423-RQMT-003-A, Original Revision -
Earth Science Data and Information Systems (ESDIS) Project, Code 423

Appendix A. Metadata Requirements Base Reference for United Metadata Model Common (UMM-Common)

Check the ESDIS CM library at https://ops1-cm.ems.eosdis.nasa.gov/cm2/ to verify that this is the correct version prior to use

Appendix A. Metadata Requirements Base Reference for United Metadata Model Common (UMM-Common)
Signature/ Approval Page

Prepared by:

Signature obtained on file

Valerie Dixon
ESDIS CMR Manager
GSFC Code 586

Reviewed by:

Signature obtained on file

Karen Michael
EOSDIS System Manager
GSFC Code 423

Signature obtained on file

Jeanne Behnke
ESDIS Deputy Manager for Science Operations
GSFC Code 423

Approved by:

Signature obtained on file

Andrew Mitchell
ESDIS Project Manager
GSFC Code 423

[Electronic] Signatures available in B32 Room E148 online at: / https://ops1-cm.ems.eosdis.nasa.gov/cm2/

Preface

This document is under ESDIS Project configuration control. Once this document is approved, ESDIS approved changes are handled in accordance with Class I and Class II change control requirements described in the ESDIS Configuration Management Procedures. Changes to this document shall be verified by a document change notice (DCN) and implemented by change bars or by complete revision.

Any questions should be addressed to: esdis-esmo-cmo@lists.nasa.gov

ESDIS Configuration Management Office (CMO)
NASA/GSFC
Code 423
Greenbelt, Md. 20771

Abstract

Originally there was an effort to harmonize a list of standards and specifications that was in use by the NASA Earth Science community. These specifications included the Directory Interchange Format (DIF), Earth Observing System (EOS) Clearing House (ECHO) 10, Service Entry Resource Format (SERF), and International Organization for Standardization (ISO) 19115-2. The result of the harmonization effort was the Unified Metadata Model (UMM).

This document - the UMM-Common document - describes the compilation of elements that are shared among the UMM profiles which include: collections, granules, services, visualizations, variables, and documents. Implementers of ESDIS Common Metadata Repository (CMR), its clients, and data providers should reference this document and the UMM as a guide while implementing the system, its clients, or generating metadata. Links to more information about the standards and specifications used in this document can be found in Reference Documents .

Keywords: UMM-S, UMM-Common, UMM-C, UMM-G, UMM-Var, NASA Earthdata Search, Tools, EOSDIS, ESDIS, CMR

Change History Log

Revision	Effective Date	Description of Changes (Reference the CCR & CCB Approval Date)
V1.0	February 2015	Provisional Release.
Baseline, Original Rev-	10/31/2018	CCR 423-ESDIS-193; approved 10/10/2018 Baseline in COMET as stand-alone Appendix A to the Metadata Requirements Base Reference core as Revision B. Pages A-1 through 137

Check the ESDIS CM library at https://ops1-cm.ems.eosdis.nasa.gov/cm2/ to verify that this is the correct version prior to use

Table of Contents

List of Figures

List of Tables

136
Table A.4: Tiling Identification Systems Translation

Check the ESDIS CM library at https://ops1-cm.ems.eosdis.nasa.gov/cm2/ to verify that this is the correct version prior to use

APPENDIX A INTRODUCTION

Earth Observing System Data and Information System (EOSDIS) generates, archives, and distributes enormous amounts of Earth Science data, which in turn are made available to the science community and the public at large. To aid in the search and discovery process, these data must be organized and cataloged. Accurate, complete, and consistent metadata are required for efficient accessibility. To improve the quality and consistency among its metadata holdings, EOSDIS has developed a model describing metadata that it archives and maintains. This model documents elements that may be represented across various metadata standards and unifies them through core elements useful for discovery. This unified model, aptly named the Unified Metadata Model (UMM), was developed as part of the EOSDIS Metadata Architecture Studies (MAS I and II) conducted between 2012 and 2013. The UMM will be used by the Common Metadata Repository (CMR) and will drive search and retrieval of metadata cataloged within that system.

This document describes common elements used in various UMM reference profiles, which include: collections, granules, services, visualizations, variables, and documents. For each element in this document, the following information is provided:

- element specification
- description
- profile utilization
- cardinality
- analysis
- mapping to existing standards
- examples
- future recommendations

A.A.1 Purpose

This document provides information to the National Aeronautics and Space Administration (NASA) Earth Science community. Distribution is unlimited.

A.A.2 Scope

This document is a supplemental document to the Collection Metadata Model. It holds common elements that are shared between the other metadata models.

