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MEETING OF THE

Expert Team on WORLD DATA CENTRES
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# GAW Metadata for WIS

## GAW Profile of ISO19115:2003/cor. 1:2006

|  | **In Preparation** | **Review** | **Approved** |
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# Document management

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Chapter 1    # Scope

The GAW profile is designed to be compatible with the WMO Core Metadata Profile v1.3, which is an informal profile of ISO19115:2003/cor. 1:2006. This means that neither profile requires any extensions of the ISO19115:2003/cor. 1:2006 standard, and that both profiles contain the mandatory entities defined in ISO19115:2003/cor. 1:2006 as 'mandatory'. However, both profiles put additional constraints on compliance. Moreover, the GAW profile can be considered to be an extension of the WMO Core Metadata Profile.

As prescribed by ISO19115:2003/cor. 1:2006, both profiles use the <gmd:MD_Metadata> root element. The full model of ISO19115:2003/cor. 1:2006 is shown in Figure 1 in UML notation. Also shown in this figure are the mandatory classes of the WMO Core (blue stars) and the GAW Profile (orange stars), respectively. A comprehensive metadata profile of ISO19115:2003/cor. 1:2006 is shown in Appendix A.1.

A full specification of the WMO Core Metadata Profile v1.3 is shown in **Error! Reference source not found.**. The specification of the GAW Metadata Profile v1.0 is shown in Figure 3.

a)



b)
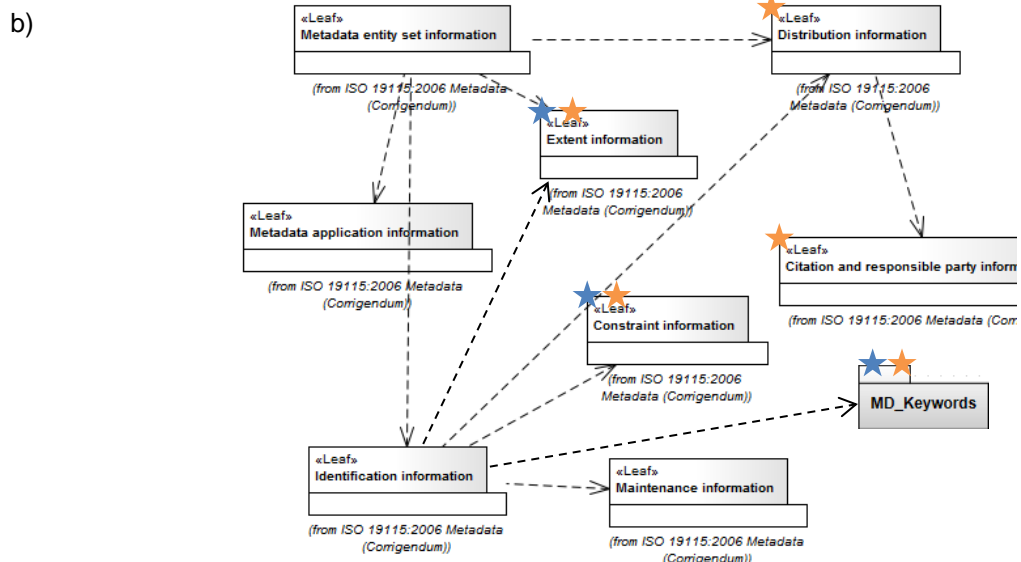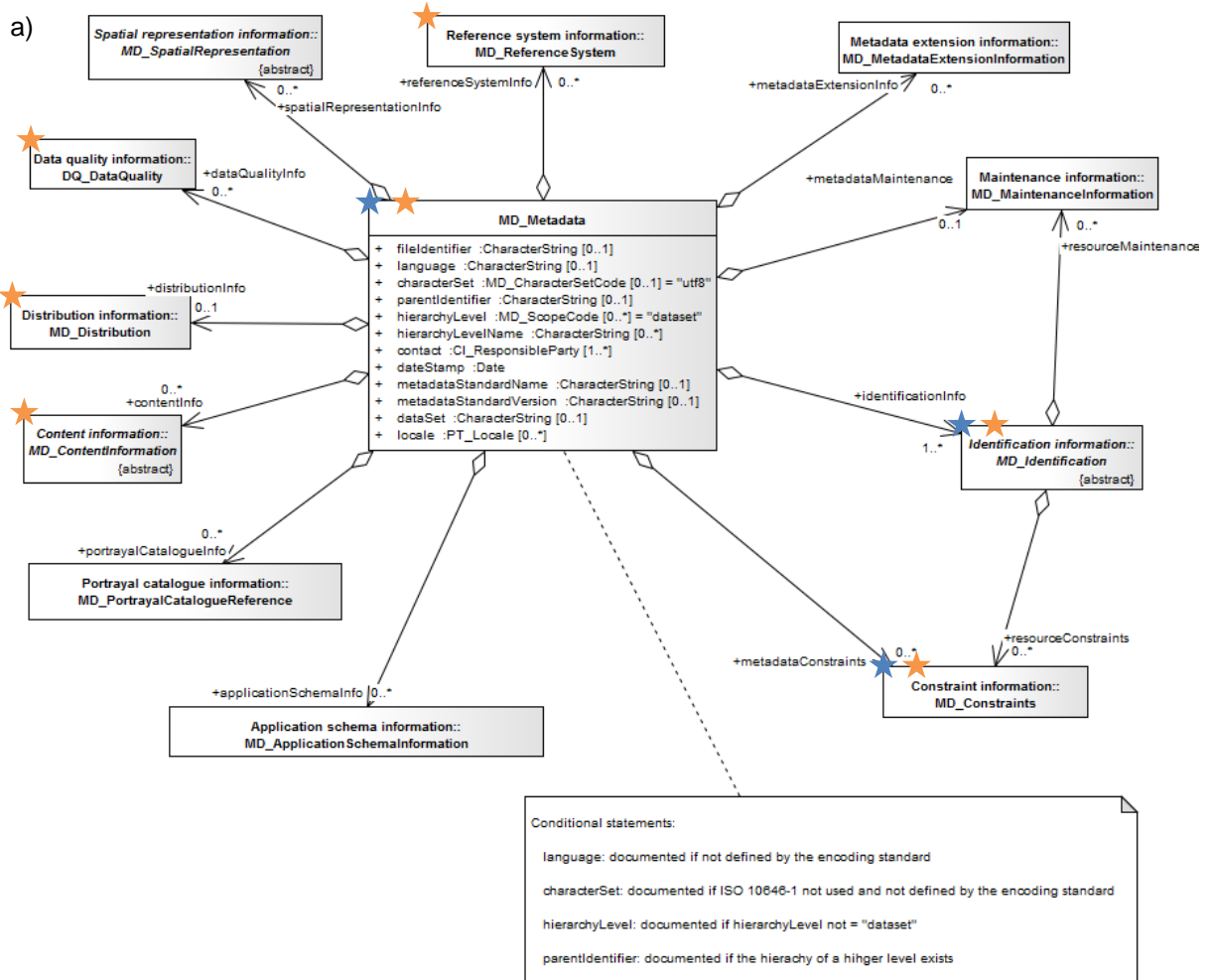


