

Global Map Specifications Version 2.1

Revised on 18 June 2011

For more information on the Global Mapping project,
please visit the Global Map site.

ISCGM Home Page
<http://www.iscgm.org/>



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1. Introduction

1.1 The need for a Global Map

Since the 1972 United Nations Human Environment Conference, people around the world have realised that solving global environmental problems must be done at a global scale through communication and collaboration. One principle declared at this conference was that, "International matters concerning the protection and improvement of the environment should be handled in a cooperative spirit by all countries, big and small, on an equal footing. Cooperation through multilateral or bilateral arrangements or other appropriate means is essential to effectively control, prevent, reduce and eliminate adverse environmental effects resulting from activities conducted in all spheres."

For this reason, international organizations and institutions provide and share map information about the changing state of the planet. The Agenda 21 plan resulting from 1992's Earth Summit (the United Nations Conference on Environment and Development held in Rio de Janeiro in June 1992) addressed the need for improved accessibility, quality, standardization, and availability of geographic information between nations. National and international organizations were urged to strengthen their mechanisms of information processing and exchange in order to, "Ensure effective and equitable availability of information," throughout the world.

This was reinforced by the Special Session of the United Nation General Assembly on the implementation of Agenda 21 held five years later. One resolution stated that, "A supportive environment needs to be established to enhance national capacities and capabilities for information collection, processing and dissemination, especially in developing countries, to facilitate public access to information on global environmental issues through appropriate means, including...global mapping."

"Initiatives and partnerships for global mapping," were strongly encouraged in the Johannesburg Plan of Implementation following the World Summit on Sustainable Development in 2002. The Global Map project was subsequently registered as an initiative following this summit with the goal of completing global coverage by the year 2007.

Clearly, it is essential that the citizens, researchers, and decision makers of the world have access to accurate, authoritative and up-to-date maps of fundamental environmental features if they are to fully understand and appreciate their shared global environment. Without the Global Map, reliable cartographic data and information of the entire world would remain difficult to find, get, and use. Participating national mapping organizations are urged to, "Foster the use of Global Map and identify the needs for basic geographic data and reflect these needs in new specifications."

This document contains the latest Global Map Specifications.

1.2 Purpose and intended use of the Global Map

The concept of Global Mapping and the establishment of an international body for Global Mapping were first proposed by the Ministry of Construction of Japan in 1992. In 1994, Geographical Survey Institute of Japan (GSI) proposed the first draft set of technical specifications. The Global Map project has grown significantly to involve the participation of many interested nations.

The main objective of this global project is to bring all nations and concerned organizations together to collaboratively develop and provide easy and open access to worldwide geographic information at a scale of 1:1,000,000. The use of these data will facilitate the implementation of global agreements and conventions for environmental protections; will support the monitoring of major environmental phenomena; and will encourage economic growth within the context of sustainable development. As part of this objective, Global Map products will be developed to this specification.

2. General Information

2.1 Product extents

The Global Map product will encompass the entire globe, at a scale of 1:1 million. All the data sets will be consistent with this scale and these specifications.

2.2 Reference coordinate system

The ITRF94 coordinate system will be adopted as the reference coordinate system. GRS80 ellipsoid will be adopted to represent the position of spatial objects in longitude and latitude. As the difference between these coordinates and WGS84 coordinates is negligible at the scale of this product, data in WGS84 will be taken to be in ITRF94.

2.3 Precision

A pair of longitude and latitude values describes the position of spatial objects. The data shall be stored in decimal degrees to a minimum of three decimal points as geographic coordinates with southern and western hemispheres having a negative sign for latitude and longitude, respectively.

Resolution of vertical values is 1 metre.

2.4 Accuracy

The positional accuracy of spatial data is the degree to which planimetric coordinates and elevations of features agree with their real world values. The planimetric accuracy will be composed of errors from three sources:

- The positional accuracy of the source material
- Errors due to conversion processes.
- Errors due to the manipulation processes.

Absolute horizontal and vertical accuracy will vary by location according to the source data. Absolute accuracy is defined as the difference between the stored coordinates and the true coordinates for a specific point.

For horizontal accuracy, 90% of points will be within $\pm 2\text{km}$ of their actual location. In the case of data obtained from satellite images, the maximum error is less than or equal to 0.5km.

Vertical accuracy is notionally ± 150 metres for 90% of points. This figure may need to be reviewed once the data are available, as sources to this accuracy may not be available in areas of high relief.

2.5 Series of Global Map

There are two series of Global Map. One is National and Regional version which each participating NMOs are basically in charge of development of their own Global Map. The other is Global Version which is developed by using satellite imagery with cooperation between participating NMOs and supporting stakeholders. (Global version covers only in vegetation layer and land cover layer.)

2.6 Relationship to other international efforts, specifications, and standards

The Global Map directly contributes to the development of a global Spatial Data Infrastructure. Formal relationships exist between the ISCGM and the GSDI, the GEOSS, and the One Geology initiatives. Global Map specifications have been written to comply with international standardization agreements, specifically the International Organization for Standardization (ISO) TC 211 recommendations for geographic data.

3. Data Model

Spatial features are organised into thematic layers, with each layer containing logically related geographic information. These layers will either be in vector or raster form.

3.1 Vector Data

3.1.1 Representation of features and layers

The layers in vector representation will include all those layers other than elevation, vegetation, land cover and land use. The features of the vector data model will be comprised of three spatial objects: points, edges and faces. (Formal ISO/TC211 terminology for these can be found in Appendix B.) Vector layers and the associated feature types are shown in the following table.

Layer	Feature name	Feature type	Inclusion	Abbreviation
Transportation	Airport	point	optional	airp
	Railroad Station	point	optional	rstatp
	Port	point	optional	portp
	Railroad	edge	mandatory	rail
	Road	edge	mandatory	roadl
	Trails and Tracks Line	edge	mandatory	trail
	Ferry route	edge	optional	ferryl
Boundaries	Political Boundary	point	mandatory	polbndp
	Coast Line	edge	mandatory	coastl
	Political Boundary Line	edge	mandatory	polbndl
	Political Boundary Area	face	mandatory	polbnda
Drainage	Miscellaneous (Dam/Weir/Island/Spring /Water-Hole)	point	optional	miscp
	Miscellaneous (Dam/Weir)	edge	optional	miscl
	Aqueduct/Canal/Flume/ Penstock	edge	optional	aquel
	Water Course	edge	mandatory	riverl
	Inland Water	face	mandatory	inwatera
Population Centres	Built-up Area	point	optional	builtupp
	Built-up Area	face	optional	builtupa

* The last character of abbreviation indicates primitive type (p: point, l: line, a: area).

Fig. 1 Vector layers and associated feature types

Note: Mandatory layers will only be populated where the features are present and are significant at the scale of the data.

International boundaries for the Global Map will be as defined by nations supplying data. Where adjoining nations supply different representations of the border both will be included in the product. All data will be identified as to its origin (see Appendix D).

3.1.2 Topology

Vector data in the Global Map will be partially topologically structured. Features stored as edges and faces will be individually structured.

Topology will be retained across the tile boundaries. Real world phenomena that cross the tile edge will have exactly the same coordinates on the nodes on the tile edge on each tile. This will enable the database to function as a seamless unit for analysis purposes. For example, in the diagram below, the road edge in both tiles will be matched at the edge of both tiles.

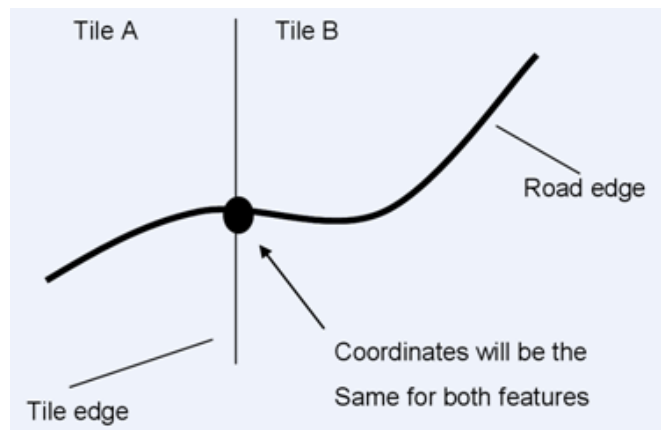


Fig. 2 Topology across the tile edge

3.1.3 Data quality

- Logical consistency will be kept.
- Features will not be duplicated or omitted where they meet the selection criteria.
- Metadata will document the data's quality (see section 5 Metadata).

3.2 Raster Data

3.2.1 Representation of features and layers

Raster grid cells will be arrayed on a horizontal coordinate system in degrees of latitude and longitude referenced to ITRF94 and GRS80. Small islands less than approximately 1 square kilometre may not be represented.

The following groups of features are stored as raster layers:

ELEVATION: The vertical distance between the surface of the earth and the standard sea level that the nation has defined. Vertical units represent elevation in meters above Mean Sea Level (MSL).

VEGETATION: Percent tree cover data by an integer value from 0 to 100 will be used as vegetation layer.

LAND COVER: GLCNMO global legend (APPENDIX D Table 2) will be used for land cover layer.

LAND USE: Codes developed for the Global Map (APPENDIX D Table 2) will be adopted.

3.2.2 Data structure

Cell size for raster data will be 30 arc-seconds by 30 arc-seconds. With the origin being the NW corner of the tile.

3.2.3 Determination of cell's attributes

A cell's attribute value represents a characteristic that is dominant near the centre position of the cell.

3.2.4 Header file

A header file will accompany each raster file. Items to be included in the header file are as follows. One of the figures in parentheses is chosen if there are any. Data will meet the default values where specified in parentheses and italicised.

BYTEORDER	Byte order in which image pixel values are stored. Big endian (<i>M</i>).
LAYOUT	organisation of the bands in the file (<i>BIL = band interleaved by line</i>) (<i>note: all files are single band images</i>)
NROWS	Number of rows (cells) in longitude direction of the image
NCOLS	Number of columns (cells) in latitude direction of the image
NBANDS	Number of spectral bands in the image (<i>1</i>)
NBITS	Number of bits per cell (<i>8 for land cover, land use and vegetation layers and 16 for elevation</i>)
BANDROWBYTES	Number of bytes of data per row
TOTALROWBYTES	Total number of bytes of data per row
BANDGAPBYTES	The number of bytes between bands in a BSQ format image (<i>0</i>)
NODATA	Value used for masking purposes (<i>For the higher, 9998 for elevation, 255 for vegetation, land cover, and land use. For the sea -9999 for elevation, 0 for vegetation, land cover, and land use.</i>)
ULXMAP	Longitude of the centre of the upper-left pixel
ULYMAP	Latitude of the centre of the upper-left pixel
XDIM	Width of a cell in longitude direction
YDIM	Width of a cell in latitude direction

A sample raster header file is at Appendix F.

3.2.5 Attributes description

The attribute for a raster file is the value of each of the cells, as referred to in the data dictionary.

3.3 Attributes

An attribute is a particular property of a feature.

The non-locational information about a feature instance will be stored as attributes. Attributes are classified into two groups: mandatory attributes and optional attributes. Names should be stored in roman characters without diacritical marks. Attributes other than names will be stored in English characters.

3.4 Data Dictionary

The data dictionary is included as Appendix D. The table lists vector and raster feature types and their attributes.

Vector features will be selected on the basis of their suitability for 1:1 million scale mapping and the feature definitions. As a result some feature types will only occur in the less densely settled areas where they are relatively more important than in the more densely settled areas. For example, Trails will be shown where there is not a well developed road network.

4. Output formats

For interoperability of Global Map uses, user friendly formats are defined independently with the official formats.

4.1 File format

4.1.1 Vector

GML 3.2.1, standardized in ISO19136, has replaced VPF as the official distribution format. This format provides a standard format for transferring digital geographic data. (Details are shown in Appendix H.)

4.1.2 Raster

BIL (Band Interleaved by Line) format; a simple binary raster format without embedded header will be adopted as the official distribution format. This type of data stores pixel information band by band for each line, or row, of the image. For example, given a one-band image such as the ones for Global Map, data is written for row 1, data is written for row 2, and so on, until the total number of rows in the image is reached. Vegetation, Land Cover and Land Use layers will be 8-bit unsigned data and the elevation data will be 16-bit signed.

A header file will accompany each raster file.

The data are stored in row major order (all the data for row 1, followed by all the data for row 2. etc.).

The elevation data are in big-endian byte order, that is, the most significant byte is stored first.

4.2 Area of file coverage (tiling)

4.2.1 Vector

Where a Nations territory is less than 3,000,000 square km the data are delivered as one separate file for each feature class.

For those Nations with territory spanning greater than 3,000,000 square km the data will be divided into tiles. Files should be adjusted so that extreme differences in size do not occur.

4.2.2 Raster

Whole national territory is basically defined as one file coverage,

The tiling of Global version series (referred to 2.5) is to be divided by the tiles of 30 deg x 30 deg which starts from the equator and the Greenwich meridian.

4.3 File names

4.3.1 Vector

Vector data have a file name of the form `www_xxx_y.zzz` where `www` identifies the abbreviation of the feature shown in fig.1, `xxx` identifies the country code which is defined at three-character ISO 3166 Nation Code, `y` shows the Unique ID (refer to 4.2) if a territory is divided, `zzz` is the extension identifying the data (gml). In the case that a nation territory is less than 3,000,000 square km and not needed to be tiling, the data have a file name of `www_xxx.zzz`

Example of file name

`coastl_ind_2.gml`: Coastline of Global Map India in gml format in the case of tiling

`coastl_jpn.gml`: Coastline of Global Map Japan in gml format in the case of no tiling

4.3.2 Raster

4.3.2.1 National and Regional version

National and Regional version of Raster data have a file name of the form `ww_xxx.zzz` where `ww` identifies the theme, `xxx` identifies the country code which is defined at three-character ISO 3166 Nation Code, and `zzz` is the extension identifying the data (bil) or the header (hdr).

Identifier	Theme
el	elevation
ve	vegetation
lc	land cover
lu	land use

Fig. 3 Theme identifiers for raster

4.3.2.2 Global version

Global version of Raster data have a file name of the form wwyy.zzz where ww identifies the theme, and yy identifies the file number as shown in the following Fig.4, and zzz is the extension identifying the data (bil) or the header (hdr)

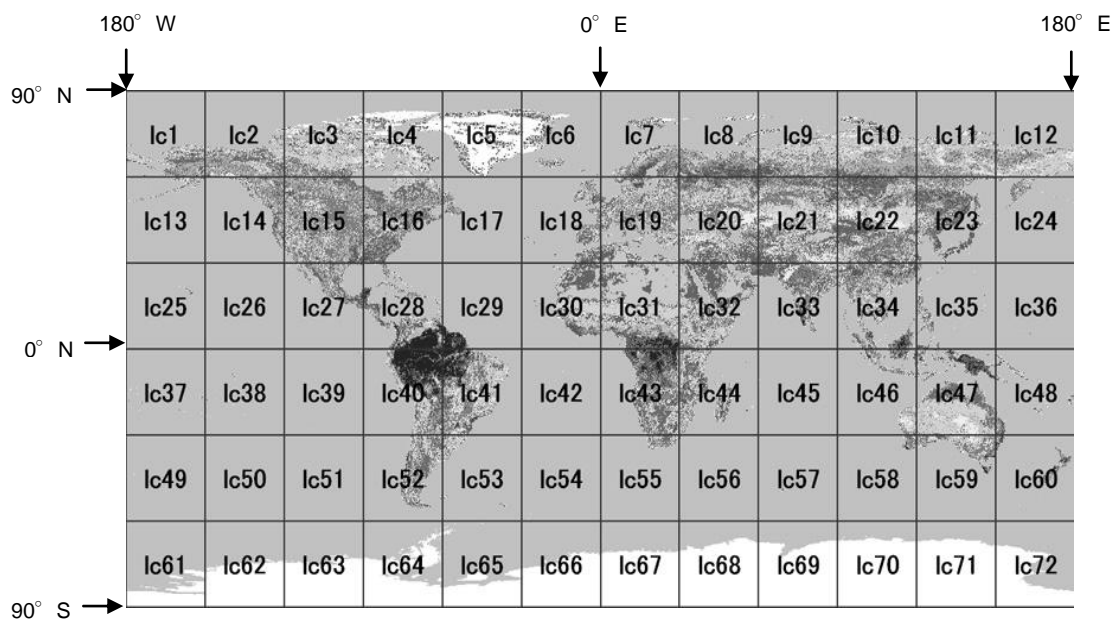


Fig.4 Tiling of Global version (ex. land cover)

4.4 Directory Structure

Each database directory such as gm_XXX will contain a national or a regional dataset. The directory structure is as follows.

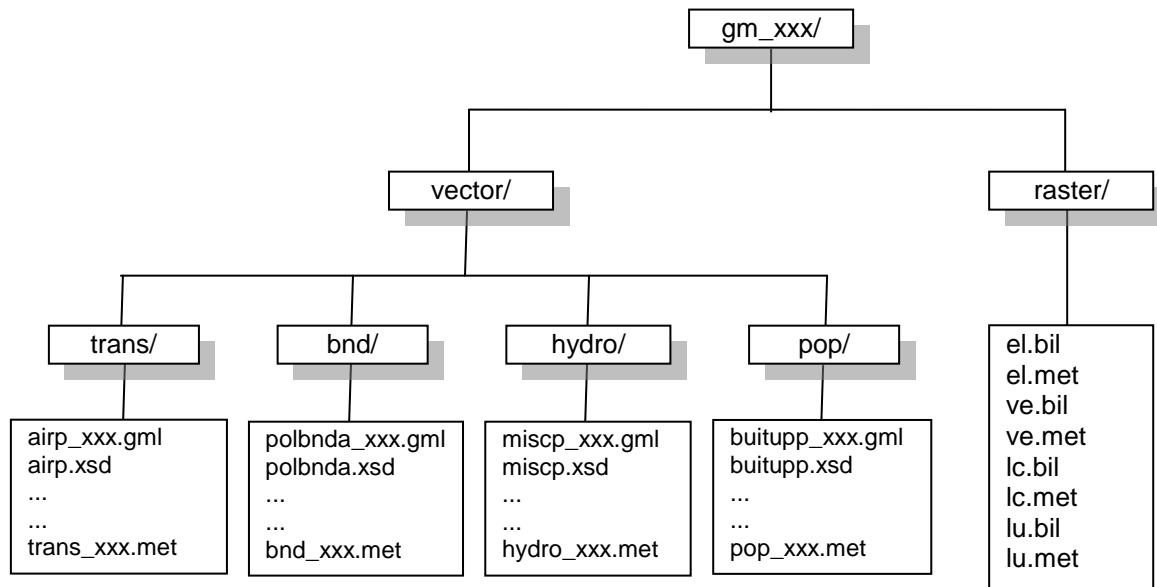


Fig. 5 Directory structure (ex. accompanying a metadata file in each layer)

5. Metadata

Metadata is data about the contents, quality, condition and other characteristics of the data. It also describes the lineage, process and accuracy of the dataset. Metadata for Global Map follows the Global Map metadata profile based on the ISO19115 core metadata elements and other essential elements for Global Map. Encoding methods follow ISO19139.

5.1 Metadata file

A metadata file accompanies each layer or feature. This file will be a XML file with utf8. Metadata have a file name of the form `www_XXX.zzz` where `www` identifies the abbreviation of the layer name or feature name shown table, `XXX` identifies the country code which is defined at three-character ISO 3166 Nation Code and `zzz` is the extension 'met'.

Example of file name (metadata)

`trans_ind.met`: name of the metadata file for transportation layer of Global Map India

`airp_jpn.met`: name of the metadata file for airport feature of Global Map Japan

5.2 Contents

The contents of metadata follow the ISO standard of metadata (ISO 19115). Metadata will be described in English. Metadata will be supplied separately for each layer in the dataset. For details, please refer to Appendix G.

