Session 6   GGOS Portal and Metadata Flow
(second draft)

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1. Metadata standards for products and data

1.1.   What are metadata and why they should be used

Metadata are data about data.

- Metadata describe what, where, when and by whom a particular set of data were collected, and how the data are formatted.

- Metadata are used to facilitate the understanding, use and management of data. The metadata required for effective data management varies with the type of data and context of use.

- Metadata are essential for understanding information stored in data warehouses and have become increasingly important in XML-based Web applications.

Metadata do not contain the actual data nor do they replace a database.

1.2.   Why interoperability is important

- The IEEE Standard Computer Dictionary describes interoperability as follows: Ability of two or more systems or components to exchange information and to use the information that has been exchanged.
- ISO /IEC 2382-01, Information Technology Vocabulary, Fundamental Terms, defines interoperability as follows: "The capability to communicate, execute programs, or transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units".

Products / applications achieve interoperability with other products / applications using either or both of two approaches:
- By adhering to published interface standards
- By making use of a "broker" of services that can convert one product's interface into another product's interface "on the fly".

Both methods will be used in GGOS applications to achieve the interoperability of metadata. The ISO 19115 standard for geographic metadata is widely used in the GIS world and recommended e.g., by FGDC, OGC and GEOSS. Presently the WMO will apply an extended ISO 19115 metadata standard to its datasets. Here it is proposed to follow the same strategy for the GGOS and the data provided through the services.

Cross mapping allows the use of different metadata standards as long as the necessary information covers the requested formalities and are based on XML technology. E.g., the NASA proposed Directory Interchange Format (DIF) and ISO 19115 crosswalk is provided in table 11, displaying an example in the field of habit classification which easily can be adapted to other science fields.

1.3. Different levels of metadata granularity

The ISO 19115 standard defines an extensive set of metadata elements; typically only a subset of the full number of elements is used. However, it is essential that a basic minimum number of metadata elements be maintained for a dataset.

Core Metadata to be consistent with ISO 19115

The core metadata elements required to identify a dataset are used typically for catalogue purposes. These core metadata include the Dublin core which is accepted as basis for various standards. The list of core metadata contains metadata elements answering the following questions: "Does a dataset on a specific topic exist ('what')?", "For a specific place ('where')?", "For a specific date or period ('when')?" and "A point of contact to learn more about or order the dataset ('who')?". Already these core metadata facilitates interoperability, because they allow users to understand without ambiguity the geographic data and the related metadata provided by either the producer or the distributor. The required elements are listed in table 1.

Table 1 The ISO core-element set with mandatory fields, the core elements contain several sub-elements

ISO19115 metadata entity set information	ISO No	Metadata elements	
MD_Metadata			
	8	Metadata point of contact	m
	9	Metadata date stamp	m
MD_Identification	360	Dataset title	m
	362	Dataset reference date	m
	25	Abstract describing the dataset	m
	39	Dataset language	m
MD_DataIdentification	41	Dataset topic category	m

Table 1: The ISO core-element set with mandatory fields

Core light metadata set as mandatory metadata for all geodetic datasets

This core light metadata set should be the minimum basis for all geodetic data sets provide by GGOS and the IAG Services. Using most of the recommended optional elements in the core metadata set as mandatory in addition to the already mandatory elements result in a small list of core metadata for geographic datasets which comprises 22 elements (table 2). The main extensions are the descriptive keywords, the spatial resolution, the reference system, format information. But also the still as conditional marked elements are worth to be filled. With these extensions a more detailed information about data within GGOS can be provided which is accessible by international services outside our community e.g., GEOSS. Because the core light metadata set is clearly arranged it should be possible to describe almost all data sets produced by the IAG services in a simple way without too many efforts. The lists of descriptive keywords and data set categories topics can be set up according the GCMD list as a beginning and more improved during discussion (table 9). The format descriptions should follow the table 4 with extensions for gravity and other geodetic fields not covered here.

To create the core light metadata follow chapter 1.4.

Table 2.   A recommended Core light metadata set for all geodetic datasets, an extended recommended ISO core-element set

ISO19115 metadata entity set information	ISO No	Metadata elements	IERS GGOS
MD_Metadata	2	Metadata file identifier	o
	10	Metadata standard name	o
	11	Metadata standard version	o
	3	Metadata language	c
	4	Metadata character set	c
	8	Metadata point of contact	**m**
	9	Metadata date stamp	**m**
	6	Scope to which the metadata applies	**c**
MD_Identification	360	Dataset title	**m**
	361	Dataset short title	**o**
	362	Dataset reference date	**m**
	29	Dataset responsible party	**m**
	25	Abstract describing the dataset	**m**
	33	Descriptive keywords	**m**
	28	Status	**o**
MD_DataIdentification	37	Spatial representation type	o
	38	Spatial resolution of the dataset	**m**
	39	Dataset language	**m**
	40	Dataset character set	c
	41	Dataset topic category	**m**
	42	Geographic location	**m**
	43	bounding box or geographic identifier	**m**
	45	Vertical and temporal extent of dataset	**m**
MD_Constraints	71	Constraints on using the resource	**o**
DQ_DataQuality	79	Scope of data	**m**
	81	Lineage statement	**m**
	135	Value unit for reporting a data quality result	**o**
	137	Quantitative value of the evaluation procedure	**o**
MD_MaintenanceInformation	143	Maintenance frequency	**o**
MD_ReferenceSystem	196	Reference system	**m**
MD_Distribution	271	Distribution format	**m**
	277	On-line resource	**m**
	285	Format name	**m**
	286	Format version	**m**
MD_MetadataExtension-Information	14	Information on metadata extensions	**o**
MD_ApplicationSchema-Information	321	Application schema information	**o**

(m = mandatory, c = conditional, o = optional, (o) = not part of core set).

Extended Metadata sets

The full ISO metadata standard (ISO 19115) might be able to address most IAG service requirements. This standard is very complex, but it specifies a process (in ISO 19115 Annex C) where a community can adopt parts of the standard which it feels relevant (including the "Core Elements") and also extend the elements, keywords and code table instances to suit that community. As an example, the WMO Core Metadata Profile has been adapted to the geodetic requirements in a first step and is named GGOS Core Metadata Profile. In principle each IAG service can develop its own profile based on GGOS Core Metadata Profile (ISO19115 p. 120).

To follow this strategy the following granularity can be developed:
- GGOS provides core metadata information for almost all geodetic data sets. This solution should be realised fast to comply (e.g., GEOSS). If it is operational this service attracts users from other communities and fields of interest and "links" them to the specific IAG services or components.
- The individual IAG services expand the ISO metadata standard to there requirements. Based on this specific metadata profile a more detailed response can be made available.
- An alternative might be that the GGOS metadata profile will include all service specific specifications. As a consequence the GGOS master profile might be not clearly arranged and will confuse the user by e.g., much extended code lists.

A first draft to create a Geodetic Metadata Profile is given in the (table 3). This profile is based on the discussion and the result which took place at WMO for several years. The extended code list can be complemented to the need of the IAG service or product. As an example to describe the SINEX file in addition to the core light elements for search in GEOSS: What, Where, When, Who extensions of core elements for search in GGOS:

- stations: technique, time period,

- parameter: type, time period, quality, data frequency

is added.

1.4. Tools to create and export metadata sets and to search for metadata
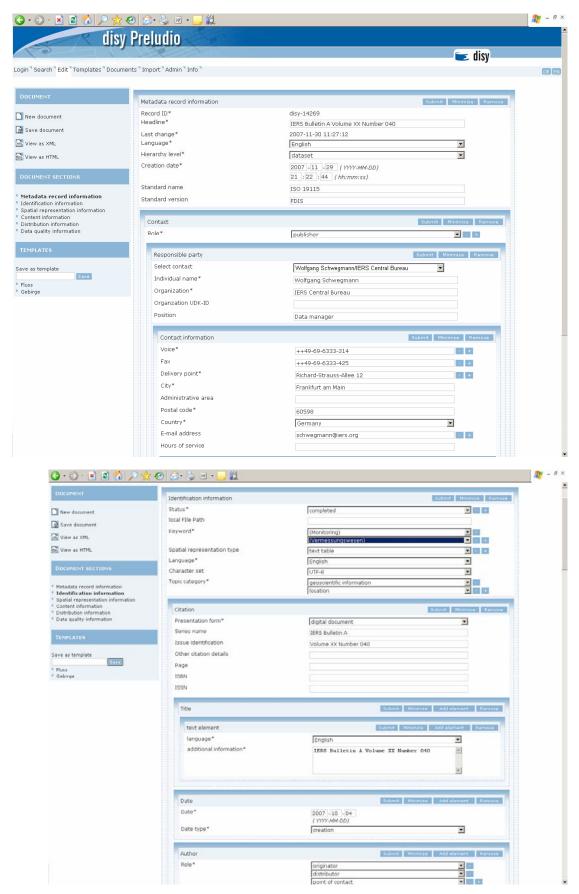
The ISO 19115 standard provides a general definition for directory searches and exchange that should be applicable to a wide variety of GGOS datasets. It does not specify how these metadata should be archived or presented to users. It also does not specify any particular implementation and could be implemented as a database, a flat file, or any other suitable mechanism.
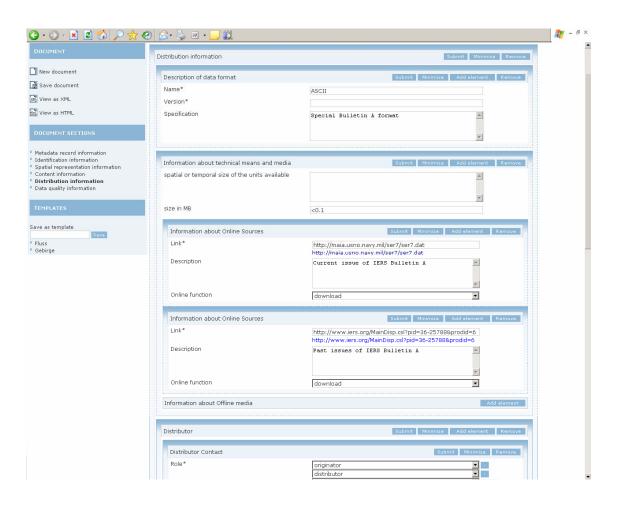
Here different methods can be applied:

- The information needed is extracted from the data set by scripts and provided in the required format (XML)

- The information can only partly extracted from the data set and must be completed by the data provider

- The information must be completed by the provider

Scripts should be developed by some institutions and made available for the broad geodetic community. To add information the use of editors is recommended, e.g. CatMDEdit, disyPreludio. The later offers a very comfortable user interface and as a special service, user

profiles according to ISO 19115 will be developed on request. As an example the IERS Bulletin A is described by GGOS core light metadata

1.5. Applications

Metadata management within IERS

Based on a decision of the IERS Directing Board the IERS Data and Information System should realize a central access point for all IERS Products and Information related to the field of Earth Rotation and Reference Systems. It has been developed in the framework of the "Geotechnologienprojekt" financed by the Federal Ministry of Science and Application and contributions from BKG.

An important part of the data system is the metadata management. Initially, a metadata schema (profile) has been developed to describe the characteristics of all IERS products by one common schema. This metadata schema allows search for specific information, to compare the various products, to give a descriptive summary of a product, etc. This metadata profile was designed to describe all characteristics of the IERS products. The profile comprises metadata fields like Content, Data, Time, Accuracy, Format, Access, Creator, Contact, Documentation, etc. The metadata are the basis for the dynamic IERS Web site.

The process to collect the metadata consists of two steps. A general metadata class is being assigned to each product. As soon as a new product version is being archived the metadata of the superior class is being attached complemented by information extracted from the individual product version.

To be compliant to the international metadata standard for geographic information (ISO 19115) the IERS metadata schema has been extended. In table 10 the elements in column 2 are indicated by "yes" to align the IERS metadata to the metadata set of "GeoPortal.Bund" the German Geoportal. This applied standard is widely used by metadata catalogues

allowing for interdisciplinary searches by so called catalogue service web interfaces (CSW). By this extension and inclusion in the "GeoPortal.Bund" the IERS data are interoperable and made available for the GEOSS pilot project.

2. Standardised data formats

A preliminary list of known formats within selected IAG services has been compiled and provided in the annex as table 4.

3. List of relevant information common to all Services

The Inter-Service Data Integration for Geodetic Operations (INDIGO) (http://indigo.nasa.gov) provides support for the central offices of the International GNSS Service (IGS, formerly the International GPS Service), International Laser Ranging Service (ILRS), and International VLBI Service for Geodesy and Astrometry (IVS), International DORIS Service as well as the Crustal Dynamics Data Information System (CDDIS) data archive system, to develop information systems which enable the simultaneous use of multiple space geodetic techniques for earth science. Development activities for INDIGO continue.

The data and products from these services are made possible by the many worldwide agencies that utilize their own resources to collaboratively create them.

INDIGO works closely with the International Earth Rotation and Reference Systems Service (IERS) and the Global Geodetic Observing System (GGOS), and intends to develop systems which are extensible, to allow other space geodetic techniques to participate.

The tables 5 to 8 IAG Geometric Services Comparison Charts: Data, Products, Service Information, Site Information (s. annex) give an overview of the geometrical services; other services are not yet included and should be added.

4.   GGOS & Service Portals

Introduction

The GGOS Portal will be a unique access point for all GGOS products. The portal will also provide a route to the heterogeneous IAG service/technique specific information systems. The portal will be equipped with a database of relevant metadata and WEB services established according to international standards, which will enable searches for relevant data and products in a most effective way.

Background

The IAG services, as components of GGOS, provide very important and valuable data, information, and products, which are indispensable for Earth sciences and their applications. The GGOS portal will give access to these data and products as well as general information about geodesy. The portal will contribute to GGOS objectives to promote and improve the visibility of scientific research in geodesy and to achieve maximum benefit for the scientific community and in society in general. Behind the GGOS portal, each contributing service will continue its own visibility and responsibility to maintain and manage its supporting data and information system.

The IAG services produce important and valuable products that cannot only be promoted by GGOS but are critical to the generation of GGOS products. These products and data are only available at the data centres of the individual components of GGOS. It is clear that for a future GGOS, all the relevant products for Earth sciences and applications have to be made accessible through the GGOS portal, that leads the user – including the non-specialists working in neighbouring or different fields – to the individual products and their characteristics, as shown in Figure 1 below. The products and data themselves will remain physically located at many different data and product centres and will be promoted by the individual IAG services as well. As a draw for newcomers or scientists that are not familiar with space geodesy, the initial web pages of the GGOS portal will present the "burning questions" of society and lead the way from there to the products relevant for the corresponding topic, their characteristics, location, availability, latency, accuracy, etc. The expert user will have the ability to skip these introductory pages and immediately proceed to the databases themselves. General information about the GGOS project will also be available through the portal, providing a valuable resource for both the external and internal GGOS communities.

