Metadata ID	MD_Metadata (1)	Unique identifier for this metadata item
Metadata language	fileIdentifier (2)	Language of this metadata item
Metadata char. set	<b>language</b> (3)	Character set of this metadata item (Default of ISO 10646-1)
Metadata contact	<b>characterSet</b> (4)	Party responsible for this metadata item
	<b>contact</b> (8)	
	CI_ResponsibleParty (see 374 below)	
Metadata date	<b>dateStamp</b> (9)	Date that this metadata item was created
Metadata name	metadataStandardName (10)	Name of the metadata standard (including profile name) used
Metadata Version	metadataStandardVersion (11)	Version (profile) of the metadata standard used
	referenceSystemInfo (13)	Description of the data temporal and spatial reference system
	MD_ReferenceSystem (186)	Information about the reference systems used (temporal, coordinate and geographic)
Data Reference System	ReferenceSystemIdentifier	Name of reference system

Data information	(187) ReferenceAuthority (206) CI_ResponsibleParty (374) (see below) ReferenceDescription (207) <b>IdentificationInfo</b> (15) MD_DataIdentification (see 36 below)	Person or party responsible for maintenance of the reference system  Description of the Reference System  Basic information about the data
Data distribution Information	<b>distributionInfo</b> (17) MD_Distribution (see 270 below)	Information about the data distribution and availability
Data Lineage or Quality	dataQualityInfo(18) LI_Lineage (see 82 below)	Information about the data lineage or quality
Title	MD_DataIdentification (36) Citation (24) <b>title</b> (360)	Basic information required to uniquely identify a dataset  Name of the dataset
Reference Date	<b>referenceDate</b> (362) CI_Date (see 393 below)	Reference date for the dataset
Identifier	<b>identifier</b> (365) identifierType (366)	Unique identifier for dataset Form of the unique identifier (if standardized)
Abstract	<b>abstract</b> (25)	Brief narrative summary of the contents of the dataset
Dataset Contact	<b>pointOfContact</b> (29) CI_ResponsibleParty (see 374 below)	Identification of, and means of communication with, person(s) and organizations(s) associated with the dataset
Update frequency	resourceMaintenance(30) maintenanceAnd UpdateFrequency(143) maintenanceNote(148)	Frequency with which changes are made to the dataset after the initial dataset is created Information regarding specific requirements for maintaining the dataset
Access Rights or Restrictions	resourceConstraints (35) MD_Constraints (67) (see below)	Restrictions on the access and use of the resource or metadata
Spatial Resolution	spatialResolution (38) spatialRepresentationType (37)	Spatial density of the data in the dataset (e.g. grid spacing) Method used to spatially represent data in the dataset [Code list: B.5.26]
Language	language(39)	Language(s) used in the dataset, if applicable

Character set Topic Category	characterSet (40) <b>topicCategory</b> (41)	Character set used in the dataset, if applicable Discipline covered by this dataset [ISO code list B.5.27] - Note this field is of limited use for WMO purposes but is a required field within the ISO standard and is included to ensure conformity.
Keywords	<b>descriptiveKeywords</b> (33)	List of predefined and other keywords used to describe the dataset
Date or period	<b>CI_Date</b> (393) <b>date or period</b> (394) <b>dateType</b> (395)	Reference date or period for the dataset Type of date [code list: creation, publication or revision date]
Responsible Party Organization Org. role  Individual name Position  Phone number Fax number Address  E-mail address Web Site	CI_ResponsibleParty (374) <b>organisationName</b> (376) <b>role</b> (379)  individualName (375) positionName (377) contactInfo (378) <b>CI_Contact</b> (387) phone (388) voice (408) facsimile (409) address(389) deliveryPoint (381) city (382) postalCode (384) country (385) electronicMailAddress (386) onLineAddress (390)	Name of the responsible organization Function performed by the responsible party [code list: resourceProvider, custodian, owner, user, distributor, originator, etc"] Name of the responsible person Position of the responsible person  NOTE: Either a phone number or address is required  Telephone by which individuals can speak to the responsible party Telephone number of a fax machine for the responsible party  Address line for the location City of the location Postal code Country Electronic mail address of the responsible party URL of organization
Vertical Extent	EX_Extent (334) Description (335) Ex_VerticalExtent (354) minimumValue (355) maximumValue (356) unitOfMeasure (357) verticalDatum (358)	Information about spatial, vertical, and temporal extent of the dataset Spatial and temporal extent for the dataset (in text) Vertical domain of the dataset Lowest vertical extent contained in the dataset Highest vertical extent contained in the dataset Vertical units used for vertical extent information (E.g.: metres, feet, hectopascals) Information about the origin from which the maximum and minimum elevation values are measured (see ISO 1911)

<p>Geographic Extent Geographic name Bounding box Bounding polygon Temporal Extent</p>	<p>EX_GeographicExtent (339) EX_GeographicDescription (348) geographicIdentifier (349) EX_GeographicBoundingBox  westBoundLongitude (344) eastBoundLongitude (345) southBoundLatitude (346) northBoundLatitude (347)  EX_BoundingPolygon (341) polygon (342) EX_TemporalExtent (350) Extent (351) beginDateTime (new) endDateTime (new) dataFrequency (new)</p>	<p>Note: At least either a description, bounding box or bounding polygon is required Description of the geographic area using identifiers (names) Identifier used to represent a geographic area or location NOTE This is only an approximate reference so specifying the co-ordinate system is unnecessary Western-most limit of the dataset, longitude in decimal degrees (positive east) Eastern-most limit of the dataset, longitude in decimal degrees (positive east) Southern-most limit of the dataset, latitude in decimal degrees (positive north) Northern-most, limit of the dataset, latitude in decimal degrees (positive north)  Sets of points defining a bounding polygon  NOTE: Each of the 3 fields below is <b>required if applicable</b> Beginning date of the data in the dataset Ending date of data in the dataset Observing frequency of the data in the dataset [code: WMO_DataFrequencyCode]</p>
<p>Access Rights or Restrictions</p>	<p>MD_Constraints (67) useLimitation (68)  MD_LegalConstraints (69) accessConstraints (70) useConstraints (71) otherConstraints (72) MD_SecurityConstraints (73) classification (74) userNote (75)  classificationSystem (76) handlingDescription (78)</p>	<p>Restrictions on the access and use of the dataset or metadata (Could specify WMO Additional Data as free text Restrictions and legal prerequisites for accessing and using the dataset Any special restrictions or limitations on obtaining the dataset Any special restrictions or limitations or warnings on using the dataset Other restrictions and legal prerequisites for accessing and using the dataset Handling restrictions imposed on the dataset for security reasons Name of the handling restrictions on the dataset Explanation of the application of the legal constraints or other restrictions and legal prerequisites for obtaining and using the dataset Name of the classification system Additional information about the restrictions on handling the dataset</p>
<p>Format name Format version</p>	<p>MD_Distribution (270) distributionFormat (271) <b>name</b> (285) version (286) TransferOptions (273)</p>	<p>Information about the distributor of and options for obtaining the dataset Provides a description of the format of the data to be distributed Name of the data transfer format(s) Version of the format (date, number, etc.) NOTE: At least either on-line source or off-line media is required</p>



On-line source	OnLine (277) linkage (397) WMO_Source (new)	Information about online sources from which the dataset can be obtained Location (address) for on-line access using a Uniform Resource Locator WMO centre identifier
Off-line media	Offline (278) mediumName (292)	Information about offline media on which the dataset can be obtained Name of the medium on which the dataset can be received [code list: ISO B.5.20]
Processing Level	<b>LI_Lineage</b> (82) statement(83) processStep(84) source(85)	Information about the level of processing applied to the dataset Information about the events or source data used in constructing the dataset Information about an event in the creation process for the dataset Information about the source data used in creating the dataset
Reference System	MD_ReferenceSystem (186) referenceSystemIdentifier (187) authority (206) CI_ResponsibleParty (374) (see above) code(207)	Information about the reference systems used (temporal, coordinate and geographic) Name of reference system Person or party responsible for maintenance of the reference system namespace  Alphanumeric value identifying an instance in the namespace