6. Suggestions for change

Suggestions for changes or corrections to these Specifications should be referred to the Secretariat of ISCGM (sec@iscgm.org) or:

Secretariat of ISCGM
Geographical Survey Institute
Kitasato 1, Tsukuba, Ibaraki, 305-0811 JAPAN

7. Data Sources

When the Global Mapping project started, existing data was utilized as an initial Global Map data as follows.

Global 30 Arc Second Elevation Data Set (GTPO30) (US Geol. Survey, EROS Data Centre)

Elevation (DEM)

Global Land Cover Characteristics Database (US Geol. Survey, U. of Nebraska-Lincoln, EC Joint Research Centre).

Land Cover
Land Use
Vegetation

VMAP Level 0 (NGA)

Drainage System (rivers, streams, lakes)
Transportation (roads, railways, airports)
Political Boundaries (including coastlines)
Populated Places

8. References

Global Map Technical Specifications (Draft), Secretariat of ISCGM, Global Mapping Forum '97, Gifu, Japan.

Directorate of Geomatics, Department of National Defence, Canada, June 1997, *The Digital Geographic Information Exchange Standard (DIGEST)* URL: <http://www.digest.org> (custodian NGA).

NGA (former NIMA), 1995, *VMAP0 Military Specifications*, URL: <http://earth-info.nga.mil/publications/specs/> (MIL-STD-2407 and its Change Notice 1)

U.S. Geological Survey (USGS), University of Nebraska-Lincoln (UNL), and European Commission's Joint Research Centre (JRC), 1996, *Global Land Cover Characterization Data Set*, product documentation, URL: <http://edcns17.cr.usgs.gov/glcc/>

U.S. Geological Survey's EROS Data Center (EDC), 1996, *Global 30 Arc Second Elevation Data Set*, product documentation, URL: <http://www1.gsi.go.jp/geowww/globalmap-gsi/gtopo30/gtopo30.html>

APPENDIX A Update History of the Specifications

Discussions on the specifications of Global Map were started at ISCGM3 in Gifu, Japan on November 12-14, 1997 through discussions and subsequent adoption of provisional technical specifications. The discussions were thereafter continued at WG2 on Specifications. The specifications have been revised in contents as follows:

- Ver. 1.0: Adopted at ISCGM5 in Canberra, Australia on November 20, 1998.
- Ver. 1.1: Adopted at ISCGM7 in Cape Town, South Africa on March 16, 2000.
Text representation was amended.
- Ver. 1.2: Adopted at ISCGM12 in Cairo, Egypt on April 17, 2005.
A condition to express names thoroughly in upper case characters was modified so that the Secretariat can more smoothly process the data to upload them on the Web site. On the expression of a river mouth, it was decided to draw a temporary line on the border of river and sea.
- Ver. 1.2.1: Adopted at ISCGM13 in Santiago, Chile on November 11, 2006.
Small correction on the description of meta data (See Annex C) and correction on the expression of data dictionary were made.
- Ver. 1.3: Adopted at ISCGM14 in Cambridge, U. K. on July 14, 2007
Items on the data development and provision in tiling of the global coverage of “Land Cover data (GLCNMO)” and “Percent Tree Cover data” in Raster layers and description method of the header file, terminology and Data Dictionary were added.
- Ver. 2: Adopted at ISCGM16 in Bangkok, Thailand on October 25, 2009.
The specifications were totally revised based on the opinions from participating organization. The main points of this revision are as follows:
- Rearrangement of chapters and articles
 - Addition and deletion of features and attributes and attribute values in Vector layers
 - Change of official format in vector data from VPF to GML 3.2.1 standardized in ISO19136
 - Adoption of Metadata based on ISO19115
 - Change of the tiling method
 - Addition of “Update History of Specifications” as Appendixes
 - Some corrections on the description associated with points shown above and others

APPENDIX B Glossary of terms

Terminology definitions according to ISO/TC211 (Source: ISO/TC211 Terminology web page; URL: <http://www.isotc211.org/> dated 19th August 2008, except for “Attribute” and “Percent tree cover”)

Accuracy

Closeness of agreement between a test result and the accepted reference value.

Altitude

Distance of a point from a chosen reference surface along a line perpendicular to that surface.

Attribute

A property which describes a geometrical, topological, thematic, or other characteristic of an entity.

[ISO/TC 211 N 279, Geospatial services - Portrayal of Geographic Information; WG 4

Date of source document: 1996-10-23

Term status: comments given in ISO/TC 211/WG 1/PT 04 N 015

Document status: Working Draft]

Boundary

Set that represents the limit of an entity.

Code

Representation of a label according to a specified scheme.

Connected node

Node that starts or ends one or more edges.

Coordinate

One of a sequence of n numbers designating the position of a point in n-dimensional space.

Curve

1-dimensional geometric primitive, representing the continuous image of a line.

Data

Reinterpretable representation of information in a formalised manner suitable for communication, interpretation, or processing.

Data element

Unit of data that, in a certain context, is considered indivisible.

Dataset

Identifiable collection of data.

Edge

1-dimensional topological primitive.

Face

2-dimensional topological primitive.

Feature

Abstraction of real world phenomena.

Feature attribute

Characteristic of a feature.

Geographic data

Data with implicit or explicit reference to a location relative to the Earth.

Grid

Network composed of two or more sets of curves in which the members of each set intersect the members of the other sets in an algorithmic way.

Metadata

Data about data

NOTE — Metadata for geographic data typically provides information about its identification, extent, quality, spatial and temporal schema, spatial reference, metadata and distribution.

Metadata element

Discrete unit of metadata.

Model

Abstraction of some aspects of reality.

Node

0-dimensional topological primitive.

Percent tree cover

A percentage of the area covered by a vertical projection of the canopy of the tree within a unit mapping area or a pixel.

Point

0-dimensional geometric primitive, representing a position.

Quality

Totality of characteristics of a product that bear on its ability to satisfy stated and implied needs.

Raster

Usually rectangular pattern of parallel scanning lines forming or corresponding to the display on a cathode ray tube.

Schema

Formal description of a model.

Spatial object

Object used for representing a spatial characteristic of a feature.

Surface

2-dimensional geometric primitive, locally representing a continuous image of a region of a plane.

Vector

Quantity having direction as well as magnitude.

APPENDIX C Acronyms and Abbreviations

BIL	Byte Interleaved by Line
BSQ	Band Sequential
DEM	Digital Elevation Model
DIGEST	Digital Geographic Information Exchange Standard
GLCNMO	Global Land Cover by NMO
GML	Geography Markup Language
GRS80	Geodetic Reference System 1980
GTOPO30	Global digital elevation model (DEM) with a horizontal grid spacing of 30 arc seconds.
ISCGM	International Steering Committee for Global Mapping
ISO	International Organization for Standardization
ITRF94	International Terrestrial Reference Frame 1994
MSL	Mean Sea Level
VMAP0	Vector Smart Map Level 0
VPF	Vector Product Format
WG	Working Group
WGS84	World Geodetic System 84
XML	Extensible Markup Language

APPENDIX D Global Map Data Dictionary

Table 1 Vector data

Optional features are put in parentheses in italics such as (*Airport*).

The attribute named 'soc' will identify the source country for the data. Values will be the country code of the country supplying the data (see Appendix E). The additional value 'vma' will indicate data that has been taken unchanged from the Vmap level 0 products.

Definitions in this dictionary are based on DIGEST Edition 2.1 September 2000 as reference.

Field size of * is a variable length field and may be of any length.

Layer	Feature Name	Abbreviation	Definition	Feature type	Attributes	Field name	Field type	Field size (bytes)	Value type/codes	Value Description or Example
Transportation	<i>(Airport)</i>	airp	A defined area used for landing, take-off and movement of aircraft including associated buildings and facilities.	point	FACC feature code	f_code	Character text string	5	GB005	
					ICAO designator	iko	Character text string	4	UNK Actual value	if not applicable eg FAJS
					IATA designator	ita	Character text string	3	UNK Actual value	if not applicable eg NRT
					Name	nam	Character text string	*	UNK Actual value	Unknown eg JOHANNESBURG INTERNATIONAL
					Usage	use	Number (short integer)	2	0 4 8 22 23 999	Unknown National (Domestic) Military/Defence Joint Military/Defence/ Civilian International Other
					Airfield/Aerodrome elevation	zv3	Number (short integer)	2	-999 -500 to 9999	Unknown Elevation in metres

Layer	Feature Name	Abbreviation	Definition	Feature type	Attributes	Field name	Field type	Field size (bytes)	Value type/codes	Value Description or Example
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap level 0
	(Railroad Station)	rstatp	A stopping place for the transfer of passengers and/or freight.	point	FACC feature code	f_code	Character text string	5	AQ125	
					Name	nam	Character text string	*	UNK Actual value	Unknown eg Tokyo
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap level 0
	Railroad	raill	A rail or set of parallel rails on which a train or tram runs.	edge	FACC feature code	f_code	Character text string	5	AN010	
					Existence category	exs	Number (short integer)	2	2 5 28 55 59	Doubtful Under construction Operational Unexamined/Unsurveyed Not useable
					Feature configuration	fco	Number (short integer)	2	0 2 3	Unknown Multiple Single
					Location	loc	Number (short integer)	2	0 4 8 25 999	Unknown Below surface/ Submerged underground On ground surface Suspended or elevated above ground or water surface Other
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap level 0
	Road	roadl	An open way maintained for vehicular use.	edge	FACC feature code	f_code	Character text string	5	AP030	

Layer	Feature Name	Abbreviation	Definition	Feature type	Attributes	Field name	Field type	Field size (bytes)	Value type/codes	Value Description or Example
					Accuracy category	acc	Number (short integer)	2	1 2	Accurate Approximate
					Existence category	exs	Number (short integer)	2	2 5 28 55	Doubtful Under construction Operational Unexamined/Unsurveyed
					Surface	rst	Number (short integer)	2	0 1 2	Unknown Paved Not paved
					Median category	med	Number (short integer)	2	0 1 2	Unknown With median Without median
					Route intended use	rtt	Number (short integer)	2	0 14 15 16 999	Unknown Primary route Secondary route Highway Other
					Seasonal availability	rsu	Number (short integer)	2	0 1 2	Unknown All year Seasonal
					Location	loc	Number (short integer)	2	0 4 8 25 999	Unknown Below surface / Submerged underground On ground surface Suspended or elevated above ground or water surface Other
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap label 0
	Trails and Tracks Line	trail	A path worn by the passage of people or animals.	edge	FACC feature code	f_code	Character text string	5	AP050	
					Existence category	exs	Number (short integer)	2	2 5 28	Doubtful Under construction Operational

Layer	Feature Name	Abbreviation	Definition	Feature type	Attributes	Field name	Field type	Field size (bytes)	Value type/codes	Value Description or Example
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendic E for country codes list (eg USA) Vmap lebel 0
	(Ferry Route)	ferryl	A ferry route in a body of inland water connecting a road or railroad.	edge	FACC feature code	f_code	Character text string	5	AQ070	
					Transportation use category	tuc	Number (short integer)	2	3 4	Railroad Road
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap lebel 0
	(Port)	portp	A point where a ferry takes on or discharges its load.	point	FACC feature code	f_code	Character text string	5	AQ080	
					Name	nam	Character text string	*	UNK Actual value	Unknown eg Yokohama port
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap lebel 0
Boundaries	Political Boundary	polbndp	An area controlled by administrative authority.	point	FACC feature code	f_code	Character text string	5	FA001	
					Country code	coc	Character text string	3	Country code	See Appendix E for county codes list (eg USA)
					State/Province/ Prefecture name	nam	Character text string	*	UNK Actual value	if not applicable eg VIRGINIA
					Local admistrative area name	laa	Character text string	*	UNK Actual value	if not applicable eg FAIRFAX
					Population	pop	Number (long integer)	4	-99999999 -89999999 Actual value	Unknown * ¹ Attributed in the main polygon (see the end of Appendix D) eg 10000
					Year of population census	ypc	Number (short integer)	2	0 Actual value	Unknown eg 2009
					Administrative code	adm_co de	Chatacter text string	*	UNK Actual value	if not applicable

Layer	Feature Name	Abbreviation	Definition	Feature type	Attributes	Field name	Field type	Field size (bytes)	Value type/codes	Value Description or Example
					SALB code	salb	Character text string	*	UNK Actual value	if not applicable eg JPN001001
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap level 0
	Coast Line	coastl	The line where a land mass is in contact with a body of water.	edge	FACC feature code	f_code	Character text string	5	BA010	
					Accuracy category	acc	Number (short integer)	2	0 1 2 3	Unknown Accurate Approximate Tentative
					Existence category	exs	Number (short integer)	2	0 1 3 44 46 55 60	Unknown Definite Tentative Approximate/About Man-made Unexamined/Unsurveyed Indefinite (shoreline)
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap level 0
	Political Boundary Line	polbndl	A line of demarcation between controlled areas.	edge	FACC feature code	f_code	Character text string	5	FA000	
					Boundary status type	bst	Number (short integer)	2	1 2 3	Definite Indefinite In dispute
					Usage	use	Number (short integer)	2	23 26 30 39	International Primary ie state Secondary ie local Special
					Source Country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap level 0
	Political Boundary Area	polbnda	An area controlled by administrative authority.	face	FACC feature code	f_code	Character text string	5	FA001	

Layer	Feature Name	Abbreviation	Definition	Feature type	Attributes	Field name	Field type	Field size (bytes)	Value type/codes	Value Description or Example
					Country code	coc	Character text string	3	Country code	See Appendix E for county codes list (eg USA)
					State/Province/Prefecture name	nam	Character text string	*	UNK Actual value	if not applicable eg VIRGINIA
					Local administrative area name	laa	Character text string	*	UNK Actual value	if not applicable eg FAIRFAX
					Population	pop	Number (long integer)	4	-99999999 -89999999 Actual value	Unknown * ¹ Attributed in the main polygon (see the end of Appendix D) eg 10000
					Year of population census	ypc	Number (short integer)	2	0 Actual value	Unknown eg 2009
					Administrative code	adm_code	Character text string	*	UNK Actual value	if not applicable
					SALB code	salb	Character text string	*	UNK Actual value	if not applicable eg JPN001001
					Source Country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap level 0
Drainage	(Miscellaneous (Dam/Weir/Island/Spring/Water-Hole))	miscp	A permanent barrier across a watercourse used to impound water or to control its flow.	point	FACC feature code	f_code	Character text string	5	BI020	
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap level 0
	(Miscellaneous (Dam/Weir))	miscl	A permanent barrier across a watercourse used to impound water or to control its flow.	edge	FACC feature code	f_code	Character text string	5	BI020	
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap level 0
	(Aqueduct/Canal/Flume/)	aquel	A pipe or artificial channel designed to transport water from a remote source,	edge	FACC feature code	f_code	Character text string	5	BH000	

Layer	Feature Name	Abbreviation	Definition	Feature type	Attributes	Field name	Field type	Field size (bytes)	Value type/codes	Value Description or Example
	Penstock)		usually by gravity. A man-made or improved natural waterway used for transportation. An open, inclined channel which carries water for use in such operations as mining or logging. A pipeline or channel generally used by hydroelectric plants or water mills to transport water by gravity or under pressure.		Existence category	exs	Number (short integer)	2	0 1 5 6	Unknown Definite Under construction Abandoned/Disused
					Locaton category	loc	Number (short integer)	2	0 4 8 25 999	Unknown Below surface/Submerged underground On ground surface Suspended or elevated above ground or water surface Other
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap lebel 0
	Water Course	riverl	A natural flowing watercourse. (from origin to end point)	edge	FACC feature code	f_code	Character text string	5	BH140	
					Hydrological category	hyc	Number (short integer)	2	0 6 8	Unknown Non-perennial/Intermittent/ Fluctuating Perennial/Permanent
					Line type	lit	Number (short integer)	2	0 1 2	Unknown Single line stream Network connector/Imaginary line
					Name	nam	Character text string	*	UNK Actual value	Unknown eg NILE
					Source country or VMA	soc	Character text string	3	Country code Vma	See Appendix E for country codes list (eg USA) Vmap lebel 0
	Inland Water	inwatera	Any known inland waterway body, such as: lake/pond, reservoir, river/stream, etc. requiring separation into individual features due to status/type grouping that is currently indeterminable.	face	FACC feature code	f_code	Character text string	5	BH000	
					Hydrological category	hyc	Number (short integer)	2	0 6 8	Unknown Non-perennial/Intermittent/ Fluctuating Perennial/Permanent

Layer	Feature Name	Abbreviation	Definition	Feature type	Attributes	Field name	Field type	Field size (bytes)	Value type/codes	Value Description or Example
					Hydrological type	hyt	Number (short integer)	2	0 1 4 7 10 13 16	Unknown River Lake Lagoon Reservoir Swamp or marsh Glacier
					Name	nam	Character text string	*	UNK Actual value	Unknown eg LAKE TANGANYIKA
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap level 0
Population Centres	(Built-up Area)	builtupp	An area containing a concentration of buildings and other structures.(smaller than Built-up Area(face))	point	FACC feature code	f_code	Character text string	5	AL020	
					Population	pop	Number (long integer)	4	-99999999 -89999999 Actual value	Unknown * ¹ Attributed in the main polygon (see the end of Appendix D) eg10000
					Year of population census	ypc	Number (short integer)	2	0 Actual value	Unknown eg 2009
					Name	nam	Character text string	*	UNK Actual value	Unknown eg EMBARCACION
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap level 0
	(Built-up Area)	builtupa	An area containing a concentration of buildings and other structures.(larger than Built-up Area(point))	face	FACC feature code	f_code	Character text string	5	AL020	
					Population	pop	Number (long integer)	4	-99999999 -89999999 Actual value	Unknown * ¹ Attributed in the main polygon (see the end of Appendix D) eg 10000

Layer	Feature Name	Abbreviation	Definition	Feature type	Attributes	Field name	Field type	Field size (bytes)	Value type/codes	Value Description or Example
					Year of population census	ypc	Number (short integer)	2	0 Actual value	Unknown eg 2009
					Name	nam	Character text string	*	UNK Actual value	Unknown eg NAIROBI
					Source country or VMA	soc	Character text string	3	Country code vma	See Appendix E for country codes list (eg USA) Vmap label 0

*¹ The population value of multiple polygons will be assigned to main area and “-89999999”, indicating “attributed in the main polygon” will be assigned to the other polygons.