GGOS Portal Architecture

The success of the GGOS portal will depend on data and information providers accepting and implementing a set of interoperability arrangements, including technical specifications for collecting, processing, storing, and disseminating shared data, metadata and products. GGOS interoperability will be based on non-proprietary standards, with preference given to formal international standards. The eXtensible Markup Language (XML) has become a quasi standard to facilitate the sharing of data across different information systems, particularly via the Internet. Moreover, Web services for the support of interoperable Machine to Machine communication over a network are built on XML based standards (SOAP, WSDL).
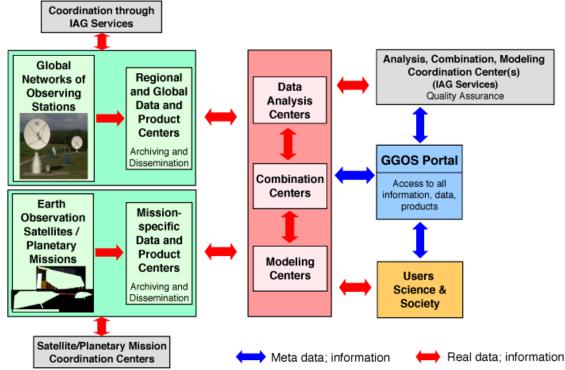

Figure 1. GGOS system design, directing users through the portal to underlying data, products and information.

Data, products, and information from contributing IAG services will be catalogued in a publicly accessible clearinghouse maintained collectively under the GGOS portal. The catalogue including thesauri will itself be subject to GGOS interoperability specifications, including the standard search and portrayal services.

The functions of the GGOS portal (e.g., search capabilities for stations, satellites, data, products, institutions, data mining tools, visualization, Web services, connections to other catalogues, etc.) are supported by the GGOS Clearinghouse (Figure 2). The GGOS Clearinghouse will be an facility that collects and distributes information concerning the data catalogues and services.
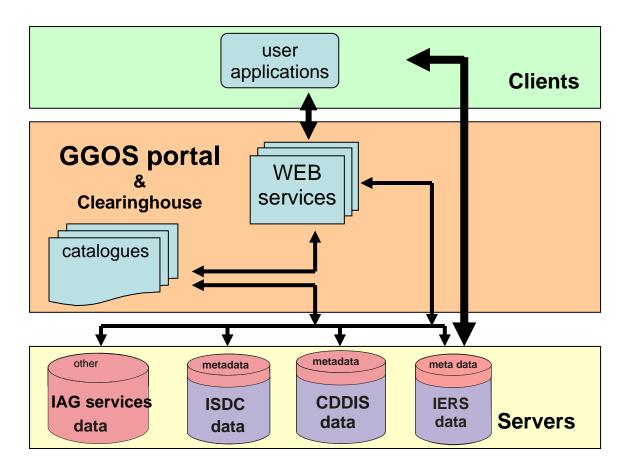
Figure 2. GGOS portal architecture

The GGOS Clearinghouse provides access to a distributed network of catalogue services that support the interoperability agreements of GGOS. Contributing IAG services may nominate catalogues containing structured, standards-based metadata and other Web services for access by the GGOS Clearinghouse. The clearinghouse provides search capability across the catalogues and their registered resources by mapping these catalogues. The GGOS portal will search the GGOS Clearinghouse but will also provide access to other GGOS resources e.g., calendar functions, bulletin boards, etc. Through the use of interoperability standards, additional portals may be established for national or professional communities to access the GGOS Clearinghouse.

The metadata to be held by the clearinghouse is dependent upon the approach used for searching. Two anticipated capabilities for access to remote catalogues (see Figure 3) may include:

- Distributed search approach: search requests are sent in parallel to registered distributed catalogues of the IAG services.
- Harvested approach: The clearinghouse periodically harvests all metadata from registered distributed catalogues. A user search request is executed against the metadata harvested from the remote catalogues and the results are managed and portrayed in the GGOS Clearinghouse.
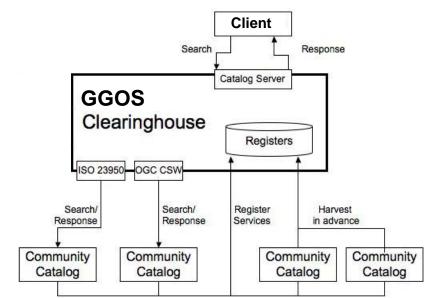
Figure 3. GGOS Clearinghouse architecture – engineering viewpoint (according to D. Nebert).

GGOS Portal Goals and Objectives

The GGOS Portal will provide a Web site that:

- represents a single Web access point (door of entry) for all geodetic products relevant in the framework of GGOS,
- access to general information about GGOS,
- help in answering the "burning questions of society" and leads the way to the products, their characteristics, location, availability, latency, and accuracy,
- an information resource for GGOS participants (e.g., working group resources, calendar, meeting summaries, presentation archive, etc.),
- access the GGOS clearinghouse to search data catalogues, products and data sets generated by GGOS components,
- allows searching and information retrieval of descriptive metadata from multiple, diverse target resources, databases, web pages, and library catalogues.

Later the GGOS portal should offer a set of tools for organized knowledge discovery including visualisation to assist identification and selection of appropriate resources (information, data, products).

Tasks to be addressed by the GGOS Portal:

1. Installation of a GGOS Web site
   o Basic functionalities, hot spot information, news, tutorials, quick links, announcements, etc.
   o General information on and explanations of data, products, and geodetic techniques, with direction to service-specific resources
   o Facilitate GGOS communication
     - Calendars
     - User forums on relevant topics
     - Bibliography
     - Presentations
     - Meeting summaries
     - Working group activities

2. Installation of a clearinghouse
   o host catalogues for metadata for all "products" of the IAG services relevant to GGOS based on GGOS standards

- o ensure interoperability within the GGOS community and to other systems e.g. GEOSS:
  - Data
  - Products
  - Organizational components (e.g., infrastructure, supporting institutions, personnel, services)
  - Networks and their stations
- o Search (temporal, spatial, multi-technique, keywords, etc.) of metadata, data, and product databases
- o Web services (Catalogue Service Web, Web Map Service (Portrayal), etc…

3. Distributed applications for data mining of the GGOS products /data files to be provided through the GGOS Portal include:
   - o Data location tools (parse and merge data)
   - o Data visualization tools
   - o Data analysis tools

   The Web portal applications allowing users to download, install and customize the portal services in their own environment.

Based on modern architecture, standards and Web services the requested tasks to build up the GGOS portal can be realized not only by single institutions but also by consortia with distributed server architecture. The portal should be designed and implemented in such a fashion to permit mirroring/installation at alternate physical locations.

Table 3

Version 0.1 of GGOS Core Metadata Profile of the ISO Metadata Standard
- November 2007 -

Notes: The GGOS Core Meta Data Profile is developed based on the WMO Core Metadata Profile of the ISO Metadata Standard and recommendations of the GEO Architecture and Data Committee.

The following table provides an overview of the GGOS Core Metadata Profile suitable for use by decision makers and users. To implement this standard the International Standard ISO 19115: 2003 and its corrigendum 1, which describe the complete ISO standard, must be consulted.

Of the core elements listed, those in **bold** are mandatory and those in italic are optional with all others being conditional.

This Metadata Profile is a core set as a basic profile to collect the metadata for GGOS data sets. The ISO Standard in general provide more features to descript the data sets in more details.

Deviations from the ISO 19115 are marked in red, information marked in green are lists which have to be complemented by GGOS or the IAG services. The lists of descriptive keywords and data set categories topics can be set up according the GCMD list as a beginning and more improved during discussion (table 7). The format descriptions should follow the table 2 with extensions for gravity and other geodetic fields not covered here.

Generic Name	ISO Name/Role name and Reference Lines	Definition
Information about the metadata - Basic information of GGOS Core Metadata Profile version 0.1		
[Metadata entity]		
	MD_Metadata (1)	Root entity which defines metadata about a resource or resources
File ID	*fileIdentifier (2)*	Unique identifier for this metadata file
Language	language (3)	Language of this metadata item (ISO639-2, other parts may be used)
Character set	characterSet (4) MD_CharacterSetCode (B.5.10)	Full name of the character coding standard used for this metadata set
File identifier	parentIdentifier (5)	File identifier of the metadata to which this metadata is a subset (child)
Scope of metadata	hierarchyLevel (6) MD_ScopeCode (B.5.25)	Scope to which the metadata applies
Number of hierarchy	hierarchyLevelName (7)	Name of the hierarchy levels for which the metadata is provided
Contact	**contact (8) CI_ResponsibleParty (see 374)**	Party responsible for the metadata information
Date	**dateStamp (9)**	Date that the metadata was created (ISO8601)
Standard name	*metadataStandardName (10)*	Name of the metadata standard (including profile name) used

Standard version	*metadataStandardVersion (11)*	Version of the metadata standard (version of the profile) used
URI	*dataSetURI (11.1)*	Uniformed Resource Identifier (URI) of the dataset to which the metadata applies
Localized character string	*locale (11.2)*	Provides information about an alternatively used localized character string for a linguistic extension
	PT_Locale (ISO19139) languageCode LanguageCode (ISO639) country CountryCode (ISO3166) characterEncoding MD_characterSetCode (B.5.10)	
Spatial information	*spatialRepresentationInfo (12)* *MD_SpatialRepresentation (see 156)*	Digital representation of spatial information in the dataset
Reference system	*referenceSystemInfo (13)* *MD_ReferenceSystem (see 186)*	Description of the spatial and temporal reference systems used in the dataset l
Metadata extension	*metadataExtensionInfo (14)* *MD_MetadataExtensionInform ation (see 303)* extensionOnlineResource (304) CI_OnlineResource (see 396) extendedElementInformation (305) MD_ExtendedElementInf ormation(see 306)	Information describing metadata extensions
Dataset identification	**identificationInfo (15)** **MD_Indentification (see 36)**	Basic information about the resource(s) to which the metadata applies
Content	*contentInfo (16)* *MD_ContentInformation (see 232)*	Content of the dataset in more detail than the keywords.
Distribution Information	*distributionInfo (17)* *MD_Distribution (see 270)*	Information about the distributor of and options for obtaining the resource(s)
Data quality	*dataQualityInfo (18)* *DQ_DataQuality (see 78)*	Overall assessment of quality of resource(s) Information about the catalogue of rules defined for the portrayal of resource(s)

Catalogues	*portrayalCatalogueInfo (19)* *MD_PortrayalCatalogueReference (see 268)*	
Restriction	*metadataConstraints (20)* *MD_Constraints (see 67)*	Restrictions on the access and use of the dataset (Could specify GGOS additional Data as free text) Note: At present the GGOS Core Metadata will not contain the ISO parameters that describe access constraints to the metadata, but implementers should be aware that the ISO parameters exist and might be required in later versions of the GGOS Core. Any metadata "published" through a system developed for the GGOS Core is therefore likely to be disclosed regardless of privacy markings on the metadata.
Conceptual schema	*applicationSchemaInfo (21)* *MD_ApplicationSchemaInformation (see 320)*	Information about the conceptual schema of a dataset
Frequency of update	*metadataMaintenance (22)* *MD_MaintenanceInformation (see 142)*	Information about the frequency of metadata updates, and the scope of those updates
Aggregation of dataset	*series* *DS_Aggregate*	Aggregation of dataset
Dataset	*describes* *DS_DataSet*	Dataset
Property type	*propertyType* *GF_PropertyType (ISO19109)*	Textual information related to the feature type
	featureType *GF_FeartureType (ISO19109)*	Textual information describing the concept of a feature type
	featureAttribute *GF_AttributeType (ISO19109)*	Class of attribute definitions of a feature type

[Identification]	MD_Identification (23) MD_ServiceIdentification (47) MD_DataIdentification (36)	Basic information required to uniquely identify resource(s) See ISO19119 for further information
	citation (24) **CI_Citation (see 359)**	Citation data for the dataset
	abstract (25)	Brief narrative summary of the content of the dataset
	purpose (26)	Summary of the intentions with which the dataset was developed
	credit (27)	Recognition of those who contributed to the dataset
	status (28)	Status of the dataset

	MD_ProgressCode (B.5.23)	
	pointOfContact (29)	Identification of, and means of communication with, person(s) and organizations(s) associated with the dataset
	CI_ResponsibleParty (see 374)	
	resourceMaintenance(30)	Information about the frequency of resource updates, and the scope of those updates
	MD_MaintenanceInformation (see 142)	
	graphicOverview (31)	A graphic that illustrates the dataset
	MD_BrowseGraphic (see 48)	
	resourceFormat (32)	A description of the format of the dataset
	MD_Format (see 284)	
	<mark>*descriptiveKeywords (33)*</mark>	<mark>Commonly used words or formalised words or phrases used to describe the subject</mark>
	MD_Keywords (see 52)	
	resourceSpecificUsage (34)	Basic information about specific applications for which the dataset have been or being used by different users
	MD_Usage (see 62)	
	resourceConstraints (35)	Restrictions on the access and use of the resource or metadata (could specify GGOS additional data as free text)
	MD_Constraints (see 67)	
	aggregationInfo (35.1)	Aggregate dataset information
	MD_AggregateInformation (see 66.1)	
	(MD_DataIdentification (36))	
	spatialRepresentationType (37)	Method used to spatially represent geographic information
	MD_spatialRepresentationType Code (B.5.26)	
	spatialResolution (38)	Spatial density of the data in the dataset (e.g. grid spacing)
	MD_Resolution (see 59)	
	language (39)	Language(s) used in the dataset (ISO639-2, other parts may be used)
	characterSet (40)	Full name of the character coding standard used for the dataset
	MD_CharacterSetCode (B.5.10)	
	<mark>topicCategory (41)</mark>	Discipline covered by this dataset <mark>[ISO code list B.5.27]</mark> - Note this field is of limited use for GGOS purposes but is a required field within the ISO standard and is included to ensure conformity
	MD_TopicCategoryCode (B.5.27)	
	environmentDescription (44)	Description of the dataset in the producer's processing environment
	extent (45)	Extent information including the bounding box, bounding polygon, vertical and temporal extent of dataset
	EX_Extent (see 334)	
	supplementalInformation (46)	Any other descriptive information about the dataset
[Browse graphic]	MD_BrowseGraphic (48)	

	fileName (49)	Name of the file that contains a graphic that provides an illustration of the dataset
	fileDescription (50)	Text description of the illustration
	fileType (51)	Format in which the illustration is encoded, e.g. CGM, EPS, GIF, JPEG, PBM, PS, TIFF, XWD
[Keywords]	MD_Keywords (52)	
	keyword (53)	List of predefined and other keywords used to describe the dataset. Keywords should be taken from a standard thesaurus (the URI for this thesaurus should be given – this, for example, would facilitate searching in different languages), or other defined list but free form keywords are permitted as well.
	GGOS_Keyword (GGOS)	
	type (54)	Subject matter used to group similar keywords
	MD_KeywordTypeCode (B.5.17)	
	thesaurusName (55)	Name of the formally registered thesaurus or a similar authoritative source of keywords
	CI_Citation (see 359)	
[Representative fraction]	MD_RepresentativeFraction (56)	
	denominator (57)	The number below the line in a vulgar fraction
[Resolution]	MD_Resolution (59)	
	equivalentScale (60)	Level of detail expressed as the scale of a comparable hardcopy map or chart
	MD_RepresentativeFraction (56)	
	distance (61)	Ground sample distance
[Usage]	MD_Usage (62)	
	specificUsage (63)	Brief description of the resource and/or resource series usage
	usageDateTime (64)	Date and time of the first use or range of uses of the resource and/or resource series
	userDeterminedLimitations (65)	Applications, determined by the user for which the resource and/or resource series is not suitable
	userContactInfo (66)	Identification of and means of communicating with person(s) and organization(s) using the resource(s)
	CI_ResponsibleParty (see 374)	
[Aggregation]	MD_AggregateInformation (66.1)	
	aggregateDataSetName (66.2)	Citation information about the aggregate dataset
	CI_Citation (see 359)	
	aggregateDataSetIdentifier (66.3)	Identification information about aggregate dataset
	MD_Identifier (see 205)	
	associationType (66.4)	Association type of the aggregate dataset
	DS_AssociationTypeCode	