## Annex to paragraph 3.1

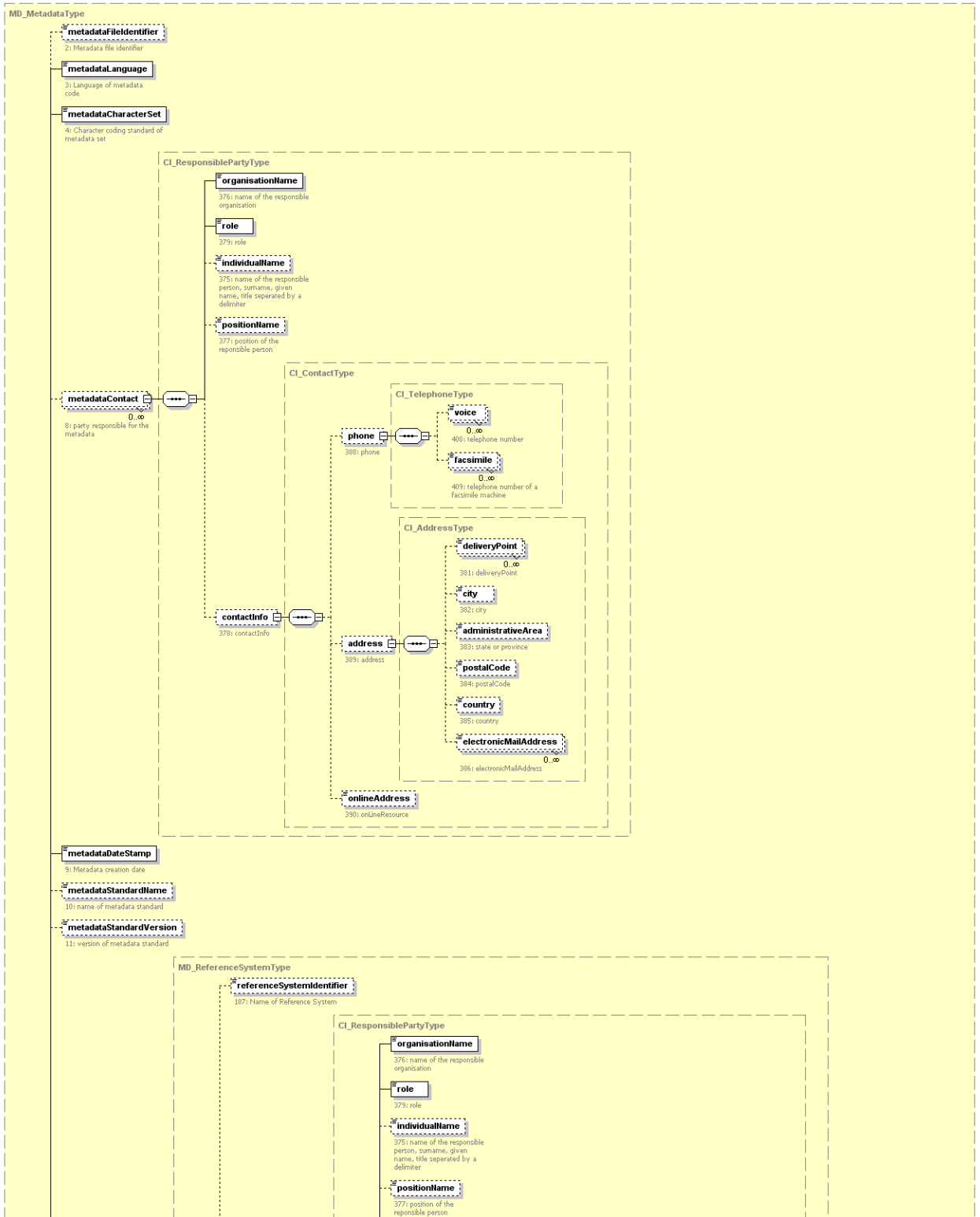
**Extensions to ISO Code Lists****B.5.26 MD\_SpatialRepresentationTypeCode <<CodeList>>**

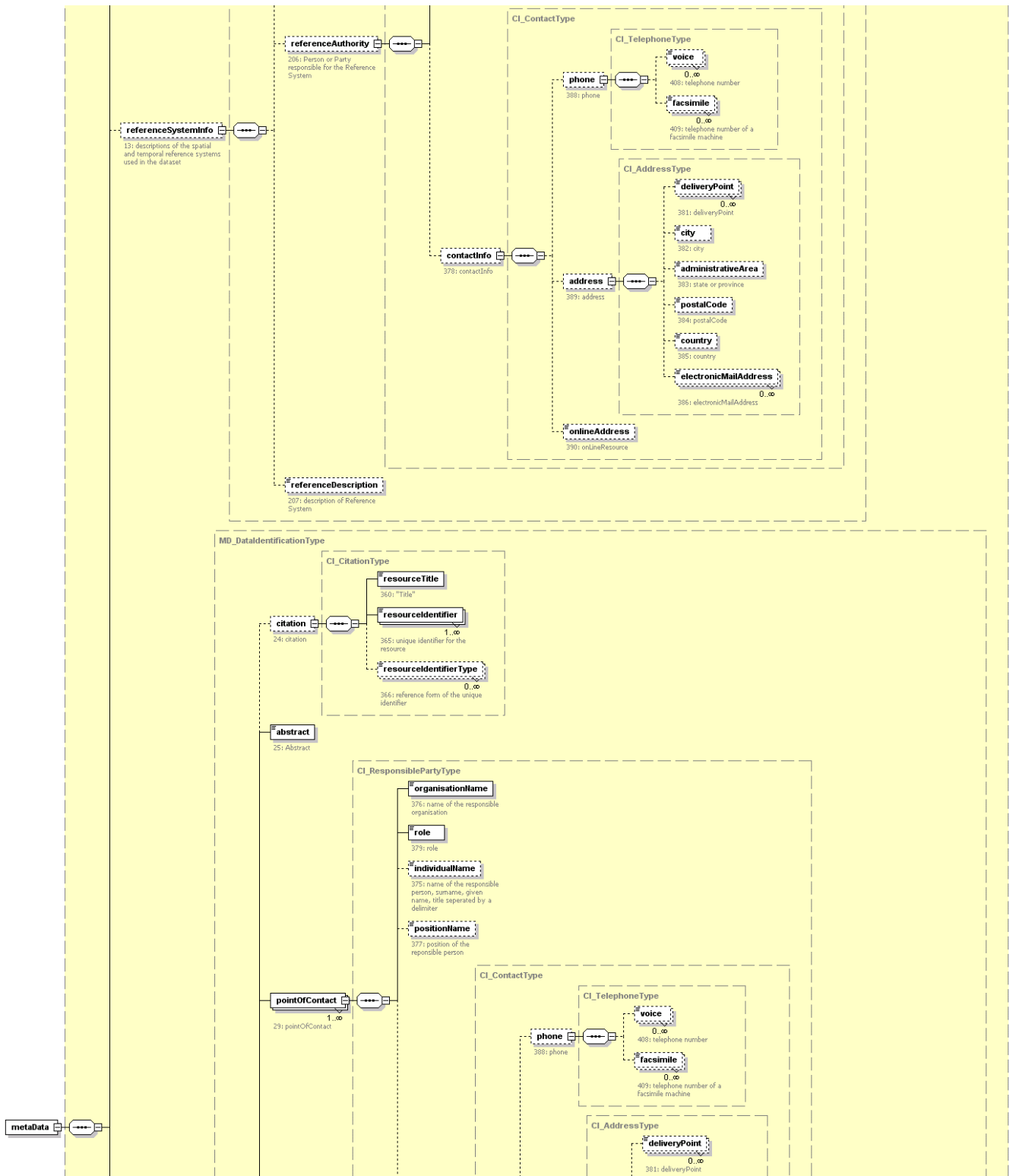
	<b>Name</b>	<b>Domain code</b>	<b>Definition</b>
1.	MD_SpatialRepresentationTypeCode	SpatRepTypCd	method used to represent geographic information in the dataset
2.	vector	001	vector data is used to represent geographic data
3.	grid	002	grid data is used to represent geographic data
4.	textTable	003	textual or tabular data is used to represent geographic data
5.	tin	004	triangulated irregular network
6.	stereoModel	005	three-dimensional view formed by the intersecting homologous rays of an overlapping pair of images
7.	video	006	scene from a video recording
<b>Additional entries</b>			
8.	<b>irregularPoints</b>	<b>007</b>	<b>Irregularly-spaced points, such as meteorological stations</b>

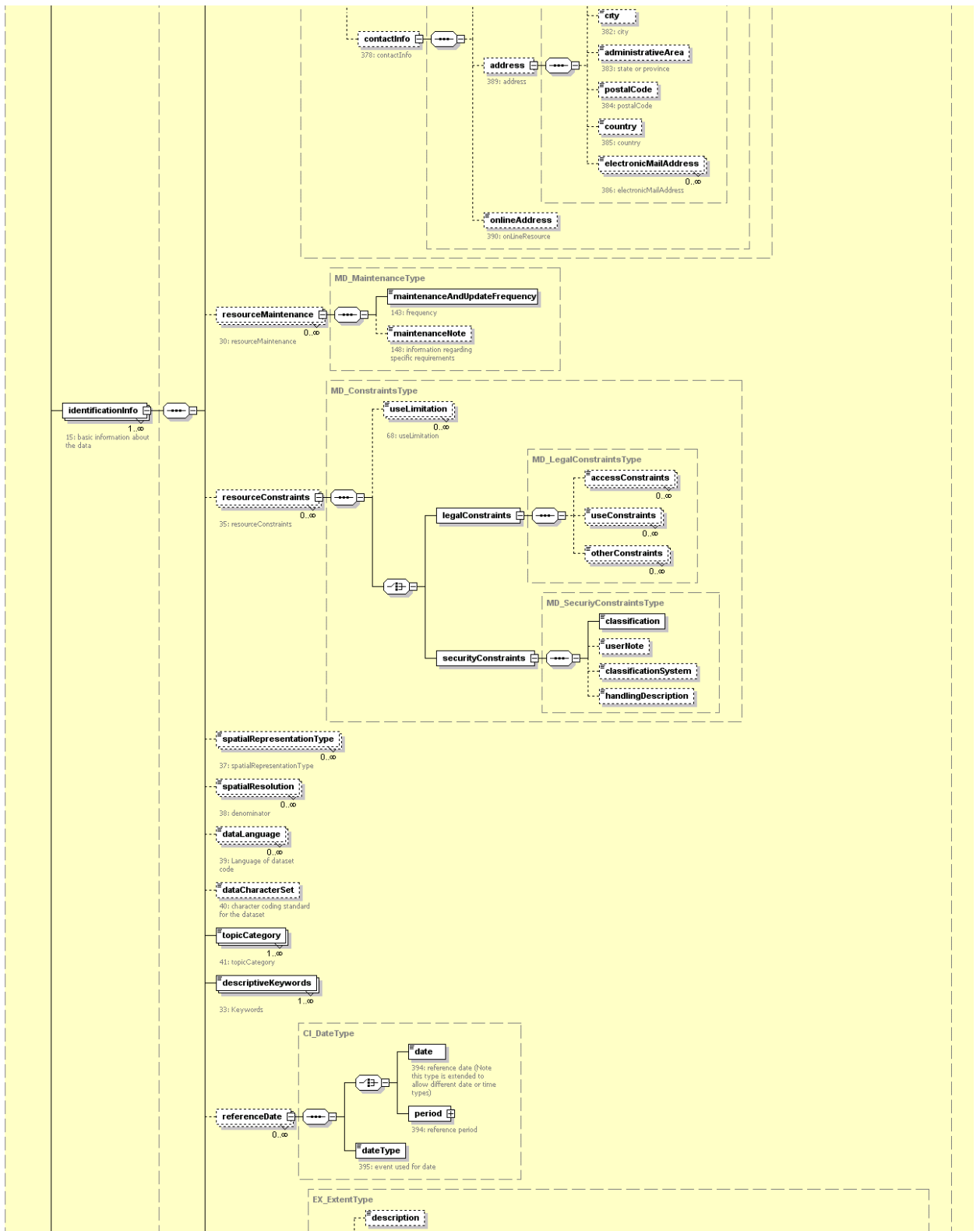
**NEW:****WMO\_DataFrequencyCode <<CodeList>>**