A.A.3 Impact

This document outlines common elements used in the UMM that are intended to be backward-compatible with existing NASA earth science metadata implementations. It will impact providers from NASA Distributed Active

Check the ESDIS CM library at https://ops1-cm.ems.eosdis.nasa.gov/cm2/ to verify that this is the correct version prior to use

Archive Centers (DAAC), CMR client developers, metadata catalog developers, and users.

A.A.4 Copyright Notice

The contents of this document are not protected by copyright in the United States and may be used without obtaining permission from NASA.

A.A.5 Feedback

Questions, comments and recommendations on the contents of this document should be directed to support@earthdata.nasa.gov.

A.A.6 Document Conventions

This document contains UMM common elements, each of which contains the following components:

- Element Name: Provides the element name.
- Element Specification: Provides the sub-elements, cardinality of the sub-elements within (), any valid values within <>, applicable comments and notes within {}, and any other major factors that make up the element.
- Description: Provides background information on the purpose of the element and its intended use. Furthermore, any information about the element's current usage, recommendations for usage, or unresolved issues is also documented here. The term "resource" is also used mainly in the description section though it can be used elsewhere and it is meant to denote collections, granules, services, visualizations, variables, documents, etc.
- Profile Utilization: Lists which profiles use the specific element.
- Cardinality: Indicates the expectation of counts for this element, summarized in Table A.1.
- Analysis: Gives an analysis of this element where needed and describes any necessary reconciliation.
- Mapping: Gives Extensible Markup Language (XML) Path Language (XPath) mappings for this element to the elements in other specifications. This can be considered as the "crosswalk" for this element. For a link to more information about XPaths please see Related Documents.
- Examples: XML snippets from "cross-walked" data standards documenting sample values for the element. Whenever possible, a Uniform Resource Locator (URL) to the specific collection or service used for the metadata snippet, is provided.
- Recommendations: Provides any future recommendations for the element.

Table A.11. Cardinality

Value	Description
1	Exactly one of this element is required
0..N	Optionally, up to and including N number of this element may be present
0..*	Optionally, any number of this element may be present
1..*	At least one of this element is required, any number may be present

A.A.7 Related Documentation

The latest versions of all documents below should be used. The latest ESDIS Project documents can be obtained from URL: https://ops1-cm.ems.eosdis.nasa.gov. ESDIS documents have a document number starting with either 423 or 505. Other documents are available for reference in the ESDIS project library website at: http://esdisfmp01.gsfc.nasa.gov/esdis_lib/default.php unless indicated otherwise.

A.A.7.1 Applicable Documents

The following documents are referenced within or are directly applicable, or contain policies or other directive matters that are binding upon the content of this document.

423-RQMT-003	Metadata Requirements Base Reference Document
423-RQMT-003-B	Metadata Requirements Base Reference Appendix B UMM-Collection
DIF 9	https://gcmd.nasa.gov/Aboutus/xml/dif/dif.xsd
DIF 10	https://gcmd.gsfc.nasa.gov/Aboutus/xml/dif/dif_v10.2.xsd
ECHO 10	https://wiki.earthdata.nasa.gov/ECHO
SERF	https://gcmd.nasa.gov/Aboutus/xml/serf/serf.xsd https://gcmd.nasa.gov/add/serfguide/index.html
ISO 19115-2 (MENDS)	http://www.iso.org/iso/catalogue_detail.htm?csnumber=39229 https://cdn.earthdata.nasa.gov/iso/
ISO 19115-1	https://github.com/ISO-TC211/XML

A.A.7.2 Reference Documents

The following documents are not binding on the content but referenced herein and, amplify or clarify the information presented in this document.

Tags	http://en.wikipedia.org/wiki/Tag_%28metadata%29
XPath	XPath is a language for addressing parts of an XML

	document, designed for use with XSLT.
XLinks	http://en.wikipedia.org/wiki/XLink

Check the ESDIS CM library at https://ops1-cm.ems.eosdis.nasa.gov/cm2/ to verify that this is the correct version prior to use

APPENDIX B COMMON ELEMENTS

The following subsections describe each of the metadata elements that are common among the various UMM profiles.

A.B.1 Metadata Language

Element Specification

MetadataLanguage

Description

The language used in the metadata record.

Profile Utilization

Collection, Granule, Service, Visualization, Variable, Document

Cardinality

0..1

Analysis

If not supplied the default language of English will be assumed.