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Layer	Definition	Feature Class	Value	Value Meaning
Elevation	Elevation above mean sea level.	cell	-407 to 8752	Elevation in metres
			-9999	areas masked as sea
Vegetation	Percent tree cover	cell	0 to 100	Percent
			254	areas masked as water bodies
			255	areas of no data
Land Cover	GLCNMO land cover classification	cell	1	<p>Broadleaf Evergreen Forest LCC Code: 21496-121340 LCC Formula: A3A20B2XXD1E1-A21 LCC Label: Broadleaved Evergreen Closed to Open (100-40)% Trees (No differentiation has been made between Cultivated-managed and/or Natural and Semi-natural Vegetation) The main layer consists of broadleaved evergreen closed to open trees. The crown cover is between 100 and 40%. The height is in the range of >30 - 3m. Tree type plantation or orchard of broadleaved evergreen tree is included in this class.</p>
			2	<p>Broadleaf Deciduous Forest LCC Code: 21497-121340 LCC Formula: A3A20B2XXD1E2-A21 LCC Label: Broadleaved Deciduous Closed to Open (100-40)% Trees (No differentiation has been made between Cultivated-managed and/or Natural and Semi-natural Vegetation) The main layer consists of broadleaved deciduous closed to open trees. The crown cover is between 100 and 40%. The height is in the range of >30 - 3m. Tree type plantation or orchard of broadleaved deciduous tree is included in this class.</p>
			3	<p>Needleleaf Evergreen Forest LCC Code: 21499-121340 LCC Formula: A3A20B2XXD2E1-A21 LCC Label: Needleleaved Evergreen Closed to Open (100-40)% Trees (No differentiation has been made between Cultivated-managed and/or Natural and Semi-natural Vegetation) The main layer consists of needleleaved evergreen closed to open trees. The crown cover is between 100 and 40%. The height is in the range of >30 - 3m.</p>

				Tree type plantation or orchard of needleleaved evergreen tree is included in this class.
			4	<p>Needleleaf Deciduous Forest</p> <p>LCC Code: 21500-121340</p> <p>LCC Formula: A3A20B2XXD2E2-A21</p> <p>LCC Label: Needleleaved Deciduous Closed to Open (100-40)% Trees (No differentiation has been made between Cultivated-managed and/or Natural and Semi-natural Vegetation)</p> <p>The main layer consists of needleleaved deciduous closed to open trees. The crown cover is between 100 and 40%. The height is in the range of >30 - 3m.</p> <p>Tree type plantation or orchard of needleleaved deciduous tree is included in this class.</p>
			5	<p>Mixed Forest</p> <p>LCC Code: 21495 / 21498</p> <p>LCC Formula: A3A20B2XXD1 / A3A20B2XXD2</p> <p>LCC Label: Broadleaved Closed to Open Trees /Needleleaved Closed to Open Trees (No differentiation has been made between Cultivated-managed and/or Natural and Semi-natural Vegetation)</p> <p>The main layer consists of broadleaved closed to open trees. The crown cover is between 100 and 40%. The height is in the range of >30 - 3m. / The main layer consists of needleleaved closed to open trees. The crown cover is between 100 and 40%. The height is in the range of >30 - 3m.</p> <p>Tree type plantation or orchard of mixed trees is included in this class.</p>
			6	<p>Tree Open</p> <p>LCC Code: 20014-3012</p> <p>LCC Formula: A3A11B2-A13</p> <p>LCC Label: Open (40 - (20-10)%) Trees (Woodland)</p> <p>The main layer consists of open trees. The crown cover is between 40 and (20-10)%. The height is in the range of >30 - 3m.</p>
			7	<p>Shrub</p> <p>LCC Code: 21450</p> <p>LCC Formula: A4A20B3</p> <p>LCC Label: Closed to Open Shrubland (Thicket)</p> <p>The main layer consists of closed to open shrubland. The crown cover is between 100 and 15%. The height is in the range of 5 - 0.3m.</p> <p>Shrub type plantation or orchard is included in this class.</p>
			8	<p>Herbaceous</p> <p>LCC Code: 21639</p> <p>LCC Formula: A2A20B4XXXXXXF1</p> <p>LCC Label: Closed to Open Herbaceous Vegetation, Single Layer (No differentiation has been made between Cultivated-managed and/or Natural and Semi-natural Vegetation)</p> <p>The main layer consists of closed to open herbaceous vegetation. The crown cover is between 100 and 15%. The height is in the range of 3 - 0.03m. The vegetation consists of one single layer.</p> <p>Pasture is included in this class.</p>

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			9	<p>Herbaceous with Sparse Tree / Shrub LCC Code: 21642 LCC Formula: A2A20B4XXXXXXF2F5F10G2F2F6F10G3 LCC Label: Closed to Open Herbaceous Vegetation with Trees and Shrubs The main layer consists of closed to open herbaceous vegetation. The crown cover is between 100 and 15%. The height is in the range of 3 - 0.03m. The second layer consists of sparse trees. The third layer consists of sparse shrubs.</p>
			10	<p>Sparse Vegetation LCC Code: 20059 // 20050 LCC Formula: A2A14B4 // A1A14B1 LCC Label: Sparse Herbaceous Vegetation // Sparse Woody Vegetation The main layer consists of sparse herbaceous vegetation. The crown cover is between (20-10) and 1%. The height is in the range of 3 - 0.03m but may be further defined into a smaller range. // The main layer consists of sparse woody vegetation. The crown cover is between (20-10) and 1%. The height is in the range of 7 - 2m.</p>
			11	<p>Cropland LCC Code: 10025 LCC Formula: A3 LCC Label: Herbaceous Crop(s) A defined area is covered by herbaceous crops. This class excludes paddy field and pasture.</p>
			12	<p>Paddy field LCC Code: 10037// 10049 LCC Formula: A4 // A5 LCC Label: Graminoid Crops //Non-Graminoid Crops A defined area is covered with graminoid crops. // A defined area is covered with non-graminoid crops. The main cover type is rice paddy influenced by the presence of water. This class includes water hyacinth as fodder, lotus root as food crop, and so on.</p>
			13	<p>Cropland /Other Vegetation Mosaic LCC Code: 0003 / 0004 // 0006 / 0004 LCC Formula: A11 / A12 // A23 / A12 LCC Label: Cultivated and Managed Terrestrial Area(s) /Natural And Semi-Natural Primarily Terrestrial Vegetation //Cultivated Aquatic or Regularly Flooded Area(s) /Natural And Semi-Natural Primarily Terrestrial Vegetation Primarily vegetated areas containing more than four percent vegetation during at least two months a year. The environment is influenced by the edaphic substratum. Some part of the vegetative cover is characterised by the removal of the (semi)natural vegetation and replacement with a vegetative cover resulting from human activities. This cover is artificial and requires maintenance. It is grown with the intention to be managed and/or (partly) harvested at the end of the growing season. Before or after harvest there may be a period without vegetative cover. The other part of the vegetative cover is characterised by the presence of (semi)natural vegetation which species composition, its environmental and ecological processes are indistinguishable from, or in a process of achieving, its undisturbed state. The vegetative cover is not artificial and does not need to be managed nor maintained. The mosaicked surface of cropland and tree plantation is included in this class.</p>

				Also the mosaicked surface of cropland and other vegetation influenced by the presence of water is included in this class.
			14	<p>Mangrove</p> <p>LCC Code: 41520-R3</p> <p>LCC Formula: A1A20B1-R3</p> <p>LCC Label: Closed to Open Woody Vegetation Water Quality: Saline Water</p> <p>The main layer consists of closed to open woody vegetation. The crown cover is between 100 and 15%. The height is in the range of 7 - 2m.</p> <p>Water Quality: Saline. Depending on the level of Total Dissolved Solids (TDS) expressed in parts per million (ppm), three classes are distinguished: fresh, brackish and saline water (Cowardin et al., 1979).</p> <p>1) Fresh Water: Less than 1 000 ppm TDS.</p> <p>2) Brackish Water: Between 1 000 and 10 000 ppm TDS.</p> <p>3) Saline Water: More than 10 000 ppm TDS.</p>
			15	<p>Wetland</p> <p>LCC code: 41520-R1 // 41520-R2 // 42156</p> <p>LCC formula: A1A20B1-R1 // A1A20B1-R2 // A2A20B4</p> <p>LCC Label: Closed to Open Woody Vegetation Water Quality: Fresh Water // Closed to Open Woody Vegetation Water Quality: Brackish Water // Closed to Open Herbaceous Vegetation</p> <p>The main layer consists of closed to open woody vegetation. The crown cover is between 100 and 15%. The height is in the range of 7 - 2m. // The main layer consists of closed to open woody vegetation. The crown cover is between 100 and 15%. The height is in the range of 7 - 2m. // The main layer consists of closed to open herbaceous vegetation. The crown cover is between 100 and 15%. The height is in the range of 3 - 0.03m.</p> <p>Water Quality: Fresh Water or Brackish Water. Depending on the level of Total Dissolved Solids (TDS) expressed in parts per million (ppm), three classes are distinguished: fresh, brackish and saline water (Cowardin et al., 1979).</p> <p>1) Fresh Water: Less than 1 000 ppm TDS.</p> <p>2) Brackish Water: Between 1 000 and 10 000 ppm TDS.</p> <p>3) Saline Water: More than 10 000 ppm TDS.</p>
			16	<p>Bare area, consolidated (gravel, rock)</p> <p>LCC code: 6001</p> <p>LCC formula: A1</p> <p>LCC Label: Consolidated Material(s)</p> <p>The land cover consists of consolidated material(s).</p>
			17	<p>Bare area, unconsolidated (sand)</p> <p>LCC code: 6004</p> <p>LCC formula: A2</p> <p>LCC Label: Unconsolidated Material(s)</p> <p>The land cover consists of unconsolidated material(s).</p>
			18	<p>Urban</p> <p>LCC code: 0010</p> <p>LCC formula: B15</p> <p>LCC Label: Artificial Surfaces and Associated Area(s)</p>

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				The environment is influenced by the edaphic substratum. The cover is artificial and a result of human activities. Vegetated urban is included in this class.
			19	Snow / Ice LCC code: 8006 // 8009 LCC formula: A2B1 // A3B1 LCC Label: Perennial Snow // Perennial Ice The land cover consists of perennial snow. // The land cover consists of perennial ice. Perennial: The snow / ice covers the surface for more than 9 months each year in all years.
			20	Water Bodies LCC code: 7001 // 8001 LCC formula: A1 // A1 LCC Label: Artificial Waterbodies // Natural Waterbodies The land cover consists of artificial water bodies. A further specification can be made in flowing or standing water. // The land cover consists of natural water bodies.
			255	no data
Land Use	Global Map land use classification	cell	10	Forest: <i>Area dominated by trees higher than shrubs with a canopy cover greater than or equal to 10 percent.</i>
			20	Mixture: <i>Area where more than two classes are mixed including Non-vegetated area, Agricultural area, Grassland/Shrub and Wetland. This class is not applied where one class dominates.</i>
			30	Grassland/shrub: <i>Area covered by trees with canopy cover less than 10percent.</i>
			40	Agricultural area: <i>Area where agricultural activities are implemented constantly.</i>
			50	Wetland: <i>Area where underground water level is near the ground surface, or area with humid soil.</i>
			60	Barren area: <i>Non-vegetated area where no artificial structures exist.</i>
			70	Built-up area: <i>Area where artificial structures occupy significant surfaces.</i>
			80	Drainage/water: <i>Area inside coastline forming water surface.</i>
			90	Ocean: <i>Area outside coastline forming water surface.</i>
			255	no data

“GLCNMO land cover classification” in the above table is used for global or continental land cover products. LCC code and LCC formula in the Value Meaning column is the land cover definition by Land Cover Classification System version 2 (LCCS2) developed by FAO (<http://www.glcnlccs.org/>). “/” in LCC code and LCC formula means “or”.

(Informative) Table 3 Raster data (Former Global Map Specifications before version 1.2.1)

The definitions and classifications of vegetation and land cover data were revised in Specifications version 1.3. On the other hand, vegetation and land cover data based on former Specifications are released from ISCGM website together with some national websites. The former specifications about vegetation and land cover data are shown below for reference.

Layer	Definition	Feature Class	Value	Value Meaning
Vegetation	Global Map Vegetation Classification (Modified Walter)	cell	10	Tropical rainforest: <i>Evergreen forest which has high rainfall and high humidity throughout the year. This class has an upper canopy formed by trees from 30 to 40m tall and may have occasional emerging trees taller than the upper canopy.</i>
			20	Hydrotropic forest: <i>Deciduous broad-leaved trees which are defoliated in dry season and foliate in rainy season.</i>
			30	Grassland in tropical or sub-tropical zone: <i>Grassland which has a long dry season and is heavily dried. Trees are only sparsely distributed. Plant density depends on dryness.</i>
			40	Semi desert in tropical or sub-tropical zone: <i>Plants are sparsely distributed in the area which has a little rainfall and is heavily dried</i>
			50	Desert in tropical or sub-tropical zone: <i>Plants are very sparsely distributed in the area which has a little rainfall and is extremely dried.</i>
			60	Evergreen thick-leaved forest: <i>Forest which has high rainfall in the rainy season and is relatively dried in summer. Trees which have evergreen thick and hard leaves dominate this forest.</i>
			70	Evergreen broad-leaved forest: <i>Forest in the warm temperate zone which has high rainfall in summer, or is humid throughout the year. Broad-leaved trees which have a little larger leaves than evergreen thick-leaved trees are the main component of this forest.</i>
			80	Deciduous broad-leaved forest: <i>Forest which mainly consists of trees defoliated in winter. This forest appears in the area which has sufficient rainfall in cool temperate zone.</i>
			90	Grassland in temperate zone: <i>Grassland in drier climates in temperate zone. No trees grow.</i>
			100	Semi-desert in temperate zone: <i>Heavily dried area in the temperate zone. Grasses, such as mugwort and pigweed cover this area.</i>
			110	Desert in temperate zone: <i>Extremely dried area in temperate zone. Grasses, such as mugwort and pigweed cover this area.</i>
			120	Northern coniferous forest: <i>Coniferous trees in semi-frigid zone which has very cold and long winter. Trees in this forest are usually evergreen</i>
			130	Tundra: <i>Plant colony consists of shrub, grass with broad leaves, moss and lichen. Trees cannot become tall due to severe cold.</i>
			140	Water body: <i>Water surfaces, such as rivers and lakes.</i>
			150	Ice and snow: <i>Area which is covered with snow and ice throughout the year.</i>
			210	Wetland: <i>Vegetated area with waterlogged soils or surface water for significant periods of the year.</i>
			220	Mixed forest: <i>Forest containing a mixture of types. Usually deciduous and coniferous.</i>
			230	Mixed land: <i>Area containing a mosaic of other types.</i>
			240	Non natural: <i>Cultivated, urban or otherwise modified vegetation.</i>
			250	Unclassified: <i>Areas not included in other classifications. For example, barren land.</i>
Land Cover	International Geosphere Biosphere Programme Land Cover Classification (DISCOVER data set)	cell	1	Evergreen Needleleaf Forest: <i>Lands dominated by trees with a percent canopy cover >60% and height exceeding 2 meters. Almost all trees remain green all year. Canopy is never without green foliage.</i>

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			2	Evergreen Broadleaf Forest: Lands dominated by trees with a percent canopy cover > 60% and height exceeding 2 meters. Almost all trees remain green all year. Canopy is never without green foliage.
			3	Deciduous Needleleaf Forest: Lands dominated by trees with a percent canopy cover > 60% and height exceeding 2 meters. Consists of seasonal needleleaf tree communities with an annual cycle of leaf-on and leaf-off periods.
			4	Deciduous Broadleaf Forest: Lands dominated by trees with a percent canopy cover > 60% and height exceeding 2 meters. Consists of seasonal broadleaf tree communities with an annual cycle of leaf-on and leaf-off periods.
			5	Mixed Forest: Lands dominated by trees with a percent canopy cover > 60% and height exceeding 2 meters. Consists of tree communities with interspersed mixtures or mosaics of the other four forest cover types. None of the forest types exceeds 60% of the landscape.
			6	Closed Shrublands: Lands with woody vegetation less than 2 meters tall and with shrub canopy cover > 60%. The shrub foliage can be either evergreen or deciduous.
			7	Open Shrublands: Lands with woody vegetation less than 2 meters tall and with shrub canopy cover between 10-60%. The shrub foliage can be either evergreen or deciduous.
			8	Woody Savannas: Lands with herbaceous and other understory systems, and with forest canopy cover between 3-60%. The forest cover height exceeds 2 meters.
			9	Savannas: Lands with herbaceous and other understory systems, and with forest canopy cover between 10-30%. The forest cover height exceeds 2 meters.
			10	Grasslands: Lands with herbaceous types of cover. Tree and shrub cover is less than 10%.
			11	Permanent Wetlands: Lands with a permanent mixture of water and herbaceous or woody vegetation that cover extensive areas. The vegetation can be present in either salt, brackish, or fresh water.
			12	Croplands: Lands covered with temporary crops followed by harvest and a bare soil period (e.g., single and multiple cropping systems). Note that perennial woody crops will be classified as the appropriate forest or shrub land cover type.
			13	Urban and Built-Up: Land covered by buildings and other man-made structures.
			14	Cropland/Natural Vegetation Mosaic: Lands with a mosaic of croplands, forests, shrublands, and grasslands in which no one component comprises more than 60% of the landscape.
			15	Snow and Ice: Lands under snow and/or ice cover throughout the year.
			16	Barren or Sparsely Vegetated: Lands with exposed soil, sand, rocks, or snow and never has more than 10% vegetated cover during any time of the year.
			17	Water Bodies: Oceans, seas, lakes, reservoirs, and rivers. Can be either fresh or salt water bodies.

(Informative) Table 4 Comparative listing between the legend of land cover based on current specifications (after version 1.3) and former ones (before version 1.2.1)

Land cover data based on former Specifications (before version 1.2.1) are also available together with ones based on specifications after version 1.3. Comparative listing between current land cover legend and former one is shown below for reference.

Current land Cover (After Specification version 1.3)	Former land cover (Before specifications version 1.2.1)
1. Broadleaf Evergreen Forest	2. Evergreen Broadleaf Forests
2. Broadleaf Deciduous Forest	4. Deciduous Broadleaf Forests
3. Needleleaf Evergreen Forest	1. Evergreen Needleleaf Forests
4. Needleleaf Deciduous Forest	3. Deciduous Needleleaf Forests
5. Mixed Forest	5. Mixed Forests
6. Tree Open	8. Woody Savannas
7. Shrub	6. Closed Shrublands 7. Open Shrublands
8. Herbaceous, single layer	10. Grasslands
9. Herbaceous with Sparse and Tree/Shrub	9. Savanna
10. Sparse Vegetation	16. Barren
11. Cropland	12. Croplands
12. Paddy field	
13. Cropland/Natural Vegetation Mosaic	14. Cropland/Natural Vegetation Mosaics
14. Mangrove	11. Permanent Wetlands
15. Wetland	
16. Bare area, consolidated (gravel, rock)	16. Barren
17. Bare area, unconsolidated (sand)	
18. Urban	13. Urban and Built-up
19. Snow/Ice	15. Snow and Ice
20. Water Bodies	17. Water Bodies

APPENDIX E Three-character ISO 3166 Nation Code

Country	3 character code
Afghanistan	AFG
Åland Islands	ALA
Albania	ALB
Algeria	DZA
American Samoa	ASM
Andorra	AND
Angola	AGO
Anguilla	AIA
Antigua and Barbuda	ATG
Argentina	ARG
Armenia	ARM
Aruba	ABW
Australia	AUS
Austria	AUT
Azerbaijan	AZE
Bahamas	BHS
Bahrain	BHR
Bangladesh	BGD
Barbados	BRB
Belarus	BLR
Belgium	BEL
Belize	BLZ
Benin	BEN
Bermuda	BMU
Bhutan	BTN
Bolivia (Plurinational State of)	BOL
Bosnia and Herzegovina	BIH
Botswana	BWA
Brazil	BRA
British Virgin Islands	VGB
Brunei Darussalam	BRN
Bulgaria	BGR
Burkina Faso	BFA
Burundi	BDI
Cambodia	KHM
Cameroon	CMR
Canada	CAN
Cape Verde	CPV
Cayman Islands	CYM

Country	3 character code
Central African Republic	CAF
Chad	TCD
Channel Islands	
Chile	CHL
China	CHN
Hong Kong Special Administrative Region of China	HKG
Macao Special Administrative Region of China	MAC
Colombia	COL
Comoros	COM
Congo	COG
Cook Islands	COK
Costa Rica	CRI
Côte d'Ivoire	CIV
Croatia	HRV
Cuba	CUB
Cyprus	CYP
Czech Republic	CZE
Democratic People's Republic of Korea	PRK
Democratic Republic of the Congo	COD
Denmark	DNK
Djibouti	DJI
Dominica	DMA
Dominican Republic	DOM
Ecuador	ECU
Egypt	EGY
El Salvador	SLV
Equatorial Guinea	GNQ
Eritrea	ERI
Estonia	EST
Ethiopia	ETH
Faeroe Islands	FRO
Falkland Islands (Malvinas)	FLK
Fiji	FJI
Finland	FIN
France	FRA
French Guiana	GUF
French Polynesia	PYF
Gabon	GAB
Gambia	GMB
Georgia	GEO