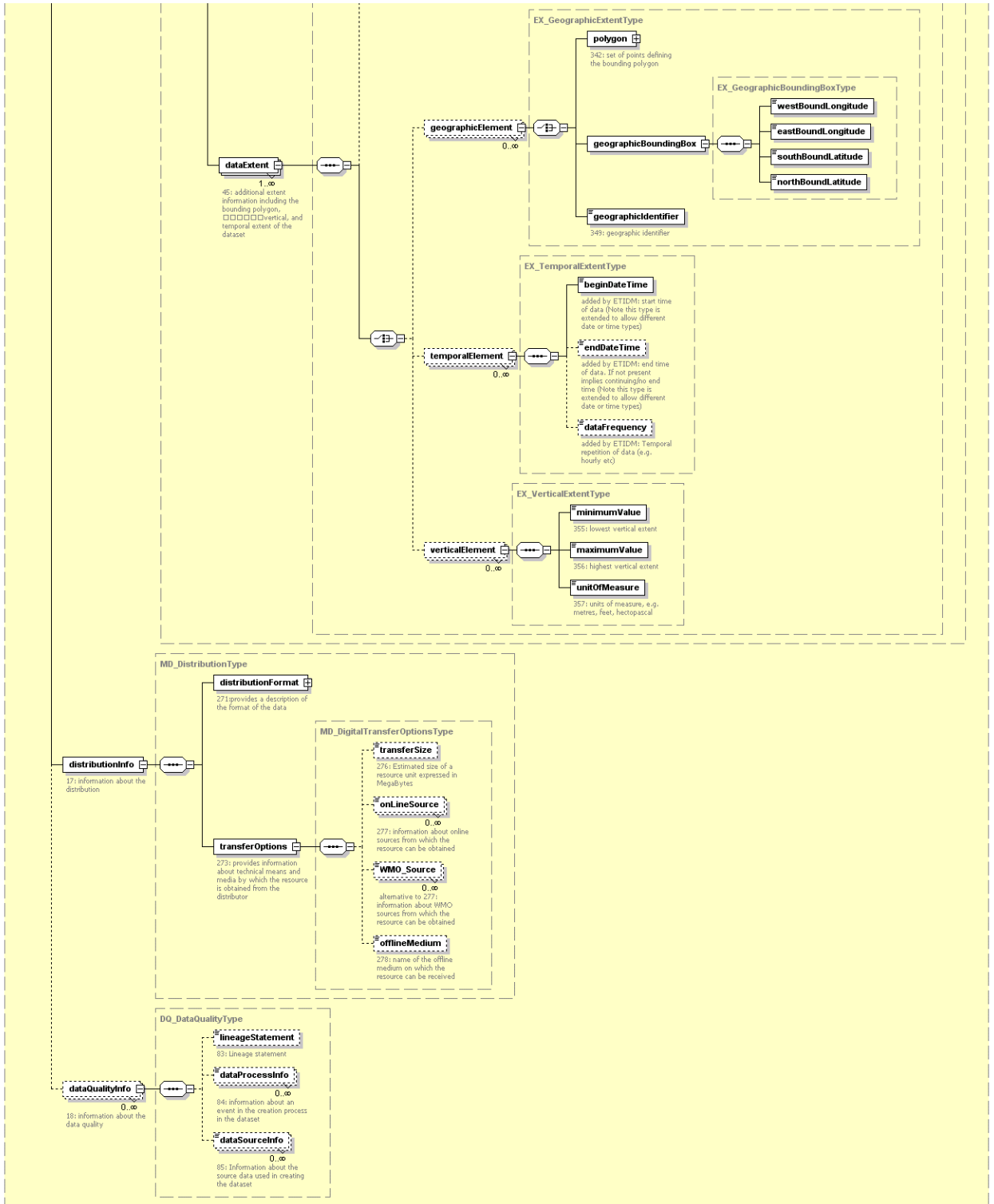
	<b>Name</b>	<b>Domain code</b>	<b>Definition</b>
1.	WMO_DataFrequencyCode	DataFreqCd	Temporal sampling frequency of the data within the dataset
2.	Continuous	001	More than once per minute
3.	1minute	002	
4.	5minute	003	
5.	10minute	004	
6.	15minute	005	
7.	30minute	006	
8.	Hourly	007	
9.	3hourly	008	
10.	6hourly	009	
11.	8hourly	010	
12.	12hourly	011	
13.	Daily	012	
14.	Weekly	013	
15.	10day	014	
16.	Fortnightly	015	
17.	Monthly	016	
18.	3monthly	017	
19.	6monthly	018	
20.	Annual	019	
21.	decade	020	Decade or longer

## Annex to Paragraph 4.2 XML Schema Schematic









## Annex to Paragraph 4.2 (Continued)

### XML Schema

Latest version of WMO Metadata XML Schema is available at  
<http://www.wmo.ch/web/www/metadata/WMO-metadata-XML.html>

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- edited with XML Spy v4.1 U (http://www.xmlspy.com) by Gil Ross Met Office
UK -->
<xs:schema targetNamespace="http://www.wmo.ch/www/metadata"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns="http://www.wmo.ch/www/metadata" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:annotation>
    <xs:documentation> Schema for the WMO Community Core Metadata Profile.
Based on XML Schema and ISO 19115
Version 0.1 Defined by Expert Team on Integrated Data Management 13-16 May
2002 Shinfield England.
    </xs:documentation>
  </xs:annotation>
  <!-- Include code lists -->
  <xs:include
schemaLocation="http://www.wmo.ch/www/metadata/WMO19115_CodeLists_v0_1.xsd"/>
  <xs:element name="metaData" type="MD_MetadataType"/>
  <xs:complexType name="MD_MetadataType">
    <xs:annotation>
      <xs:documentation>Lines 2-22</xs:documentation>
    </xs:annotation>
    <xs:sequence>
      <xs:element name="metadataFileIdentifier" type="xs:string" minOccurs="0">
        <xs:annotation>
          <xs:documentation>2: Metadata file identifier</xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="metadataLanguage" type="xs:language" default="en">
        <xs:annotation>
          <xs:documentation>3: Language of metadata code</xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="metadataCharacterSet" type="MD_CharacterSetCodeType">
        <xs:annotation>
          <xs:documentation>4: Character coding standard of metadata
set</xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="metadataContact" type="CI_ResponsiblePartyType"
minOccurs="0" maxOccurs="unbounded">
        <xs:annotation>
          <xs:documentation>8: party responsible for the
metadata</xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="metadataDateStamp" type="xs:date">
        <xs:annotation>
          <xs:documentation>9: Metadata creation date</xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="metadataStandardName" type="xs:string" minOccurs="0">
        <xs:annotation>
          <xs:documentation>10: name of metadata standard</xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="metadataStandardVersion" type="xs:string"
minOccurs="0">
```

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```
<xs:annotation>
  <xs:documentation>11: version of metadata
  standard</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="referenceSystemInfo" type="MD_ReferenceSystemType"
minOccurs="0">
  <xs:annotation>
    <xs:documentation>13: descriptions of the spatial and temporal
    reference systems used in the dataset</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="identificationInfo" type="MD_DataIdentificationType"
maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation>15: basic information about the
    data</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="distributionInfo" type="MD_DistributionType">
  <xs:annotation>
    <xs:documentation>17: information about the
    distribution</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="dataQualityInfo" type="DQ_DataQualityType"
minOccurs="0" maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation>18: information about the data
    quality</xs:documentation>
  </xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
<xs:complexType name="MD_DataIdentificationType">
  <xs:annotation>
    <xs:documentation>MD_Identification Lines 24-35 and Lines 37-
    46</xs:documentation>
  </xs:annotation>
<xs:sequence>
  <xs:element name="citation" type="CI_CitationType" minOccurs="0">
    <xs:annotation>
      <xs:documentation>24: citation</xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="abstract" type="xs:string">
    <xs:annotation>
      <xs:documentation>25: Abstract</xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="pointOfContact" type="CI_ResponsiblePartyType"
maxOccurs="unbounded">
    <xs:annotation>
      <xs:documentation>29: pointOfContact</xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="resourceMaintenance" type="MD_MaintenanceType"
minOccurs="0" maxOccurs="unbounded">
    <xs:annotation>
      <xs:documentation>30: resourceMaintenance</xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="resourceConstraints" type="MD_ConstraintsType"
minOccurs="0" maxOccurs="unbounded">
    <xs:annotation>
```



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```

    <xs:documentation>35: resourceConstraints</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="spatialRepresentationType"
type="MD_SpatialRepresentationTypeCode" minOccurs="0"
maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation>37: spatialRepresentationType</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="spatialResolution" type="xs:positiveInteger"
minOccurs="0" maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation>38: denominator</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="dataLanguage" type="xs:language" minOccurs="0"
maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation>39: Language of dataset code</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="dataCharacterSet" type="MD_CharacterSetCodeType"
minOccurs="0">
  <xs:annotation>
    <xs:documentation>40: character coding standard for the
      dataset</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="topicCategory" type="MD_TopicCategoryCodeType"
maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation>41: topicCategory</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="descriptiveKeywords"
type="WMO_KeywordsOrFreeKeywordsType" maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation>33: Keywords</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="referenceDate" type="CI_DateType" minOccurs="0"
maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation/>
  </xs:annotation>
</xs:element>
<xs:element name="dataExtent" type="EX_ExtentType" maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation>45: additional extent information including the
      bounding polygon,
      vertical, and temporal extent of the dataset</xs:documentation>
  </xs:annotation>
</xs:element>
<!-- <xs:element name="validityDate" type="CI_DateType" minOccurs="0"/> --
-->
</xs:sequence>
</xs:complexType>
<xs:complexType name="CI_CitationType">
  <xs:annotation>
    <xs:documentation>CI_Citation Lines 360-373 </xs:documentation>
  </xs:annotation>
</xs:sequence>
  <xs:element name="resourceTitle" type="xs:string">
    <xs:annotation>
```