*Figure 1. a) Metadata entity set information of ISO19115:2003/Cor.1 2006 (source:*
*http://www.isotc211.org/hmmg/HTML/EARoot/EA14/EA2/EA2/EA2682.htm); b) classes for*
*Identification Information (adapted from:*
*http://www.isotc211.org/hmmg/HTML/EARoot/EA14/EA2/EA3/EA2720.htm); blue stars: Entities used*
*in the WMO Core Metadata Profile v1.3; orange stars: Entities used in the GAW Profile v1.0.*

*Figure 2. Full specification of the WMO Core Metadata Profile v1.3. Mandatory items are shown in bold.*



*Figure 3. Specification of the GAW Metadata Profile v1.0. Optional items are not shown.*
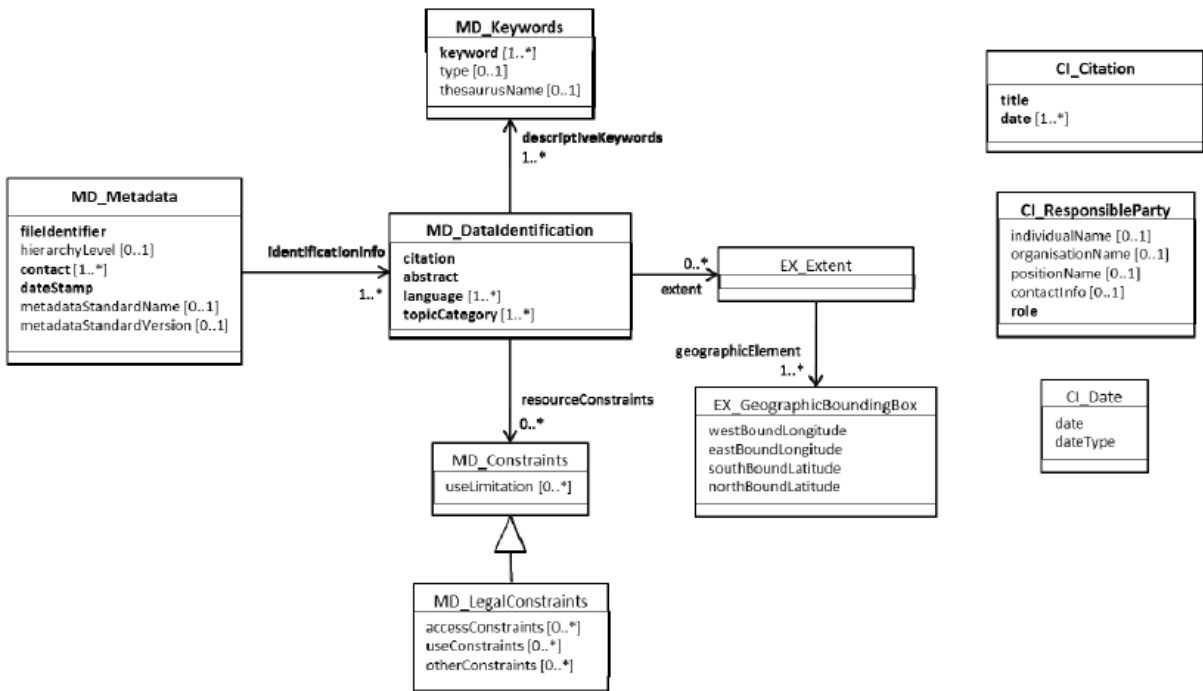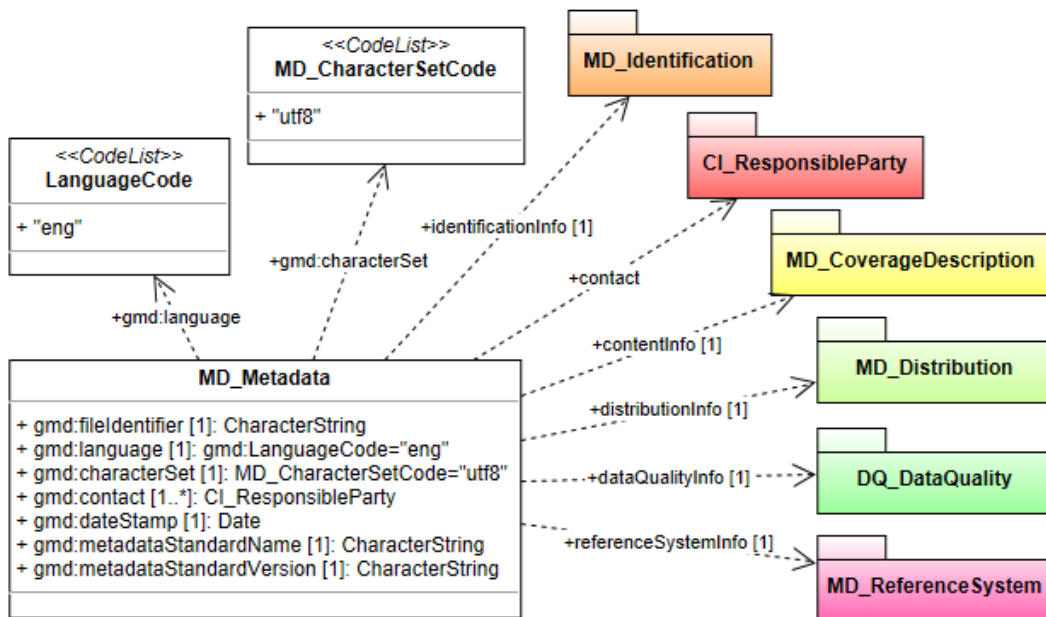
Table 1 lists the mandatory entities under the root for both profiles of ISO19115:2003/cor. 1:2006. With the requirement of additional classes in the GAW Profile, metadata that considered important for the GAW Programme can and must be specified. It is noteworthy that the GAW Profile was developed with the requirements of WIGOS in mind, recognizing that the WIGOS Core Metadata Standard is still under development.