	(B.5.7)	
	initiativeType (66.5)	Type of initiative under which the aggregate dataset was produced
	DS_InitiativeTypeCode (B.5.8)	
[Constraint (includes legal and security]	MD_Constraints (67)	
	useLimitation (68)	Limitation affecting the fitness for use of the resource.
Legal Constraint	MD_LegalConstraints (69)	Restrictions and legal prerequisites for accessing and using the dataset
	useLimitation (68)	Limitation affecting the fitness for use of the resource.
	accessConstraints (70)	Any special restrictions or limitations on obtaining the dataset
	MD_RestrictionCode (B.5.24)	
	useConstraints (71)	Any special restrictions or limitations or warnings on using the dataset
	MD_RestrictionCode (B.5.24)	
	otherConstraints (72)	Other restrictions and legal prerequisites for accessing and using the dataset
Security Constraint	MD_SecurityConstraints (73)	Handling restrictions imposed on the dataset for security reasons
	useLimitation (68)	Limitation affecting the fitness for use of the resource.
	classification (74)	Name of the handling restrictions on the dataset
	MD_ClassificationCode (B.5.11)	
	userNote (75)	Explanation of the application of the legal constraints or other restrictions and legal prerequisites for obtaining and using the dataset
	classificationSystem (76)	Name of the classification system
	handlingDescription (77)	Additional information about the restrictions on handling the dataset
[Data quality]	DQ_DataQuality (78)	
	scope (79)	The specific data to which the data quality information applies
	DQ_Scope (see 138)	
	report (80)	Quantitative quality information for the data specified by the scope
	DQ_Element (see 99)	
	lineage (81)	Non-quantitative quality information about the lineage of the data specified by the scope
	LI_Lineage (see 82)	
[Lineage]	LI_Lineage (82)	Information about the level of processing applied to the dataset. This field should be used to indicate whether the data are observations, analyses (re-analyses), forecast (based on initial states including observations), simulations or other sources of data. Could also be used to include the platform/mission in the source of data (e.g. Ship, aircraft, satellite, satellite id).
		May need to use pairs of [source, processing step] to provide additional information. May contain references (e.g. URI) to external information on the

		processing and source.
	statement (83)	Information about the events or source data used in constructing the dataset
	processStep (84)	Information about an event in the creation process for the dataset
	LI_ProcessStep (see 86)	
	source (85)	Information about the source data used in creating the dataset
	LI_Source (see 92)	
[Process step]	LI_ProcessStep (86)	
	description (87)	Description of the event, including related parameters or tolerances
	rationale (88)	Requirement or purpose for the process step
	dateTime (89)	Date and time or range of date and time on or over which the process step occurred
	processor (90)	Identification of, and means of communication with, person(s) and organization(s)
	CI_ResponsibleParty (see 374)	associated with the process step
	source (91)	Information about the source data used in creating the data specified by the scope
	LI_Source (see 92)	
[Source]	LI_source (92)	
	description (93)	Detailed description of the level of the source data
	scaleDenominator (94)	Denominator of the representative fraction on a source map
	MD_RepresentativeFraction (see 56)	
	sourceReferenceSystem (95)	Spatial reference system used by the source data
	MD_ReferenceSystem (see 186)	
	sourceCitation (96)	Recommended reference to be used for the source data
	CI_Citation (see 359)	
	sourceExtent (97)	Information about the spatial, vertical and temporal extent of the source data
	EX_Extent (see 334)	
[Data quality element]	DQ_Element (99)	Aspect of quantitative quality information
	DQ_Completeness (108)	Presence and absence of features, their attributes and their relationship
	DQ_CompletenessCommission (109)	Excess data present in the dataset, as described by the scope
	DQ_CompletenessOmission (110)	Data absent from the dataset, as described by the scope
	DQ_LogicalConsistency (111)	Degree of adherence to logical rules of data structure, attribution and relationships
	DQ_ConceptualConsistency (112)	Adherence to rules of the conceptual schema
	DQ_DomainConsistency (113)	Adherence of values to the value domains
	DQ_FormatConsistency (114)	Degree to which data is stored in accordance with the physical structure of the dataset, as described by the scope

	DQ_TopologicalConsistency (115)	Correctness of the explicitly encoded topological characteristics of the dataset as described by the scope
	DQ_PositionalAccuracy (116)	Accuracy of the position of features
	DQ_AbsoluteExternalPositionalAccuracy (117)	Closeness of reported coordinate values to values accepted as or being true
	DQ_GriddedDataPositionalAccuracy (118)	Closeness of gridded data position values to values accepted as or being true
	DQ_RelativeInternalPositionalAccuracy (119)	Closeness of the relative positions of features in the scope to their respective relative positions accepted as or being true
	DQ_TemporalAccuracy (120)	Accuracy of the temporal attributes and temporal relationships of features
	DQ_AccuracyOfATimeMeasurement (121)	Correctness of the temporal references of an item (reporting of error in time measurement
	DQ_TemporalConsistency (122)	Correctness of ordered events or sequences, if reported
	DQ_TemporalValidity (123)	Validity of data specified by the scope with respect to time
	DQ_ThematicAccuracy (124)	Accuracy of quantitative attributes and the correctness of non-quantitative attributes and of the classifications of features and their relationships
	DQ_ThematicClassificationCorrectness (125)	Compassion of the classes assigned to features or their attributes to a universe of discourse
	DQ_NonQuantitativeAttributeAccuracy (126)	Accuracy of non-quantitative attributes
	DQ_QuantitativeAttributeAccuracy (127)	Accuracy of quantitative attributes
	nameOfMeasure (100)	Name of the test applied to the data
	measureIdentification (101) *MD_Identifier (see 205)*	Code identifying a registered standard procedure
	measureDescription (102)	Description of the measure
	evaluationMethodType (103) *DQ_EvaluationMethodTypeCode (B.5.6)*	Type of method used to evaluate quality of the dataset
	evaluationMethodDescription (104)	Description of the evaluation method
	evaluationProcedure (105) *CI_Citation (see 359)*	Reference to the procedure information
	dateTime (106)	Date or range of dates on which a data quality measure was applied
	result (107) **DQ_Result (see 128)**	Value obtained from applying a data quality measure or the outcome of evaluating the obtained value against a specified acceptable conformance quality level
[Result]	DQ_Result (128)	
Conformance result	DQ_ConformanceResult (129)	Information about the outcome of evaluating the obtained value against a specified

		acceptable conformance quality level
	specification (130) **CI_Citation (see 359)**	Citation of products specification or user requirement against which data is being evaluated
	explanation (131)	Explanation of the meaning of conformance for this result
	pass (132)	Indication of the conformance result where 0= fail and 1=pass
Quantitative result	DQ_QuantitativeResult (133)	The values or information about the value(s) obtained from applying a data quality level
	valueType (134)	Value type for reporting a data quality result
	valueUnit (135)	Value unit for reporting a data quality result
	errorStatistic (136)	Statistical method used to determine the value
	value (137)	Quantitative value or values, content determined by the evaluation procedure used
[Scope]	DQ_Scope (138)	
	level (139) **MD_ScopeCode (B.5.25)**	Hierarchical level of the data specified by the scope
	extent (140) *EX_Extent (see 334)*	Information about the horizontal, vertical and temporal extent of the data specified by the scope
	levelDescription (141) MD_ScopeDescription (see 149)	Detailed description about the level of the data specified by the scope
[Maintenance]	MD_MaintenanceInformation (142)	
	maintenanceAndUpdateFrequency (143) **MD_MaintenanceFrequencyCode (B.5.18)**	Frequency with which changes and additions are made to the resource after the initial resource is completed
	dateOfNextUpdate (144)	Scheduled revision date for resource
	userDefinedMaintenanceFrequency (145)	Maintenance period other than those defined
	updateScope (146) *MD_ScopeCode (B.5.25)*	Scope of data to which maintenance is applied
	updateScopeDescription (147) *MD_ScopeDescription (see 149)*	Additional information about the range or extent of the resource
	maintenanceNote (148)	Information regarding specific requirements for maintenance the resource
	contact (148.1) *CI_ResponsibleParty (see 374)*	Identification of, and means of communicating with, person(s) and organizations with responsible party for maintaining the metadata
[Scope description]	MD_ScopeDescription (149)	
	attribute (150)	Attributes to which the information applies
	feature (151)	Features to which the information applies

	featureInstances (152)	Feature instances to which the information applies
	attributeInstances (153)	Attribute instances to which the information applies
	dataset (154)	Dataset to which the information applies
	other (155)	Class of information that does not fall into the other categories to which the information applies
[Spatial representation]	MD_SpatialRepresentation (156)	
Grid spatial rep.	MD_GridSpatialRepresentation (157)	
	MD_Georectified (162)	
	numberOfDimensions (158)	Number of independent spatial-temporal axes
	axisDimensionsProperties (159)	Information about spatial-temporal axis properties
	MD_Dimension (see 179)	
	cellGeometry (160)	Identification of grid data as point or cell
	MD_CellGeometryCode (B.5.9)	
	transformationParameterAvailability (161)	Identification of whether or not parameters for transformation between image coordinates and geographic or map coordinates exist (are available)
Regularly spaced	(MD_Georectified)	
	checkPointAvailability (163)	Indication of whether or not geographic position points are available to test the accuracy of the georeferenced grid data
	checkPointDescription (164)	Description of geographic position points used to test the accuracy of the georeferenced grid data
	cornerPoints (165)	Earth location in the coordinate system defined by the Spatial Reference System and the grid coordinate of the cells at opposite ends of grid coverage along two diagonals in the grid spatial dimensions. There are four corner points in a georectified grid; at least two corner points along one diagonal are required.
	centerPoint(166)	Earth location in the coordinate system defined by the Spatial Reference System and the grid coordinate of the cell halfway between opposite ends of the grid in the spatial dimensions
	pointInPixel (167) **MD_PixelOrientationCode (B.5.22)**	Point in a pixel corresponding to the Earth location of the pixel
	transformationDimensionDescription (168)	General description of the transformation
	transformationDimensionMapping (169)	Information about which grid axes are the spatial map axes
Irregularly Spaced	MD_Georeferenceable (170)	
	numberOfDimensions (158)	Number of independent spatial-temporal axes

	axisDimensionsProperties (159) **MD_Dimension (see 179)**	Information about spatial-temporal axis properties
	cellGeometry (160) **MD_CellGeometryCode (B.5.9)**	Identification of grid data as point or cell
	transformationParameterAvailability (161)	Identification of whether or not parameters for transformation between image coordinates and geographic or map coordinates exist (are available)
	controlPointAvailability (171)	Indication of whether or not control point(s) exists
	orientationParameterAvailability (172)	Indication of whether or not orientation parameters are available
	orientationParameterDescription (173)	Description of parameters used to describe sensor orientation
	georeferencedParameters (174)	Terms which support grid data georeferencing
	parameterCitation (175) CI_Citation (see 359)	Reference providing description of the parameters
Vector spatial rep.	MD_VectorSpatialPresentation (176)	
	topologyLevel (177) *MD_TopologyLevelCode (B.5.28)*	Code which identifies the degree of complexity of the spatial relationship
	geometricObjects (178) *MD_GeometricObjects (see 183)*	Information about the geometric objects used in the dataset
[Dimension]	MD_Dimension (179)	
	dimensionName (180) **MD_DimensionNameTypeCode (B.5.14)**	Name of the axis
	dimensionSize (181)	Number of elements along the axis
	resolution (182)	Degree of detail in the grid dataset
[Geometric objects]	MD_GeometricObjects (183)	
	geometricObjectType (184) **MD_GeometricObjectTypeCode (B.5.15)**	Name of point or vector objects used to locate zero-, one-, two-, or three-dimensional spatial locations in the dataset
	geometricObjectCount (185)	Total number of the point or vector object type occurring in the dataset
[Reference System]	MD_ReferenceSystem (186)	Information about the reference systems used (temporal, coordinate and geographic)
	referenceSystemIdentifier (187) RS_Identifier (see 208)	Name of reference system

Spacial and temporal reference	RS_ReferenceSystem (195)
	name (196)
	   RS_Identifier (see 208)
	domainOfValidity (197)
	   EX_Extent (see 334)
		Name of reference system used
		
		Range which is valid for the reference system

[Identifier]
 	
Identifier for reference system
	MD_Identifier (205)
	authority (206)
	   CI_Citation (see 359)
	code (207)
	
	RS_Identifier (208)
	authority (206)
	   CI_Ciation (see 359)
	code (207)
	codeSpace (208.1)
	version (208.2)
		Person or party responsible for maintenance of the namespace
		
		Alphanumeric value identifying an instance in the namespace
		
		Person or party responsible for maintenance of the namespace
		
		Alphanumeric value identifying an instance in the namespace
		Name or identifier of the person or organization responsible for namespace
		Version identifier for the namespace

[Content Information] FeatureCatalogue Grid data cell	MD_ContentInformation (232) MD_FeatureCatalogueDescription (233) *complianceCode (234)* *language (235)* **includeWithDataset (236)** *featureTypes (237)* **featureCatalogueCitation (238)** CI_Citation (see 359) MD_CoverageDescription (239)	The ISO standard provides both "feature catalogues" and "Coverage" to describe the attributes of the data held in the dataset. This GGOS Core Metadata chooses to use "feature" to describe all aspects of these attributes, including those relating to grids of data. Identification of whether or no the cited feature catalogue complies with [ISO 19110. Value 1 if feature catalogue is compliant with ISO19110. Default is 0 (not compliant) Language(s) used in the Catalogue (ISO639-2, other parts can be used) Indication of whether or not the feature catalogue is included with the dataset. Required if feature Catalogue is used. Value 1 in feature catalogue is included in dataset, 0 if not. Subset of feature types from the cited feature catalogue occurring in the dataset. Note: the physical variables described by the data are attributes of a feature (which could be an observed profile or a field of data, for example). Complete bibliographic reference to one or more external feature catalogue. Required if feature Catalogue is used. Bibliographic reference to the feature catalogue(s) used.