```

        <xs:documentation>360: "Title"</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="resourceIdentifier" type="xs:string"
maxOccurs="unbounded">
    <xs:annotation>
        <xs:documentation>365: unique identifier for the
            resource</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="resourceIdentifierType" type="xs:string" minOccurs="0"
maxOccurs="unbounded">
    <xs:annotation>
        <xs:documentation>366: reference form of the unique
            identifier</xs:documentation>
    </xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
<xs:complexType name="CI_ResponsiblePartyType">
    <xs:annotation>
        <xs:documentation>CI_ResponsibleParty Lines 375-379 </xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element name="organisationName" type="xs:string">
            <xs:annotation>
                <xs:documentation>376: name of the responsible
                    organisation</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="role" type="CI_RoleCodeType">
            <xs:annotation>
                <xs:documentation>379: role</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="individualName" type="xs:string" minOccurs="0">
            <xs:annotation>
                <xs:documentation>375: name of the responsible person, surname,
                    given name, title seperated by a delimiter</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="positionName" type="xs:string" minOccurs="0">
            <xs:annotation>
                <xs:documentation>377: position of the reponsible
                    person</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="contactInfo" type="CI_ContactType" minOccurs="0">
            <xs:annotation>
                <xs:documentation>378: contactInfo</xs:documentation>
            </xs:annotation>
        </xs:element>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CI_ContactType">
    <xs:annotation>
        <xs:documentation>CI_Contact DataType (B.3.2.2)</xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element name="phone" type="CI_TelephoneType" minOccurs="0">
            <xs:annotation>
                <xs:documentation>388: phone</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="address" type="CI_AddressType" minOccurs="0">

```

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```
<xs:annotation>
  <xs:documentation>389: address</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="onlineAddress" type="xs:anyURI" minOccurs="0">
  <xs:annotation>
    <xs:documentation>390: onLineResource</xs:documentation>
  </xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
<xs:complexType name="CI_TelephoneType">
  <xs:annotation>
    <xs:documentation>CI_Telephone Lines 408-409</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="voice" type="xs:string" minOccurs="0"
      maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation>408: telephone number</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="facsimile" type="xs:string" minOccurs="0"
      maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation>409: telephone number of a facsimile
          machine</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CI_AddressType">
  <xs:annotation>
    <xs:documentation>CI_Address Lines 381-386</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="deliveryPoint" type="xs:string" minOccurs="0"
      maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation>381: deliveryPoint</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="city" type="xs:string" minOccurs="0">
      <xs:annotation>
        <xs:documentation>382: city</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="administrativeArea" type="xs:string" minOccurs="0">
      <xs:annotation>
        <xs:documentation>383: state or province</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="postalCode" type="xs:string" minOccurs="0">
      <xs:annotation>
        <xs:documentation>384: postalCode</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="country" type="xs:string" minOccurs="0">
      <xs:annotation>
        <xs:documentation>385: country</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="electronicMailAddress" type="xs:string" minOccurs="0"
      maxOccurs="unbounded">
      <xs:annotation>
```

```

        <xs:documentation>386: electronicMailAddress</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CI_DateType">
  <xs:annotation>
    <xs:documentation>CI_Date Lines 394-395: reference date and
    event</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:choice>
      <xs:element name="date" type="dateAndTimeTypes">
        <xs:annotation>
          <xs:documentation>394: reference date (Note this type is extended
          to allow different date or time types)</xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="period" type="EX_TemporalExtentType">
        <xs:annotation>
          <xs:documentation>394: reference period</xs:documentation>
        </xs:annotation>
      </xs:element>
    </xs:choice>
    <xs:element name="dateType" type="CI_DateTypeCodeType">
      <xs:annotation>
        <xs:documentation>395: event used for date</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MD_ConstraintsType">
  <xs:annotation>
    <xs:documentation>MD_Constraints Lines 68-77: restrictions on the access
    and use of data</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="useLimitation" type="xs:string" minOccurs="0"
    maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation>68: useLimitation</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:choice>
      <xs:element name="legalConstraints" type="MD_LegalConstraintsType"/>
      <xs:element name="securityConstraints"
      type="MD_SecuriyConstraintsType"/>
    </xs:choice>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MD_LegalConstraintsType">
  <xs:annotation>
    <xs:documentation>MD_LegalConstraints Lines 70-72: restrictions and legal
    prerequisites</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="accessConstraints" type="MD_RestrictionCodeType"
    minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="useConstraints" type="MD_RestrictionCodeType"
    minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="otherConstraints" type="xs:string" minOccurs="0"
    maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MD_SecuriyConstraintsType">

```

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```

<xs:annotation>
  <xs:documentation>MD_SecurityConstraints</xs:documentation>
</xs:annotation>
<xs:sequence>
  <xs:element name="classification" type="MD_ClassificationCodeType"/>
  <xs:element name="userNote" type="xs:string" minOccurs="0"/>
  <xs:element name="classificationSystem" type="xs:string" minOccurs="0"/>
  <xs:element name="handlingDescription" type="xs:string" minOccurs="0"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="MD_ReferenceSystemType">
  <xs:annotation>
    <xs:documentation>MD_ReferenceSystemType Lines 187-188 expanding as
    classes information about the reference system</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="referenceSystemIdentifier" type="xs:string"
    minOccurs="0">
      <xs:annotation>
        <xs:documentation>187: Name of Reference System</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="referenceAuthority" type="CI_ResponsiblePartyType"
    minOccurs="0">
      <xs:annotation>
        <xs:documentation>206: Person or Party responsible for the Reference
        System</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="referenceDescription" type="xs:string" minOccurs="0">
      <xs:annotation>
        <xs:documentation>207: description of Reference
        System</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MD_MaintenanceType">
  <xs:annotation>
    <xs:documentation>MD_Maintenance Lines 143-148: scope and frequency of
    updating</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="maintenanceAndUpdateFrequency"
    type="MD_MaintenanceFrequencyCodeType">
      <xs:annotation>
        <xs:documentation>143: frequency</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="maintenanceNote" type="xs:string" minOccurs="0">
      <xs:annotation>
        <xs:documentation>148: information regarding specific
        requirements</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EX_ExtentType">
  <xs:annotation>
    <xs:documentation>EX_Extent Lines 335-338</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"/>
    <xs:choice>

```

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```
<xs:element name="geographicElement" type="EX_GeographicExtentType"
minOccurs="0" maxOccurs="unbounded"/>
<xs:element name="temporalElement" type="EX_TemporalExtentType"
minOccurs="0" maxOccurs="unbounded"/>
<xs:element name="verticalElement" type="EX_VerticalExtentType"
minOccurs="0" maxOccurs="unbounded"/>
</xs:choice>
</xs:sequence>
</xs:complexType>
<xs:complexType name="EX_GeographicExtentType">
  <xs:annotation>
    <xs:documentation>EX_GeographicExtent Lines 340-349: geographic area of
    the dataset</xs:documentation>
  </xs:annotation>
  <xs:choice>
    <xs:element name="polygon" type="PolygonType">
      <xs:annotation>
        <xs:documentation>342: set of points defining the bounding
        polygon</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="geographicBoundingBox"
    type="EX_GeographicBoundingBoxType"/>
    <xs:element name="geographicIdentifier" type="xs:string">
      <xs:annotation>
        <xs:documentation>349: geographic identifier</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:choice>
</xs:complexType>
<xs:complexType name="EX_GeographicBoundingBoxType">
  <xs:annotation>
    <xs:documentation>EX_GeographicBoundingBox Lines 344-
    347</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="westBoundLongitude" type="LongitudeType"/>
    <xs:element name="eastBoundLongitude" type="LongitudeType"/>
    <xs:element name="southBoundLatitude" type="LatitudeType"/>
    <xs:element name="northBoundLatitude" type="LatitudeType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EX_TemporalExtentType">
  <xs:annotation>
    <xs:documentation>EX_TemporalExtent: time period covered by the
    dataset</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="beginDateTime" type="dateAndTimeTypes">
      <xs:annotation>
        <xs:documentation>added by ETIDM: start time of data (Note this type
        is extended to allow different date or time
        types)</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="endDateTime" type="dateAndTimeTypes" minOccurs="0">
      <xs:annotation>
        <xs:documentation>added by ETIDM: end time of data. If not present
        implies continuing/no end time (Note this type is extended to allow
        different date or time types)</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="dataFrequency" type="frequencyCodeType" minOccurs="0">
      <xs:annotation>
```