*Table 1. Comparison of the WMO Core Metadata Profile v1.3 with the GAW Metadata Profile v1.0.*

| WMO Core Profile v1.3 | | | GAW Profile v1.0 | |
|---|---|---|---|---|
| **Section** | **Obligation** | **Reference** | **Section** | **Obligation** |
| gmd:fileIdentifier | M | Specification Part 1, 8.1 | gmd:fileIdentifier | M |
| | | | gmd:language | M |
| | | | gmd:characterSet | M |
| gmd:contact | M | Specification Part 1, 8.2 | gmd:contact | M |
| gmd:datestamp | M | Specification Part 1, 8.1 | gmd:datestamp[1] | M |
| | | | gmd:metadataStandardName | M |
| | | | gmd:metadataStandardVersion | M |
| | | | gmd:referenceSystemInfo | M |
| gmd:identificationInfo | M | Specification Part 1, 8.2 | gmd:identificationInfo | M |
| | | | gmd:contentInfo | M |
| | | | gmd:distributionInfo | M |
| | | | gmd:dataQualityInfo | M |

An important section in both profiles is gmd:identificationInfo. This is implemented using gmd:MD_DataIdentification class, with the entities shown ingmd:identificationInfo Table 2.

---

[1] *This element is used to distinguish versions of the same metadata record*

*Table 2. Comparison of section **identificationInfo** in the WMO Core Metadata Profile v1.3 and the GAW Metadata Profile v1.0, respectively.*

| WMO Core Profile v1.3 | | | GAW Profile v1.0 | |
|---|---|---|---|---|
| **Section** | **Obligation** | **Reference (or content)** | **Section** | **Obligation** |
| gmd:citation/gmd:title | M | Specification Part 1, 8.2 | gmd:citation/gmd:title | M |
| gmd:citation/gmd:date | M | Specification Part 1, 8.2 | gmd:citation/gmd:date | M |
| gmd:abstract | M | Specification Part 1, 8.2 | gmd:abstract | M |
| | | | gmd:purpose | M |
| | | | gmd:pointOfContact | M |
| gmd:descriptiveKeywords | M | Specification Part 1, 8.2.1 WMO_CategoryCode | gmd:descriptiveKeyword (id="wmoCategory") | M |
| | | | gmd:descriptiveKeywords (id="observedVariable") | M |
| | | | gmd:resourceConstraints | M |
| | | | gmd:spatialRepresentationType | M |
| gmd:language | M | Specification Part 1, 8.2.5 (English) | gmd:language | M |
| | | | gmd:characterSet | M |
| gmd:topicCategory | M | Specification Part 2, Table 13 | gmd:topicCategory | M |
| | | | gmd:extent id="Region" | M |
| | | | gmd:extent id="Country" | M |
| | | | gmd:extent id="Station" | M |
| gmd:extent | C/geogr. information? | (geographical bounding box) | gmd:extent id=" boundingGeographicBoundingBox" | M |

Note: Since the metadata records provided by GAWSIS are not published for (real-time) global distribution, the WMO_DistributionScopeCode is not specified at present.

# Chapter 2 Conformance

[Text will be inspired by similar text in the WMO Core Profile specs]

# Chapter 3   **Normative References**

[Text will be inspired by similar text in the WMO Core Profile specs]

ISO19115:2003/Cor 1:2006 Geographic information – Metadata (ISO/TC 211, 2007)

WMO_Core_Metadata_Profile_v1.3_Specification_Part_1_v1.0FINAL.pdf (WMO, 2013)

WMO_Core_Metadata_Profile_v1.3_Specification_Part_2_v1.0FINAL.pdf (WMO, 2013)

# Chapter 4 Terms and Definitions

## 4.1 Terms

**Namespace**
collection of names, identified by a URI reference, which are used in XML documents as element names and attribute names

**Metadata Element** (source: ISO19115-1:2011)
discrete unit of **metadata**
NOTE 1 Metadata elements are unique within a metadata class.
NOTE 2 Equivalent to an attribute and/or an association in UML terminology.
NOTE 3 Class attributes and relationships are referred to collectively as metadata elements

**Metadata Entity** (source: ISO19115-1:2011)
set of **metadata** elements describing the same aspect of data
NOTE 1 May contain one or more metadata entities.
NOTE 2 Equivalent to a class in UML terminology.