Country	3 character code
Germany	DEU
Ghana	GHA
Gibraltar	GIB
Greece	GRC
Greenland	GRL
Grenada	GRD
Guadeloupe	GLP
Guam	GUM
Guatemala	GTM
Guernsey	GGY
Guinea	GIN
Guinea-Bissau	GNB
Guyana	GUY
Haiti	HTI
Holy See	VAT
Honduras	HND
Hungary	HUN
Iceland	ISL
India	IND
Indonesia	IDN
Iran (Islamic Republic of)	IRN
Iraq	IRQ
Ireland	IRL
Isle of Man	IMN
Israel	ISR
Italy	ITA
Jamaica	JAM
Japan	JPN
Jersey	JEY
Jordan	JOR
Kazakhstan	KAZ
Kenya	KEN
Kosovo	*RKS
Kiribati	KIR
Kuwait	KWT
Kyrgyzstan	KGZ
Lao People's Democratic Republic	LAO
Latvia	LVA
Lebanon	LBN
Lesotho	LSO
Liberia	LBR
Libyan Arab Jamahiriya	LBY
Liechtenstein	LIE

Country	3 character code
Lithuania	LTU
Luxembourg	LUX
Madagascar	MDG
Malawi	MWI
Malaysia	MYS
Maldives	MDV
Mali	MLI
Malta	MLT
Marshall Islands	MHL
Martinique	MTQ
Mauritania	MRT
Mauritius	MUS
Mayotte	MYT
Mexico	MEX
Micronesia (Federated States of)	FSM
Monaco	MCO
Mongolia	MNG
Montenegro	MNE
Montserrat	MSR
Morocco	MAR
Mozambique	MOZ
Myanmar	MMR
Namibia	NAM
Nauru	NRU
Nepal	NPL
Netherlands	NLD
Netherlands Antilles	ANT
New Caledonia	NCL
New Zealand	NZL
Nicaragua	NIC
Niger	NER
Nigeria	NGA
Niue	NIU
Norfolk Island	NFK
Northern Mariana Islands	MNP
Norway	NOR
Occupied Palestinian Territory	*PSE
Oman	OMN
Pakistan	PAK
Palau	PLW
Panama	PAN
Papua New Guinea	PNG

Country	3 character code
Paraguay	PRY
Peru	PER
Philippines	PHL
Pitcairn	PCN
Poland	POL
Portugal	PRT
Puerto Rico	PRI
Qatar	QAT
Republic of Korea	KOR
Republic of Moldova	MDA
Réunion	REU
Romania	ROU
Russian Federation	RUS
Rwanda	RWA
Saint-Barthélemy	BLM
Saint Helena	SHN
Saint Kitts and Nevis	KNA
Saint Lucia	LCA
Saint-Martin (French part)	MAF
Saint Pierre and Miquelon	SPM
Saint Vincent and the Grenadines	VCT
Samoa	WSM
San Marino	SMR
Sao Tome and Principe	STP
Saudi Arabia	SAU
Senegal	SEN
Serbia	SRB
Seychelles	SYC
Sierra Leone	SLE
Singapore	SGP
Slovakia	SVK
Slovenia	SVN
Solomon Islands	SLB
Somalia	SOM
South Africa	ZAF
Spain	ESP
Sri Lanka	LKA
Sudan	SDN
Suriname	SUR
Svalbard and Jan Mayen Islands	SJM
Swaziland	SWZ
Sweden	SWE

Country	3 character code
Switzerland	CHE
Syrian Arab Republic	SYR
Tajikistan	TJK
Thailand	THA
The former Yugoslav Republic of Macedonia	MKD
Timor-Leste	TLS
Togo	TGO
Tokelau	TKL
Tonga	TON
Trinidad and Tobago	TTO
Tristan da Cunha	*TDC
Tunisia	TUN
Turkey	TUR
Turkmenistan	TKM
Turks and Caicos Islands	TCA
Tuvalu	TUV
Uganda	UGA
Ukraine	UKR
United Arab Emirates	ARE
United Kingdom of Great Britain and Northern Ireland	GBR
United Republic of Tanzania	TZA
United States of America	USA
United States Virgin Islands	VIR
Uruguay	URY
Uzbekistan	UZB
Vanuatu	VUT
Venezuela (Bolivarian Republic of)	VEN
Viet Nam	VNM
Wallis and Futuna Islands	WLF
Western Sahara	ESH
Yemen	YEM
Zambia	ZMB
Zimbabwe	ZWE

* The codes shown below which are not designed by ISO 3166 are used as a country code for attribute value in vector data (For details, refer to Appendix D).

Kosovo	RKS
Palestinian	PSE
Tristan da Cunha	TDC
China and Democratic People's Republic of Korea	C&P

APPENDIX F Sample header file for Raster representation

BYTEORDER	M
LAYOUT	BIL
NROWS	600
NCOLS	600
NBANDS	1
NBITS	8
BANDROWBYTES	600
TOTALROWBYTES	600
BANDGAPBYTES	0
NODATA	
ULXMAP	100.00416666666667
ULYMAP	9.995833333333333
XDIM	0.008333333333333
YDIM	0.008333333333333

APPENDIX G Metadata

1. Foreword

Global Map Metadata Profile is based on ISO 19115 core metadata elements and other profiles to provide information about Global Map data. This profile is created strictly according to the rules for creating a profile in ISO/IS 19115 clause C6.

2. Normative reference

All normative references of this profile are the same as ISO19115.

3. Terms, definitions, symbols and abbreviated terms

Terms, definitions, symbols and abbreviated terms used in this profile refer to those in ISO19115.

4. Metadata

4.1 Descriptions of Metadata package

Metadata package members of this metadata profile are shown in the following table. Metadata package is a subset of metadata that define the related metadata entities and elements. Metadata element is a base component of metadata and assembly of elements will be a metadata entity. Moreover, assembly of entity under the same theme will be a metadata package. Metadata package corresponds to UML (Unified Modeling Language) package, metadata entity corresponds to UML class, and metadata element corresponds to UML class or role of association.

Package	Explanation
Metadata entity set information	This package includes all root classes for describing metadata, and indicates their correlation
Identification information	Identification information is for identifying particular data set. It includes citation, abstract, purpose, credits and contact information of the information resource.
Constraint information	This package includes information about constraint matters such as access constraints and use constraints.
Data quality information	This package is composed of information describing the quality of the data. Lineage information is described.
Maintenance information	This package is composed of information describing the maintenance and update practice for information.
Reference system	This package is composed of information describing the spatial reference

information	system used.
Distribution information	This package is composed of information describing the information for accessing resource.
Extent information	This package is composed of information describing the spatial and temporal extent covered by a resource.
Citation and responsible party information	This package is composed of authoritative reference information including responsible party and contact information.

4.2 Relationship between Metadata packages and Metadata entities

Relationship between metadata packages and metadata entities is shown in the following table.

Metadata entity corresponding to the package is listed in the second line (named entity).

Corresponding numbers are also indicated in UML diagram line and data dictionary line.

Metadata package	Entity	UML diagram (Figure)	Data dictionary
Metadata entity set information	MD_Metadata	G.A.1	G.B.2.1
Identification information	MD_Identification	G.A.2	G.B.2.2
Constraint information	MD_Constraints	G.A.3	G.B.2.3
Data quality information	DQ_DataQuality	G.A.4	G.B.2.4
Lineage information	LI_Lineage	G.A.5	G.B.2.4
Maintenance information	MD_MaintenanceInformation	G.A.6	G.B.2.5
Reference system information	MD_ReferenceSystem	G.A.7	G.B.2.6
Distribution information	MD_Distribution	G.A.8	G.B.2.7
Extent information	EX_Extent	G.A.9	G.B.3.1
Citation and responsible party information	CI_Ciation CI_ResponsibleParty	G.A.10	G.B.3.2

Annex G.A (normative)

Metadata schemas

G.A.1 Metadata UML models

Metadata for describing Global Map data is defined using an abstract object model in the Unified Modeling Language (UML)

G.A.2 Metadata package UML diagrams

G.A.2.1 Metadata entity set information

Figure G.A.1 defines the class “MD_Metadata” and shows containment relationships with the other metadata classes which, in aggregate, define metadata for geographic data. The other metadata class diagrams can be found on the following pages. The data dictionary for this diagram is located in G.B.2.1.

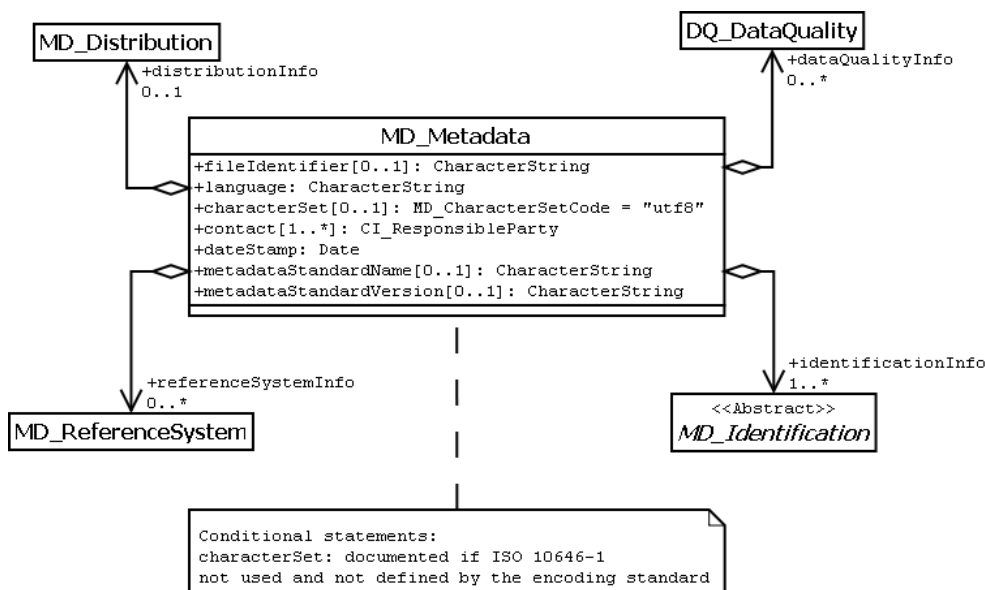


Figure G.A.1 --- Metadata entity set information

G.A.2.2 Identification information

Figure G.A.2 defines the metadata classes required to identify a resource. It also defines separate specialization sub-classes for identifying data and services. The data dictionary for this diagram is located in G.B.2.2.

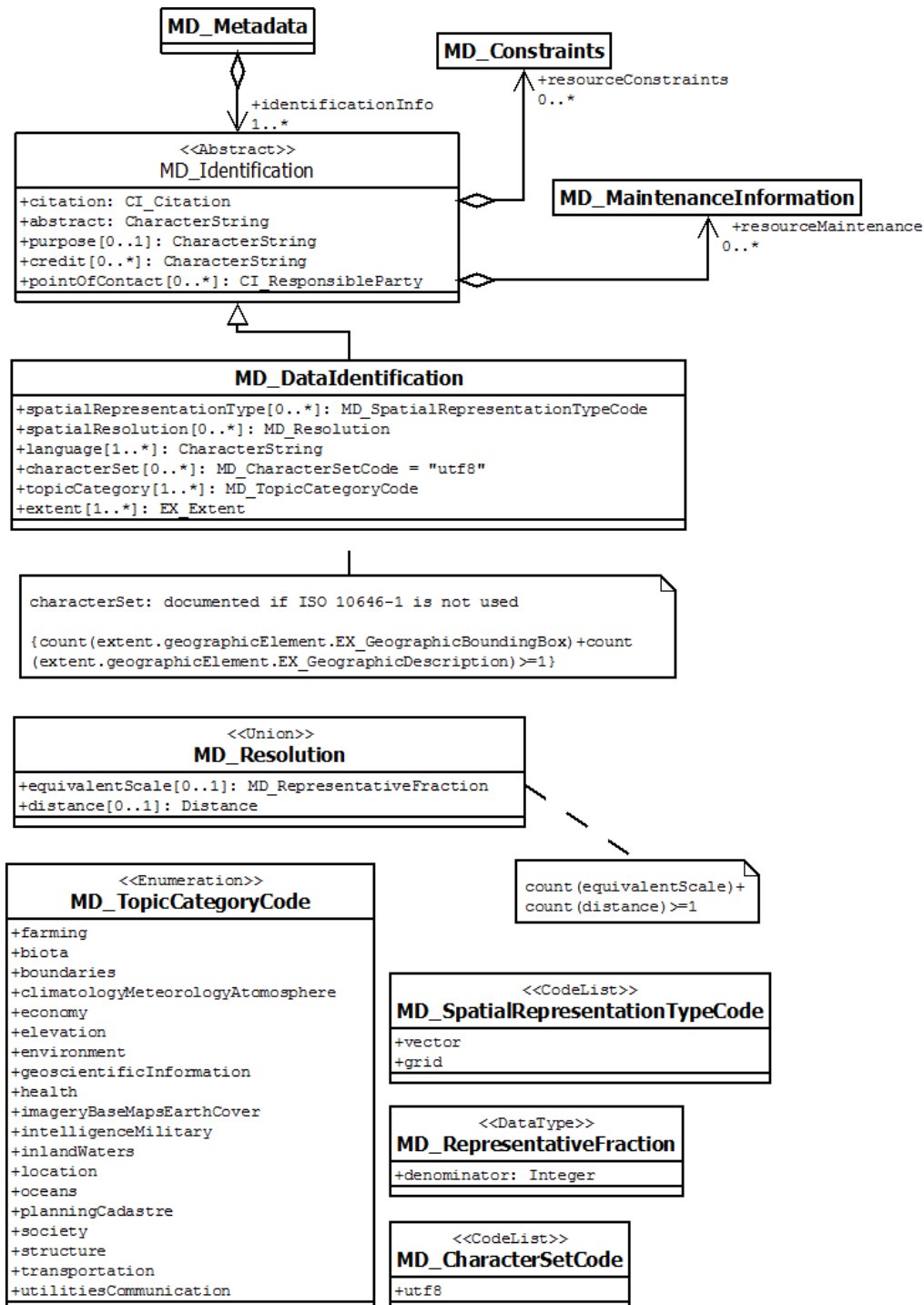


Figure G.A.2 --- Identification information

G.A.2.3 Constraint information

Figure G.A.3 defines the metadata required for managing rights to information including restrictions on access and use. The data dictionary for this diagram is located in G.B.2.3

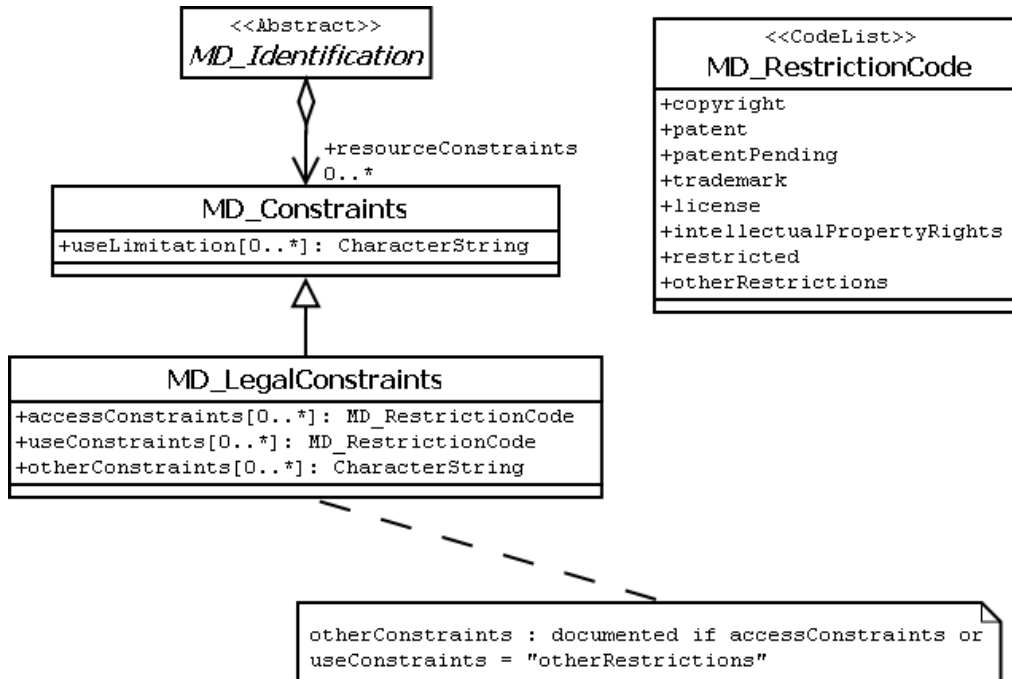


Figure G.A.3 --- Constraint information

G.A.2.4 Data quality information

G.A.2.4.1 General

Figure G.A.4 defines the metadata required to give a general assessment of the quality of resource. The data dictionary for this diagram is located in G.B.2.4

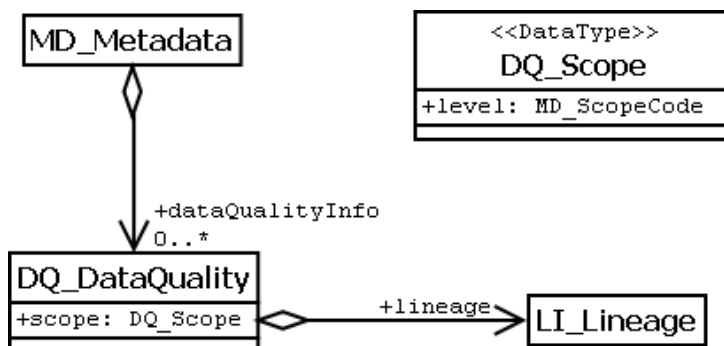


Figure G.A.4 --- Data quality information

G.A.2.4.2 Lineage information

Figure G.A.5 defines metadata required to describe the sources and production processes used in producing a dataset. The data dictionary for this diagram is located in G.B.2.4.

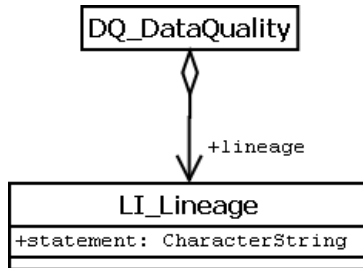


Figure G.A.5 --- Lineage information

G.A.2.5 Maintenance information

Figure G.A.6 defines the metadata required to describe the maintenance and update practices for information. The data dictionary for this diagram is located in G.B.2.5.