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```

    <xs:documentation>added by ETIDM: Temporal repetition of data (e.g.
      hourly etc)</xs:documentation>
  </xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
<xs:complexType name="EX_VerticalExtentType">
  <xs:annotation>
    <xs:documentation>EX_VerticalExtent Lines 355-358</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="minimumValue" type="xs:float">
      <xs:annotation>
        <xs:documentation>355: lowest vertical extent</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="maximumValue" type="xs:float">
      <xs:annotation>
        <xs:documentation>356: highest vertical extent</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="unitOfMeasure" type="xs:string">
      <xs:annotation>
        <xs:documentation>357: units of measure, e.g. metres, feet,
          hectopascal</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PolygonType">
  <xs:annotation>
    <xs:documentation>set of points to define a polygon</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="point" type="PointType" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation>point</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PointType">
  <xs:annotation>
    <xs:documentation>Latitude and longitude value</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="latitude" type="LatitudeType"/>
    <xs:element name="longitude" type="LongitudeType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="DQ_DataQualityType">
  <xs:annotation>
    <xs:documentation>DQ_DataQuality Lines 79-81</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="lineageStatement" type="xs:string" minOccurs="0">
      <xs:annotation>
        <xs:documentation>83: Lineage statement</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="dataProcessInfo" type="xs:string" minOccurs="0"
      maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation>84: information about an event in the creation
          process in the dataset</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

```

    </xs:annotation>
  </xs:element>
  <xs:element name="dataSourceInfo" type="xs:string" minOccurs="0"
maxOccurs="unbounded">
    <xs:annotation>
      <xs:documentation>85: Information about the source data used in
        creating the dataset</xs:documentation>
    </xs:annotation>
  </xs:element>
</xs:sequence>
</xs:complexType>
<xs:complexType name="MD_DistributionType">
  <xs:annotation>
    <xs:documentation>MD_Distribution Lines 271-273</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="distributionFormat" type="MD_FormatType">
      <xs:annotation>
        <xs:documentation>271:provides a description of the format of the
          data</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="transferOptions" type="MD_DigitalTransferOptionsType">
      <xs:annotation>
        <xs:documentation>273: provides information about technical means
          and media by which the resource is obtained from the
          distributor</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MD_FormatType">
  <xs:annotation>
    <xs:documentation>284 Specifies representation of data objects Lines 285-
      290</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="formatName" type="xs:string">
      <xs:annotation>
        <xs:documentation>285: name of the data transfer
          format(s)</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="formatVersion" type="xs:string" minOccurs="0">
      <xs:annotation>
        <xs:documentation>286: version of the format(s)</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MD_DigitalTransferOptionsType">
  <xs:annotation>
    <xs:documentation>274 Technical means and media by which a resource is
      obtained from the distributor Lines 275-278</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="transferSize" type="xs:float" minOccurs="0">
      <xs:annotation>
        <xs:documentation>276: Estimated size of a resource unit expressed
          in MegaBytes</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="onLineSource" type="xs:anyURI" minOccurs="0"
      maxOccurs="unbounded">
      <xs:annotation>

```



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```
<xs:documentation>277: information about online sources from which
the resource can be obtained</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="WMO_Source" type="xs:string" minOccurs="0"
maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation> alternative to 277: information about WMO sources
from which the resource can be obtained</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="offlineMedium" type="MD_MediumNameCodeType"
minOccurs="0">
  <xs:annotation>
    <xs:documentation>278: name of the offline medium on which the
resource can be received</xs:documentation>
  </xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
<xs:simpleType name="forecastLeadTimeType">
  <xs:annotation>
    <xs:documentation>Type to allow forecast lead time
T+nnn.dd</xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:pattern value="T\+[0-9]+|T\+[0-9]+\.[0-9]*"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="dateAndTimeTypes">
  <xs:annotation>
    <xs:documentation>Type to allow xs:date or xs:time or xs:dateTime or
forecastLeadTimeType</xs:documentation>
  </xs:annotation>
  <xs:union memberTypes="xs:date xs:time xs:dateTime forecastLeadTimeType"/>
</xs:simpleType>
<xs:simpleType name="WMO_KeywordListType">
  <xs:annotation>
    <xs:documentation>List of WMO keywords </xs:documentation>
  </xs:annotation>
  <xs:list itemType="WMO_KeywordType"/>
</xs:simpleType>
<xs:simpleType name="numberListType">
  <xs:list itemType="xs:decimal"/>
</xs:simpleType>
<xs:simpleType name="freeKeywordsListType">
  <xs:list itemType="xs:string"/>
</xs:simpleType>
<xs:simpleType name="WMO_KeywordsOrFreeKeywordsType">
  <xs:annotation>
    <xs:documentation>List of WMO keywords including numers (decimals and
free string lists)</xs:documentation>
  </xs:annotation>
  <xs:union memberTypes="WMO_KeywordListType numberListType
freeKeywordsListType"/>
</xs:simpleType>
<xs:simpleType name="LongitudeType">
  <xs:annotation>
    <xs:documentation>Type of a longitude value</xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:float">
    <xs:minInclusive value="-180.0"/>
    <xs:maxInclusive value="180.0"/>
  </xs:restriction>
</xs:simpleType>
```

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```
<xs:simpleType name="LatitudeType">
  <xs:annotation>
    <xs:documentation>Type of a latitude value</xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:float">
    <xs:minInclusive value="-90.0"/>
    <xs:maxInclusive value="90.0"/>
  </xs:restriction>
</xs:simpleType>
</xs:schema>
```

**Annex to Paragraph 4.2 (continued)**

**XML Code List**

Latest version of XML Schema code list is available at  
<http://www.wmo.ch/web/www/metadata/WMO-metadata-XML.html>

Annex to Paragraph 4.4

Examples

**Example 1: Climatological data**

<p align="center"><b>Structured Text</b> (extra line spacing to match XML entries)</p>	<p align="center"><b>XML</b> (indentation for readability only and has no significance in XML) (white space within enumerations IS important)</p>
<p>MD_Metadata:                      language: en                      characterSet: <u>utf8</u>                      contact:                          CI_ResponsibleParty:                              organisationName: Agriculture and Agri-Food Canada                              role: originator                              individualName: Henry Hayhoe                              positionName: Research Scientist                              contactInfo:                                  CI_Contact:                                      phone:                                          voice: 1-(613)-759-1524                                          facsimile: 1-(613)-759-1924                                      address:                                          deliveryPoint: Eastern Cereal and Oilseed Research                                              Centre                                          city: Ottawa                                          administrativeArea: ON                                          postalCode: K1A 0C6                                          country: Canada                                          electronicMailAddress: hayhoeh@em.agr.ca                        dateStamp: <u>20020521</u>                      MD_DataIdentification:                      citation:                          title: Ottawa CDA climate data</p>	<pre>&lt;?xml version="1.0" encoding="UTF-8"?&gt; &lt;metaData xmlns="http://www.wmo.ch/www/metadata" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wmo.ch/www/metadata http://www.wmo.ch/www/metadata/WMO19115_metadata_v0_1.xsd"&gt;   &lt;metadataLanguage&gt;en&lt;/metadataLanguage&gt;   &lt;metadataCharacterSet&gt;utf8&lt;/metadataCharacterSet&gt;   &lt;metadataContact&gt;     &lt;organisationName&gt;Agriculture and Agri-Food Canada&lt;/organisationName&gt;     &lt;role&gt;originator&lt;/role&gt;     &lt;individualName&gt;Henry Hayhoe&lt;/individualName&gt;     &lt;positionName&gt;Research Scientist&lt;/positionName&gt;     &lt;contactInfo&gt;       &lt;phone&gt;         &lt;voice&gt;1-(613)-759-1524&lt;/voice&gt;         &lt;facsimile&gt;1-(613)-759-1924&lt;/facsimile&gt;       &lt;/phone&gt;       &lt;address&gt;         &lt;deliveryPoint&gt;Eastern Cereal and Oilseed Research           Centre&lt;/deliveryPoint&gt;         &lt;city&gt;Ottawa&lt;/city&gt;         &lt;administrativeArea&gt;ON&lt;/administrativeArea&gt;         &lt;postalCode&gt;K1A 0C6&lt;/postalCode&gt;         &lt;country&gt;Canada&lt;/country&gt;         &lt;electronicMailAddress&gt;hayhoeh@em.agr.ca&lt;/electronicMailAddress&gt;       &lt;/address&gt;     &lt;/contactInfo&gt;   &lt;/metadataContact&gt;   &lt;metadataDateStamp&gt;2002-05-21&lt;/metadataDateStamp&gt;   &lt;identificationInfo&gt;     &lt;citation&gt;       &lt;resourceTitle&gt;Ottawa CDA climate data&lt;/resourceTitle&gt;</pre>

<p>             identifier: 6105976              identifierType: station number           </p> <p>             abstract: Climatological observations from Agriculture and Agri-Food Canada's Central Experimental Farm located in Ottawa 4 km southwest of the Parliament Buildings. Daily observations have been recorded since November 1, 1889. Data are updated monthly and made available online. They are forwarded to the Meteorological Service of Canadian for quality control and archiving in the national climate archive.           </p> <p>             PointOfContact:           </p> <p>             CI_ResponsibleParty:           </p> <p>             OrganisationName: Agriculture and Agri-Food Canada              role: originator              individualName: : Douglas Balchin              positionName: Station Manager              contactInfo:           </p> <p>             CI_Contact:           </p> <p>             phone:           </p> <p>             voice: 1-(613)-759-1531              facsimile: 1-(613)-759-1924              address:           </p> <p>             deliveryPoint: Eastern Cereal and Oilseed Research Centre              city: Ottawa              administrativeArea: ON              postalCode: K1A 0C6              country: Canada              electronicMailAddress: balchind@em.agr.ca           </p> <p>             ResourceMaintenance:           </p> <p>             maintenanceAndUpdateFrequency: monthly           </p> <p>             MD_Constraints:           </p> <p>             useLimitation: Data have undergone preliminary quality checks and are not for official use           </p>	<pre> &lt;resourceIdentifier&gt;6105976&lt;/resourceIdentifier&gt; &lt;resourceIdentifierType&gt;station number &lt;/resourceIdentifierType&gt; &lt;/citation&gt; &lt;abstract&gt;Climatological observations from Agriculture and Agri-Food Canada's Central Experimental Farm located in Ottawa 4 km southwest of the Parliament Buildings. Daily observations have been recorded since November 1, 1889. Data are updated monthly and made available online. They are forwarded to the Meteorological Service of Canadian for quality control and archiving in the national climate archive.&lt;/abstract&gt;  &lt;pointOfContact&gt;   &lt;organisationName&gt;Agriculture and Agri-Food Canada&lt;/organisationName&gt;   &lt;role&gt;originator&lt;/role&gt;   &lt;individualName&gt;Douglas Balchin&lt;/individualName&gt;   &lt;positionName&gt;Station Manager&lt;/positionName&gt;   &lt;contactInfo&gt;     &lt;phone&gt;       &lt;voice&gt;1-(613)-759-1531&lt;/voice&gt;       &lt;facsimile&gt;1-(613)-759-1924&lt;/facsimile&gt;     &lt;/phone&gt;     &lt;address&gt;       &lt;deliveryPoint&gt;Eastern Cereal and Oilseed Research Centre&lt;/deliveryPoint&gt;       &lt;city&gt;Ottawa&lt;/city&gt;       &lt;administrativeArea&gt;ON&lt;/administrativeArea&gt;       &lt;postalCode&gt;K1A 0C6&lt;/postalCode&gt;       &lt;country&gt;Canada&lt;/country&gt;       &lt;electronicMailAddress&gt;balchind@em.agr.ca&lt;/electronicMailAddress&gt;     &lt;/address&gt;   &lt;/contactInfo&gt; &lt;/pointOfContact&gt; &lt;resourceMaintenance&gt;   &lt;maintenanceAndUpdateFrequency&gt;monthly&lt;/maintenanceAndUpdateFrequency&gt; &lt;/resourceMaintenance&gt; &lt;resourceConstraints&gt;   &lt;useLimitation&gt;Data have undergone preliminary quality checks and are not for official use&lt;/useLimitation&gt; </pre>
--	--