**Attribute**

…

**Class**

…

**Metadata Section** (source: ISO19115-1:2011)
subset of **metadata** which consists of a collection of related **metadata entities** and **metadata elements**
NOTE Equivalent to a package in UML terminology.

**WIS Discovery Metadata**
Metadata consistent with this standard that is used within the WIS for discovery of information shared through the WIS

**WIGOS Metadata**
In contrast to WIS metadata intended to facilitate discovery, access and retrieval of data, WIGOS metadata are intended to support the adequate use of the data. WIGOS metadata is a lot more comprehensive than WIS metadata.

## 4.2      UML Model/Data Dictionary Relationships

| UML Model | Data Dictionary |
|---|---|
| Package | Section |
| Generalized Class | Entity |
| Specified Class | Entity |
| Class | Entity |
| Attribute | Element |
| Association | Element |

[Source: ISO19115-1:2011]

## 4.3      Acronyms

UML          Unified Modelling Language

URI          Uniform Resource Identifier

URN          Uniform Resource Name

WIS          WMO Information System

WIGOS       WMO Integrated Global Observing System

WMO          World Meteorological Organisation

XML          Extensible Markup Language

XPath        XML Path Language

## 4.4      Namespace Abbreviations[2]

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

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

This list corresponds to external namespaces used by the WMO Core Metadata Profile and GAW Metadata Profile.

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[2] *Here and elsewhere in the document, text has been inserted from the specification document oft he WMO Core Metadata Profile v1.3.*

gco         Geographic Common extensible markup language (http://isotc211.org/2005/gco)

gmd         Geographic MetaData extensible markup language (http://isotc211.org/2005/gmd)

gml         Geography Markup Language (http://www.opengis.net/gml/3.2)

xlink       Xml LINKing language (http://www.w3.org/1999/xlink)

## 4.5    External Classes

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

*Table 3. Sources of UML Classes*

| Prefix | International Standard | Package |
|--------|----------------------|---------|
| CI | ISO 19115:2003/Cor. 1:2006 | Citation Information |
| EX | ISO 19115:2003/Cor. 1:2006 | Extent Information |
| MD | ISO 19115:2003/Cor. 1:2006 | Metadata Entity |
| DQ | ISO 19115:2003/Cor. 1:2006 | Data Quality |
| LI | ISO 19115:2003/Cor. 1:2006 | Lineage |

# Chapter 5 Obligation/Condition[3]

## 5.1 General

This is a descriptor indicating whether a metadata entity or metadata element shall always be documented in the metadata, or sometimes be documented (i.e. contains value(s)). This descriptor may have the following values: M (mandatory), C (conditional), or O (optional).

## 5.2 Mandatory (M):

The metadata entity or metadata element shall be documented.

## 5.3 Conditional (C):

Specifies an electronically manageable condition under which at least one metadata entity or a metadata element is mandatory. 'Conditional' is used for one of the three following possibilities:

- Expressing a choice between two or more options. At least one option is mandatory and must be documented.
- Documenting a metadata entity or a metadata element if another element has been documented.
- Documenting a metadata element if a specific value for another metadata element has been documented. To facilitate reading by humans, the specific value is used in plain text (ex. table in Clause B.2, row 3 "C/not defined by encoding?"). However, the code shall be used to verify the condition in an electronic user interface. If the answer to the condition is positive, then the metadata entity or the metadata element shall be mandatory.

## 5.4 Optional (O):

The metadata entity or the metadata element may be documented or may not be documented. Optional metadata entities and optional metadata elements have been defined to provide a guide to those looking to fully document their data. (Use of this common set of defined elements will help promote interoperability among geographic data users and producers world-wide.) If an optional entity is not used, the elements contained within that entity (including mandatory elements) will also not be used. Optional entities may have mandatory elements; those elements only become mandatory if the optional entity is used.

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[3] *Source: (ISO/TC 211, 2007)*

# Chapter 6   XML Encoding

WIS implementation is predicated on the publication of metadata records as XML documents. To establish inter-operability, this requirement is also imposed on GAW Metadata records generated for exchange within WIS.

→ *GAW metadata for exchange within the WIS shall be encoded in XML.*

## 6.1      ISO/TS 19139:2007 Compliance

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

## 6.2      Explicit Identification of Namespaces in XML

Use of a default (implied) namespaces in a metadata record may lead to misinterpretation of the XML document and failure to validate.

→ *Each GAW Metadata record shall explicitly define XML namespaces used within.*

## 6.3      GML Namespace

ISO/TS 19139:2007 is dependent on ISO 19136:2007 'Geographic information – Geography Markup Language (GML)'. ISO 19136:2007 relates to GML version 3.2.1.

→ *Each GAW Metadata record shall declare the associated namespace URN, namely* *http://www.opengis.net/gml/3.2*.

## 6.4      Declaring Compliance With the WMO Core Metadata Profile

A GAW Metadata record may declare compliance with version 1.3 of the WMO Core Metadata Profile as follows:

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

## 6.5      Uniqueness of Metadata Records within the WIS

The Manual on WIS (WMO No. 1060; WIS-TechSpec-1: Uploading of Metadata for Data and Products, Section 5.2) requires compliance of metadata records with the WMO Core Metadata Profile and the provision of a globally unique identifier for each WIS Discovery Metadata record. A WIS Discovery Metadata record shall be uniquely identified using the gmd:MD_Metadata/gmd:fileIdentifier attribute. As metadata records encoded using the GAW Metadata Profile are also intended for use within WIS, they also shall comply with this requirement.