	MD_ImageDescription (243)	
	attributeDescription (240)	Description of the attribute described by the measurement value
	contentType (241)	Type of information represented by the cell value
	MD_CoverageContentType Code (B.5.12)	
	dimension (242)	Information on the attribute described by the measurement value
	MD_RangeDimension (256)	
	(MD_ImageDescription)	
	illuminationElevationAngle (244)	Illumination elevation measured in degrees clockwise
	illuminationAzimuthAngle (245)	Illumination azimuth measured in degrees clockwise
	imagingCondition (246)	Conditions affected the image
	MD_ImagingConditionCode (B.5.16)	
	imageQualityCode (247)	Specifies the image quality
	MD_Identifier (see 205)	
	cloudCoverPercentage (248)	Area of the dataset obscured by clouds, expressed as percentage of spatial extent
	processingLevelCode (249)	Image distributor's code that identifies the level of radiometric and geometric
	MD_Identifier (see 205)	processing that has been applied
	compressionGenerationQuantity (250)	Count of the number of lossy compression cycles performed on the image
	triangulationIndicator (251)	Indication of whether or not triangulation has been performed upon the image
	radiometricCalibrationDataavailability (252)	Indication of whether or not the radiometric calibration information for generating the radiometrically calibrated standard data product is available
	cameraCalibrationInformationAvailability (253)	Indication of whether or not constants are available which allow for camera calibration corrections
	filmDistortionInformationAvailability (254)	Indication of whether or not Calibration Reseau information is available
	lensDistortionInformationAvailability (255)	Indication of whether or not lens aberration correction information is available
[Range dimension]	MD_RangeDimension (256)	
	MD_Band (259)	
	sequenceIdentifier (257)	Number that uniquely identifies instances of bands of wavelength on which a sensor operates
	descriptor (258)	Description of the range of a cell measurement value
Range of wavelengths	(MD_Band)	
	maxValue (260)	Longest wavelength that the sensor is capable of collecting within a designated band

	minValue (261)	Shortest wavelength that the sensor is capable of collecting within a designated band
	units (262)	Units in which sensor wavelengths are expressed
	peakResponse (263)	Wavelength at which the response is the highest
	bitsPerValue (264)	Maximum number of significant bits in the uncompressed representation for the value in each and of each pixel
	toneGradation (265)	Number of discrete numerical values in the grid data
	scaleFactor (266)	Scale factor which has been applied to the cell value
	offset (267)	The physical value corresponding to a cell value of zero
[Portrayal catalogue]	MD_PortrayalCatalogueReference (268)	
	portrayalCatalogueCitation (269) CI_Citation (see 359)	Bibliographic reference to the portrayal catalogue cited
[Distribution]	MD_Distribution (270)	
	distributionFormat (271) MD_Format (see 284)	A description of the format of the data to be distributed
	distributor (272) MD_Distributor (see 279)	Information about the distributor
	transferOptions (273) MD_DigitalTransferOptions (see 274)	Information about technical means and media by which a resource is obtained from the distributor
[Digital transfer options]	MD_DigitalTransferOptions (274)	
	unitsOfDistribution (275)	Tiles, layers, geographic areas, etc., in which data is available
	transferSize (276)	Estimated size of a unit in the specified transfer format, expressed in megabytes.
	onLine (277) CI_OnlineResource (see 396)	Information about online sources from which the resource can be obtained
	offLine (278) MD_Medium (see 291)	Information about offline media on which the resource can be obtained
[Distributor information]	MD_Distributor (279)	
	distributorContact (280) CI_ResponsibleParty (see 374)	Party from whom the resource may be obtained. This list need not be exhaustive
	distributionOrderProcess (281) MD_StandardOrderProcess (see 298)	Information about how the resource may be obtained, and related instructions and fee information
	distributorFormat (282) MD_Format (see 284)	Information about the format used by the distributor

	distributorTransferOptions (283)
	    MD_DigitalTransferOptions
	    (see 274)
		Information about the technical means and media used by the distributor

[Format]	MD_Format (284)
	    name (285)
	    version (286)
	    amendmentNumber (287)
	    specification (288)
	    fileDecompressionTechnique
	    (289)
	    formatDistributor (290)
	        MD_Distributor (279)
		
		Name of the data transfer format(s)
		Version of the format (date, number, etc.)
		Amendment number of the format version
		Name of a subset, profile, or product specification of the format
		Recommendations of algorithms or processes that can be applied to read or
		    expand resources to which compression techniques have been applied
		Information about the distributor's format

[Medium]	MD_Medium (291)
	    name (292)
	        MD_MediumNameCode (B.5.20)
	    density (293)
	    densityUnits (294)
	    volumes (295)
	    mediumFormat (296)
	        MD_MediumFormatCode
	        (B.5.19)
	    mediumNote (297)
		
		Name of the medium on which the resource can be received
		
		Density at which the data is recorded
		Units of measure for the recording density
		Number of items in the media identified
		Method used to write to the medium
		
		Description of other limitations or requirements for using the medium

[Standard order process]	MD_StandardOrderProcess (298)
	    fees (299)
	
	    plannedAvailableDateTime (300)
	    orderingInstructions (301)
	    turnaround (302)
		
		Fees and terms for retrieving the resource. Include monetary units (as specified in
		    ISO 4217)
		Date and time when the resource will be available
		General instructions, terms and services provided by the distributor
		Typical turnaround time for the filling of an order

[Extended element]	MD_ExtendedElementInformation (306)
	    name (307)
	    shortName (308)
	
	    domainCode (309)
	    definition (310)
	    obligation (311)
	        MD_ObligationCode (B.5.21)
		
		Name of the extended metadata element
		Short form suitable for use in an implementation method such as XML or SGML.
		    NOTE other methods may be used
		Three digit code assigned to the extended element
		Definition of the extended element
		Obligation of the extended element

	condition (312)	Condition under which the extended element is mandatory
	dataType (313) **MD_DatatypeCode (B.5.13)**	Code which identifies the kind of value provided in the extended element
	maximumOccurrence (314)	Maximum occurrence of the extended element
	domainValue (315)	Valid values that can be assigned to the extended element
	parentEntity (316)	Name of the metadata entity(s) under which this extended metadata element may appear. The name(s) may be standard metadata element(s) or other extended metadata element(s)
	rule (317)	Specifies how the extended element relates to other existing elements and entities
	rationale (318)	Reason for creating the extended element
	source (319) **CI_ResponsibleParty (see 374)**	Name of the person or organization creating the extended element
[Application schema]	MD_ApplicationSchemaInformation (320)	
	name (321) **CI_Citation (see 359)**	Name of the application schema used
	schemaLanguage (322)	Identification of the schema language used
	constraintLanguage (323)	Formal language used in Application Schema
	schemaAscii (324)	Full application schema given as an ASCII file
	graphicsFile (325)	Full application schema given as a graphics file
	softwareDevelopmentFile (326)	Full application schema given as a software development file
	softwareDevelopmentFileFormat (327)	Software dependent format used for the application schema software dependent file
[Extent]	EX_Extent (334)	
	description (335)	Spatial and temporal extent for the dataset (in text)
	geographicElement (336)	GGOS metadata must contain the "bounding box" where relevant – even if global. However, either or both of a geographical name and/or a bounding polygon and/or an irregular point set should be used as well.
	extentTypeCode (340)	Identification of whether the bounding polygon encompasses an area covered by the data or an area where data is not present
	polygon (342)	The polygon is defined as a set of co-ordinate pairs with the last pair the same as the first. When the points in the polygon are traversed, the interior is to the left of the direction of travel. If the region has "holes", multiple polygons may be used. The points of the outer polygon will be traversed anti-clockwise, and those of inner polygons will be traversed clockwise.
		NOTE For polar-orbiting satellites, polygon should be used to appropriately encompass a slant area which is composed by orbits.

	westBoundLongitude (344)	Western-most limit of the dataset, longitude in decimal degrees (positive east)
	eastBoundLongitude (345)	Eastern-most limit of the dataset, longitude in decimal degrees (positive east)
	southBoundLatitude (346)	Southern-most limit of the dataset, latitude in decimal degrees (positive north)
	northBoundLatitude (347)	Northern-most, limit of the dataset, latitude in decimal degrees (positive north)
		Sets of points defining a bounding polygon.
		NOTE This is only an approximate reference so specifying the co-ordinate system is unnecessary. Using latitude and longitude, for any box surrounding a Pole, the limits are +/-90 and the southern (northern) most latitude, and the longitude extent must be +/-180. Bounding box may not be effective when used to search for data that cross the international date line or a pole.
	geographicIdentifier (349) **MD_Identifier (205)**	Identifier used to represent a geographic area or location. While it is preferable to use names from a well-known Gazetteer (this should be referred to in the identifier), it is acceptable to use names that are not in a Gazetteer.
		NOTE: Each of the Extent fields below is required if applicable
	temporalElement (337) **extent (351)**	Date and time for the content of the dataset
	verticalElement (338)	Vertical domain of the dataset (Note: There is potential ambiguity about vertical extent, particularly in oceanography. This can be resolved by the unitOfMeasure.)
	minimumValue (355)	Lowest vertical extent contained in the dataset
	maximumValue (356)	Highest vertical extent contained in the dataset
	unitOfMeasure (357)	Vertical units used for vertical extent information (E.g.: metres, feet, hectopascals)
		This must include the sign convention for height (whether values increase upwards or downwards).
	verticalDatum (358)	Information about the origin from which the maximum and minimum elevation values are measured (see ISO 1911).
[Station]	station	
	stationDescription (GGOS)	Description of a geodetic station
	InternationalStationId (GGOS)	
	code (GGOS)	Code list for station types; e.g. DOMES
	owner (GGOS)	
	stationName (GGOS)	Name of the station
	country (GGOS)	Name of county
	GGOSRegion (GGOS)	Name of GGOS Region
	latitude (GGOS)	Latitude
	longitude (GGOS)	Longitude
	statonHeight (GGOS)	Height of the station

	referenceHeight (GGOS)	Reference height
	stationContactInfo (GGOS)	Contact point of the station
	CI_Contact (see 387)	
	prodctList (GGOS)	List of products
	product (GGOS)	
	timePeriod (GGOS)	Time period
	beginDateTime (GGOS)	
	endDateTime (GGOS)	
	dataFrequency (GGOS)	
	accessRights (GGOS)	Access rights
	quality (GGOS)	Quality
[Citation]	CI_Citation (359)	Standardized resource reference
	title (360)	Name by which the cited resource is known
	alternateTitle (361)	Short name or other language name by which the cited information is known
	date (362)	Reference date for the cited resource
	CI_Date (see 393)	
	edition (363)	Version of the cited resource
	editionDate (364)	Date of the edition
	identifier (365)	Value uniquely identifying an object within a namespace
	MD_Identifier (see 205)	
	citedResponsibleParty (367)	Name and position information for an individual or organization that is responsible
	CI_ResponsibleParty (see 374)	for the resource
	presentationForm (368)	Mode in which the resource is represented
	CI_PresentationFormCode (B.5.4)	
	series (369)	Information about the series, or aggregate dataset, of which the dataset is a part
	CI_Series (see 403)	
	otherCitationDetails (370)	Other information required to complete the citation that is not recorded elsewhere
	collectiveTitle (371)	Common title with holdings note
		NOTE title identifies elements of a series collectively, combined with information about what volumes are available at the source cited
	ISBN (372)	International Standard Book Number
	ISSN (373)	International Standard Serial Number
[Responsible party]	CI_ResponsibleParty (374)	Identification of, and means of communication with, person(s) and organizations associated with the dataset
	individualName (375)	Name of the responsible person-surname, given name, title, separated by a delimiter

	organisationName (376)	Name of the responsible organization
	positionName (377)	Role or position of the responsible person
	contactInfo (378)	Address of the responsible party
	CI_Contact (see 387)	NOTE: Either a phone number or address is required
	role(379)	Function performed by the responsible party
	CI_RoleCode (B.5.5)	
[Address]	CI_Address (380)	
	deliveryPoint (381)	Address line for the location (as described in ISO11180, Annex A)
	city (382)	City of the location
	administrativeArea (383)	State, province of the location
	postalCode (384)	Postal code (Zip or other)
	country (385)	Country (ISO3166-3, other parts may be used)
	electronicMailAddress (386)	Electronic mail address of the responsible party
[Contact]	CI_Contact (387)	
	phone (388)	Telephone numbers at which the organization or individual may be contacted
	CI_Telephone (see 407)	
	address (389)	Physical and email address at which the organization or individual may be
	CI_Address (see 380)	contacted
	onlineResource (390)	On-line information that can be used to contact the individual or organization
	CI_OnlineResource (see 396)	
	hoursOfService (391)	Time period (including time zone) when individuals can contact the organization or individual
	contactInstructions (392)	Supplemental instructions on how or when to contact the organization or individual
[Date]	CI_Date (393)	
	date (394)	Reference date for the dataset
	dateType (395)	Type of date [code list: creation, publication or revision date]
	CI_DateTypeCode (B.5.2)	
Online resources]	CI_OnlineResource (396)	
	linkage (397)	Location for on-line access using Uniform Resource Locator (URL) etc.
	protocol (398)	Connection protocol to be used
	applicationProfile (399)	Name of an application profile that can be used with the online resource
	name (400)	Name of the online resource
	description (401)	Detailed text description of what the online resource is/does
	function (402)	Code for function performed by the online resource
	CI_OnlineFunctionCode (B.5.3)	
[Series]	CI_Series (403)	

	name (404)	Name of the series, or aggregate dataset, of which the dataset is a part	
	issueIdentification (405)	Information identifying the issue of the series	
	page (406)	Details on which pages of the publication the article was published	
[Telephone]	CI_Telephone (407)		
	voice (408)	Telephone numbers by which individuals can speak to the responsible organization or individual	
	facsimile (409)	Telephone numbers of a facsimile machine for the responsible organization or individual	

Extensions to ISO Code Lists

B.5.2 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
Additional entries			
5.	**reference**	**004**	