<p>MD_LegalConstraints:  useConstraints: intellectualPropertyRights</p> <p>spatialResolution:  spatialRepresentationType: irregularPoints</p> <p>dataLanguage: en  dataCharacterSet: utf8</p> <p>topicCategory: climatologyMeteorologyAtmosphere  descriptiveKeywords: daily maximum air temperature, daily minimum air temperature, daily soil temperature, rainfall, snowfall, dew point, sunshine, wind, snow depth on ground, rainfall rate  thesaurusName: WMO</p> <p>CI_Date:  Date: 20020521  dateType: publication date</p> <p>dataExtent</p> <p>EX_VerticalExtent:  minimumValue: 79  maximumValue: 79  unitOfMeasure: metres</p> <p>EX_GeographicExtent:  EX_GeographicBoundingBox:  westBoundLongitude: 75.72  eastBoundLongitude: 75.72  northBoundLatitude: 45.38  southBoundLatitude: 45.38</p> <p>EX_TemporalExtent:  beginDateTime: 19980101T0000  dataFrequency: Daily</p>	<pre> &lt;legalConstraints&gt;   &lt;useConstraints&gt;intellectualPropertyRights&lt;/useConstraints&gt; &lt;/legalConstraints&gt; &lt;/resourceConstraints&gt; &lt;spatialRepresentationType&gt;irregularPoints&lt;/spatialRepresentationType&gt; &lt;dataLanguage&gt;en&lt;/dataLanguage&gt; &lt;dataCharacterSet&gt;utf8&lt;/dataCharacterSet&gt; &lt;topicCategory&gt;climatologyMeteorologyAtmosphere&lt;/topicCategory&gt; &lt;descriptiveKeywords&gt;daily maximum air temperature, daily minimum air temperature,   daily soil temperature, rainfall, snowfall, dew point, sunshine, wind, snow depth on   ground, rainfall rate&lt;/descriptiveKeywords&gt;  &lt;thesaurusName&gt;WMO&lt;/thesaurusName&gt; &lt;referenceDate&gt;   &lt;date&gt;2002-05-21&lt;/date&gt;   &lt;dateType&gt;publicationDate&lt;/dateType&gt; &lt;/referenceDate&gt; &lt;dataExtent&gt;   &lt;verticalElement&gt;     &lt;minimumValue&gt;79&lt;/minimumValue&gt;     &lt;maximumValue&gt;79&lt;/maximumValue&gt;     &lt;unitOfMeasure&gt;metres&lt;/unitOfMeasure&gt;   &lt;/verticalElement&gt; &lt;/dataExtent&gt; &lt;dataExtent&gt;   &lt;geographicElement&gt;     &lt;geographicBoundingBox&gt;       &lt;westBoundLongitude&gt;75.72&lt;/westBoundLongitude&gt;       &lt;eastBoundLongitude&gt;75.72&lt;/eastBoundLongitude&gt;       &lt;southBoundLatitude&gt;45.38&lt;/southBoundLatitude&gt;       &lt;northBoundLatitude&gt;45.38&lt;/northBoundLatitude&gt;     &lt;/geographicBoundingBox&gt;   &lt;/geographicElement&gt; &lt;/dataExtent&gt; &lt;dataExtent&gt;   &lt;temporalElement&gt;     &lt;beginDateTime&gt;1998-01-01T00:00:00&lt;/beginDateTime&gt;     &lt;dataFrequency&gt;daily&lt;/dataFrequency&gt;   &lt;/temporalElement&gt; &lt;/dataExtent&gt; </pre>
---	--

<p>MD_Distribution: distributionFormat:     name: Free text</p> <p>TransferOptions:     OnlineSource: ftp:/SIS.AGR.CA/pub/CLBRR/WEATHER/</p> <p>LI_Lineage:     Statement: Data are collected from a single climatological station</p>	<pre>&lt;/identificationInfo&gt; &lt;distributionInfo&gt;   &lt;distributionFormat&gt;     &lt;formatName&gt;Free text&lt;/formatName&gt;   &lt;/distributionFormat&gt;   &lt;transferOptions&gt;     &lt;onLineSource&gt;ftp:/SIS.AGR.CA/pub/CLBRR/WEATHER/&lt;/onLineSource&gt;   &lt;/transferOptions&gt; &lt;/distributionInfo&gt; &lt;dataQualityInfo&gt;   &lt;lineageStatement&gt;Data are collected from a single climatological     station&lt;/lineageStatement&gt; &lt;/dataQualityInfo&gt; &lt;/metaData&gt;</pre>
--	--

**Example 2: GRIB gridded data**

<b>Structured Text</b> (extra line spacing to match XML entries)	<b>XML</b> (indentation for readability only and has no significance in XML) (white space within enumerations IS important)
<p>MD_Metadata:</p> <p>language: en            characterSet: <u>utf8</u>            contact:</p> <p>    CI_ResponsibleParty:            organisationName: Met Office            role: originator resourceProvider            positionName: Customer Call Centre            contactInfo:</p> <p>        CI_Contact:                  phone:                  voice: 0845 300 0300                  voice: +44 (0)1344 855680                  facsimile: 0845 300 1300                  facsimile: +44 (0)1344 855681</p> <p>        address:                  deliveryPoint: London Road                  city: Bracknell                  administrativeArea: Berkshire                  postalCode: RG12 2SZ                  country: United Kingdom                  electronicMailAddress:                          enquiries@metoffice.com</p> <p>        onlineAddress: <a href="http://www.metoffice.com">http://www.metoffice.com</a></p> <p>dateStamp: <u>2002-05-21</u>            metadataStandardName: WMO19115_metadata_v0_1</p>	<pre>&lt;?xml version="1.0" encoding="UTF-8"?&gt; &lt;!-- XML file generated by XML Spy v4.1 U (<a href="http://www.xmlspy.com">http://www.xmlspy.com</a>) Gil Ross Met Office UK--&gt; &lt;metaData xmlns="http://www.wmo.ch/www/metadata" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wmo.ch/www/metadata http://www.wmo.ch/www/metadata/WMO19115_metadata_v0_1.xsd"&gt;   &lt;metadataLanguage&gt;en&lt;/metadataLanguage&gt;   &lt;metadataCharacterSet&gt;utf8&lt;/metadataCharacterSet&gt;   &lt;metadataContact&gt;      &lt;organisationName&gt;Met Office&lt;/organisationName&gt;     &lt;role&gt;resourceProvider&lt;/role&gt;     &lt;positionName&gt;Customer Call Centre&lt;/positionName&gt;     &lt;contactInfo&gt;        &lt;phone&gt;         &lt;voice&gt;0845 300 0300&lt;/voice&gt;         &lt;voice&gt;+44 (0)1344 855680 &lt;/voice&gt;         &lt;facsimile&gt;0845 300 1300&lt;/facsimile&gt;         &lt;facsimile&gt;+44 (0)1344 855681&lt;/facsimile&gt;       &lt;/phone&gt;       &lt;address&gt;         &lt;deliveryPoint&gt; London Road&lt;/deliveryPoint&gt;         &lt;city&gt;Bracknell&lt;/city&gt;         &lt;administrativeArea&gt;Berkshire&lt;/administrativeArea&gt;         &lt;postalCode&gt;RG12 2SZ&lt;/postalCode&gt;         &lt;country&gt;United Kingdom&lt;/country&gt;         &lt;electronicMailAddress&gt;enquiries@metoffice.com         &lt;/electronicMailAddress&gt;       &lt;/address&gt;       &lt;onlineAddress&gt; <a href="http://www.metoffice.com">http://www.metoffice.com</a>&lt;/onlineAddress&gt;     &lt;/contactInfo&gt;   &lt;/metadataContact&gt; &lt;/metadataDateStamp&gt;2002-05-21&lt;/metadataDateStamp&gt; &lt;metadataStandardName&gt;WMO19115_metadata_v0_1&lt;/metadataStandardName&gt;</pre>