→ *Each GAW Metadata record intended for use within WIS shall include one gmd:MD_Metadata/gmd:fileIdentifier attribute.*

→ *The gmd:MD_Metadata/gmd:fileIdentifier attribute for each GAW Metadata record for use within WIS shall be unique within the WIS.*

The WMO Core Metadata Profile Specification (WMO, 2013) should be consulted for further details and recommendations for this attribute.

## 6.6      Support of Discovery within WIS DAR Catalogue

The WMO Core Metadata Profile Specification (WMO, 2013) contains a comprehensive description of mandatory and optional elements of metadata records that support the discovery of content in the WIS DAR Catalogue. The GAW Metadata Profile complies with the requirements specified for the WMO Core Metadata Profile, but extends the requirements for the **keyword** and **boundingBox** attributes.

→ *Each GAW Metadata record shall specify the spatial extent of the data using the following identifiers:*
- id="Region"
- id="Country"
- id="Station"
- id="boundingGeographicBoundingBox"

## Chapter 7    Detailed Description of Structure of GAW Metadata Records

### 7.1    gmd:fileIdentifier

| Namespace:Entity | gmd:fileIdentifier |
|---|---|
| XPath | //gmd:MD_Metadata/gmd:fileIdentifier |
| Implementating class | gmd:MD_Metadata |
| Content | gco:CharacterString |
| Description | Within WIS, represents a globally unique file identifier identifying the metadata record |
| UML Diagram |  |

### 7.2    gmd:language

| Namespace:Entity | gmd:language |
|---|---|
| XPath | //gmd:MD_Metadata/gmd:language |
| Implementating class | gmd:MD_Metadata |
| Content | gco:CharacterString |
| Description | Specifies the language of the metadata record |
| UML Diagram |  |

### 7.3    gmd:characterSet

| Namespace:Entity | gmd:characterSet |
|---|---|
| XPath | //gmd:MD_Metadata/gmd:characterSet |
| Implementating class | gmd:MD_Metadata |
| Content | gmd:MD_CharacterSetCode codeListValue="utf8" |
| Description | Specifies the character set (encoding) of the metadata record |
| UML Diagram |  |

## 7.4    gmd:contact

| Namespace:Entity | gmd:contact |
|---|---|
| XPath | //gmd:MD_Metadata/gmd:contact |
| Implementating class | gmd:CI_ResponsibleParty |
| Content | gmd:contactInfo |
| Description | Specifies the party responsible for generating the metadata file |
| UML Diagram |  |

## 7.5    gmd:dateStamp

| | |
|---|---|
| **Namespace:Entity** | gmd:dateStamp |
| **XPath** | //gmd:MD_Metadata/gmd:dateStamp |
| **Implementating class** | gmd:MD_Metadata |
| **Content** | gco:Date |
| **Description** | Specifies the creation date of the metadata file. Dates must be specified according to ISO 8601, preferably as YYYY-MM-DD |
| **UML Diagram** | **MD_Metadata**<br>+ gmd:fileIdentifier [1]: CharacterString<br>+ gmd:language [1]: gmd:LanguageCode="eng"<br>+ gmd:characterSet [1]: MD_CharacterSetCode="utf8"<br>+ gmd:contact [1..*]: CI_ResponsibleParty<br>+ gmd:dateStamp [1]: Date<br>+ gmd:metadataStandardName [1]: CharacterString<br>+ gmd:metadataStandardVersion [1]: CharacterString |

## 7.6    gmd:metadataStandardName

| | |
|---|---|
| **Namespace:Entity** | gmd:metadataStandardName |
| **XPath** | //gmd:MD_Metadata/gmd:metadataStandardName |
| **Implementating class** | gmd:MD_Metadata |
| **Content** | gco:CharacterString |
| **Description** | Element shall be used in conjunction with <gmd:metadataStandardVersion> to declare compliance with WMO Core Metadata Profile by specifying "WMO Core Metadata Profile of ISO 19115 (WMO Core), 2003/Cor.1:2006 (ISO 19115), 2007 (ISO/TS 19139)" |
| **UML Diagram** | **MD_Metadata**<br>+ gmd:fileIdentifier [1]: CharacterString<br>+ gmd:language [1]: gmd:LanguageCode="eng"<br>+ gmd:characterSet [1]: MD_CharacterSetCode="utf8"<br>+ gmd:contact [1..*]: CI_ResponsibleParty<br>+ gmd:dateStamp [1]: Date<br>+ gmd:metadataStandardName [1]: CharacterString<br>+ gmd:metadataStandardVersion [1]: CharacterString |

## 7.7    gmd:metadataStandardVersion

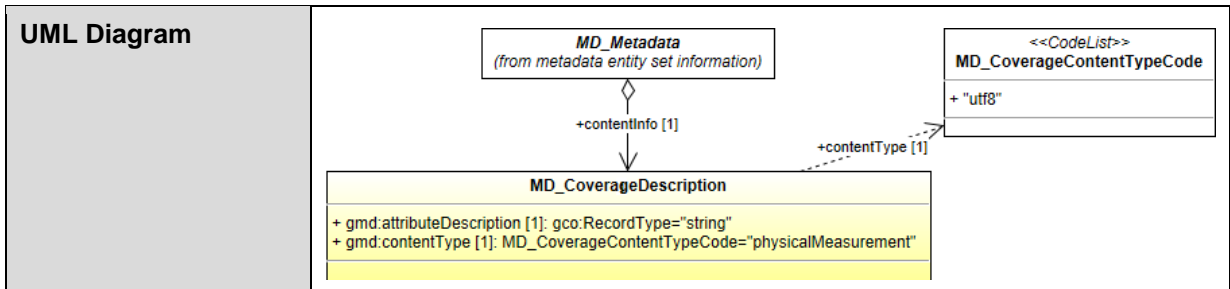| | |
|---|---|
| **Namespace:Entity** | gmd:metadataStandardVersion |
| **XPath** | //gmd:MD_Metadata/gmd:metadataStandardVersion |
| **Implementating class** | gmd:MD_Metadata |
| **Content** | gco:CharacterString |
| **Description** | Element shall be used in conjunction with <gmd:metadataStandardName> |