B.5.5 CI_RoleCode <<CodeList>>

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

B.5.10 MD_CharacterSetCode <<CodeList>>

	Name	Domain code	Definition
18.	MD_CharacterSetCode	CharSetCd	name of the character coding standard used for the resource
19.	ucs2	001	16-bit fixed size Universal Character Set, based on ISO/IEC 10646
20.	ucs4	002	32-bit fixed size Universal Character Set, based on ISO/IEC 10646
21.	utf7	003	7-bit variable size UCS Transfer Format, based on ISO/IEC 10646
22.	utf8	004	8-bit variable size UCS Transfer Format, based on ISO/IEC 10646
23.	utf16	005	16-bit variable size UCS Transfer Format, based on ISO/IEC 10646
24.	8859part1	006	ISO/IEC 8859-1, Information technology – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1
25.	8859part2	007	ISO/IEC 8859-2, Information technology – 8-bit single-byte coded graphic character sets – Part 2: Latin alphabet No. 2
26.	8859part3	008	ISO/IEC 8859-3, Information technology – 8-bit single-byte coded graphic character sets – Part 3: Latin alphabet No. 3
27.	8859part4	009	ISO/IEC 8859-4, Information technology – 8-bit single-byte coded graphic character sets – Part 4: Latin alphabet No. 4
28.	8859part5	010	ISO/IEC 8859-51, Information technology – 8-bit single-byte coded graphic character sets – Part 5: Latin/Cyrillic alphabet
29.	8859part6	011	ISO/IEC 8859-6, Information technology – 8-bit single-byte coded graphic character sets – Part 6: Latin/Arabic alphabet
30.	8859part7	012	ISO/IEC 8859-7, Information technology – 8-bit single-byte coded graphic character sets – Part 7: Latin/Greek alphabet
31.	8859part8	013	ISO/IEC 8859-8, Information technology – 8-bit single-byte coded graphic character sets – Part 8: Latin/Hebrew alphabet
32.	8859part9	014	ISO/IEC8859-9, Information technology – 8-bit single-byte coded graphic character sets – Part 9: Latin alphabet No. 5

	Name	Domain code	Definition
33.	8859part10	015	ISO/IEC 8859-10, Information technology – 8-bit single-byte coded graphic character sets – Part 10: Latin alphabet No. 6
34.	8859part11	016	ISO/IEC 8859-11, Information technology – 8-bit single-byte coded graphic character sets – Part 11: Latin/Thai alphabet
35.	(reserved for future use)	017	a future ISO/IEC 8-bit single-byte coded graphic character set (e.g. possibly ISO/IEC 8859-12
36.	8859part13	018	ISO/IEC 8859-13, Information technology – 8-bit single-byte coded graphic character sets – Part 13: Latin alphabet No. 7
37.	8859part14	019	ISO/IEC 8859-14, Information technology – 8-bit single-byte coded graphic character sets – Part 14: Latin alphabet No. 8 (Celtic)
38.	8859part15	020	ISO/IEC 8859-15, Information technology – 8-bit single-byte coded graphic character sets – Part 15: Latin alphabet No. 9
39.	8859part16	021	ISO/IEC 8859-16, Information technology – 8-bit single-byte coded graphic character sets – Part 16: Latin alphabet No. 10
40.	jis	022	japanese code set used for electronic transmission
41.	shiftJIS	023	japanese code set used on MS-DOS based machines
42.	eucJP	024	japanese code set used on UNIX based machines
43.	usAscii	025	united states ASCII code set (ISO 646 US)
44.	ebcdic	026	ibm mainframe code set
45.	eucKR	027	korean code set
46.	big5	028	traditional Chinese code set used in Taiwan, Hong Kong of China and other areas
47.	GB2312	029	simplified Chinese code set
Additional entries			
48.	**CP1251**	**030**	

B.5.11 MD_ClassificationCode <<CodeList>>

	Name	Domain code	Definition
49.	MD_ClassificationCode	ClassificationCd	name of the handling restrictions on the dataset
50.	unclassified	001	available for general disclosure
51.	restricted	002	not for general disclosure
52.	confidential	003	available for someone who can be entrusted with information
53.	secret	004	kept or meant to be kept private, unknown, or hidden from all but a select group of people
54.	topsecret	005	of the highest secrecy

B.5.18 MD_MaintenanceFrequencyCode <<CodeList>>

	Name	Domain code	Definition
55.	MD_MaintenanceFrequencyCode	MaintFreqCd	frequency with which modifications and deletions are madeto the data after it is first produced
56.	continual	001	data is repeatedly and frequently updated
57.	daily	002	data is updated each day
58.	weekly	003	data is updated on a weekly basis
59.	fortnightly	004	data is updated every two weeks
60.	monthly	005	data is updated each month
61.	quarterly	006	data is updated every three months
62.	biannually	007	data is updated twice each year
63.	annually	008	data is updated every year
64.	asNeeded	009	data is updated as deemed necessary
65.	irregular	010	data is updated intervals that are uneven in duration
66.	notPlanned	011	there are no plans to update the data
67.	unknown	012	frequency of maintenance for the data is not known
Additional entries			
68.	**hourly**	**013**	
69.	**3-hourly**	**014**	
70.	**6-hourly**	**015**	
71.	**12-hourly**	**016**	

B.5.20 MD_MediumNameCode <<CodeList>>

	Name	Domain code	Definition
72.	MD_MediumNameCode	MedNameCd	name of the medium
73.	cdRom	001	read-only optical disk
74.	dvd	002	digital versatile disk
75.	dvdRom	003	digital versatile disk, read only
76.	3halfInchFloppy	004	3.5 inch magnetic disk
77.	5quarterInchFloppy	005	5.25 inch magnetic disk
78.	7trackTape	006	7 track magnetic tape
79.	9trackTape	007	9 track magnetic tape
80.	3480Cartridge	008	3480 cartridge tape drive
81.	3490Cartridge	009	3490 cartridge tape drive
82.	3580Cartridge	010	3580 cartridge tape drive
83.	4mmCartridgeTape	011	4 millimetre magnetic tape
84.	8mmCartridgeTape	012	8 millimetre magnetic tape
85.	1quarterInchCartridgeTape	013	0.25 inch magnetic tape
86.	digitalLinearTape	014	half inch cartridge streaming tape drive
87.	onLine	015	direct computer linkage
88.	satellite	016	linkage through a satellite communication system
89.	telephoneLink	017	communication through a telephone network
90.	hardcopy	018	pamphlet or leaflet giving descriptive information

B.5.23 MD_ProgressCode <<CodeList>>

	Name	Domain code	Definition
91.	MD_ProgressCode	ProgCd	status of the dataset or progress of a review
92.	completed	001	production of the data has been completed
93.	historicalArchive	002	data has been stored in an offline storage facility
94.	obsolete	003	data is not longer relevant
95.	onGoing	004	data is continually being updated
96.	planned	005	fixed date has been established upon or by which the data will be created or updated
97.	required	006	data needs to be generated or updated
98.	underDevelopment	007	data is currently in the process of being created
Additional entries			
99.	owner	008	

B.5.24 MD_RestrictionCode <<CodeList>>

	Name	Domain code	Definition
100.	MD_RestrictionCode	RestrictCd	limitation(s)placed upon the access or use of the data
101.	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
102.	patent	002	government has granted exclusive right to make, sell, use or license an invention or discovery
103.	patentPending	003	produced or sold information awaiting a patent
104.	trademark	004	a name, symbol, or other device identifying a product, officially registered and legally restricted to the use of the owner or manufacturer
105.	license	005	formal permission to do something
106.	intellectualPropertyRights	006	rights to financial benefit from and control of distribution of non-tangible property that is a result of creativity
107.	restricted	007	withheld from general circulation or disclosure
108.	otherRestrictions	008	limitation not listed

B.5.25 MD_ScopeCode <<CodeList>>

	Name	Domain code	Definition
109.	MD_ScopeCode	ScopeCd	class of information to which the referencing entity applies
110.	attribute	001	information applies to the attribute value
111.	attributeType	002	information applies to the characteristic of a feature
112.	collectionHardware	003	information applies to the collection hardware class
113.	collectionSession	004	information applies to the collection session
114.	dataset	005	information applies to the dataset
115.	series	006	information applies to the series Note: "series" applies to any DS_Aggregate
116.	nonGeographicDataset	007	information applies to non-geographic data
117.	dimensionGroup	008	information applies to a dimension group
118.	feature	009	information applies to a feature
119.	featureType	010	information applies to a feature type
120.	propertyType	011	information applies to a property type
121.	fieldSession	012	information applies to a field session
122.	software	013	information applies to a computer program or routine
123.	service	014	information applies to a capability which a service provider entity makes available to a service user entity through a set of interfaces that define a behaviour, such as a use case
124.	model	015	information applies to a copy or limitation of an existing or hypothetical object
125.	tile	016	information applies to a tile, a spatial subset of geographic data

B.5.26 MD_SpatialRepresentationTypeCode <<CodeList>>

	Name	Domain code	Definition
126.	MD_SpatialRepresentationTypeCode	SpatRepTypCd	method used to represent geographic information in the dataset
127.	vector	001	vector data is used to represent geographic data
128.	grid	002	grid data is used to represent geographic data
129.	textTable	003	textual or tabular data is used to represent geographic data
130.	tin	004	triangulated irregular network
131.	stereoModel	005	three-dimensional view formed by the intersecting homologous rays of an overlapping pair of images
132.	video	006	scene from a video recording
Additional entries			
133.	**bitmap**	**007**	
134.	**irregularPoints**	**008**	**Irregularly-spaced points, such as meteorological stations**

B.5.27 MD_TopicCategoryCode <<CodeList>>

	Name	Domain code	Definition
135.	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.
136.	farming	001	rearing of animals and/or cultivation of plants Examples: agriculture, irrigation, aquaculture, plantations, herding, pests and diseases affecting crops and livestock
137.	biota	002	flora and/or fauna in natural environment Examples: wildlife, vegetation, biological sciences, ecology, wilderness, sealife, wetlands, habitat
138.	boundaries	003	legal land descriptions Examples: political and administrative boundaries

	Name	Domain code	Definition
139.	climatologyMeteorol ogyAtmosphere	004	processes and phenomena of the atmosphere Examples: cloud cover, weather, climate, atmospheric conditions, climate change, precipitation
140.	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
141.	elevation	006	height above or below sea level Examples: altitude, bathymetry, digital elevation models, slope, derived products
142.	environment	007	environmental resources, protection and conservation Examples: environmental pollution, waste storage and treatment, environmental impact assessment, monitoring environmental risk, nature reserves, landscape
143.	geoscientificInformat ion	008	information pertaining to earth sciences Examples: geophysical features and processes, geology, minerals, sciences dealing with the composition, structure and origin of the earth's rocks, risks of earthquakes, volcanic activity, landslides, gravity information, soils, permafrost, hydrogeology, erosion
144.	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
145.	imageryBaseMapsE arthCover	010	base maps Examples: land cover, topographic maps, imagery, unclassified images, annotations
146.	intelligenceMilitary	011	military bases, structures, activities Examples: barracks, training grounds, military transportation, information collection
147.	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
148.	location	013	positional information and services Examples: addresses, geodetic networks, control points, postal zones and services, place names
149.	oceans	014	features and characteristics of salt water bodies (excluding inland waters) Examples: tides, tidal waves, coastal information, reefs
150.	planningCadastre	015	information used for appropriate actions for future use of the land Examples: land use maps, zoning maps, cadastral surveys, land ownership
151.	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
152.	structure	017	man-made construction Examples: buildings, museums, churches, factories, housing, monuments, shops, towers
153.	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
154.	utilitiesCommunicati on	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
Additional entries			
155.	**ITRF**	**020**	
156.	**ICRF**	**021**	
157.	**EOP**	**022**	
158.	**hydrology**	**023**	
159.	**climatology**	**024**	
160.	**Mapping function**	**025**	
161.	**GPS**	**026**	
162.	**DORIS**	**027**	
163.	**LASER**	**028**	

	Name	Domain code	Definition
164.	VLBI	029	
165.	Gravity	030	
166.	Gravity models	031	
167.	Absolute gravity	032	
168.			
169.			
170.			
171.			
172.			
173.			
174.			
175.			
176.			
177.			
178.			
179.			

GGOS DataFrequencyCode <<CodeList>> (GGOS)

	Name	Domain code	Definition
1.	GGOS_DataFrequencyCode	DataFreqCd	Temporal sampling frequency of the data within the dataset
2.	continuous	001	More than once per minute
3.	1-minute	002	
4.	5-minute	003	
5.	10-minute	004	
6.	15-minute	005	
7.	30-minute	006	
8.	hourly	007	
9.	3-hourly	008	
10.	6-hourly	009	
11.	8-hourly	010	
12.	12-hourly	011	
13.	daily	012	
14.	weekly	013	
15.	10-daily	014	
16.	fortnightly	015	
17.	monthly	016	
18.	quarterly	017	
19.	biannually	018	
20.	annually	019	
21.	decadally	020	Decade or longer
22.	irregularly	021	

Table 4

Standardized Data Formats

Format	Description	Version	ASCII/ Binary	Type	IGS	ILRS	IVS	IDS
RINEX	Receiver Independent Exchange format that can accommodate GNSS data (GPS, GLONASS, future Galileo). Seven main file types: C (satellite and receiver clock), D (Hatanaka compressed GNSS observation data) G (GLONASS broadcast ephemeris), H (GEO broadcast ephemeris) M (meteorological), N (GPS broadcast ephemeris), O (GNSS observation data). Each file type consists of a header and data section which contains information for the entire file. Each file contains the data from one receiver and one session (e.g., day, hour, sub-hour). Observables are: time, pseudo-range, phase, and Doppler. ftp://igscb.jpl.nasa.gov/pub/data/format/rinex210.txt ftp://igscb.jpl.nasa.gov/pub/data/format/rinex211.txt ftp://igscb.jpl.nasa.gov/pub/data/format/rinex300.txt	2.10, 2.11 3.0 (F)	A	D	X			
Hatanaka	Compression format used with RINEX observation data files ftp://terras.gsi.go.jp/software	4.0.	A	D	X			
NPT	Normal point format. Data are sampled over time based upon the presence of some minimum number of data points in the sampling interval Data record contains data from one station and one pass segment. Pass segment consists of a header record followed by data records. http://ilrs.gsfc.nasa.gov/products_formats_procedures/normal_point/np_format.html	2	A	D		X		
FR	Full-rate format. he full-rate data are sorted by satellite and time and are available in daily and monthly increments. http://ilrs.gsfc.nasa.gov/products_formats_procedures/fullrate/fr_format_v3.html	3	A	D		X		
CRD	Consolidated Laser Ranging Data format under development. An integrated, flexible, extensible format for the ILRS full-rate, sampled engineering, and normal point data. Will accommodate transponder data and to handle high repetition rate laser data without unnecessary redundancy. File consists of header, configuration, and data records from one satellite and one session (hourly, daily, monthly). http://ilrs.gsfc.nasa.gov/products_formats_procedures/crd.html	0.26	A			X		
CPF	Consolidated Prediction Format. The CPF information accurately predicts positions and ranges for a much wider variety of laser ranging targets than had been previously possible. CPF files include daily tables of X, Y, and Z positions for each target which can then be interpolated for very accurate predictions. CPF provides an expanded format capability and greatly improves tracking on low satellites because the full modeling potential of the orbit computation at the prediction center will be passed on to the stations. http://ilrs.gsfc.nasa.gov/products_formats_procedures/predictions/cpf.html	1.01	A	P		X		
SINEX	Software Independent Exchange Format. General-purpose solution exchange format for space geodesy that facilitates the task of combining solutions. SINEX was designed to be modular and general enough to handle multiple techniques. It provides complete information on a priori information that can be removed when required, making it unnecessary to submit or distribute multiple SINEX solution files, e.g. constrained and unconstrained (free) solution files. Also used for VLBI experiment data. http://ilrs.gsfc.nasa.gov/products_formats_procedures/predictions/cpf.html	2.01	A	P	X	X	X	X
SP	Standard Product (for orbits) for all satellite types. The basic format is a position and clock record; a second, optional, record contains velocities and clock rates-of-change. Also includes satellite clock corrections, orbit accuracy exponents, comment lines, as many as three different sets of	SP3c, SP1	A		X	X (F)		X