<p>metadataStandardVersion: 0.1  MD_ReferenceSystem:      ReferenceSystemIdentifier: Plat Caree</p> <p>    Description: Global regularly spaced latitude longitude          Grid</p> <p>MD_DataIdentification:      citation:          title: Complete Met Office Global Model forecast composed of GRIB  bulletins          identifier: TBA</p> <p>    abstract: Full set of GRIB bulletins prepared for a single Met Office  Global model forecast</p> <p>    PointOfContact:          CI_ResponsibleParty:              OrganisationName: Met Office              role: resourceProvider              positionName: Customer Call Centre              contactInfo:                  CI_Contact:                      phone:                          voice: 0845 300 0300                          voice: +44 (0)1344 855680                          facsimile: 0845 300 1300                          facsimile: +44 (0)1344 855681</p> <p>                address:                      deliveryPoint: London Road                      city: Bracknell                      administrativeArea: Berkshire                      postalCode: RG12 2SZ                      country: United Kingdom                      electronicMailAddress:                          enquiries@metoffice.com</p>	<pre> me&gt; &lt;metadataStandardVersion&gt;0.1&lt;/metadataStandardVersion&gt; &lt;referenceSystemInfo&gt;   &lt;referenceSystemIdentifier&gt;Plat Caree&lt;/referenceSystemIdentifier&gt;   &lt;referenceDescription&gt;Global regularly spaced latitude longitude   grid&lt;/referenceDescription&gt; &lt;/referenceSystemInfo&gt; &lt;identificationInfo&gt;   &lt;citation&gt;     &lt;resourceTitle&gt;Complete Met Office Global Model forecast composed     of GRIB bulletins&lt;/resourceTitle&gt;     &lt;resourceIdentifier&gt;TBA&lt;/resourceIdentifier&gt;   &lt;/citation&gt;   &lt;abstract&gt;Full set of GRIB bulletins prepared for a single Met Office Global   model forecast&lt;/abstract&gt;   &lt;pointOfContact&gt;      &lt;organisationName&gt;Met Office&lt;/organisationName&gt;     &lt;role&gt;resourceProvider&lt;/role&gt;     &lt;positionName&gt;Customer Call Centre&lt;/positionName&gt;     &lt;contactInfo&gt;        &lt;phone&gt;         &lt;voice&gt;0845 300 0300 &lt;/voice&gt;         &lt;voice&gt;+44 (0)1344 855680&lt;/voice&gt;         &lt;facsimile&gt;0845 300 1300&lt;/facsimile&gt;         &lt;facsimile&gt;+44 (0)1344 855681&lt;/facsimile&gt;       &lt;/phone&gt;       &lt;address&gt;         &lt;deliveryPoint&gt; London Road&lt;/deliveryPoint&gt;         &lt;city&gt;Bracknell&lt;/city&gt;         &lt;administrativeArea&gt;Berkshire&lt;/administrativeArea&gt;         &lt;postalCode&gt;RG12 2SZ&lt;/postalCode&gt;         &lt;country&gt;United Kingdom&lt;/country&gt;         &lt;electronicMailAddress&gt;enquiries@metoffice.com&lt;/electroni         cMailAddress&gt;       &lt;/address&gt;     &lt;/contactInfo&gt;   &lt;/pointOfContact&gt; &lt;/resourceMaintenance&gt; </pre>
--	--

<p>resourceMaintenance:              maintenanceAndUpdateFrequency: 12-hourly</p> <p>    maintenanceNote: disseminated at 4 hours past the                  reference date/time</p> <p>MD_Constraints:              useLimitation: This is provided under aegis of WMO, or                  alternatively under written contract</p> <p>    MD_LegalConstraints:                  useConstraints: intellectualPropertyRights</p> <p>spatialRepresentationType: grid</p> <p>topicCategory: climatologyMeteorologyAtmosphere</p> <p>    descriptiveKeywords: NWP Model Analysis Forecast GRIB Bulletin              Pressure Height Wind Maximum Speed Direction Temperature Relative              Humidity Precipitation Amount Rate Cloud Liquid Ice Tropopause</p> <p>    CI_Date:                  Date 2002-05-01T00:00:00                  dateType: referenceDate</p> <p>dataExtent              description: Global Grid 2.5 degree latitude and 2.5 degree              longitude steps, 6 sectors, one sector per GRIB</p> <p>    geographicElement                  geographicBoundingBox                      westBoundLongitude: -180</p> <p>            eastBoundLongitude: 180                      southBoundLatitude: -90</p> <p>            northBoundLatitude: 90</p>	<pre> &lt;maintenanceAndUpdateFrequency&gt;12- hourly&lt;/maintenanceAndUpdateFrequency&gt; &lt;maintenanceNote&gt;disseminated at 4 hours past the reference date/time&lt;/maintenanceNote&gt; &lt;/resourceMaintenance&gt; &lt;resourceConstraints&gt;   &lt;useLimitation&gt;This is provided under aegis of WMO, or alternatively   under written contract&lt;/useLimitation&gt;   &lt;legalConstraints&gt;     &lt;useConstraints&gt;intellectualPropertyRights &lt;/useConstraints&gt;   &lt;/legalConstraints&gt; &lt;/resourceConstraints&gt; &lt;spatialRepresentationType&gt;grid&lt;/spatialRepresentationType&gt; &lt;topicCategory&gt;climatologyMeteorologyAtmosphere &lt;/topicCategory&gt; &lt;descriptiveKeywords&gt;NWP Model Analysis Forecast GRIB Bulletin   Pressure Height Wind Maximum Speed Direction Temperature Relative   Humidity Precipitation Amount Rate Cloud Liquid Ice Tropopause &lt;/descriptiveKeywords&gt; &lt;referenceDate&gt;   &lt;date&gt;2002-05-01T00:00:00&lt;/date&gt;   &lt;dateType&gt;referenceDate&lt;/dateType&gt; &lt;/referenceDate&gt; &lt;dataExtent&gt;   &lt;description&gt;Global Grid 2.5 degree latitude and 2.5 degree longitude   steps, in 6 sectors, one sector per GRIB &lt;/description&gt;   &lt;geographicElement&gt;     &lt;geographicBoundingBox&gt;       &lt;westBoundLongitude&gt;-180 &lt;/westBoundLongitude&gt;       &lt;eastBoundLongitude&gt;180&lt;/eastBoundLongitude&gt;       &lt;southBoundLatitude&gt;-90&lt;/southBoundLatitude&gt;       &lt;northBoundLatitude&gt;90&lt;/northBoundLatitude&gt;     &lt;/geographicBoundingBox&gt;   &lt;/geographicElement&gt; &lt;/dataExtent&gt; &lt;dataExtent&gt;   &lt;description&gt;Validity Time Range&lt;/description&gt;   &lt;temporalElement&gt;     &lt;beginDateTime&gt;T+00&lt;/beginDateTime&gt;     &lt;endDateTime&gt;T+120&lt;/endDateTime&gt;   &lt;/temporalElement&gt; &lt;/dataExtent&gt; </pre>
--	---

<p>Description: Validity Time Range temporalElement: beginDateTime: T+00 endDateTime: T+120 dataFrequency: 6-hourly</p> <p>description: Vertical Range also includes surface measures such as rainfall accumulations verticalElement: minimumValue: 100 maximumValue: 1000 unitOfMeasure: hectoPascals</p> <p>MD_Distribution: distributionFormat: name: WMO GRIB FM92 version: version 1 GRIB</p> <p>TransferOptions: transferSize: 21 OnlineSource: <a href="http://www.metoffice.com">http://www.metoffice.com</a> WMO_Source: WMO GTS on reference date</p> <p>OfflineMedium: digitalLinearTape</p> <p>LI_Lineage: statement: This is the unmodified output from the Met Office Global Model on the declared date ProcessStep: The NWP Output has been interpolated to the GRIB grid and compressed using GRIB methods Source: The output is from an internally consistent Numerical Weather Prediction model initiated from the analysis at the reference date</p>	<pre> &lt;dataFrequency&gt;6-hourly&lt;/dataFrequency&gt; &lt;/temporalElement&gt; &lt;/dataExtent&gt; &lt;dataExtent&gt;   &lt;description&gt;Vertical Range also includes surface measures such as   rainfall accumulations&lt;/description&gt;   &lt;verticalElement&gt;     &lt;minimumValue&gt;100&lt;/minimumValue&gt;     &lt;maximumValue&gt;1000&lt;/maximumValue&gt;     &lt;unitOfMeasure&gt;hectoPascals&lt;/unitOfMeasure&gt;   &lt;/verticalElement&gt; &lt;/dataExtent&gt; &lt;/identificationInfo&gt; &lt;distributionInfo&gt;   &lt;distributionFormat&gt;     &lt;formatName&gt;WMO GRIB FM92&lt;/formatName&gt;     &lt;formatVersion&gt;version 1 GRIB&lt;/formatVersion&gt;   &lt;/distributionFormat&gt;   &lt;transferOptions&gt;     &lt;transferSize&gt;21&lt;/transferSize&gt;     &lt;onLineSource&gt;<a href="http://www.metoffice.com">http://www.metoffice.com</a>&lt;/onLineSource&gt;     &lt;WMO_Source&gt;WMO GTS on reference date &lt;/WMO_Source&gt;     &lt;offlineMedium&gt;digitalLinearTape&lt;/offlineMedium&gt;   &lt;/transferOptions&gt; &lt;/distributionInfo&gt; &lt;dataQualityInfo&gt;   &lt;lineageStatement&gt;This is the unmodified output from the Met Office Global   Model on the declared date&lt;/lineageStatement&gt;   &lt;dataProcessInfo&gt;The NWP Output has been interpolated to the GRIB grid   and compressed using GRIB methods&lt;/dataProcessInfo&gt;   &lt;dataSourceInfo&gt;The output is from an internally consistent Numerical   Weather Prediction model initiated from the analysis at the reference   date&lt;/dataSourceInfo&gt; &lt;/dataQualityInfo&gt; &lt;/metaData&gt; </pre>
---	---