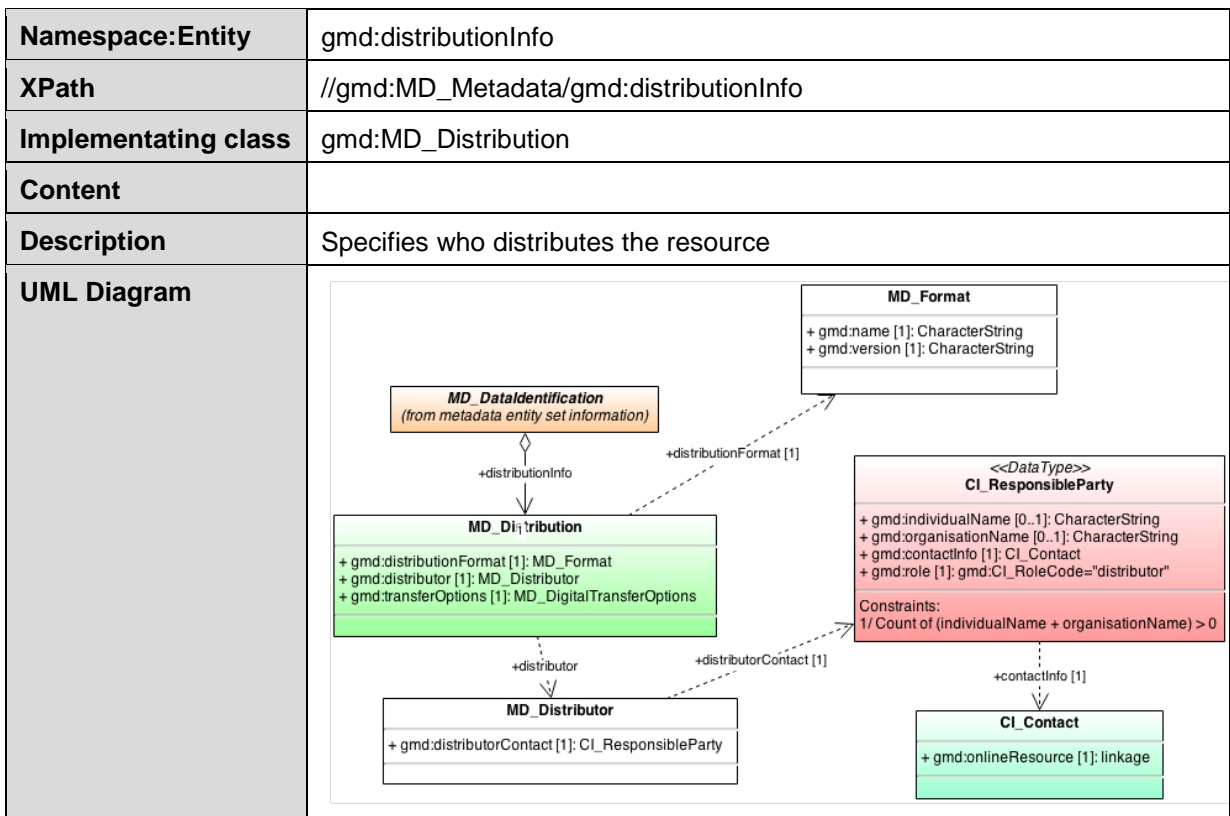| | |
|---|---|
| | to declare compliance with WMO Core Metadata Profile by specifying "1.3" |
| **UML Diagram** |  |

## 7.8 gmd:identificationInfo

| | |
|---|---|
| **Namespace:Entity** | gmd:identificationInfo |
| **XPath** | //gmd:MD_Metadata/gmd:identificationInfo |
| **Implementating class** | gmd:MD_DataIdentification |
| **Content** | |
| **Description** | This category identifies and describes the resource. |
| **UML Diagram** |  |