Format	Description	Version						
	satellite position accuracy indicators. ftp://igscb.jpl.nasa.gov/pub/data/format/sp1.pdf ftp://igscb.jpl.nasa.gov/pub/data/format/sp3c.txt							
IONEX	Ionosphere Exchange format. A common data format to exchange, compare, or combine TEC maps. Supports the exchange of 2- and 3-dimensional TEC maps given in a geographic grid. ftp://igscb.jpl.nasa.gov/pub/data/format/ionex1.pdf	1	A	P	X			
Site log	Information organized by section describing sites used by analysts in reducing data. Information includes site IDs, location, coordinates/eccentricities, surveys, co-location, instrument information, site ownership, etc. ftp://igscb.jpl.nasa.gov/pub/station/general/blank.log ftp://cddis.gsfc.nasa.gov/reports/slrlog/slr_blank.txt ftp://ivscc.gsfc.nasa.gov/pub/config/ns-config.txt		A	O	X	X	X	X
ANTEX	Contain information for GNSS satellite and receiver antennas, including phase center offsets. ftp://igscb.jpl.nasa.gov/pub/station/general/antex13.txt	1.3	A	O	X			
Tropo SINEX	Format based on SINEX for the series of total zenith path delay transformed to precipitable water vapor. ftp://igscb.jpl.nasa.gov/pub/data/format/sinex_tropo.txt	0.01	A	P	X			
ERP	ftp://igscb.jpl.nasa.gov/pub/data/format/erp.txt	2	A	P	X			
GSFC DB	Goddard VLBI database format. The VLBI database is a binary format for archiving and handling geodetic/astrometric observables delay and delay rate generated by fringe-fitting algorithms from raw correlator output. Developed for the CALC/SOLVE data analysis system, the files also contain other generated outputs such as correlation coefficients, fringe amplitudes and total phases; cable calibration and station weather information; theoretical observables and parameter partial derivatives (from CALC); and editing and ambiguities (from SOLVE). http://gemini.gsfc.nasa.gov/solve/	8.8.89	B	D			X	
NGS Card	NGS format for VLBI data transfer. Partial ASCII transcription of a Goddard database file. This format is being used by VLBI analysis packages such as Modest, Occam, and SteelBreeze. http://lacerta.gsfc.nasa.gov/mk5/help/dbngs_format.txt		A	D			X	
Baseline length	Time series of baseline lengths consisting of downloadable baseline length results, including graphs and statistics, for a chosen baseline. An automatic script computes the information online from the submissions of six participating Analysis Centers as well as a combined solution. The data, residual, and plot files for all seven time series can be downloaded for further analysis. http://vlbi.geod.uni-bonn.de/baseline-project/		A	P			X	
DORIS data	Standard exchange format for range-rate observations; DORIS-specific. ftp://ftp.cls.fr/pub/ids/data/doris21.fmt	2.1	A	D				X
STCD	Station Coordinate Difference format for time series of coordinates expressed at a reference epoch. Provides coordinate time-series results in both Cartesian and ellipsoidal coordinates. Coordinate time-series consist of residuals relative to a reference position. Each coordinate of the series is assumed to be expressed in the same reference system as at the observation epoch. http://ids.cls.fr/documents/report/CB_STCD_format_v1.0.pdf	1.0	A	D				X

A=ASCII   P=Product
B=Binary   O=Other
D=Data   F=Future

Table 5

IAG Geometric Services Comparison Chart
– Data –

Item	IGS	ILRS	IVS	IDS
Data Storage at	Global, Regional, and Local Data Centers	Global, Regional, and Operational Data Centers	Data Centers	Data Centers
Primary (Global) Data Centers	CDDIS (USA), SIO (USA), IGN (France), KASI (Korea)	CDDIS (USA), EDC (Germany)	CDDIS (USA), BKG (Germany), OPAR (France)	CDDIS (USA), IGN (France)
Regional Data Centers	BKG (Germany), GA (Australia), NRCan (Canada), NGS (USA), JPL (USA)	Shanghai (China)	CNR (Italy), GeoDAF (Italy), NICT (Japan)	–
Data Availability	1990 to today	1976 to today	1979 to today	1990 to today
Data File Organization	Sub-hourly, hourly, and daily files per station (grouped by year and day-of-year)	Hourly, daily, and monthly files per satellite and station (grouped by year and satellite)	Session-wise (grouped by year and session)	10-day "cycle" files per satellite
Format of Data Files	RINEX (obs, nav, met)	NP Format (quick-look), Full-rate Format	Goddard data base format (binary), NGS card format (ASCII)	DORIS format
Auxiliary Data Files	official abbrev. for rcvr, ant, radomes (rcvr_ant.tab); ant. phase center (igs_01.pcv); reference pt info (antenna.gra)	Satellite orbit prediction files (by email or ftp)	Observing schedules, session logs, met data, notes	Satellite information
Standard compression software	Z compressed format	Z compressed format	Z compressed format	Z compressed format
Special compression software	Hatanaka	–	–	–
Data Transfer Mechanism	FTP	FTP	FTP	FTP

– non-existent; n/a not applicable

Table 6

IAG Geometric Services Comparison Chart
– Products –

Item	IGS	ILRS	IVS	IDS	IERS
Analysis Centers (AC)	about 10 ACs, additional AACs	8 ACs, additional AACs	about 20 ACs	6 ACs, additional AACs	product centers (TRF, EOP, rapid service/prediction), convention center
Software	Gipsy/OASIS, Bernese, GAMIT, EPOS, PAGE, NAPEOS	Geodyn, Solve, UTOPIA, DOGS, EPOS, SATAN, GINS/MATLO	Calc/Solve, Modest, Occam, Gloria, SteelBreeze, Geosat	Gipsy/OASIS, Geodyn, Zoom, GINS, Bernese	Various
Combined Solution	Analysis Center Coordinator, & Product Centers (RF, Time)	Analysis Coordinator (primary and backup)	Analysis Coordinator	Analysis Coordinator	Combination Centers
Products Overview	http://igscb.jpl.nasa.gov/components/prods.html	http://ilrs.gsfc.nasa.gov/products_formats_procedures/products.html	http://ivscc.gsfc.nasa.gov/products-data/products.html	http://ids.cls.fr/html/analysis_coord/documents/struct_dc.html	http://www.iers.org/MainDisp.csl?pid=8-10
Product Types:					
Satellite Orbit Prediction	–	daily	n/a	–	n/a
Satellite Orbit Determination	satellite ephemerides for GPS (4 types) and GLONASS (2 types)	{satellite ephemerides}	n/a	n/a	n/a
Satellite Clocks	GPS clock information	n/a	n/a	n/a	n/a
EOP	Polar motion, Polar motion rates, length-of-day	EOP, length-of-day	session-wise EOP solution (EOP-S) / 1-hour Intensive EOP solution (EOP-I)	Polar motion, length-of-day	Long term, rapid service, and predictions for EOP
TRF	IGS tracking station coordinates and velocities	TRF solution (station positions and velocities)	TRF solution (station positions, velocities, correlations) roughly every 3 months	Weekly and monthly time series of DORIS station positions, cumulative solutions (positions/velocities), time series of coordinates of the TRF origin, station coordinate difference plots	ITRF
CRF	n/a	n/a	CRF solution at irregular time schedule	n/a	ICRF
Troposphere	Zenith tropospheric path delay estimates	–	troposphere parameters per session and station	–	–
Ionosphere	Global ionospheric maps	–	–	derived vertical total electron content (VTEC)	–
Contributions to IERS	Station positions, polar motion, polar motion rates, length-of-day (weekly combined solutions)	Station positions, polar motion, length-of-day (weekly combined solutions)	EOP & position (DSNX) (combined solutions by session)	Station positions, polar motion, length-of-day (weekly combined solutions)	n/a

– non-existent; n/a not applicable; { } planned

Table 7

IAG Geometric Services Comparison Chart
– Service Information –

Item	IGS	ILRS	IVS	IDS	IERS
Service Inauguration	1994	1998	1999	2003	1988
Organization (Chart)	http://igscb.jpl.nasa.gov/organization/figure1.html	http://ilrs.gsfc.nasa.gov/about_ilrs/organiza.html	http://ivscc.gsfc.nasa.gov/about/org/index.html	http://ids.cls.fr/html/organization/schema.html	http://www.iers.org/MainDisp.csl?pid=15-33
Terms of Reference	http://igscb.jpl.nasa.gov/organization/bylaws.html	http://ilrs.gsfc.nasa.gov/about_ilrs/termsref.html	http://ivscc.gsfc.nasa.gov/about/org/documents/ivsTOR.html	http://ids.cls.fr/html/organization/tor.html	http://www.iers.org/MainDisp.csl?pid=14-36
Publications	Annual Reports, Technical Reports, Workshop Proceedings	Annual Reports, Performance Report Cards, Special Reports	Annual Reports, Newsletters, General Meeting Proceedings	Annual Reports, Workshop Proceedings	Annual Reports, Bulletins, Technical Notes
Meetings	Workshop	General Assembly, Technical Workshop	General Meeting, Technical Meeting, Workshop	Workshop	Workshop
Working Groups	Reference Frame, Clock Products, Troposphere, Ionosphere, GNSS, LEO, Real-Time, Data Center	Analysis, Data Formats and Procedures, Missions, Networks and Engineering, Transponder	GPS Phase Center Mapping, IVS Product Specification and Observing Programs, VLBI2010, Second Realization of the ICRF	Analysis, Site Selection	Site Survey and Co-Location, Combination, Prediction, Second Realization of the ICRF
Pilot Projects	Tide Gauge Benchmark Monitoring, GLONASS (closed)	–	Tropospheric parameters (closed), Baseline products	–	–
Mailing Lists	http://igscb.jpl.nasa.gov/mail/mailindex.html	http://ilrs.gsfc.nasa.gov/contact_ilrs/mail_services/	http://ivscc.gsfc.nasa.gov/mailman/listinfo	http://ids.cls.fr/html/report/doris_mails.html	http://www.iers.org/MainDisp.csl ?pid=45-25788
FTP Archives	ftp://igscb.jpl.nasa.gov/igscb	At data centers	ftp://ivscc.gsfc.nasa.gov/pub/	http://ids.cls.fr/html/data_centers.html	http://www.iers.org/MainDisp.csl ?pid=34-8

– non-existent; n/a not applicable

Table 8

IAG Geometric Services Comparison Chart
– Site Information –

Item	IGS	ILRS	IVS	IDS
Network Map	http://igscb.jpl.nasa.gov/network/maps/allmaps.html	http://ilrs.gsfc.nasa.gov/stations/index.html	http://ivscc.gsfc.nasa.gov/stations/ns-map.html	http://ids.cls.fr/html/doris/sitelog.html
Network List	http://igscb.jpl.nasa.gov/network/list.html	http://ilrs.gsfc.nasa.gov/stations/sitelist/index.html	ftp://ivscc.gsfc.nasa.gov/about/org/components/ns-list.html	http://ids.cls.fr/html/doris/sitelog.html
Form of Site Log	ASCII file	HTML document or ASCII file	ASCII file	ASCII file
Example Site Log (Greenbelt)	http://igscb.jpl.nasa.gov/igscb/station/log/gode_20030911.log	ftp://cddis.gsfc.nasa.gov/pub/reports/slrlog	http://ivscc.gsfc.nasa.gov/pub/config/ns/ggao.config.txt	http://ids.cls.fr/html/doris/stations/GREB.shtml
Site Identification	[Sec 1] site name, 4-character ID, DOMES, CDP number	[Sec 1&3] site name, DOMES, CDP number, 4-char code	[Sec 1] site name, 8-letter code, DOMES, CDP number	[Sec 1] site name, DOMES, 4-char code
Approx. Station Coordinates	[Sec 2]	[Sec 2]	[Sec 2.1]	[Sec 1&3&4]
Tectonic Plate	[Sec 2]	[Sec 2]	[Sec 2.1]	[Sec 1]
Geologic Information	[Sec 1]	[Sec 1]	–	[Sec 1]
Monument/Marker Description	[Sec 1]	[Sec 1]	–	[Sec 2]
Local Surveys	–	–	[Sec 2.2]	–
Local Ties, Collocation	[Sec 5&7] local vectors between collocated techniques	[Sec 13] local vectors between co-located techniques, vectors between collocated SLR systems	[Sec 10] list of techniques, no local difference vectors	[Sec 5&6&7] local vectors between co-located techniques,vectors between collocated DORIS system
Instrument Information (antenna, receiver, laser)	[Sec 3&4] incl. history of antenna and receiver changes	[Sec 4&5&6]	[Sec 3&4]	[Sec 2&3]
Local Events (possibly affecting position)	–	[Sec 14]	–	–
Time/Frequency Standards	[Sec 6]	[Sec 9]	[Sec 8]	–
Meteorological Instrumentation	[Sec 8]	[Sec 12]	[Sec 7]	[Sec 8]
Field System Computer	–	–	[Sec 11]	–
Aircraft Detection	n/a	[Sec 11]	n/a	n/a
Local Contact Information	[Sec 11]	[Sec 15]	[Sec 13]	[Sec 9]