**Example 3: Ocean Gridded Data**

Structured Text	XML (indentation for readability only and has no significance in XML)
<p>MD_Metadata:  language: en  characterSet: UTF-8  contact:  CI_ResponsibleParty:  organisationName: Hydrometeorological Research  Center of Russia  role: originator  individualName: Alexander Zelenko  positionName: Head of Laboratory  contactInfo:  CI_Contact:  phone:  voice: 7-095-255-2227  facsimile: 7-095-252-1824    address:  deliveryPoint: Hydrometcenter of Russia  city: Moscow  postalCode: 123242  country: Russian Federation  electronicMailAddress: zelenko@mecom.ru</p> <p>dateStamp: 2002-05-16  metadataStandardName: WMO19115 Metadata    metadataStandardVersion: 0.1</p>	<pre>&lt;?xml version="1.0" encoding="UTF-8"?&gt; &lt;metaData&gt;   &lt;metadataLanguage&gt;en&lt;/metadataLanguage&gt;   &lt;metadataCharacterSet&gt;utf8&lt;/metadataCharacterSet&gt;   &lt;metadataContact&gt;     &lt;organisationName&gt;Hydrometeorological Research Center of Russia &lt;/organisationName&gt;     &lt;role&gt;originator&lt;/role&gt;     &lt;individualName&gt;Alexander Zelenko&lt;/individualName&gt;     &lt;positionName&gt;Head of Laboratory&lt;/positionName&gt;     &lt;contactInfo&gt;       &lt;phone&gt;         &lt;voice&gt;7-095-255-2227&lt;/voice&gt;         &lt;facsimile&gt;7-095-252-1824&lt;/facsimile&gt;       &lt;/phone&gt;       &lt;address&gt;         &lt;deliveryPoint&gt;Hydrometcenter of Russia&lt;/deliveryPoint&gt;         &lt;city&gt;Moscow&lt;/city&gt;         &lt;postalCode&gt;123242&lt;/postalCode&gt;         &lt;country&gt;Russian Federation&lt;/country&gt;         &lt;electronicMailAddress&gt;zelenko@mecom.ru &lt;/electronicMailAddress&gt;       &lt;/address&gt;     &lt;/contactInfo&gt;   &lt;/metadataContact&gt;    &lt;metadataDateStamp&gt;2002-05-16&lt;/metadataDateStamp&gt;   &lt;metadataStandardName&gt;WMO19115 Metadata &lt;/metadataStandardName&gt;   &lt;metadataStandardVersion&gt;0.1&lt;/metadataStandardVersion&gt;</pre>

MD\_DataIdentification

Citation

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identifier: MONTH\_ASST\_HMC

abstract: Monthly sea surface temperature (SST) analysis is based on the in-situ observations, incoming through the GTS (SHIP, BATHY, TESAC, BUOY)

pointOfContact:

CI\_ResponsibleParty:

organisationName: Hydrometeorological Research Center of Russia

role: principallInvestigator

individualName: Alexander Zelenko

positionName: Head of Laboratory

contactInfo:

CI\_Contact:

phone:

voice: 7-095-255-2227

facsimile: 7-095-252-1824

address:

deliveryPoint: Hydrometcenter of Russia

city: Moscow

postalCode: 123242

country: Russian Federation

electronicMailAddress: zelenko@mecom.ru

resourceMaintenance:

maintenanceAndUpdateFrequency: monthly

maintenanceNote: SST analysis is computed at the first day of each month

spatialRepresentationType: grid (lat-lon)

spatialResolution: 2x2 degree

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<organisationName>Hydrometeorological Research Center of Russia

</organisationName>

<role>principallInvestigator</role>

<individualName>Alexander Zelenko</individualName>

<positionName>Head of Laboratory</positionName>

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</phone>

<address>

<deliveryPoint>Hydrometcenter of Russia</deliveryPoint>

<city>Moscow</city>

<postalCode>123242</postalCode>

<country>Russian Federation</country>

<electronicMailAddress>zelenko@mecom.ru

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</pointOfContact>

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**Annex to Paragraph 5.1**  
**Keywords for Describing WMO Datasets**

(any number)	Barometer	Cooling	Dry
Absolute	Biometeorology	Cores	Duration
Accumulated	Boundary	Cover	Dust
Aerosol	Brightness	CREX	Dynamics
Aerosols	BUFR	Crop	Earth
Agriculture	Bulb	Cyclone	Electricity
Agrometeorological	Ceiling	Daily	Element
Air	Change	Data	Elevation
Albedo	Chemistry	Day	Energy
Altitude	Circulation	Days	Equivalent
Amount	Cirrocumulus	Degree	Erosion
Analyses	Cirrostratus	Depth	Evaporation
Analysis	Cirrus	Derived	Evapotranspiration
Annual	Climate	Dew	Events
Anomaly	Climatology	Diffusion	Extent
Anomalies	Cloud	Direction	Extremes
Applied	Clouds	Dissolved	Flux
Atmospheric	Component	Divergence	Fog
Aviation	Condensation	Droplet	Forecast
Balance	Conductivity	Drought	Forestry

Freeze	Hour	Low	Monthly
Frost	Hourly	Marine	Mountain
Gale	Humidity	Maximum	Nuclei
General	Hurricane	Mean	Normals
Geopotential	Hydrological	Measurement	NWP
Glacial	Hydrology	Median	Observation
Global	Hydrometeorology	Meteorological	Ocean
GPS	Ice	Micro	Oceanography
GRIB	Imagery	Micrometeorology	Ordinary
Grid	Index	Military	Oxygen
Gridded	Instruments	Minimum	Ozone
Ground	Land	Missing	Paleoclimatology
Growing	Laser	Mist	Parameterization
Gust	Layer	Mixed	Period
Hail	Layers	Mixing	pH
Hair	Level	Mode	Phenomena
Heating	Lifted	Model	Physics
Heavy	Lightning	Modification	Point
Height	Liquid	Moisture	Polar
High	Long	Monsoon	Pollution

Potential	Relative	Spectral	Tide
Precipitable	Remote	Speed	Topography
Precipitation	Rings	Spout	Tornado
Present	Salinity	Stability	Total
Pressure	Sand	Standard	Track
Properties	Satellite	Static	Transport
Quality	Scale	Storms	Tree
Quantity	Sea	Stratopause	Tropopause
Radar	Sedimentation	Stratosphere	Troposphere
Radiance	Sensing	Stratospheric	Tropospheric
Radiation	Short	Sunshine	Turbidity
Radiative	Size	Surface	Turbulence
Radiological	Sky	Swell	Type
Rain	Snow	SYNOP	Typhoon
Rainfall	Snowfall	System	Upper
Rate	Soil	Temperature	Urban
Ratio	Soils	Tendency	Use
Record	Solar	Thickness	Vapour
Reflectance	Soundings	Thunder	Variable
Reflectivity	Space	Tidal	Velocity

Visibility
Volume
Virtual
Vorticity
Warm
Water
Wave
Waves
Weather
Wet
Wind
Year
Yield



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### Glossary

CBS	Commission for Basic Systems
ET	Expert Team
ETDR&C	Expert Team on Data Representation and Codes
HTML	<a href="#">Hypertext Markup Language</a> the lingua franca for publishing hypertext on the World Wide Web. It is a non-proprietary format based upon SGML. However it was never precisely defined, and this allowed many software suppliers to add functionality at whim. This forced browsers to have to recognise these different add-ons, giving rise to inter-operability problems and eventual stalemate.
HTTP	<a href="#">Hypertext Transport Protocol</a> HTTP is a data access protocol currently run over TCP and is the basis of the World-Wide Web
ISO	<a href="#">International Standards Organisation</a> . There are very many standards which impinge on meteorology and there are 35 metadata standards of which ISO/DIS 19115 is the Geographic standard.
Java	<a href="#">A language of the C++ family</a> developed by Sun as an open language for software to run across multiple platforms.
Markup	Historically, the word markup has been used to describe annotation or other marks within a text intended to instruct a compositor or typist how a particular passage should be printed or laid out. Examples include wavy underlining to indicate boldface, special symbols for passages to be omitted or printed in a particular font and so forth. As the formatting and printing of texts was automated, the term was extended to cover all sorts of special markup codes inserted into electronic texts to govern formatting, printing, or other processing
Metadata	Metadata or "data about data" describe the content, quality, condition, location and other characteristics of data. The term is normally understood to mean structured data about digital (and non-digital) resources that can be used to help support a range of operations and functions. These might include, for example, resource description and discovery, the management of information resources (including rights management) and their long-term preservation.
OML	<a href="#">Weather Observation Definition Format</a> US Navy SYNOP/METAR etc definition format for distribution to USN Ships.
OS	Operating system The interface between programs and the hardware.
SGML	<a href="#">Standard Generalised Markup Language</a> is an international standard for the description of marked-up electronic text. It is a meta-language, that is, a means of formally describing a language, in this case, a markup language.
SVG	<a href="#">Scalar Vector Graphics</a> SVG is a language for describing two-dimensional graphics in XML. SVG allows for three types of graphic objects: vector graphic shapes, images and text. Graphical objects can be grouped, styled, transformed and incorporated into previously rendered objects. SVG drawings can be dynamic and interactive.
URI	<a href="#">Uniform Resource Identifier</a> . The generic set of all names/addresses that are short strings that refer to resources.
URL	Uniform Resource Locator. An informal term (no longer used in

	technical specifications) associated with popular URI schemes: http, ftp, mailto, etc.
W3C	<a href="#">World Wide Web Consortium</a> The standards organisation developing XML and much of the rest of the alphabet soup.
WMO	World Meteorological Organization
WWW	World Weather Watch
XInclude	<a href="#">XInclude</a> is a processing model and syntax for general-purpose inclusion. Inclusion allows merging a number of XML information sets into a single composite Infoset. It is the way to break XML documents into modules.
XML	<a href="#">EXtensible Markup Language</a> a standard format for structured documents and data on the Web. Structured data includes things like spreadsheets, address books, configuration parameters, financial transactions, and technical drawings. "document" is now taken to be a generalised name for data and documents. It is a derivation and simplification of SGML. XML looks a bit like HTML, but it is not a replacement for HTML. XML is verbose by design, and is intended to be read by an application, not a human in further processing and manipulating the document.
XMLSchema	<a href="#">XMLSchema</a> Define the vocabulary and syntax of an XML document. It is a replacement for the DTD, and it has considerably greater flexibility of definition, datatypes than DTD. Since it is also written in XML it can be processed like any other XML document.
XSLT	<a href="#">eXtensible Stylesheet Language Transformation</a> is a language for transforming XML documents into other XML documents. It is designed for use as part of XSL, which is a stylesheet language for XML. In addition to XSLT, XSL includes an XML vocabulary for specifying formatting. XSL specifies the styling of an XML document by using XSLT to describe how the document is transformed into another XML document that uses the formatting vocabulary.

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17. ISO 19111: 1), *Geographic information Spatial referencing by coordinates*
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19. ISO 19115: 1), *Geographic information Metadata*
- 1) To be published.