## 7.9 gmd:contentInfo
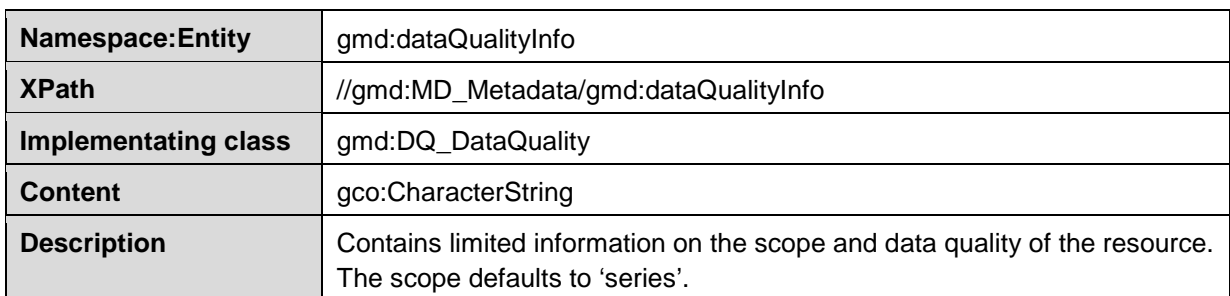
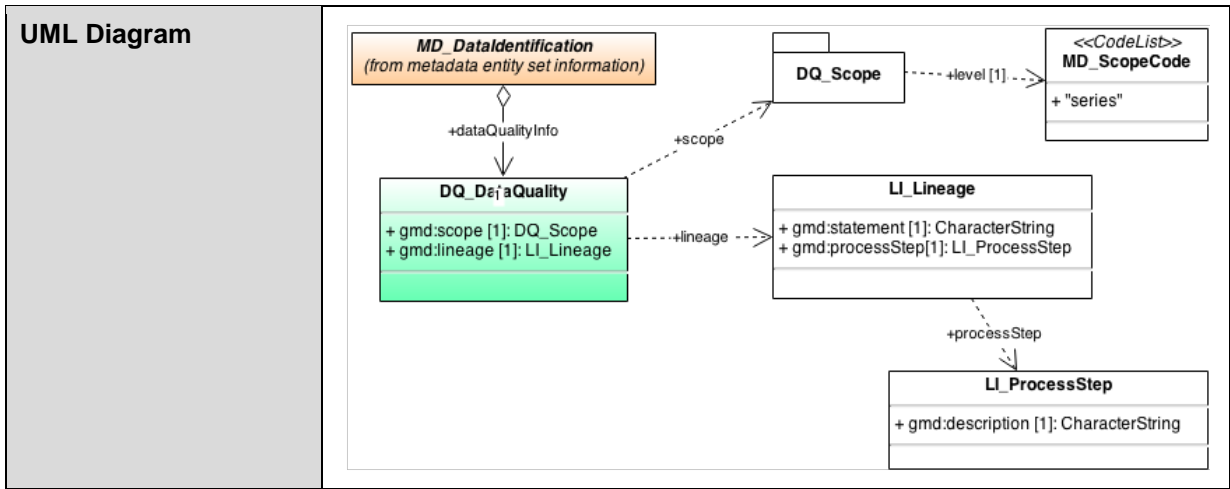| | |
|---|---|
| **Namespace:Entity** | gmd:contentInfo |
| **XPath** | //gmd:MD_Metadata/gmd:contentInfo |
| **Implementating class** | gmd:MD_CoverageDescription |
| **Content** | gco:CharacterString |
| **Description** | Specifies that the resource contains information about a 'physical measurement' |

| UML Diagram |  |
| --- | --- |

## 7.10    gmd:distributionInfo

| Namespace:Entity | gmd:distributionInfo |
| --- | --- |
| XPath | //gmd:MD_Metadata/gmd:distributionInfo |
| Implementating class | gmd:MD_Distribution |
| Content | |
| Description | Specifies who distributes the resource |
| UML Diagram |  |

## 7.11    gmd:dataQualityInfo

| Namespace:Entity | gmd:dataQualityInfo |
| --- | --- |
| XPath | //gmd:MD_Metadata/gmd:dataQualityInfo |
| Implementating class | gmd:DQ_DataQuality |
| Content | gco:CharacterString |
| Description | Contains limited information on the scope and data quality of the resource. The scope defaults to 'series'. |

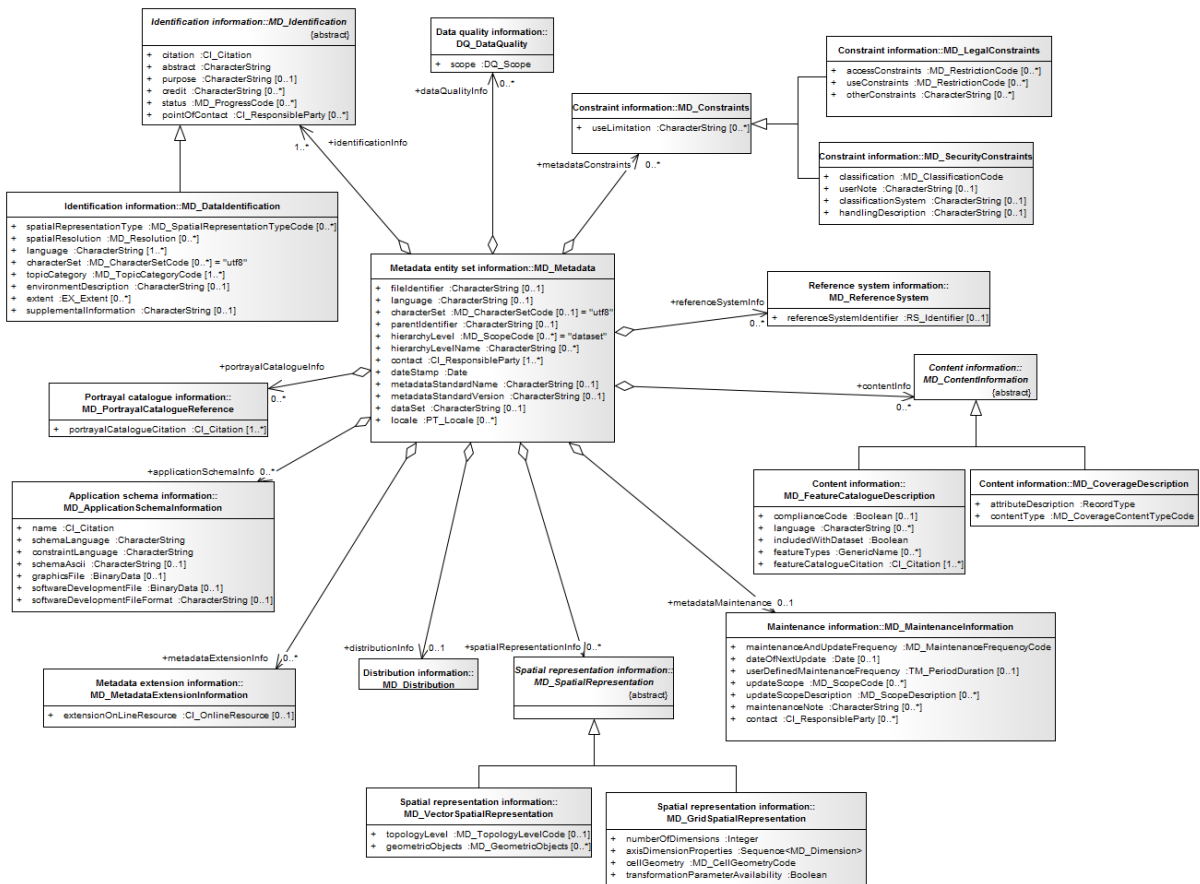| UML Diagram | |
|---|---|
| |  |

# Chapter 8 References

ISO/TC 211. (2007). ISO 19115:2003/Cor 1:2006 Geographic information -- Metadata. International Standards Organization (ISO).