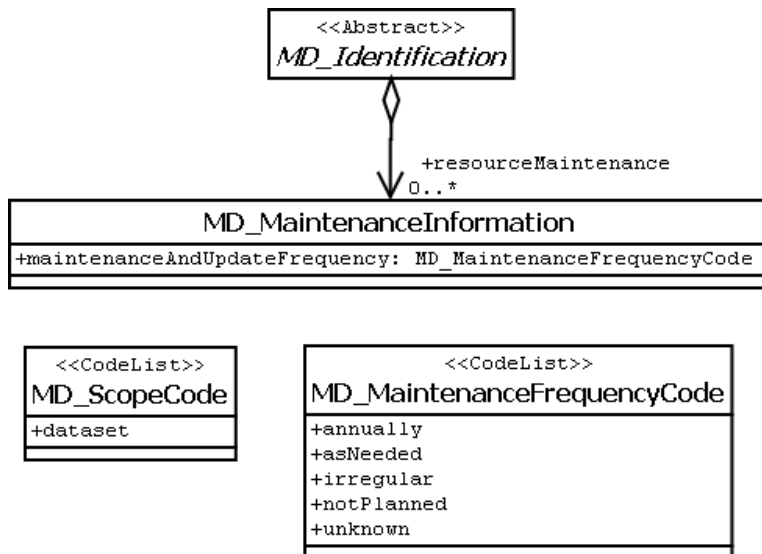


Figure G.A.6 --- Maintenance information

G.A.2.6 Reference system information

Figure G.A.7 defines metadata required to describe the spatial and temporal reference system used. The data dictionary for this diagram is located in G.B.2.6

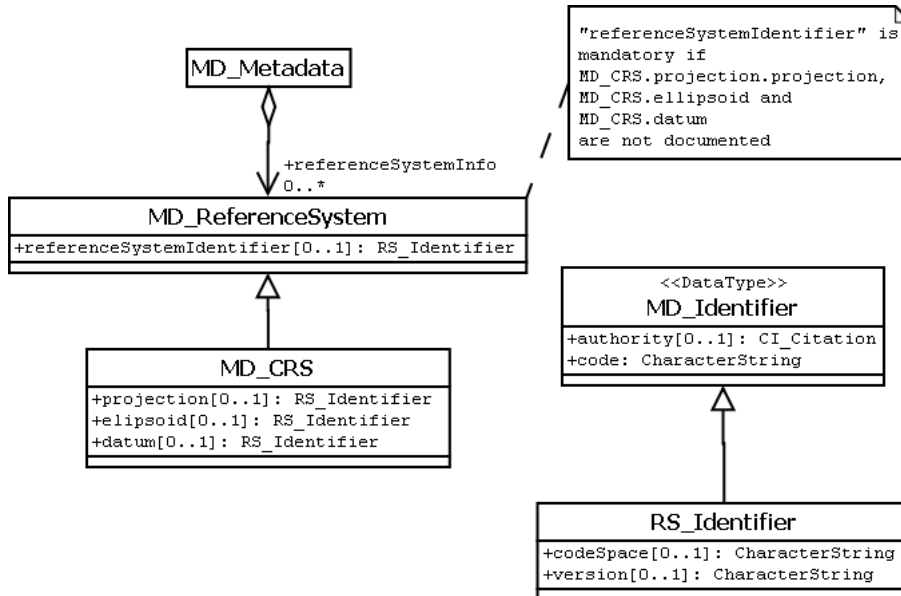


Figure G.A.7 --- Reference system information

G.A.2.7 Distribution information

Figure G.A.8 defines metadata required for accessing a resource. The data dictionary for this diagram is located in G.B.2.7

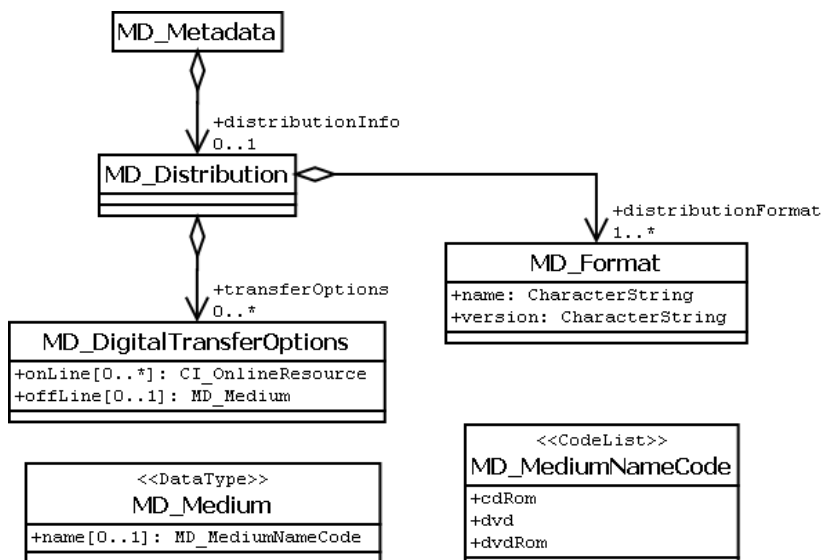


Figure G.A.8 --- Distribution information

G.A.3 Metadata data types

G.A.3.1 Extent information

Figure G.A.9 defines metadata describing the spatial and temporal extent covered by a resource. The data dictionary for this diagram is located in G.B.3.1.

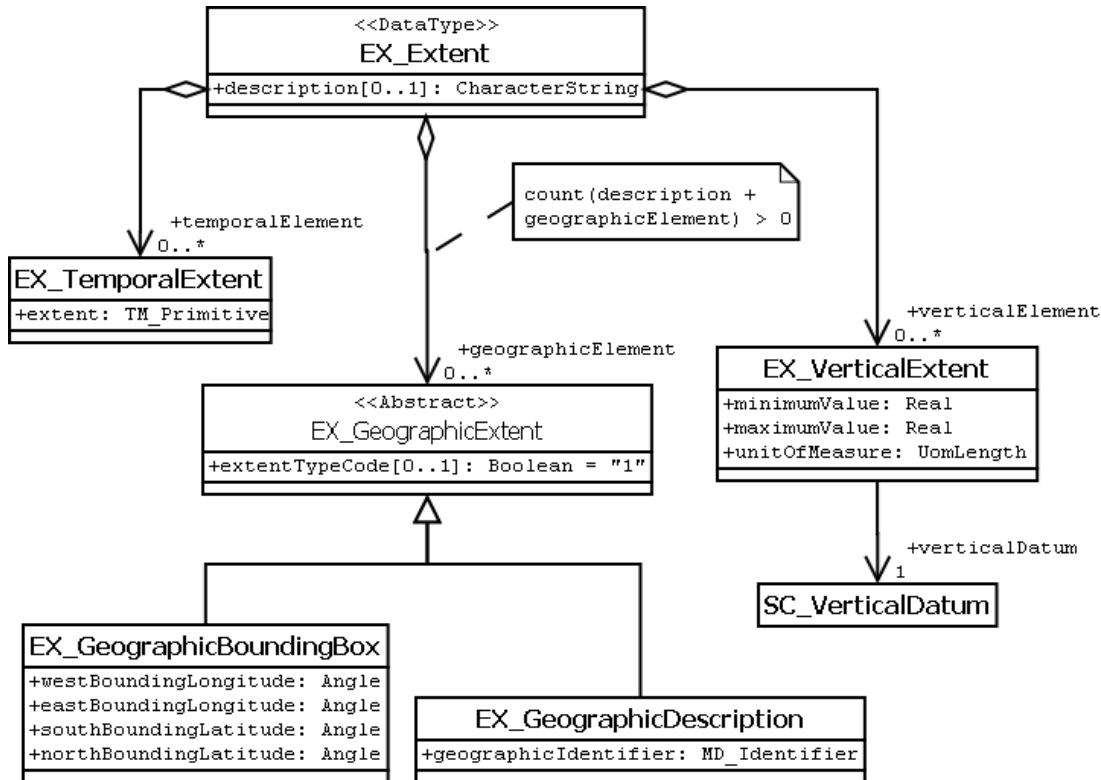


Figure G.A.9 --- Extent information

G.A.3.2 Citation and responsible party information

Figure G.A.10 defines metadata describing authoritative reference information, including responsible party and contact information. The data dictionary for this diagram is located in G.B.3.2.

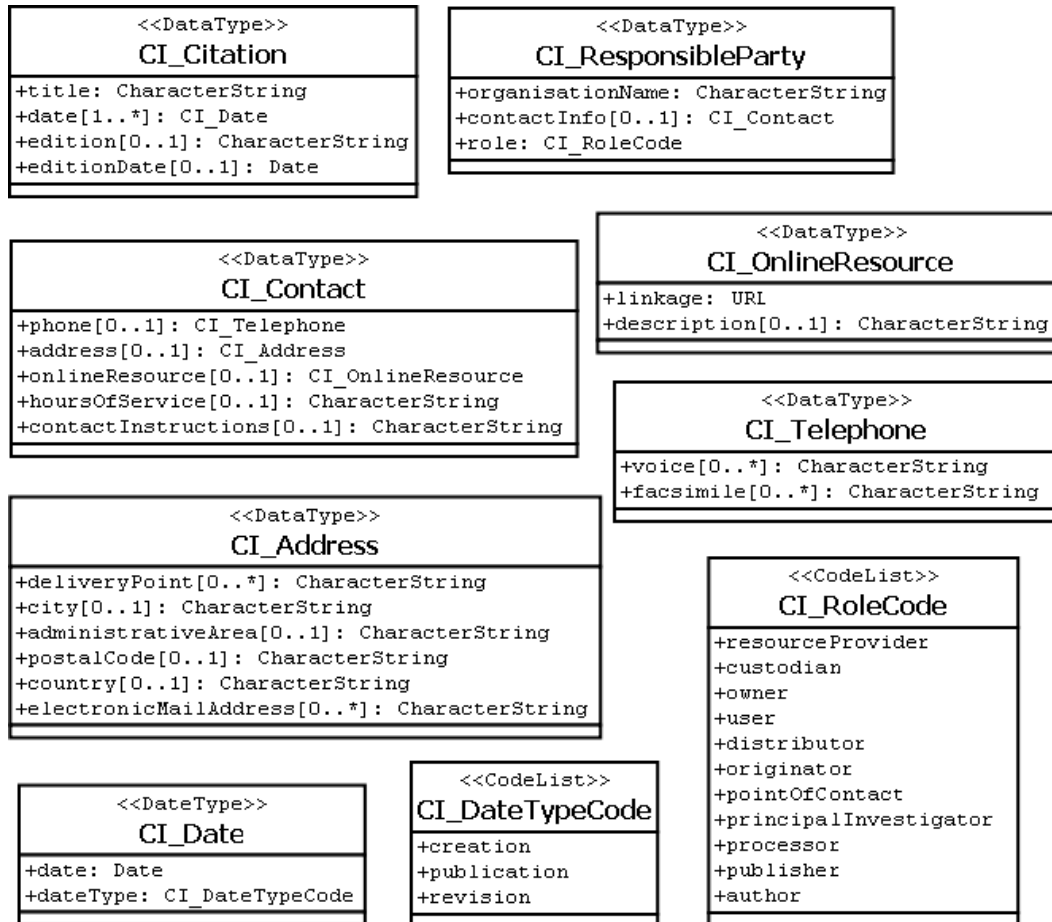


Figure G.A.10--- Citation and responsible party information

Annex G.B (normative)

Data Dictionary for geographic metadata

G.B.1 Data dictionary overview

This data dictionary describes the characteristic of the metadata defined in Clause 6 and Annex G.A. A metadata entity or metadata element shall always be documented in the metadata or sometimes documented. This descriptor may have the following values: M (mandatory), C (conditional), or O (optional). Maximum occurrence specifies the maximum number of instances the metadata entity or the metadata element may have. Single occurrences are shown by “1”; repeating occurrences are represented by “N.” For an entity, the domain indicates the line numbers covered by that entity. For a metadata element, the domain specifies the values allowed or use of free text.

G.B.2 Metadata package data dictionary

G.B.2.1 Metadata entity set information

UML model shown in Figure G.A.1.

No.	ISONo.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
1	1	MD_Metadata	root entity which defines metadata about a resource or resources	M	1	Class	
2	2	fileIdentifier	unique identifier for this metadata file	O	1	CharacterString	Free Text
3	3	language	language used for documenting metadata	M	1	CharacterString	ISO639-2, other parts may be used
4	4	characterSet	full name of the character coding standard used for the metadata set	C / ISO/IEC 10646-1 not used and not defined by encoding?	1	Class	MD_CharacterSetCode <<CodeList>>

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5	8	contact	party responsible for the metadata information	M	N	Class	CI_ResponsibleParty <<Data Type>>
6	9	dateStamp	date that the metadata was created	M	1	Class	Date
7	10	metadataStandardName	name of the metadata standard (including profile name) used	O	1	CharacterString	Free Text
8	11	metadataStandardVersion	version (profile) of the metadata standard used	O	1	CharacterString	Free Text
9	13	Role name: referenceSystemInfo	description of the spatial and temporal reference systems used in the dataset	O	N	Association	MD_ReferenceSystem
10	15	Role name: identificationInfo	basic information about the resource(s) to which the metadata applies	M	N	Association	MD_Identification <<Abstract>>
11	17	Role name: distributionInfo	provides information about the distributor of and options for obtaining the resource(s)	O	1	Association	MD_Distribution
12	18	Role name: dataQualityInfo	provides overall assessment of quality of a resource(s)	O	N	Association	DQ_DataQuality

G.B.2.2 Identification information

G.B.2.2.1 General

UML model shown in Figure G.A.2

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
13	23	MD_Identification	basic information required to uniquely identify a resource or resources	Use obligation from referencing object	use maximum occurrence from referencing object	Aggregated Class (MD_Metadata) <<Abstract>>	
14	24	citation	citation data for the resource(s)	M	1	Class	CI_Citation <<Data Type>>
15	25	abstract	brief narrative summary of the content of the resource(s)	M	1	CharacterString	
16	26	purpose	summary of the intentions with which the resource(s) was developed	O	1	CharacterString	
17	27	credit	recognition of those who contributed to the resource(s)	O	N	CharacterString	
18	29	pointOfContact	identification of, and means of communication with, person(s) and organization(s) associated with the resource(s)	O	N	Class	CI_ResponsibleParty <<Data Type>>
19	30	<i>Role name:</i> resourceMaintenance	Provides information about the frequency of resource updates, and the scope of those updates	O	N	Association	MD_MaintenanceInformation

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20	35	Role name: resourceConstraints	provides information about constraints which apply to the resource(s)	O	N	Association	MD_Constraints
21	36	MD_DataIdentification	information required to identify a dataset	Use obligation from referencing object	use maximum occurrence from referencing object	Specified Class (MD_Identification)	
22	37	spatialRepresentationType	method used to spatially represent geographic information	O	N	Class	MD_SpatialRepresentationTypeCode <<Code List>>
23	38	spatialResolution	factor which provides a general understanding of the density of spatial data in the dataset	O	N	Class	MD_Resolution <<Union>>
24	39	language	language(s) used within the dataset	M	N	CharacterString	ISO639-2, other parts may be used
25	40	characterSet	full name of the character coding standard used for the dataset	C / ISO/IEC 10646-1 not used?	N	Class	MD_CharacterSetCode <<Code List>>
26	41	topicCategory	main theme(s) of the dataset	M	N	Class	MD_TopicCategoryCode <<Enumeration>>
27	45	extent	extent information including the bounding box, bounding polygon, vertical, and temporal extent of the dataset	M	N	Class	EX_Extent <<Data Type>>

G.B.2.2.2 Representative fraction information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
28	56	MD_RepresentativeFraction	derived from ISO 19103 Scale where MD_RepresentativeFraction.denominator = 1 / Scale.measure And Scale.targetUnits = Scale.sourceUnits	Use obligation from referencing object	Use maximum occurrence from referencing object	Class <<Data Type>>	
29	57	denominator	the number below the line in a vulgar fraction	M	1	Integer	Integer > 0

G.B.2.2.3 Resolution information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
30	59	MD_Resolution	level of detail expressed as a scale factor or a ground distance	Use obligation from referencing object	Use maximum occurrence from referencing object	Class <<Union>>	
31	60	equivalentScale	level of detail expressed as the scale of a comparable hardcopy map or chart	C / distance not documented?	1	Class	MD_RepresentativeFraction <<Data Type>>
32	61	distance	ground sample distance	C / equivalentScale not documented?	1	Class	Distance

G.B.2.3 Constraint information

UML model shown in Figure G.A.3

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
33	67	MD_Constraints	restrictions on the access and use of a resource of metadata	Use Obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Identification)	
34	68	useLimitation	limitation affecting the fitness for use of the resource or metadata. Example, "not to be used for navigation"	O	N	CharacterString	Free text
35	69	MD_LegalConstraints	restrictions and legal prerequisites for accessing and using the resource or metadata	Use Obligation from referencing object	N	Specified Class (MD_Constraints)	
36	70	accessConstraints	access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource or metadata	O	N	Class	MD_RestrictionCode <<Code List>>
37	71	useConstraints	constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations or warnings on using the resource or metadata	O	N	Class	MD_RestrictionCode <<Code List>>

38	72	otherConstraints	other restrictions and legal prerequisites for accessing and using the resource or metadata	C / access Constraints or use Constraints equal "other Restrictions"?	N	CharacterString	Free text
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G.B.2.4 Data quality information

G.B.2.4.1 General

UML model shown in Figure G.A.4, G.A.5

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
39	78	DQ_DataQuality	quality information for the data specified by a data quality scope	Use Obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata)	
40	79	scope	the specific data to which the data quality information applies	M	1	Class	DQ_Scope
41	81	Role name: lineage	non-quantitative quality information about the lineage of the data specified by the scope	M	1	Association	LI_Lineage

G.B.2.4.2 Lineage information

G.B.2.4.2.1 General

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
42	82	LI_Lineage	information about the events or source data used in constructing the data specified	Use obligation from referencing object	Use maximum occurrence	Aggregated Class (DQ_DataQuality)	

			by the scope or lack of knowledge about lineage		from referencing object		
43	83	statement	general explanation of the data producer's knowledge about the lineage of a dataset	M	1	CharacterString	Free text

G.B.2.4.3 Scope information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
44	138	DQ_Scope	extent of characteristic(s) of the data for which quality information is reported	Use obligation from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	
45	139	level	hierarchical level of the data specified by the scope	M	1	Class	MD_ScopeCode <<CodeList>>

G.B.2.5 Maintenance information

G.B.2.5.1 General

UML model shown in Figure G.A.6

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
46	142	MD_MaintenanceInformation	information about the scope and frequency of updating	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Identification)	
47	143	maintenanceAndUpdateFrequency	frequency with which changes and additions are made to resource after the initial resource is completed	M	1	Class	MD_MaintenanceFrequencyCode <<CodeList>>

G.B.2.6 Reference system information

G.B.2.6.1 General

UML model shown in Figure G.A.7

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
48	186	MD_ReferenceSystem	information about the reference system	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata)	

49	187	referenceSystemIdentifier	name of reference system	C / MD_CRS. projection, MD_CRS. Ellipsoid, and MD_CRS.datum not documented?	1	Class	RS_Identifier
50	189	MD_CRS	metadata about a coordinate system in which attributes have been derived from SC_CRS as defined in ISO 19111 - Spatial referencing by coordinates	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_Referencing System)	
51	190	projection	identity of the projection used	O	1	Class	RS_Identifier
52	191	ellipsoid	identity of the ellipsoid used	O	1	Class	RS_Identifier
53	192	datum	identity of the datum used	O	1	Class	RS_Identifier

G.B.2.6.2 Identifier information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
54	205	MD_Identifier	value uniquely identifying an object within a namespace	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class	
55	206	authority	person or party responsible for maintenance of the namespace	O	1	Class	CI_Citation
56	207	code	alphanumeric value identifying an instance in the namespace	M	1	CharacterString	Free text

57	208	RS_Identifier	identifier used for reference systems	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_Identifier)	
58	208.1	codeSpace	name or identifier of the person or organization responsible for namespace	O	1	CharacterString	Free text
59	208.2	version	version identifier for the namespace	O	1	CharacterString	Free text

G.B.2.7 Distribution information

G.B.2.7.1 General

UML model shown in Figure G.A.8

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
60	270	MD_Distribution	information about the distributor of and options for obtaining the resource	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata)	
61	271	Role name: distributionFormat	provides a description of the format of the data to be distributed	M	N	Association	MD_Format

62	273	Role name: transferOptions	provides information about technical means and media by which a resource is obtained from the distributor	O	N	Association	MD_DigitalTransferOptions
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G.B.2.7.2 Digital transfer options information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
63	274	MD_DigitalTransferOptions	technical means and media by which a resource is obtained from the distributor	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Distribution)	
64	277	onLine	information about online sources from which the resource can be obtained	O	N	Class	CI_OnlineResource <<Data Type>>
65	278	offLine	information about offline media on which the resource can be obtained	O	1	Class	MD_Medium <<Data Type>>

G.B.2.7.3 Format information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
66	284	MD_Format	description of the computer language construct that specifies the representation of data objects in a record, file, message, storage device or transmission channel	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Distribution)	
67	285	name	name of the data transfer format(s)	M	1	CharacterString	Free text
68	286	version	version of the format (date, number, etc.)	M	1	CharacterString	Free text