[Sec ?] Section in site log file; – non-existent; n/a not applicable

Table 10

IERS	GPB (GPB = GeoPortal.Bund)					CORE	MCO	Condition	Meaning	Short name	Domain	GGOS Name
metaData	**MD_Metadata Metadata (1)**					...						
metadataFileIdentifier	yes	fileIdentifier (2)				O			unique identifier for this metadata file	mdFileID	Free text	Metadata file identifier
metadataLanguage	yes	language (3)				C		not defined by encoding?	language used for documenting metadata	mdLang	ISO 639-2	Metadata language
metadataCharacterSet	yes	characterSet (4)				C		ISO/IEC 10646-1 not used and not defined by encoding?	full name of the character coding standard used for the metadata set	mdChar	ISO 19115 B.5.10	Metadata character set
-	?	parentIdentifier (5)				C		(6) is not equal to "dataset"	file identifier of the metadata to which this metadata is a subset (child)	mdParentID	Free text	Metadata parent identifier
-	yes	hierarchyLevel (6)				C		(6) is not equal to "dataset" (default)	scope to which the metadata applies	mdHrLv	ISO 19115 B.5.25	Metadata hierarchy level
-	yes	hierarchyLevelName (7)				C		(6) is not equal to "dataset"	name of hierarchy levels for which the metadata is applied	mdHrLvName	Free text	Metadata hierarchy level name
metadataContact		contact (8)	**CI_ResponsibleParty RespParty (374)**				(M)			[mdContact]		
individualName	yes		individualName (375)			C		(376) and (377) not documented	name of responsible person for the metadata (surname, given name, title)	rpIndName	Free text	Metadata contact individual name
organisationName	yes		organisationName (376)			C		(375) and (377) not documented	name of responsible organization for the metadata	rpOrgName	Free text	Metadata contact organisation name
positionName	no		positionName (377)			C		(375) and (376) not documented	role or position of the person responsible for the metadata	rpPosName	Free text	Metadata contact position name
contactInfo		contactInfo (378)	**CI_Contact Contact (387)**			...				[rpCntInfo]		
phone			phone (388)	**CI_Telephone Telephone (407)**						[cntPhone]		
voice	yes			voice (408)		O			telephone number of organisation or individual responsible for the metadata	voiceNum	Free text	Metadata contact phone voice
facsimile	no			facsimile (409)		O			facsimile number of organisation or individual responsible for the metadata	faxNum	Free text	Metadata contact phone facsimile
address			address (389)	**CI_Address Address (380)**						[cntAddress]		
deliveryPoint	no			deliveryPoint (381)		O			address line for the location of organis. or individ. responsible for the metadata	delPoint	see ISO11180 Annex A	Metadata contact address delivery point
city	no			city (382)		O			city of the location of organis. or …	city	Free text	Metadata contact address city
administrativeArea	no			administrativeArea (383)		O			state, province of the location of org. …	adminArea	Free text	Metadata contact address administrative area
postalCode	no			postalCode (384)		O			ZIP or other postal code of the loc. …	postCode	Free text	Metadata contact address postal code
country	no			country (385)		O			country of the pyhsical address of …	country	ISO 3166-3	Metadata contact address country
electronicMailAddress	yes			electronicMailAddress (386)		O			eMail address of organis. or individ. …	eMailAdd	Free text	Metadata contact address electronic mail
-			onlineResource (390)	**CI_OnlineResource OnlineRes (396)**		...				[cntOnlineRes]		
onlineAddress	no			linkage (397)		M			URL for on-line information about the organisation or individual responsible…	linkage	URL	Metadata contact address online resource
role	yes		role (379)			M			function performed by the party responsible for the metadata	role	ISO 19115 B.5.5	Metadata contact role
metadataDateStamp	yes	dateStamp (9)				M			date that the metadata was created	mdDateSt	ISO19115 B.4.2	Metadata date stamp
metadataStandardName	yes	metadataStandardName (10)				O			name of the metadata standard (including profile name) used	mdStanName	Free text	Metadata standard name
metadataStandardVersion	yes	metadataStandardVersion (11)				O			version (profile) of the metadata standard used	mdStanVer	Free text	Metadata standard version
referenceSystemInfo		referenceSystemInfo (13)	**MD_ReferenceSystem RefSystem (186)**			...				[refSysInfo]		
-			referenceSystemIdentifier (187)	**RS_Identifier RsIdent (208)**		...				[refSysId]		
referenceIdentifier	yes			code (207)		O			name of reference system used	identCode	Free text	Dataset reference system name
identificationInfo		identificationInfo (15)	**MD_Identification Ident (23)**			...				[dataIdInfo]		
citation			citation (24)	**CI_Citation Citation (359)**		...				[idCitation]		
resourceTitle	yes			title (360)		M			name by which the cited resource is known	resTitle	Free text	Dataset citation title
-	yes			alternateTitle (361)		O			short name or other language name by which the cited information is known	resAltTitle	Free text	Dataset citation alternate title
auf der Ebene identificationinfo eingeordnet! (mehrfach!)	yes			date (362)	**CI_Date DateRef (393)**	(M)				resRefDate		
	yes			date (394)		M			reference date for the cited resource	refDate	ISO19115 B.4.2	Dataset citation date
	yes			dateType (395)		M			event used for reference date	refDateType	ISO 19115 B.5.2	Dataset citation date type
abstract	yes		abstract (25)			M			brief narrative summary of the content of the resource(s)	idAbs	Free text	Dataset abstract
-	yes		status (28)			O			status of the resource(s)	idStatus	ISO 19115 B.5.23	Dataset status
pointOfContact			pointOfContact (29)	**CI_ResponsibleParty RespParty (374)**			(O)			[idPoC]		
individualName	yes			individualName (375)		C		(376) and (377) not documented	name of person responsible for the data (surname, given name, title)	rpIndName	Free text	Dataset contact individual name
organisationName	yes			organisationName (376)		C		(375) and (377) not documented	name of organisation responsible for the data	rpOrgName	Free text	Dataset contact organisation name
positionName	no			positionName (377)		C		(375) and (376) not documented	role or position of the person responsible for the data	rpPosName	Free text	Dataset contact position name

Element	Flag	Path	Class	Sub-element	Obl.	Condition	Description	ShortName	Type	Dataset
contactInfo		contactInfo (378)	CI_Contact Contact (387)					[rpCntInfo]		
phone		phone (388)	CI_Telephone Telephone (407)					[cntPhone]		
voice	yes			voice (408)	O		telephone number of organisation or individual responsible for the data	voiceNum	Free text	Dataset contact phone voice
facsimile	yes			facsimile (409)	O		facsimile number of organisation or …	faxNum	Free text	Dataset contact phone facsimile
address		address (389)	CI_Address Address (380)					[cntAddress]		
deliveryPoint	yes			deliveryPoint (381)	O		address line for the location of organis. or individ. responsible for the data	delPoint	see ISO11180 Annex A	Dataset contact address delivery point
city	yes			city (382)	O		city of the location of organis. or …	city	Free text	Dataset contact address city
administrativeArea	no			administrativeArea (383)	O		state, province of the location of org. …	adminArea	Free text	Dataset contact address administrative area
postalCode	yes			postalCode (384)	O		ZIP or other postal code of the loc. …	postCode	Free text	Dataset contact address postal code
country	yes			country (385)	O		country of the pyhsical address of …	country	ISO 3166-3	Dataset contact address country
electronicMailAddress	yes			electronicMailAddress (386)	O		eMail address of organisation or …	eMailAdd	Free text	Dataset contact address electronic mail
-		onlineResource (390)	CI_OnlineResource OnlineRes (396) …					[cntOnlineRes]		
onlineAddress	yes			linkage (397)	M		URL for on-line information about the organisation or individual responsible…	linkage	URL	Dataset contact address online resource
role	yes	role (379)			M		function performed by the party responsible for the data	role	ISO 19115 B.5.5	Dataset contact role
descriptiveKeywords		descriptiveKeywords (33)	MD_Keywords Keywords (52) …					[descKeys]		
- kein Unterelement	yes		keyword (53)		M		commonly used word(s) or formalised word(s) or phrase(s) used to describe the subset	keyword	Free text	Dataset keywords
-		MD_DataIdentification DataIdent (36) …								
spatialRepresentationType	yes	spatialRepresentationType (37)			O		method used to spatially represent geographic information	spatRpType	ISO 19115 B.5.26	Dataset spatial representation type
spatialResolution		spatialResolution (38)	MD_Resolution Resol (59) (O)					[dateScale] [equScale]		
		equivalentScale (60)	MD_RepresentativeFraction RepFract (56)							
? Leeres Element: spationResolution!	yes		denominator (57)		C	either (69) resp. (57) or (61) must be documented	the number below the line in a vulgar fraction	rfDenom	Integer > 0	Dataset spatial resolution denominator
	no	distance (61)			C		ground sample distance	scaleDist	ISO 19115 B.4.3	Dataset spatial resolution distance
dataLanguage	yes	language (39)			M		language(s) used within the dataset	dataLang	ISO 639-2	Dataset language
dataCharacterSet	yes	characterSet (40)			C	ISO/IEC 10646-1 not used?	full name of the character coding standard used for the dataset	dataChar	ISO19115 B.5.10	Dataset character set
topicCategory	yes	topicCategory (41)			M C	(6) equals "dataset"	main theme(s) of the dataset	tpCat	ISO19115 B.5.27	Dataset topic category
dataExtent		extent (45)	EX_Extent Extent (334)					[dataExt]		
description	no		description (335)		C	(336), (337) + (338) not documented	spatial and temporal extent for the referring object	exDesc	Free text	Dataset extent description
geographicElement **geographicBoundingBox**		geographicElement (336)	EX_GeographicExtent GeoExtent (339) EX_GeographicBoundingBox GeoBndBox (343)					[geoEle]		
westBoundLongitude	yes			westBoundLongitude (344)	C		western most coord. of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	westBL	Angle B.4.3 [-180, 180]	Dataset extent geographic bb westBL
eastBoundLongitude	yes			eastBoundLongitude (345)	C	if (6) equals "dataset" either (343) or (348) is required	eastern most coord- of the limit of the dataset extent, expressed in …	eastBL	Angle B.4.3 [-180, 180]	Dataset extent geographic bb eastBL
southBoundLatitude	yes			southBoundLatitude (346)	C		southern most coord. of the limit of the dataset extent, expressed in longitude in decimal degrees (positive north)	southBL	Angle B.4.3 [-90, 90]	Dataset extent geographic bb southBL
northBoundLatitude	yes			northBoundLatitude (347)	C		northern most coord. of the limit of the dataset extent, expressed in …	northBL	Angle B.4.3 [-90, 90]	Dataset extent geographic bb northBL
-			EX_GeographicDescription GeoDesc (348)							
-			geographicIdentifier (349)	MD_Identifier MdIdent (205)						
geographicIdentifier	yes			code (207)	C		identifier to repres. a geographic area	code	Free text	Dataset extent geographic description ident.
temporalElement		temporalElement (337)	EX_TemporalExtent TempExtent (350)					[tempEle]		
beginDateTime	yes		extent (351)	TM_Primitive.begin (B4.5)	O		date and time for the content of the dataset (begin)	begin	ISO 19108	Dataset extent temporal begin
endDateTime	yes		extent (351)	TM_Primitive.end (B4.5)	O		date and time for … dataset (end)	end	ISO 19108	Dataset extent temporal end
verticalElement		verticalElement (338)	EX_VerticalExtent VertExtent (354)					[vertEle]		
minimumValue	no		minimumValue (355)		O		lowest vertical extent contained in the dataset	vertMinVal	Real	Dataset extent vertical minimum value
maximumValue	no		maximumValue (356)		O		highest … contained in the dataset	vertMaxVal	Real	Dataset extent vertical maximum value
unitOfMeasure	no		unitOfMeasure (357)		O		vertical units used for vertical extent information	vertUoM	ISO 19115 UomLength B.4.3	Dataset extent vertical unit of measure
-	no		verticalDatum (358)		O		provides information about the origin from which the maximum and minimum elevation values are measured	vertDatum	ISO 19115 SC_Vert.Datum B.4.9	Dataset extent vertical datum

Element		ISO 19115	Class / Type		O/M/C	Condition	Description	Short name	Value type	Dataset description
distributionInfo		distributionInfo (17)	MD_Distribution Distrib (270) …					[distInfo]		
distributionFormat		distributionFormat (271)	MD_Format Format (284) …					[distFormat]		
formatName	yes		name (285)		O		name of the data transfer format(s)	formatName	Free text	Dataset distribution format name
formatVersion	yes		version (286)		O		version of the format	formatVer	Free text	Dataset distribution format verson
-		distributor (272)	MD_Distributor Distributor (279) …					[distributor]		
-		distributorContact (280)	CI_ResponsibleParty RespParty (374) …					[distorCont]		
-	yes		organisationName (376)		O		name of the organisation responsible for distribution	rpOrgName	Free text	Dataset distributor organisation name
-	yes		role (379)		O		function performed by the party responsible for distribution	role	ISO 19115 B.5.5	Dataset distributor role
-		distributionOrderProcess (281)	MD_StandardOrderProcess StanOrdProc (298) …					[distorOrdPrc]		
-	yes		fees (299)		O		fees and terms for retreiving the resource	resFees	Free text	Dataset fees
-		distributorTransferOptions (283)	MD_DigitalTransferOptions DigTranOps (274) …					[distorTran]		
-			offLine (278)	MD_Medium Medium (291) …				[offLineMed]		
offLineMedium (unterhalb von transferOptions!)	yes			name (292)	O		name of the medium on which the resource can be received	medName	ISO 19115 B.5.20	Dataset off-line resource name
transferOptions		transferOptions (273)	MD_DigitalTransferOptions DigTranOps (274)					[distTranOps]		
-		onLine (277)	CI_OnlineResource OnlineRes (396) …					[onLineSrc]		
onLineSource	yes		linkage (397)		O		location (address) for on-line access using a URL	linkage	IETF RFC 1738/2056	Dataset on-line resource name
dataQualityInfo		dataQualityInfo (18)	DQ_DataQuality DataQual (78) …					[dqInfo]		
-		scope (79)	DQ_Scope DQScope (138) …					[dqScope]		
-	yes		level (139)		M		hierarchy level of the data specified by the scope	scpLvl	ISO 19115 B.5.25	Dataset scope level
-		report (80)	DQ_Element DQElement (99) …					[dqReport]		
-		result (107)	DQ_QuantitativeResult QuanResult (133) …					[measResult]		
-	yes		valueUnit (135)		C	either (135) and (137) or (83)	quantitative value(s)	quanValUnit	ISO 19115 Record B.4.3	Dataset completeness value
-	yes		value (137)				value unit for reporting a data quality result	quanVal	UnitOfMeasure B.4.3	Dataset completeness value unit
-		lineage (81)	LI_Lineage Lineage (82) …					[dataLineage]		
lineageStatement	yes		statement (83)		O C	if scope equals "dataset" or "series"	general explan. of the data producer's knowl. about the lineage of a dataset	statement	Free text	Dataset lineage statement
legalConstraints		metadataConstraints (20)	MD_LegalConstraints LegConsts (69) …					[mdConst]		
useConstraints	yes		useConstraints (71)		O		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	useConsts	ISO 19115 B.5.24	Metadata use constraints

DIF

Table 11

table 11 Metadata XMAP(1), 10.12.2007

ISO 11915 Core metadata components
ISO 11915 Other (comprehensive) metadata components
GCMD DIF Required Fields (Req.)
GCMD DIF Recommended Fields (Rec.)
GCMD DIF Optional Fields (O)