WMO. (2013). *WMO Core Metadata Profile v1.3 Specification Part 1.* Retrieved 10 30, 2013, from WMO WIS Website: http://wis.wmo.int/2012/metadata/version_1-3/WMO_Core_Metadata_Profile_v1.3_Specification_Part_1_v1.0FINAL.pdf

WMO. (2013). *WMO Core Metadata Profile v1.3 Specification Part 2.* Retrieved 10 30, 2013, from WMO WIS Website: http://wis.wmo.int/2012/metadata/version_1-3/WMO_Core_Metadata_Profile_v1.3_Specification_Part_2_v1.0FINAL.pdf
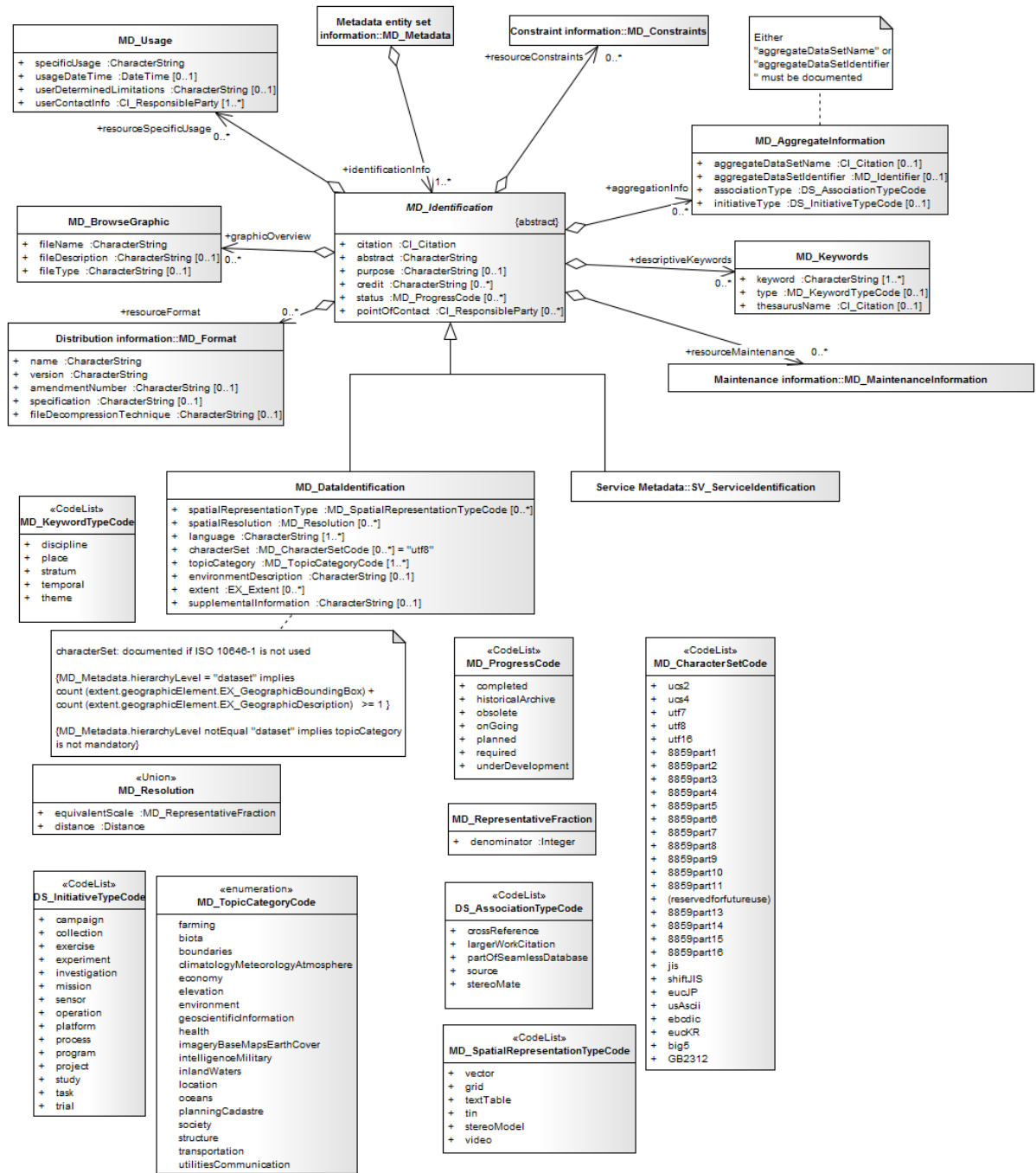
# APPENDIX A  UML Diagrams of ISO19115:2003/cor. 1:2006

## A.1.　Comprehensive Dataset Metadata Profile



(source: http://www.isotc211.org/hmmg/HTML/EARoot/EA14/EA2/EA2624.htm)

## A.2.  Identification Information



(source: http://www.isotc211.org/hmmg/HTML/EARoot/EA14/EA2/EA3/EA2718.htm)