G.B.2.7.4 Medium information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
69	291	MD_Medium	information about the media on which the resource can be distributed	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Distribution)	
70	292	name	name of the medium on which the resource can be received	O	1	Class	MD_MediumNameCode <<CodeList>>

G.B.3 Data type information

G.B.3.1 Extent information

G.B.3.1.1 General

UML model shown in Figure G.A.9

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
71	334	EX_Extent	information about horizontal, vertical, and temporal extent	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class<<Data Type>>	
72	335	description	spatial and temporal extent for the referring object	C / geographicElement not documented?	1	CharacterString	FreeText
73	336	Role name: geographicElement	provides temporal component of the extent of the referring object	C / description not documented?	N	Association	EX_GeographicExtent <<Abstract>>
74	337	Role name: temporalElement	provides temporal component of the extent of the referring object	O	N	Association	EX_TemporalExtent
75	338	Role name: verticalElement	provides vertical component of the extent of the referring object	O	N	Association	EX_VerticalExtent

G.B.3.1.2 Geographic extent information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
76	339	EX_GeographicExtent	geographic area of the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (EX_Extent) <<Abstract>>	
77	340	extentTypeCode	indication of whether the bounding polygon encompasses an area covered by the data or an area where data is not present	O	1	Boolean	0-exclusion 1-inclusion
78	343	EX_GeographicBoundingBox	geographic position of the dataset NOTE This is only an approximate reference so specifying the coordinate reference system is unnecessary	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (EX_GeographicExtent)	
79	344	westBoundLongitude	western-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	M	1	Class	Angle
80	345	eastBoundLongitude	eastern-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	M	1	Class	Angle
81	346	southBoundLatitude	southern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal	M	1	Class	Angle

			degrees (positive north)				
82	347	northboundLatitude	northern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)	M	1	Class	Angle
83	348	EX_GeographicDescription	description of the geographic area using identifiers	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (EX_Geographic Extent)	
84	349	geographicIdentifier	identifier used to represent a geographic area	M	1	Class	MD_Identifier

G.B.3.1.3 Temporal extent information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
85	350	EX_TemporalExtent	time period covered by the content of the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (EX_Extent)	
86	351	extent	date and time for the content of the dataset	M	1	Class	TM_Primitive

G.B.3.1.4 Vertical extent information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
87	354	EX_VerticalExtent	vertical domain of dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (EX_Extent)	
88	355	minimumValue	lowest vertical extent contained in the dataset	M	1	Real	Real
89	356	maximumValue	highest vertical extent contained in the dataset	M	1	Real	Real
90	357	unitOfMeasure	vertical units used for vertical extent information Examples: metres, feet, millimetres, hectopascals	M	1	Class	UomLength
91	358	role name: verticalDatum	provides information about the origin from which the maximum and minimum elevation values are measured	M	1	Association	SC_VerticalDatum

G.B.3.2 Citation and responsible party information

G.B.3.2.1 General

UML model shown in Figure G.A.10

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
92	359	CI_Citation	standardized resource reference	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<Data Type>>	
93	360	title	name by which the cited resource is known	M	1	CharacterString	Free text
94	362	date	reference date for the cited resource	M	N	Class	CI_Date <<DataType>>
95	363	edition	version of the cited resource	O	1	CharacterString	Free text
96	364	editionDate	date of the edition	O	1	Class	Date
97	374	CI_ResponsibleParty	identification of, and means of communication with, person(s) and organizations associated with the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<Data Type>>	
98	376	organisationName	name of the responsible organization	M	1	CharacterString	Free text
99	378	contactInfo	address of the responsible party	O	1	Class	CI_Contact

100	379	role	function performed by the responsible party	M	1	Class	CI_RoleCode <<CodeList>>
-----	-----	------	---------------------------------------------	---	---	-------	-----------------------------

G.B.3.2.2 Address information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
101	380	CI_Address	location of the responsible individual or organization	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<Data Type>>	
102	381	deliveryPoint	address line for the location (as described in ISO 11180, Annex A)	O	N	CharacterString	Free text
103	382	city	city of the location	O	1	CharacterString	Free text
104	383	administrativeArea	state, province of the location	O	1	CharacterString	Free text
105	384	postalCode	ZIP or other postal code	O	1	CharacterString	Free text
106	385	country	country of the physical address	O	1	CharacterString	Free text
107	386	electronicMailAddress	address of the electronic mailbox of the responsible organization or individual	O	N	CharacterString	Free text

G.B.3.2.3 Contact information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
108	387	CI_Contact	information required to enable contact with the responsible person and/or organization	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<Data Type>>	
109	388	phone	telephone numbers at which the organization or individual may be contacted	O	1	Class	CI_Telephone
110	389	address	physical and email address at which the organization or individual may be contacted	O	1	Class	CI_Address
111	390	onlineResource	on-line information that can be used to contact the individual or organization	O	1	Class	CI_OnlineResource
112	391	hoursOfService	time period (including time zone) when individuals can contact the organization or individual	O	1	CharacterString	Free text
113	392	contactInstructions	supplemental instructions on how or when to contact the individual or organization	O	1	CharacterString	Free text

G.B.3.2.4 Date information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
114	393	CI_Date	reference date and event used to describe it	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<Data Type>>	
115	394	date	reference date for the cited resource	M	1	Class	Date
116	395	dateType	event used for reference date	M	1	Class	CI_DateTypeCode <<CodeList>>

G.B.3.2.5 OnLine resource information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
117	396	CI_OnlineResource	information about on-line sources from which the dataset, specification, or community profile name and extended metadata elements can be obtained	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<Data Type>>	
118	397	linkage	location (address) for on-line accesss using a Uniform Resource Locator address or similar addressing scheme such as http://www.statkart.no/isotc211	M	1	Class	URL

119	401	description	detailed text description of what the online resource is /does	O	1	CharacterString	Free text
-----	-----	-------------	----------------------------------------------------------------	---	---	-----------------	-----------

G.B.3.2.6 Telephone information

No.	ISO No.	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
120	407	CI_Telephone	telephone numbers for contacting the responsible individual or organization	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<Data Type>>	
121	408	voice	telephone number by which individuals can speak to the responsible organization or individual	O	N	CharacterString	Free text
122	409	facsimile	telephone number of a facsimile machine for the responsible organization or individual	O	N	CharacterString	Free text

G.B.4 Externally referenced entities

G.B.4.1 Introduction

There are several entities referenced by this International Standard that are documented by other external standards. Those externally referenced entities are explained below.

G.B.4.2 Date

Date: gives values for year, month and day. Character encoding of a date is a string which shall follow the format for date specified by ISO 8601. This class is documented in full in ISO/TS 19103.

G.B.4.3 Distance, angle and UomLength information

Distance: This class is documented in full in ISO/TS 19103.

Angle: Amount of rotation need to bring one line or plane into coincidence with another, generally measured in radians or degrees. This class is documented in full in ISO/TS 19103.

UomLength: any of the measuring systems to measure the length, distance between two entities. This class is documented in full in ISO/TS 19103.

G.B.4.4 Temporal primitive information

TM_Primitive: an abstract class representing a non-decomposed element of geometry or topology. This class is fully documented in ISO 19108.

G.B.4.5 Vertical datum information

SC_VerticalDatum: set of parameters describing the relation of gravity-related heights to the Earth. This class is fully documented in ISO 19111

G.B.5 CodeLists and enumerations

CI_DateTypeCode<<CodeList>>

	Name	Domain code	Definition
1	CI_DateTypeCode	DateTypCd	identification of when a given event occurred
2	creation	001	date identifies when the resource was brought into existence
3	publication	002	date identifies when the resource was issued
4	revision	003	date identifies when the resource was examined or re-examined and improved or amended

CI_RoleCode<<CodeList>>

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

MD_CharacterSetCode<<CodeList>>

	Name	Domain code	Definition
1	MD_CharacterSetCode	CharSetCd	name of the character coding standard used for the resource
2	utf8	004	8-bit variable size UCS Transfer Format, based on ISO/IEC 10646

MD_MaintenanceFrequencyCode<<CodeList>>

	Name	Domain code	Definition
1	MD_MaintenanceFrequencyCode	MaintFreqCd	frequency with which modifications and deletions are made to the data after it is first produced
2	annually	008	data is updated every year
3	asNeeded	009	data is updated as deemed necessary
4	irregular	010	data is updated in intervals that are uneven in duration
5	notPlanned	011	there are no plans to update the data
6	unknown	012	frequency of maintenance for the data is not known

MD_MediumNameCode<<CodeList>>

	Name	Domain code	Definition
1	MD_MediumNameCode	MedNameCd	name of the medium
2	cdRom	001	read-only optical disk
3	dvd	002	digital versatile disk
4	dvdRom	003	digital versatile disk, read only

MD_RestrictionCode<<CodeList>>

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

MD_ScopeCode<<CodeList>>

	Name	Domain code	Definition
1	MD_ScopeCode	ScopeCd	class of information to which the referencing entity applies
6	dataset	005	information applies to the dataset

MD_SpatialRepresentationTypeCode<<CodeList>>

	Name	Domain code	Definition
1	MD_SpatialRepresentationTypeCode	SpaRepTypCd	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

MD_TopicCategoryCode<<Enumeration>>

	Name	Domain code	Definition
1	MD_TopicCategoryCode	TopicCatCd	high-level geographic data thematic classification to assist in the grouping and search of available geographic data sets. Can be used to group keywords as well. Listed examples are not exhaustive. NOTE It is understood there are overlaps between general categories and the user is encouraged to select the one most appropriate.
2	farming	001	rearing of animals and/or cultivation of plants Examples: agriculture, irrigation, aquaculture, plantations, herding, pests and diseases affecting crops and livestock
3	biota	002	flora and/or fauna in natural environment Examples: wildlife, vegetation, biological sciences, ecology, wilderness, sealife, wetlands, habitat
4	boundaries	003	legal land descriptions Examples: political and administrative boundaries
5	climatologyMeteorologyAtmosphere	004	processed and phenomena of the atmosphere Examples: cloud cover, weather, climate, atmospheric conditions, climate change, precipitation
6	economy	005	economic activities, conditions and employment Examples: production, labour, revenue, commerce, industry, tourism and ecotourism, forestry, fisheries, commercial or subsistence hunting, exploration and exploitation of resources such as minerals, oil and gas

7	elevation	006	height above or below sea level Examples: altitude, bathymetry, digital elevation models, derived products
8	environment	007	environmental resources, protection and conservation Examples: environmental pollution, waste storage and treatment, environmental impact assessment, monitoring environmental risk, nature reserves, landscape
9	geoscientificInformation	008	information pertaining to earth sciences Examples: geophysical features and processes, geology, minerals, sciences dealing with the composition, structure and origin of the earth's rocks, risks, risks of earthquakes, volcanic activity, landslides, gravity information, soils, permafrost, hydrogeology, erosion
10	health	009	health, health services, human ecology, and safety Examples: disease and illness, factors affecting health, hygiene, substance abuse, mental and physical health, health services
11	imageryBaseMapsEarthCover	010	base maps Examples: land cover, topographic maps, imagery, unclassified images, annotations
12	intelligenceMilitary	011	military bases, structures, activities Examples: barracks, training grounds, military transportation, information collection
13	inlandWaters	012	inland water features, drainage systems and their characteristics Examples: rivers and glaciers, salt lakes, water utilization plans, dams, currents, floods, water quality, hydrographic charts
14	location	013	positional information and services Examples: addresses, geodetic networks, control points, postal zones and services, place names
15	oceans	014	features and characteristics of salt water bodies (excluding inland waters) Examples: tides, tidal waves, coastal information, reefs
16	planningCadastre	015	information used for appropriate actions for future use of the land Examples: land use maps, zoning maps, cadastral surveys, land ownership
17	society	016	characteristics of society and cultures Examples: settlements, anthropology, archaeology, education, traditional beliefs, manners and customs, demographic data, recreational areas and activities,

			social impact assessments, crime and justice, census information
18	structure	017	man-made construction Examples: buildings, museums, churches, factories, housing, monuments, shops, towers
19	transportation	018	means and aids for conveying persons and/or goods Examples: roads, airports/airstrips, shipping routes, tunnels, nautical charts, vehicle or vessel location, aeronautical charts, railways
20	utilitiesCommunication	019	energy, water and waste systems and communications infrastructure and services Examples: hydroelectricity, geothermal, solar and nuclear sources of energy, water purification and distribution, sewage collection and disposal, electricity and gas distribution, data communication, telecommunication, radio, communication networks

Annex G.C (informative)

Dataset metadata – XML Schema

The XML schema for Global Map Metadata Profile is created based on ISO 19139 (which defines the XML Schema implementation of ISO19115).

```
<!--
*****
Global Map Metadata Profile XML Schema implementation
*** GMMP Metadata Classes ***
*** gmmp.xsd ***
*****
-->

<schema targetNamespace="http://www.iscgm.org/spec/2.0/GMMP_MetadataSchema"
xmlns:gmmp="http://www.iscgm.org/spec/2.0/GMMP_MetadataSchema" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified" version="1.0">

<!--
=====
Global Map Metadata Profile Classes
=====
-->
<!-- ===== MD_Metadata ===== -->
<element name="MD_Metadata" type="gmmp:MD_Metadata" />
<complexType name="MD_Metadata">
<sequence>
<element name="fileIdentifier" type="string" minOccurs="0" />
<element name="language" type="string" />
<element name="characterSet" type="gmmp:MD_CharacterSetCode" minOccurs="0" />
<element name="contact" type="gmmp:CI_ResponsibleParty" maxOccurs="unbounded" />
<element name="dateStamp" type="date" />
<element name="metadataStandardName" type="string" minOccurs="0" />
<element name="metadataStandardVersion" type="string" minOccurs="0" />
<element name="referenceSystemInfo" minOccurs="0">
<complexType>
<sequence>
<element ref="gmmp:MD_ReferenceSystem" maxOccurs="unbounded" />
</sequence>
</complexType>
</element>
<element name="identificationInfo">
<complexType>
<sequence>
<element ref="gmmp:MD_Identification" maxOccurs="unbounded" />
</sequence>
</complexType>
</element>
<element name="distributionInfo" minOccurs="0">
<complexType>
<sequence>
<element ref="gmmp:MD_Distribution" />
</sequence>
</complexType>
</element>
<element name="dataQualityInfo" minOccurs="0">
<complexType>
<sequence>
<element ref="gmmp:DQ_DataQuality" maxOccurs="unbounded" />
</sequence>
</complexType>
</element>
</sequence>
</complexType>

<!-- ===== MD_Identification ===== -->
<element name="MD_Identification" type="gmmp:MD_Identification" abstract="true" />
<complexType name="MD_Identification" abstract="true">
<sequence>
<element name="citation" type="gmmp:CI_Citation" />

```

```

<element name="abstract" type="string" />
<element name="purpose" type="string" minOccurs="0" />
<element name="credit" type="string" minOccurs="0" maxOccurs="unbounded" />
<element name="pointOfContact" type="gmmp:CI_ResponsibleParty" minOccurs="0" maxOccurs="unbounded" />
<element name="resourceMaintenance" minOccurs="0">
  <complexType>
    <sequence>
      <element ref="gmmp:MD_MaintenanceInformation" maxOccurs="unbounded" />
    </sequence>
  </complexType>
</element>
<element name="resourceConstraints" minOccurs="0">
  <complexType>
    <sequence>
      <element ref="gmmp:MD_Constraints" maxOccurs="unbounded" />
    </sequence>
  </complexType>
</element>
</sequence>
</complexType>

<!-- ===== MD_DataIdentification ===== -->
<element name="MD_DataIdentification" type="gmmp:MD_DataIdentification" substitutionGroup="gmmp:MD_Identification" />
<complexType name="MD_DataIdentification">
  <complexContent>
    <extension base="gmmp:MD_Identification">
      <sequence>
        <element name="spatialRepresentationType" type="gmmp:MD_SpatialRepresentationTypeCode" minOccurs="0"
maxOccurs="unbounded" />
        <element name="spatialResolution" type="gmmp:MD_Resolution" minOccurs="0" maxOccurs="unbounded" />
        <element name="language" type="string" maxOccurs="unbounded" />
        <element name="characterSet" type="gmmp:MD_CharacterSetCode" minOccurs="0" maxOccurs="unbounded" />
        <element name="topicCategory" type="gmmp:MD_TopicCategoryCode" maxOccurs="unbounded" />
        <element name="extent" type="gmmp:EX_Extent" maxOccurs="unbounded" />
      </sequence>
    </extension>
  </complexContent>
</complexType>

<!-- ===== MD_RepresentativeFraction ===== -->
<element name="MD_RepresentativeFraction" type="gmmp:MD_RepresentativeFraction" />
<complexType name="MD_RepresentativeFraction">
  <sequence>
    <element name="denominator" type="positiveInteger" />
  </sequence>
</complexType>

<!-- ===== MD_Resolution ===== -->
<element name="MD_Resolution" type="gmmp:MD_Resolution" />
<complexType name="MD_Resolution">
  <sequence>
    <element name="equivalentScale" type="gmmp:MD_RepresentativeFraction" minOccurs="0" />
    <element name="distance" type="gmmp:Distance" minOccurs="0" />
  </sequence>
</complexType>

<!-- ===== MD_Constraints ===== -->
<element name="MD_Constraints" type="gmmp:MD_Constraints" />
<complexType name="MD_Constraints">
  <sequence>
    <element name="useLimitation" type="string" minOccurs="0" maxOccurs="unbounded" />
  </sequence>
</complexType>

<!-- ===== MD_LegalConstraints ===== -->
<element name="MD_LegalConstraints" type="gmmp:MD_LegalConstraints" substitutionGroup="gmmp:MD_Constraints" />
<complexType name="MD_LegalConstraints">
  <complexContent>
    <extension base="gmmp:MD_Constraints">
      <sequence>
        <element name="accessConstraints" type="gmmp:MD_RestrictionCode" minOccurs="0" maxOccurs="unbounded" />
        <element name="useConstraints" type="gmmp:MD_RestrictionCode" minOccurs="0" maxOccurs="unbounded" />
        <element name="otherConstraints" type="string" minOccurs="0" maxOccurs="unbounded" />
      </sequence>
    </extension>
  </complexContent>
</complexType>

```

```

<!-- ===== DQ_DataQuality ===== -->
<element name="DQ_DataQuality" type="gmmp:DQ_DataQuality" />
<complexType name="DQ_DataQuality">
  <sequence>
    <element name="scope" type="gmmp:DQ_Scope" />
    <element name="lineage">
      <complexType>
        <sequence>
          <element ref="gmmp:LI_Lineage" />
        </sequence>
      </complexType>
    </element>
  </sequence>
</complexType>

<!-- ===== LI_Lineage ===== -->
<element name="LI_Lineage" type="gmmp:LI_Lineage" />
<complexType name="LI_Lineage">
  <sequence>
    <element name="statement" type="string" />
  </sequence>
</complexType>

<!-- ===== DQ_Scope ===== -->
<element name="DQ_Scope" type="gmmp:DQ_Scope" />
<complexType name="DQ_Scope">
  <sequence>
    <element name="level" type="gmmp:MD_ScopeCode" />
  </sequence>
</complexType>

<!-- ===== MD_MaintenanceInformation ===== -->
<element name="MD_MaintenanceInformation" type="gmmp:MD_MaintenanceInformation" />
<complexType name="MD_MaintenanceInformation">
  <sequence>
    <element name="maintenanceAndUpdateFrequency" type="gmmp:MD_MaintenanceFrequencyCode" />
  </sequence>
</complexType>

<!-- ===== MD_ReferenceSystem ===== -->
<element name="MD_ReferenceSystem" type="gmmp:MD_ReferenceSystem" />
<complexType name="MD_ReferenceSystem">
  <sequence>
    <element name="referenceSystemIdentifier" type="gmmp:RS_Identifier" minOccurs="0" />
  </sequence>
</complexType>

<!-- ===== MD_CRS ===== -->
<element name="MD_CRS" type="gmmp:MD_CRS" substitutionGroup="gmmp:MD_ReferenceSystem" />
<complexType name="MD_CRS">
  <complexContent>
    <extension base="gmmp:MD_ReferenceSystem">
      <sequence>
        <element name="projection" type="gmmp:RS_Identifier" minOccurs="0" />
        <element name="ellipsoid" type="gmmp:RS_Identifier" minOccurs="0" />
        <element name="datum" type="gmmp:RS_Identifier" minOccurs="0" />
      </sequence>
    </extension>
  </complexContent>
</complexType>

<!-- ===== MD_Identifier ===== -->
<element name="MD_Identifier" type="gmmp:MD_Identifier" />
<complexType name="MD_Identifier">
  <sequence>
    <element name="authority" type="gmmp:CI_Citation" minOccurs="0" />
    <element name="code" type="string" />
  </sequence>
</complexType>

<!-- ===== RS_Identifier ===== -->
<element name="RS_Identifier" type="gmmp:RS_Identifier" substitutionGroup="gmmp:MD_Identifier" />
<complexType name="RS_Identifier">
  <complexContent>
    <extension base="gmmp:MD_Identifier">
      <sequence>