FGDC Content Standard for Digital Geospatial Metadata

OBIS metadata	Description	ISO 19115 Metadata for geographic datasets	obligation	UML hierarchy	Description	GCMD DIF metadata	obligation	Description	FGDC Content Standard for Digital Geospatial Metadata	Obligation	Description	Proposed OBIS usage	Query from IOBIS database	From DiGIR Entry	Other Comment
Database name	Name or title (may include acronyms)	360 Dataset title	(M)	(MD_Metadata > MD_DataIdentification.citation > CI_Citation.title)	"Name by which the cited resource is known"	Entry_Title (this field may be duplicated under Data_Set_Citation > Data_Set_Title)	(Req.)	"Title of DIF"; descriptive enough so that a user can determine the general content of the data set	8,4 Title	(M)	The name by which the data set is known.	Include			
	Version - **would recommend be part of a citation group**	363 Dataset edition	(O)	(MD_Metadata > MD_DataIdentification.citation > CI_Citation.edition)	"Version of the cited resource"	Data_Set_Citation > Version	(Rec.)	"Version is the version of the data set"	8,5 Edition	(MIA)	The version of the title.	Include within citation			
	Date released - **would recommend be part of a citation group**	362 Dataset reference date	(M)	(MD_Metadata > MD_DataIdentification.citation > CI_Citation.date)	"Reference date for the cited resource"	Data_Set_Citation > Data_Set_Release_Date	(Rec.)	"The date when the data set was made available for release"	8,2 Publication Date	(M)	The date when the data set is published or otherwise made available for release.	Include within citation			
	Status (e.g. Final version or Data continus to be added)	28 Status of dataset	(O)	(MD_Metadata > MD_Identification.Status)	"Status of the resource(s)"	Data_Set_Progress	(O)	"The production status of the data set regarding its completeness"; Options: Planned, In Work, or Complete	1.4.1 Progress	(M)	The state of the data set. Domain: "Complete" "In work" "Planned".	Omit (only posting online data0			
		70 Access constraints for dataset	(O)	(MD_Metadata > MD_Constraints.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" ISO list: copyright, patent, patentPending, trademark, license, intellectualPropertyRights, restricted, otherRestrictions	Access_Constraints	(Rec.)	"Restrictions, limitations and legal prerequisites for accessing the data set" - free-text field	1,7 Access Constraints	(M)	Restrictions and legal prerequisites for accessing the data set. These include any access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the data set. Domain "None", free text.	Omit (only posting public data)			
Citation	Follow bibliographic standards, e.g. Author, year, title, publisher, place of publication, where appropriate. This will duplicate some other fields. **Name or title, Date Released, Version will be duplicated**	24 Dataset Citation	(M) - Only Dataset Title and Dataset Reference Date as part of the citation are mandatory	(MD_Metadata > MD_Identification.Citation) - Citation (359): MD_Metadata > MD_Identification.Citation > CI_Citation.title MD_Metadata > MD_Identification.Citation > CI_Citation.date	Citation data for the resource(s)	"Data_Set_Citation" Group: Dataset_Creator: Dataset_Title: Dataset_Series _Name Dataset_Release_Date: Dataset_Release_Place: Dataset_Publisher: Version: Issue_Identification: Data_Presentation_Form: Other_Citation_Details: Online_Resource:	(Rec.) Entry_Title (// Dataset_Title) is a required DIF field	"A citation for the data set to properly credit the data set producer. This fields indicates how the data set should be cited in the professional scientific literature."	8 "Citation" compound item: 8.1 Originator: 8.2 Publication Date: 8.4 Title: 8.7.1 Series Name: 8.8.2 Publisher: 8.8.1 Publication Place	(MIA)	The recommended reference to be used for the data set.	Include			
Taxonomic scope	Include names in informal OBIS taxonomic hierarchy, add others where appropriate.	No Match				Science Keywords Auxiliary Keywords	(Req.) (O)	"Science keywords allows the specification of keywords that are representative of the data set being described" - controlled vocabulary used for data discovery "Auxiliary Keywords - any words or phrases used to further describe data sets."				Include	Yes		Use IOBIS Taxonomic List
Geographic scope	Common place name (e.g. North-east Atlantic)	343 Geographic location of the dataset (by four coordinates or by geographic identifier)	Mandatory under certain conditions - (C)	(MD_Metadata > MD_DataIdentification.extent > EX_Extent > EX_GeographicExtent > EX_GeographicBoundingBox or EX_GeographicDescription)	"Geographic position of the dataset; (Note: This is only an approximate reference so specifying the coordinate reference system is unnecessary)"	Location	(Rec.)	"names of places which may be used for searching" - controlled vocabulary	1.6.2.2 Place Keyword	(MIA)	The geographic name of a location covered by a data set.	Include	Yes		

Category	Description	No.	Field	Obl.	Path / Code	Definition	Group	Obl.	Coverage text	No.	Spatial/Ref	Obl.	Description	Include	Notes
	Latitude-longitude box (Min Lat, Min Long, Max Lat, Max Long)	344-347	see above (+ westBoundLongitude, eastBoundLongitude, southBoundLatitude, northBoundLatitude)				"Spatial_Coverage" group: Southernmost_Latitude: Northernmost_Latitude: Westernmost_Longitude: Easternmost_Longitude: Minimum_Altitude: Maximum_Altitude: Minimum_Depth: Maximum_Depth:	(Rec.)	"Geographic coverage (horizontal/vertical) of the data described)"	1.5	Spatial Domaon: 1.5.1 Bounding Coordinate:s1.5.1.1 West Bounding Coordinate: 1.5.1.2 East Bounding Coordinate: 1.5.1.3 North Bounding Coordinate :1.5.1.4 South	(M)	the geographic areal domain of the data set.	Include	adata XMAP(1), 10.12.2007
	Geographical resolution (see guidelines)	38	Spatial Resolution	(O)	(MD_Metadata > MD_DataIdentification.spatialResolution)	"Factor which provides a general understanding of the density of spatial data in the dataset"	"Data_Resolution" group: Latitude_Resolution: Longitude_Resolution: Horizontal_Resolution_Range: Vertical_Resolution: Vertical_Resolution_Range: Temporal_Resolution: Temporal_Resolution_Range:	(Rec.)	"The difference between two adjacent geographic, vertical, or time values." Keyword list can be viewed at http://gcmd.nasa.gov/Resources/valids/keyword_list.html	4	Spatial Reference Information: 4.1 Horizontal Coordinate System Definition: 4.1.1 Geographic: 4.1.1.1 Latitude Resolution: 4.1.1.2 Longitude Resolution:	(M)	The description of the reference frame for, and the means to encode, coordinates in the data set	Include	
	Number of locations		No Match											Include	Yes
Temporal coverage	Date of first record	350-351	Additional extent information for the	(O)	(MD_Metadata > MD_DataIdentification.exte	"Time period covered by the content of the dataset" or	"Temporal_Coverage" group: Start_Date: [yyyy-mm-dd]	(Rec.)	"Temporal Coverage" in DIF – start and stop	1.3	Time Period of Content: 9.3.1	(M)	Time period of the content	Include	Yes
	Date of last record	351												Include	Yes
Habitat coverage	Major environment such as marine, brackish, freshwater, coast-land (seal haulouts, bird nesting).	53	No Exact Match Dataset keywords	(O) - the free-text character string "keyword" is the only mandatory field in the "MD_Keyword" optional field	(MD_Metadata > MD_Keywords.keyword); also see MD_KeywordTypeCode CodeList (B.5.17)	"Commonly used word(s) or formalised word(s) or phrase(s) used to describe the subject - free-text"	Science Keywords / Auxiliary Keywords (user can choose from a controlled vocabulary list or enter habitat-related keyword(s) as "free-text")	(Req.)	Some "science keywords" pertaining to habitat classification: Benthic Habitat; Coastal Habitat: Demersal Habitat: Estuarine Habitat: Pelagic Habitat; Reef Habitat; Rivers/Stream Habitat; Lakes; Saline Lakes. Keyword list can be viewed at http://gcmd.nasa.gov/Resources/valids/keyword				Same as GCMD	Include	Need to review avaiable keywords
	Depth zone (e.g. littoral, sublittoral, coastal, continental slope, deep-sea, abyssal)													Include	
	Seascape features (e.g. estuary, seamounts, bay, lagoon, canyon)													Include	
	Species habitats (sediment, rocky, front,													Include	
	Community association (e.g. coral reef, kelp forest, sea grass bed, oyster bed)													Include	
Total distribution records provided to OBIS	Insert number		No Match				No Match							Include	Yes
Total number of taxa	Insert number		No Match				No Match							Include	Yes
Collection method	Sampling method (e.g. trawl, grab, visual observation, video)		No Match		see MD_KeywordTypeCode CodeList (B.5.17) <KeyTypCd value="instrument"/>		Instrument (i.e sensor) Sensor_Name: [SHORT NAME] > [Long Name]	(Rec.)	"Instrument or hardware used to acquire the data." Keyword list can be viewed at http://gcmd.nasa.gov/Resources/valids/keyword	1.2.3	Supplementary Information	(O)	other descriptive information about the data set.	Include	
Data source	e.g. field observation, specimen in collection, image.		No Match				Platform (i.e Source) Source_Name: [SHORT NAME] > [Long Name]	(Rec.)	"The platform of data collection, as in a spacecraft, ship or ground station housing the sensor(s) used to acquire the data; or as in a map from which the data were digitized; or as in a model from which the data were generated."	1.2.3	Supplementary Information	(O)	other descriptive information about the data set.	Include	
Abstract	Short description of dataset for potential users. Mention any quality control issues.	25	Abstract describing the dataset	(M)	(MD_Metadata > MD_DataIdentification.abstract)	"Brief narrative summary of the content of the resource(s)"	Summary	(Req.)	"A brief description of the data set, descriptive enough to allow potential users of the data set to determine if the data set is useful for their needs."	1.2.1	Abstract	(M)	a brief narrative summary of the data set.	Include	
Publications from this data	Provide citation (e.g. author, year, title, journal, volume, pages). Typically paper, but can be CD or diskette publications.	359	Citation (359)	(O)	some ISO profiles uses MD_PortrayalCatalogue Reference (B.2.9)		Reference	(O)	"key bibliographic references pertaining to the data set"					Include	

Category	Definition	No.	Element	Obl.	ISO path	ISO definition	Data Center	Obl.	DIF	No.	FGDC	Obl.	Description	Status
Scientific Contact	Scientist responsible for the quality and content of the data (e.g. Principal Investigator).	374	Dataset responsible party	(O)	(MD_Metadata > MD_DataIdentification.point OfContact > CI_ResponsibleParty)	"Identification of, and means of communication with, person(s) and organizations associated with the dataset" ISO list: resourceProvider, custodian, owner, user, distributor, originator, pointOf Contact, principalInvestigator, processor, publisher, author	Data_Center_Name: [SHORT NAME] > [Long Name] Data_Center_URL: Data_Set_ID: "Personnel" Group: Role: First_Name: Middle_Name: Last_Name: Email: Phone: FAX "Contact_Address" Group: Address: City: Province_Or_State: Postal_Code: Country:	(Rec.)	INVESTIGATOR – person who headed the investigation or experiment that resulted in the acquisition of the data. TECHNICAL CONTACT– person who is knowledgeable about the technical content of the data (quality, processing methods, units...etc). DIF AUTHOR – person who is responsible for the content of the DIF (metadata contact);	1.9	Point of Contact : 10.1 Contact Person Primary (Group) :10.1.1 Contact Person : 10.3 Contact Position (title of individual) : 10.4 Contact Address : 10.4.2 Address (Group) 10.4.3 City: 10.4.4 State or Province : 10.4.6 Country : 10.5 Contact Voice Telephone : 10.6 Contact TDD/TTY Telephone : 10.7 Contact Facsimile Telephone : 10.8	(O)	contact information for an individual or organization that is knowledgeable about the data set. Where Position Title like 'Investigator'	Include
Technical contact	OBIS contact to ensure interoperability.	29	Metadata point of contact	(M)	(MD_Metadata.contact > CI_ResponsibleParty)	"Identification of, and means of communication with, person(s) and organizations associated with the resource(s)" ISO list: resourceProvider, custodian, owner, user, distributor, originator, pointOf Contact, principalInvestigator, processor, publisher, author	"Data_Center" Group: Personnel Role: TECHNICAL CONTACT and/or DIF Author	[Req.]	DATA CENTER CONTACT (Required field in "DATA CENTER" Group) –Identifies the data center point of contact responsible for the distribution of the data; Or someone who knows about the data (see definition above for TECHNICAL CONTACT)	1.9	As above	(O)	Where Position Title like 'Technical Contact'	Include
Website	One or more website url where more information on the data set is available. Indicate relationship of site to dataset, e.g. Original project description, museum collection catalogue, data centre, host organization.	396 397	On-line resource	(O)	(MD_Metadata > MD_Distribution > MD_DigitalTransferOption.o nLine > CI_OnlineResource)	"Information about on-line sources from which the dataset, specification, or community profile name and extended metadata elements can be obtained."	"Related_URL" URL Type keywords can be found at http://gcmd.nasa.gov/Resourc es/valids/url_type.html & "Project" [SHORT NAME] > [Long Name]	(Rec.)	This field provides hypertext URL links to Internet sites that contain information related to the subject of the data, as well as other useful Internet sites such as project home pages, related data archives/servers, metadata extensions, online software packages, web mapping services, and	8.10	Online Linkage	(O)	the name of an online computer resource that contains the data set. Entries should follow the Uniform Resource Locator convention of the Internet.	Include
		292	Name of medium	(O)	(MD_Metadata > MD_Distribution >MD_Medium.name)	"Name of the medium on which the resource can be received"	"Distribution" group: Distribution_Media: Distribution_Size: Distribution_Format: Fees:	(Rec.)	"Distribution - The medium, size, scientific data format, and fees involved in distributing the data set"; Distribution_Media: the media options for the user receiving the data.	6.4.2	Digital Form 6.4.2.1.1 Format Name : 'OBIS' : 6.4.2.2.1.1 : Network Resource Name (?/digir.php) :6.4.2.2.1.1.1.1 Network Resource Name	(O)	The description of options for obtaining the data set on computer-compatible media.	Omit
Comment	Optional	46	Supplemental info on dataset	(O)	(MD_Metadata > MD_DataIdentification.supp lementalInformation)	"Any other descriptive information about the dataset"	No Match		Such comments could also be recorded in the abstract/summary, and/or auxillary keyword metadata field.	1.2.3	Supplementary Information	(O)	other descriptive information about the data set.	Omit
Date this entry completed	Date this metadata form completed	9	Metadata date stamp	(M)	(MD_Metadata.dateStamp)	"Date that the metadata was created"	DIF_Creation_Date	(O) however automatically filled in	"The date the DIF was created" [yyyy-mm-dd]	7.	Metadata Reference Information : 7.1 Metadata Date	(M)	information on the currentness of the metadata information, and the responsible party.	Include