```

```

    <element name="codeSpace" type="string" minOccurs="0" />
    <element name="version" type="string" minOccurs="0" />
  </sequence>
</extension>
</complexContent>
</complexType>

<!-- ===== MD_Distribution ===== -->
<element name="MD_Distribution" type="gmmp:MD_Distribution" />
<complexType name="MD_Distribution">
  <sequence>
    <element name="distributionFormat">
      <complexType>
        <sequence>
          <element ref="gmmp:MD_Format" maxOccurs="unbounded" />
        </sequence>
      </complexType>
    </element>
    <element name="transferOptions" minOccurs="0">
      <complexType>
        <sequence>
          <element ref="gmmp:MD_DigitalTransferOptions" maxOccurs="unbounded" />
        </sequence>
      </complexType>
    </element>
  </sequence>
</complexType>

<!-- ===== MD_DigitalTransferOptions ===== -->
<element name="MD_DigitalTransferOptions" type="gmmp:MD_DigitalTransferOptions" />
<complexType name="MD_DigitalTransferOptions">
  <sequence>
    <element name="onLine" type="gmmp:CI_OnlineResource" minOccurs="0" maxOccurs="unbounded" />
    <element name="offLine" type="gmmp:MD_Medium" minOccurs="0" />
  </sequence>
</complexType>

<!-- ===== MD_Format ===== -->
<element name="MD_Format" type="gmmp:MD_Format" />
<complexType name="MD_Format">
  <sequence>
    <element name="name" type="string" />
    <element name="version" type="string" />
  </sequence>
</complexType>

<!-- ===== MD_Medium ===== -->
<element name="MD_Medium" type="gmmp:MD_Medium" />
<complexType name="MD_Medium">
  <sequence>
    <element name="name" type="gmmp:MD_MediumNameCode" minOccurs="0" />
  </sequence>
</complexType>

<!--
=====
GMMP Data Type Classes
=====
-->
<!-- Type EX_Extent Classes -->
<!-- ===== EX_Extent ===== -->
<element name="EX_Extent" type="gmmp:EX_Extent" />
<complexType name="EX_Extent">
  <sequence>
    <element name="description" type="string" minOccurs="0" />
    <element name="geographicElement" minOccurs="0">
      <complexType>
        <sequence>
          <element ref="gmmp:EX_GeographicExtent" maxOccurs="unbounded" />
        </sequence>
      </complexType>
    </element>
    <element name="temporalElement" minOccurs="0">
      <complexType>
        <sequence>
          <element ref="gmmp:EX_TemporalExtent" maxOccurs="unbounded" />
        </sequence>
      </complexType>
    </element>
  </sequence>
</complexType>

```

```

    </complexType>
  </element>
  <element name="verticalElement" minOccurs="0">
    <complexType>
      <sequence>
        <element ref="gmmp:EX_VerticalExtent" maxOccurs="unbounded" />
      </sequence>
    </complexType>
  </element>
</sequence>
</complexType>

<!-- ===== EX_GeographicExtent ===== -->
<element name="EX_GeographicExtent" type="gmmp:EX_GeographicExtent" abstract="true" />
<complexType name="EX_GeographicExtent" abstract="true">
  <sequence>
    <element name="extentTypeCode" type="boolean" minOccurs="0" />
  </sequence>
</complexType>

<!-- ===== EX_GeographicBoundingBox ===== -->
<element name="EX_GeographicBoundingBox" type="gmmp:EX_GeographicBoundingBox"
substitutionGroup="gmmp:EX_GeographicExtent" />
<complexType name="EX_GeographicBoundingBox">
  <complexContent>
    <extension base="gmmp:EX_GeographicExtent">
      <sequence>
        <element name="westBoundLongitude" type="gmmp:approximateLongitude" />
        <element name="eastBoundLongitude" type="gmmp:approximateLongitude" />
        <element name="southBoundLatitude" type="gmmp:approximateLatitude" />
        <element name="northBoundLatitude" type="gmmp:approximateLatitude" />
      </sequence>
    </extension>
  </complexContent>
</complexType>

<!-- ===== EX_GeographicDescription ===== -->
<element name="EX_GeographicDescription" type="gmmp:EX_GeographicDescription"
substitutionGroup="gmmp:EX_GeographicExtent" />
<complexType name="EX_GeographicDescription">
  <complexContent>
    <extension base="gmmp:EX_GeographicExtent">
      <sequence>
        <element name="geographicIdentifier" type="gmmp:MD_Identifier" />
      </sequence>
    </extension>
  </complexContent>
</complexType>

<!-- ===== EX_TemporalExtent ===== -->
<element name="EX_TemporalExtent" type="gmmp:EX_TemporalExtent" />
<complexType name="EX_TemporalExtent">
  <sequence>
    <element name="extent" type="gmmp:TimeDuration" />
  </sequence>
</complexType>

<!-- ===== EX_VerticalExtent ===== -->
<element name="EX_VerticalExtent" type="gmmp:EX_VerticalExtent" />
<complexType name="EX_VerticalExtent">
  <sequence>
    <element name="minimumValue" type="decimal" />
    <element name="maximumValue" type="decimal" />
    <element name="unitOfMeasure" type="gmmp:UomLength" />
    <element name="verticalDatum">
      <complexType>
        <sequence>
          <element ref="gmmp:SC_VerticalDatum" />
        </sequence>
      </complexType>
    </element>
  </sequence>
</complexType>
<!-- Class SC_VerticalDatum -->
<element name="SC_VerticalDatum" type="gmmp:SC_VerticalDatum" />
<complexType name="SC_VerticalDatum">
  <sequence>

```

```

    <element name="datumID" type="gmmp:RS_Identifier" />
  </sequence>
</complexType>

<!-- Type CI_Citation Classes -->
<!-- ===== CI_Citation ===== -->
<element name="CI_Citation" type="gmmp:CI_Citation" />
<complexType name="CI_Citation">
  <sequence>
    <element name="title" type="string" />
    <element name="date" type="gmmp:CI_Date" maxOccurs="unbounded" />
    <element name="edition" type="string" minOccurs="0" />
    <element name="editionDate" type="date" minOccurs="0" />
  </sequence>
</complexType>

<!-- Type CI_ResponsibleParty Classes -->
<!-- ===== CI_ResponsibleParty ===== -->
<element name="CI_ResponsibleParty" type="gmmp:CI_ResponsibleParty" />
<complexType name="CI_ResponsibleParty">
  <sequence>
    <element name="organisationName" type="string" />
    <element name="contactInfo" type="gmmp:CI_Contact" minOccurs="0" />
    <element name="role" type="gmmp:CI_RoleCode" />
  </sequence>
</complexType>

<!-- ===== CI_Address ===== -->
<element name="CI_Address" type="gmmp:CI_Address" />
<complexType name="CI_Address">
  <sequence>
    <element name="deliveryPoint" type="string" minOccurs="0" maxOccurs="unbounded" />
    <element name="city" type="string" minOccurs="0" />
    <element name="administrativeArea" type="string" minOccurs="0" />
    <element name="postalCode" type="string" minOccurs="0" />
    <element name="country" type="string" minOccurs="0" />
    <element name="electronicMailAddress" type="string" minOccurs="0" maxOccurs="unbounded" />
  </sequence>
</complexType>

<!-- ===== CI_Contact ===== -->
<element name="CI_Contact" type="gmmp:CI_Contact" />
<complexType name="CI_Contact">
  <sequence>
    <element name="phone" type="gmmp:CI_Telephone" minOccurs="0" />
    <element name="address" type="gmmp:CI_Address" minOccurs="0" />
    <element name="onlineResource" type="gmmp:CI_OnlineResource" minOccurs="0" />
    <element name="hoursOfService" type="string" minOccurs="0" />
    <element name="contactInstructions" type="string" minOccurs="0" />
  </sequence>
</complexType>

<!-- ===== CI_Date ===== -->
<element name="CI_Date" type="gmmp:CI_Date" />
<complexType name="CI_Date">
  <sequence>
    <element name="date" type="date" />
    <element name="dateType" type="gmmp:CI_DateTypeCode" />
  </sequence>
</complexType>

<!-- ===== CI_OnlineResource ===== -->
<element name="CI_OnlineResource" type="gmmp:CI_OnlineResource" />
<complexType name="CI_OnlineResource">
  <sequence>
    <element name="linkage" type="anyURI" />
    <element name="description" type="string" minOccurs="0" />
  </sequence>
</complexType>

<!-- ===== CI_Telephone ===== -->
<element name="CI_Telephone" type="gmmp:CI_Telephone" />
<complexType name="CI_Telephone">
  <sequence>
    <element name="voice" type="string" minOccurs="0" maxOccurs="unbounded" />
    <element name="facsimile" type="string" minOccurs="0" maxOccurs="unbounded" />
  </sequence>
</complexType>

```

```

</complexType>

<!--
=====
GMMP Constraint types Classes
=====
-->
<!-- ===== Classes ===== -->
<element name="TimeDuration" type="gmmp:TimeDuration" />
<complexType name="TimeDuration">
  <sequence>
    <element name="instant" type="date" minOccurs="0"/>
    <element name="beginEnd" type="gmmp:startEndTime" minOccurs="0"/>
  </sequence>
</complexType>

<element name="startEndTime" type="gmmp:startEndTime" />
<complexType name="startEndTime">
  <sequence>
    <element name="begin" type="date" />
    <element name="end" type="date" />
  </sequence>
</complexType>

<element name="approximateLongitude" type="gmmp:approximateLongitude" />
<simpleType name="approximateLongitude">
  <restriction base="decimal">
    <minInclusive value="-180.0" />
    <maxInclusive value="180.0" />
  </restriction>
</simpleType>

<element name="approximateLatitude" type="gmmp:approximateLatitude" />
<simpleType name="approximateLatitude">
  <restriction base="decimal">
    <minInclusive value="-90.0" />
    <maxInclusive value="90.0" />
  </restriction>
</simpleType>

<!--
=====
GMMP Conceptual Schema Language Classes
=====
-->
<!-- Measure Classes -->
<complexType name="Distance">
  <complexContent>
    <extension base="gmmp:Measure" />
  </complexContent>
</complexType>

<complexType name="Measure">
  <sequence>
    <element name="value" type="decimal" />
    <element name="uom">
      <complexType>
        <sequence>
          <element name="UnitOfMeasure" type="gmmp:UnitOfMeasure" />
        </sequence>
      </complexType>
    </element>
  </sequence>
</complexType>

<!-- Units of Measure-->
<complexType name="UnitOfMeasure">
  <sequence>
    <element name="name" type="string" />
    <element name="measurementType" type="string" minOccurs="0" />
  </sequence>
</complexType>

<complexType name="UomLength">
  <complexContent>
    <extension base="gmmp:UnitOfMeasure" />
  </complexContent>

```

</complexType>

<!--

GMMP Code Lists

-->

<!-- CodeList CI_DateTypeCode -->

<element name="CI_DateTypeCode" type="gmmp:CI_DateTypeCode" />

<simpleType name="CI_DateTypeCode">

<restriction base="xs:string">

<enumeration value="001" />

<enumeration value="002" />

<enumeration value="003" />

</restriction>

</simpleType>

<!-- CodeList CI_RoleCode -->

<element name="CI_RoleCode" type="gmmp:CI_RoleCode" />

<simpleType name="CI_RoleCode">

<restriction base="xs:string">

<enumeration value="001" />

<enumeration value="002" />

<enumeration value="003" />

<enumeration value="004" />

<enumeration value="005" />

<enumeration value="006" />

<enumeration value="007" />

<enumeration value="008" />

<enumeration value="009" />

<enumeration value="010" />

<enumeration value="011" />

</restriction>

</simpleType>

<!-- CodeList MD_CharacterSetCode -->

<element name="MD_CharacterSetCode" type="gmmp:MD_CharacterSetCode" />

<simpleType name="MD_CharacterSetCode">

<restriction base="xs:string">

<enumeration value="004" />

</restriction>

</simpleType>

<!-- CodeList MD_MaintenanceFrequencyCode -->

<element name="MD_MaintenanceFrequencyCode" type="gmmp:MD_MaintenanceFrequencyCode" />

<simpleType name="MD_MaintenanceFrequencyCode">

<restriction base="xs:string">

<enumeration value="008" />

<enumeration value="009" />

<enumeration value="010" />

<enumeration value="011" />

<enumeration value="012" />

</restriction>

</simpleType>

<!-- CodeList MD_MediumNameCode -->

<element name="MD_MediumNameCode" type="gmmp:MD_MediumNameCode" />

<simpleType name="MD_MediumNameCode">

<restriction base="xs:string">

<enumeration value="001" />

<enumeration value="002" />

<enumeration value="003" />

</restriction>

</simpleType>

<!-- CodeList MD_RestrictionCode -->

<element name="MD_RestrictionCode" type="gmmp:MD_RestrictionCode" />

<simpleType name="MD_RestrictionCode">

<restriction base="xs:string">

<enumeration value="001" />

<enumeration value="002" />

<enumeration value="003" />

<enumeration value="004" />

<enumeration value="005" />

<enumeration value="006" />

<enumeration value="007" />

<enumeration value="008" />

```
</restriction>
</simpleType>

<!-- CodeList MD_ScopeCode -->
<element name="MD_ScopeCode" type="gmmp:MD_ScopeCode" />
<simpleType name="MD_ScopeCode">
  <restriction base="xs:string">
    <enumeration value="005" />
  </restriction>
</simpleType>

<!-- CodeList MD_SpatialRepresentationTypeCode -->
<element name="MD_SpatialRepresentationTypeCode" type="gmmp:MD_SpatialRepresentationTypeCode" />
<simpleType name="MD_SpatialRepresentationTypeCode">
  <restriction base="xs:string">
    <enumeration value="001" />
    <enumeration value="002" />
  </restriction>
</simpleType>

<!-- Enumeration MD_TopicCategoryCode -->
<element name="MD_TopicCategoryCode" type="gmmp:MD_TopicCategoryCode" />
<simpleType name="MD_TopicCategoryCode">
  <restriction base="xs:string">
    <enumeration value="001" />
    <enumeration value="002" />
    <enumeration value="003" />
    <enumeration value="004" />
    <enumeration value="005" />
    <enumeration value="006" />
    <enumeration value="007" />
    <enumeration value="008" />
    <enumeration value="009" />
    <enumeration value="010" />
    <enumeration value="011" />
    <enumeration value="012" />
    <enumeration value="013" />
    <enumeration value="014" />
    <enumeration value="015" />
    <enumeration value="016" />
    <enumeration value="017" />
    <enumeration value="018" />
    <enumeration value="019" />
  </restriction>
</simpleType>
</schema>
```


Annex G.D (informative)

Implementation examples

The XML schema for Global Map Metadata Profile is created based on ISO 19139 (which defines the XML Schema implementation of ISO19115)

```
<!-- Sample metadata for Global Map metadata -->
<MD_Metadata xmlns="http://www.iscgm.org/spec/2.0/GMMP_MetadataSchema"
xmlns:gmmp="http://www.iscgm.org/spec/2.0/GMMP_MetadataSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.iscgm.org/spec/2.0/GMMP_MetadataSchema gmmp.xsd">
  <fileIdentifier>Global Map Sample Metadata</fileIdentifier>
  <language>en</language>
  <characterSet>004</characterSet>
  <contact>
    <organisationName>Secretariat of ISCGM</organisationName>
    <contactInfo>
      <phone>
        <voice>81 29 864 6910</voice>
        <facsimile>81 29 864 6923</facsimile>
      </phone>
      <address>
        <deliveryPoint>Kitasato 1</deliveryPoint>
        <city>Tsukuba</city>
        <administrativeArea>Ibaraki</administrativeArea>
        <postalCode>305-0811</postalCode>
        <country>Japan</country>
        <electronicMailAddress>sec@iscgm.org</electronicMailAddress>
      </address>
      <onlineResource>
        <linkage>http://www.iscgm.org</linkage>
      </onlineResource>
    </contactInfo>
    <role>002</role>
  </contact>
  <dateStamp>2009-10-25</dateStamp>
  <metadataStandardName>ISO 19115 Global Map Metadata Profile</metadataStandardName>
  <metadataStandardVersion>1.0</metadataStandardVersion>
  <referenceSystemInfo>
    <MD_CRS>
      <projection>
        <code>Geographic</code>
      </projection>
      <ellipsoid>
        <code>GRS80</code>
        <codeSpace>Geodetic Reference System 1980</codeSpace>
      </ellipsoid>
      <datum>
        <code>ITRF94</code>
        <codeSpace>International Terrestrial Reference Frame</codeSpace>
      </datum>
    </MD_CRS>
  </referenceSystemInfo>
  <identificationInfo>
    <MD_DataIdentification>
      <citation>
        <title>Global Map Sample Boundary layer</title>
        <date>
          <date>2009-10-25</date>
          <dateType>002</dateType>
        </date>
        <edition>Version 1.0</edition>
      </citation>
      <abstract>Global Map Sample layer is one layer of the Global Map A. etc. etc.etc. </abstract>
      <purpose>The purpose of Global Map Sample is one layer of the Global Map A. etc. etc.etc. </purpose>
      <credit>Secretariat of ISCGM</credit>
      <pointOfContact>
        <organisationName>Secretariat of ISCGM</organisationName>
        <contactInfo>
          <phone>
            <voice>81 29 864 6910</voice>
```

```

    <facsimile>81 29 864 6923</facsimile>
  </phone>
  <address>
    <deliveryPoint>Kitasato 1</deliveryPoint>
    <city>Tsukuba</city>
    <administrativeArea>Ibaraki</administrativeArea>
    <postalCode>305-0811</postalCode>
    <country>Japan</country>
    <electronicMailAddress>sec@iscgm.org</electronicMailAddress>
  </address>
  <onlineResource>
    <linkage>http://www.iscgm.org</linkage>
  </onlineResource>
  </contactInfo>
  <role>007</role>
</pointOfContact>
<resourceConstraints>
  <MD_LegalConstraints>
    <useLimitation>This data is suitable in smaller scales than 1 to 1,000,000</useLimitation>
    <useConstraints>001</useConstraints>
  </MD_LegalConstraints>
</resourceConstraints>
<spatialRepresentationType>001</spatialRepresentationType>
<spatialResolution>
  <equivalentScale>
    <denominator>1000000</denominator>
  </equivalentScale>
</spatialResolution>
<language>en</language>
<topicCategory>003</topicCategory>
<extent>
  <description>This dataset covers ABC country</description>
  <geographicElement>
    <EX_GeographicBoundingBox>
      <westBoundLongitude>129.0</westBoundLongitude>
      <eastBoundLongitude>141.0</eastBoundLongitude>
      <southBoundLatitude>-38.5</southBoundLatitude>
      <northBoundLatitude>-25.5</northBoundLatitude>
    </EX_GeographicBoundingBox>
  </geographicElement>
</extent>
</MD_DataIdentification>
</identificationInfo>
<distributionInfo>
  <MD_Distribution>
    <distributionFormat>
      <MD_Format>
        <name>Global Map GML Schema</name>
        <version>1.0</version>
      </MD_Format>
    </distributionFormat>
    <transferOptions>
      <MD_DigitalTransferOptions>
        <onLine>
          <linkage>http://www.iscgm.org</linkage>
        </onLine>
        <offLine>
          <name>001</name>
        </offLine>
      </MD_DigitalTransferOptions>
    </transferOptions>
  </MD_Distribution>
</distributionInfo>
<dataQualityInfo>
  <DQ_DataQuality>
    <scope>
      <level>005</level>
    </scope>
    <lineage>
      <LI_Lineage>
        <statement>Source Data History: ABCs were sourced from the official map DEF.</statement>
      </LI_Lineage>
    </lineage>
  </DQ_DataQuality>
</dataQualityInfo>
</MD_Metadata>

```

APPENDIX H GML Documents

The following are GML schemas for Global Map data (Global Map GML profile) and sample GML instances. These schemas specify the structure and contents of each feature class of Global Map vector data. Each feature data must be prepared in accordance with the corresponding schema.

GML Schema - Airport (point data)

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="airp" type="gmp:airpType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="airpType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="iko">
            <simpleType>
              <restriction base="string">
                <length value="4" />
              </restriction>
            </simpleType>
          </element>
          <element name="ita">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element name="nam" type="string" />
          <element name="use">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="4" />
                <enumeration value="8" />
                <enumeration value="22" />
                <enumeration value="23" />
                <enumeration value="999" />
              </restriction>
            </simpleType>
          </element>
          <element name="zv3" type="integer" />
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:pointProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```

GML Schema – Railroad Station (point data)

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="rstatp" type="gmp:rstatpType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="rstatpType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="nam" type="string" />
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:pointProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```

GML Schema – Port (point data)

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="portp" type="gmp:portpType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="portpType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="nam" type="string" />
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:pointProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```

GML Schema – Railroad (edge data)

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
  xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
  targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
    schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="rail" type="gmp:railType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="railType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="exs">
            <simpleType>
              <restriction base="integer">
                <enumeration value="2" />
                <enumeration value="5" />
                <enumeration value="28" />
                <enumeration value="55" />
                <enumeration value="59" />
              </restriction>
            </simpleType>
          </element>
          <element name="fco">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="2" />
                <enumeration value="3" />
              </restriction>
            </simpleType>
          </element>
          <element name="loc">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="4" />
                <enumeration value="8" />
                <enumeration value="25" />
                <enumeration value="999" />
              </restriction>
            </simpleType>
          </element>
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:curveProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>

```

GML Schema – Road (edge data)

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="roadl" type="gmp:roadlType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="roadlType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="acc">
            <simpleType>
              <restriction base="integer">
                <enumeration value="1" />
                <enumeration value="2" />
              </restriction>
            </simpleType>
          </element>
          <element name="exs">
            <simpleType>
              <restriction base="integer">
                <enumeration value="2" />
                <enumeration value="5" />
                <enumeration value="28" />
                <enumeration value="55" />
              </restriction>
            </simpleType>
          </element>
          <element name="rst">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="1" />
                <enumeration value="2" />
              </restriction>
            </simpleType>
          </element>
          <element name="med">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="1" />
                <enumeration value="2" />
              </restriction>
            </simpleType>
          </element>
          <element name="rtt">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="14" />
                <enumeration value="15" />
                <enumeration value="16" />
                <enumeration value="999" />
              </restriction>
            </simpleType>
          </element>
          <element name="rsu">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="1" />
                <enumeration value="2" />
              </restriction>
            </simpleType>
          </element>
        </sequence>
      </extension>
    </complexContent>
  </complexType>

```

```
</simpleType>
</element>
<element name="loc">
  <simpleType>
    <restriction base="integer">
      <enumeration value="0" />
      <enumeration value="4" />
      <enumeration value="8" />
      <enumeration value="25" />
      <enumeration value="999" />
    </restriction>
  </simpleType>
</element>
<element name="soc">
  <simpleType>
    <restriction base="string">
      <length value="3" />
    </restriction>
  </simpleType>
</element>
<element ref="gml:curveProperty" />
</sequence>
</extension>
</complexContent>
</complexType>
</schema>
```


GML Schema – Trail and Tracks Line (edge data)

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="trail" type="gmp:trailType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="trailType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="exs">
            <simpleType>
              <restriction base="integer">
                <enumeration value="2" />
                <enumeration value="5" />
                <enumeration value="28" />
              </restriction>
            </simpleType>
          </element>
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:curveProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```

GML Schema – Ferry route (edge data)

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="ferry" type="gmp:ferryType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="ferryType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="tuc">
            <simpleType>
              <restriction base="integer">
                <enumeration value="3" />
                <enumeration value="4" />
              </restriction>
            </simpleType>
          </element>
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:curveProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>

```

GML Schema – Political Boundary (point data)

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="polbndp" type="gmp:polbndpType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="polbndpType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="coc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element name="nam" type="string" />
          <element name="laa" type="string" />
          <element name="adm_code" type="string" />
          <element name="salb" type="string" />
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:pointProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```

GML Schema – Coast Line (edge data)

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="coastl" type="gmp:coastlType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="coastlType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="acc">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="1" />
                <enumeration value="2" />
                <enumeration value="3" />
              </restriction>
            </simpleType>
          </element>
          <element name="exs">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="1" />
                <enumeration value="3" />
                <enumeration value="44" />
                <enumeration value="46" />
                <enumeration value="55" />
                <enumeration value="60" />
              </restriction>
            </simpleType>
          </element>
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:curveProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>

```

GML Schema – Political Boundary Line (edge data)

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="polbndl" type="gmp:polbndlType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="polbndlType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="bst">
            <simpleType>
              <restriction base="integer">
                <enumeration value="1" />
                <enumeration value="2" />
                <enumeration value="3" />
              </restriction>
            </simpleType>
          </element>
          <element name="use">
            <simpleType>
              <restriction base="integer">
                <enumeration value="23" />
                <enumeration value="26" />
                <enumeration value="30" />
                <enumeration value="39" />
              </restriction>
            </simpleType>
          </element>
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:curveProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```

GML Schema – Political Boundary Area (face data)

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="polbnda" type="gmp:polbndaType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="polbndaType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="coc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element name="nam" type="string" />
          <element name="laa" type="string" />
          <element name="pop" type="integer" />
          <element name="ypc" type="integer" />
          <element name="adm_code" type="string" />
          <element name="salb" type="string" />
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:surfaceProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>

```

GML Schema – Miscellaneous (Dam/Weir/Island/Spring/Water-Hole) (point data)

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="miscp" type="gmp:miscpType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="miscpType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:pointProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```

GML Schema – Miscellaneous (Dam/Weir) (edge data)

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
  xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
  targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
    schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="misc1" type="gmp:misc1Type" substitutionGroup="gml:AbstractFeature" />
  <complexType name="misc1Type">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:curveProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```


GML Schema – Aqueduct/Canal/Flume/Penstock (edge data)

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="aquel" type="gmp:aquelType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="aquelType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="exs">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="1" />
                <enumeration value="5" />
                <enumeration value="6" />
              </restriction>
            </simpleType>
          </element>
          <element name="loc">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="4" />
                <enumeration value="8" />
                <enumeration value="25" />
                <enumeration value="999" />
              </restriction>
            </simpleType>
          </element>
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:curveProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>

```

GML Schema – Water Course (edge data)

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="river!" type="gmp:river!Type" substitutionGroup="gml:AbstractFeature" />
  <complexType name="river!Type">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="hyc">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="6" />
                <enumeration value="8" />
              </restriction>
            </simpleType>
          </element>
          <element name="lit">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="1" />
                <enumeration value="2" />
              </restriction>
            </simpleType>
          </element>
          <element name="nam" type="string" />
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:curveProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>

```

GML Schema – Inland Water (face data)

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="inwatera" type="gmp:inwateraType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="inwateraType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="hyc">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="6" />
                <enumeration value="8" />
              </restriction>
            </simpleType>
          </element>
          <element name="hyt">
            <simpleType>
              <restriction base="integer">
                <enumeration value="0" />
                <enumeration value="1" />
                <enumeration value="4" />
                <enumeration value="7" />
                <enumeration value="10" />
                <enumeration value="13" />
                <enumeration value="16" />
              </restriction>
            </simpleType>
          </element>
          <element name="nam" type="string" />
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:surfaceProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>

```

GML Schema – Built-up Area (point data)

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="builtup" type="gmp:builtupType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="builtupType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="pop" type="integer" />
          <element name="ypc" type="integer" />
          <element name="nam" type="string" />
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:pointProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```

GML Schema – Built-up Area (face data)

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
targetNamespace="http://www.iscgm.org/spec/2.0/GMP_GMLSchema" elementFormDefault="qualified">
  <import namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd" />
  <element name="builtupa" type="gmp:builtupaType" substitutionGroup="gml:AbstractFeature" />
  <complexType name="builtupaType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element name="f_code">
            <simpleType>
              <restriction base="string">
                <length value="5" />
              </restriction>
            </simpleType>
          </element>
          <element name="pop" type="integer" />
          <element name="ypc" type="integer" />
          <element name="nam" type="string" />
          <element name="soc">
            <simpleType>
              <restriction base="string">
                <length value="3" />
              </restriction>
            </simpleType>
          </element>
          <element ref="gml:surfaceProperty" />
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```

Sample Data – Airport (point data)

```
<?xml version="1.0" encoding="UTF-8"?>
<gml:FeatureCollection xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
xsi:schemaLocation="http://www.iscgm.org/spec/2.0/GMP_GMLSchema airp.xsd">
  <gml:boundedBy>
    <gml:Envelope srsName="EPSG:4326" srsDimension="2">
      <gml:lowerCorner>24.0606 122.9754</gml:lowerCorner>
      <gml:upperCorner>45.4517 144.9584</gml:upperCorner>
    </gml:Envelope>
  </gml:boundedBy>
  <gml:featureMember>
    <gmp:airp gml:id="airp_jpn.1">
      <gmp:f_code>GB005</gmp:f_code>
      <gmp:iko>RJCR</gmp:iko>
      <gmp:ita>RBJ</gmp:ita>
      <gmp:nam>REBUN</gmp:nam>
      <gmp:use>4</gmp:use>
      <gmp:zv3>27</gmp:zv3>
      <gmp:soc>JPN</gmp:soc>
      <gml:pointProperty>
        <gml:Point srsName="EPSG:4326" srsDimension="2">
          <gml:pos>45.4517 141.0417</gml:pos>
        </gml:Point>
      </gml:pointProperty>
    </gmp:airp>
  </gml:featureMember>
  <gml:featureMember>
    <gmp:airp gml:id="airp_jpn.2">
      <gmp:f_code>GB005</gmp:f_code>
      <gmp:iko>RJCW</gmp:iko>
      <gmp:ita>WKJ</gmp:ita>
      <gmp:nam>WAKKANAI</gmp:nam>
      <gmp:use>4</gmp:use>
      <gmp:zv3>8</gmp:zv3>
      <gmp:soc>JPN</gmp:soc>
      <gml:pointProperty>
        <gml:Point srsName="EPSG:4326" srsDimension="2">
          <gml:pos>45.4029 141.8080</gml:pos>
        </gml:Point>
      </gml:pointProperty>
    </gmp:airp>
  </gml:featureMember>
  <gml:featureMember>
    <gmp:airp gml:id="airp_jpn.3">
      <gmp:f_code>GB005</gmp:f_code>
      <gmp:iko>RJER</gmp:iko>
      <gmp:ita>RIS</gmp:ita>
      <gmp:nam>RISHIRI IS.</gmp:nam>
      <gmp:use>4</gmp:use>
      <gmp:zv3>30</gmp:zv3>
      <gmp:soc>JPN</gmp:soc>
      <gml:pointProperty>
        <gml:Point srsName="EPSG:4326" srsDimension="2">
          <gml:pos>45.2360 141.1903</gml:pos>
        </gml:Point>
      </gml:pointProperty>
    </gmp:airp>
  </gml:featureMember>
</gml:FeatureCollection>
```

Sample Data – Coastline (edge data)

```

<?xml version="1.0" encoding="UTF-8"?>
<gml:FeatureCollection xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
xsi:schemaLocation="http://www.iscgm.org/spec/2.0/GMP_GMLSchema coastl.xsd">
  <gml:boundedBy>
    <gml:Envelope srsName="EPSG:4326" srsDimension="2">
      <gml:lowerCorner>20.4239 122.9308</gml:lowerCorner>
      <gml:upperCorner>45.5573 153.9831</gml:upperCorner>
    </gml:Envelope>
  </gml:boundedBy>
  <gml:featureMember>
    <gmp:coastl gml:id="coastl_jpn.1">
      <gmp:f_code>BA010</gmp:f_code>
      <gmp:acc>1</gmp:acc>
      <gmp:exs>1</gmp:exs>
      <gmp:soc>JPN</gmp:soc>
      <gml:curveProperty>
        <gml:LineString srsName="EPSG:4326" srsDimension="2">
          <gml:posList>45.4762 140.9649 45.4770 140.9704 45.4795 140.9705 45.4794 140.9686 45.4793 140.9666 45.4805 140.9645
45.4779 140.9629 45.4762 140.9649</gml:posList>
        </gml:LineString>
      </gml:curveProperty>
    </gmp:coastl>
  </gml:featureMember>
  <gml:featureMember>
    <gmp:coastl gml:id="coastl_jpn.2">
      <gmp:f_code>BA010</gmp:f_code>
      <gmp:acc>1</gmp:acc>
      <gmp:exs>1</gmp:exs>
      <gmp:soc>JPN</gmp:soc>
      <gml:curveProperty>
        <gml:LineString srsName="EPSG:4326" srsDimension="2">
          <gml:posList>45.4033 142.0509 45.4181 142.0357 45.4199 142.0349 45.4266 142.0333 45.4314 142.0356 45.4373 142.0253
45.4431 142.0243 45.4487 142.0239 45.4554 142.0173 45.4581 142.0080 45.4613 142.0031 45.4613 141.9988 45.4621
141.9968</gml:posList>
        </gml:LineString>
      </gml:curveProperty>
    </gmp:coastl>
  </gml:featureMember>
  <gml:featureMember>
    <gmp:coastl gml:id="coastl_jpn.3">
      <gmp:f_code>BA010</gmp:f_code>
      <gmp:acc>1</gmp:acc>
      <gmp:exs>1</gmp:exs>
      <gmp:soc>JPN</gmp:soc>
      <gml:curveProperty>
        <gml:LineString srsName="EPSG:4326" srsDimension="2">
          <gml:posList>45.4371 140.9968 45.4424 140.9899 45.4424 140.9887 45.4465 140.9856 45.4488 140.9848 45.4513 140.9811
45.4549 140.9799 45.4576 140.9751 45.4633 140.9696 45.4646 140.9679 45.4596 140.9670 45.4536 140.9695 45.4529 140.9745
45.4477 140.9773 45.4424 140.9725 45.4394 140.9671 45.4363 140.9832 45.4275 140.9940 45.4199 140.99400 45.4183 140.9906
45.4170 140.9864 45.4159 140.9836 45.4146 140.9873 45.4115 140.9861 45.4122 140.9905 45.4072 140.9915 45.4067 140.9906
45.4041 140.9886 45.4017 140.9870 45.3991 140.9864 45.3956 140.9873 45.3919 140.9896 45.3867 140.9906 45.3843 140.9835
45.3753 140.9867 45.3653 140.9936 45.3600 140.9968</gml:posList>
        </gml:LineString>
      </gml:curveProperty>
    </gmp:coastl>
  </gml:featureMember>
</gml:FeatureCollection>

```

Sample Data – Inland Water (face data)

```

<?xml version="1.0" encoding="UTF-8"?>
<gml:FeatureCollection xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:gmp="http://www.iscgm.org/spec/2.0/GMP_GMLSchema"
xsi:schemaLocation="http://www.iscgm.org/spec/2.0/GMP_GMLSchema inwatera.xsd">
  <gml:boundedBy>
    <gml:Envelope srsName="EPSG:4326" srsDimension="2">
      <gml:lowerCorner>24.4227 124.2111</gml:lowerCorner>
      <gml:upperCorner>45.4334 147.2508</gml:upperCorner>
    </gml:Envelope>
  </gml:boundedBy>
  <gml:featureMember>
    <gmp:inwatera gml:id="inwatera_jpn.1">
      <gmp:f_code>BH000</gmp:f_code>
      <gmp:hyc>8</gmp:hyc>
      <gmp:hyt>4</gmp:hyt>
      <gmp:nam>KUSHU KO</gmp:nam>
      <gmp:soc>JPN</gmp:soc>
      <gml:surfaceProperty>
        <gml:Surface srsName="EPSG:4326" srsDimension="2">
          <gml:patches>
            <gml:PolygonPatch>
              <gml:exterior>
                <gml:LinearRing>
                  <gml:posList>45.4269 141.0445 45.4269 141.0425 45.4283 141.0406 45.4334 141.0413 45.4329 141.0457 45.4315
141.0476 45.4287 141.0476 45.4269 141.0445</gml:posList>
                </gml:LinearRing>
              </gml:exterior>
            </gml:PolygonPatch>
          </gml:patches>
        </gml:Surface>
      </gml:surfaceProperty>
    </gmp:inwatera>
  </gml:featureMember>
  <gml:featureMember>
    <gmp:inwatera gml:id="inwatera_jpn.2">
      <gmp:f_code>BH000</gmp:f_code>
      <gmp:hyc>8</gmp:hyc>
      <gmp:hyt>4</gmp:hyt>
      <gmp:nam>MEGUMA NUMA</gmp:nam>
      <gmp:soc>JPN</gmp:soc>
      <gml:surfaceProperty>
        <gml:Surface srsName="EPSG:4326" srsDimension="2">
          <gml:patches>
            <gml:PolygonPatch>
              <gml:exterior>
                <gml:LinearRing>
                  <gml:posList>45.3982 141.8208 45.3991 141.8164 45.4024 141.8164 45.4038 141.8215 45.4033 141.8265 45.4005
141.8259 45.3987 141.8240 45.3982 141.8208</gml:posList>
                </gml:LinearRing>
              </gml:exterior>
            </gml:PolygonPatch>
          </gml:patches>
        </gml:Surface>
      </gml:surfaceProperty>
    </gmp:inwatera>
  </gml:featureMember>
  <gml:featureMember>
    <gmp:inwatera gml:id="inwatera_jpn.3">
      <gmp:f_code>BH000</gmp:f_code>
      <gmp:hyc>8</gmp:hyc>
      <gmp:hyt>4</gmp:hyt>
      <gmp:nam>O NUMA</gmp:nam>
      <gmp:soc>JPN</gmp:soc>
      <gml:surfaceProperty>
        <gml:Surface srsName="EPSG:4326" srsDimension="2">
          <gml:patches>
            <gml:PolygonPatch>
              <gml:exterior>
                <gml:LinearRing>

```



```
<gml:posList>45.3779 141.7859 45.3765 141.7770 45.3691 141.7706 45.3668 141.7643 45.3658 141.7560 45.3705
141.7497 45.3755 141.7471 45.3779 141.7471 45.3829 141.7497 45.3871 141.7554 45.3880 141.7586 45.3890 141.7643 45.3885
141.7770 45.3871 141.7846 45.3857 141.7865 45.3779 141.7859</gml:posList>
  </gml:LinearRing>
</gml:exterior>
</gml:PolygonPatch>
</gml:patches>
</gml:Surface>
</gml:surfaceProperty>
</gmp:inwatera>
</gml:featureMember>
</gml:FeatureCollection>
```