Mapping

ISO 19115-2	/gmi:MI_Metadata/gmd:language/gco:CharacterString with /gmi:MI_Metadata/gmd:MD_CharacterSetCode codeList="http://www.isotc211.org/2005/resources/Codelist/gm

	xCodelists.xml#MD_CharacterSetCode" codeListValue=
ISO 19115-1	/ mdb:MD_Metadata/mdb:defaultLocale/lan:PT_Locale/lan:language/lan:LanguageCode/@codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/codelists.xml#LanguageCode" @codeListValue= with / mdb:MD_Metadata/mdb:defaultLocale/lan:PT_Locale/lan:characterEncoding/lan:MD_CharacterSetCode/@codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml#MD_CharacterSetCode" @codeListValue=

Examples

ISO 19115-2

```
<gmd:language>

    <gco:CharacterString>eng</gco:CharacterString>

</gmd:language>

<gmd:MD_CharacterSetCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml#MD_CharacterSetCode"


codeListValue="utf8">utf8</gmd:MD_CharacterSetCode>

</gmd:characterSet>
```

ISO 19115-1

```
<mdb:MD_Metadata  ...>

  <mdb:defaultLocale>

    <lan:PT_Locale>

      <lan:language>

        <lan:LanguageCode
codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/codelists.xml#LanguageCode"

                codeListValue="eng">eng</lan:LanguageCode>

        </lan:language>

      <lan:characterEncoding>

        <lan:MD_CharacterSetCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml#MD_CharacterSetCode"
```

```
            codeListValue="utf8">utf8</lan:MD_CharacterSetCode>

    </lan:characterEncoding>

   </lan:PT_Locale>

 </mdb:defaultLocale>

 ...

</mdb:MD_Metadata>
```

Source Data Information:
ISO 19115-2 - Snippet manually generated from schema

ISO 19115-1 - Snippet manually generated from schema

Recommendations

It is recommended that the value for this element be selected from a list of language codes. The ISO standard for language codes that we will use is ISO 639-2. For more information please see the ISO 639-2 language code web site at http://www.loc.gov/standards/iso639-2/php/code_list.php .

A.B.2 Metadata Date

Element Specification

MetadataDate/Date (1)
MetadataDate/Type (1) <"CREATE", "UPDATE", "DELETE", "REVIEW">

Description

There are three types of dates used in the UMM profiles:

- Dates that concern the metadata record - called Metadata Dates in this document.
- Dates that concern the resource itself (collections, granules, services, etc.) - called Data Dates in this document.
- Dates that describe the time period in which the data set was acquired - called Temporal Extent in this document.

Of these three date types this element is comprised of dates for when the *metadata* was created, last revised, planned for future review, or planned for deletion. For dates related to the actual data or resource, the element Data Date should be used. For dates that describe the acquisition period the Temporal Extent element should be used.

Profile Utilization

Collection, Service, Document

Cardinality

0..*

Analysis

All metadata dates have been consolidated under this element. They will be typed and will all be represented by the ISO 8601 date and time conventions as part of the reconciliation process.

Mapping

DIF 9	/DIF/DIF_Creation_Date	
	/DIF/Last_DIF_Revision_Date	
	/DIF/Future_DIF_Review_Date	
DIF 10	DIF/Metadata_Dates/Metadata_Creation	
	DIF/Metadata_Dates/Metadata_Last_Revision	
	DIF/Metadata_Dates/Metadata_Future_Review	
	DIF/Metadata_Dates/Metadata_Delete	
SERF	SERF/SERF_Creation_Date	
	SERF/Last_SERF_Revision_Date	
	SERF/Future_SERF_Review_Date	
ECHO 10 Collection	/Collection/RevisionDate	
ECHO 10 Granule	N/A	
ISO 19115-2	/gmi:MI_Metadata/datestamp	This element can be populated, but not used by the UMM. This element does not contain a date type and therefore it is not known what date is represented by this element.
	/gmi:MI_Metadata/gmd:metadataExtensionInfo/gmd:MD_MetadataExtensionInformation/gmd:extendedElementInformation/gmd:MD_ExtendedElementInformation/gmd:name/gco:CharacterString=<Metadata Create Date, Metadata Update Date, Metadata Future Review Date, Metadata Delete Date>	
	with	
	.../gmd:definition/gco:CharacterString=<Create Date, Update Date, Future Review Date, Delete Date>	
	.../gmd:dataType/gmd:MD_DatatypeCode codeList="" codeListValue="" = Date	
	.../gmd:domainValue/gco:CharacterString= {the actual date}	
ISO 19115-	/mdb:MD_Metadata/mdb:dateInfo/cit:CI_Date/cit:date/gco:DateTime	

1	/ mdb:MD_Metadata/mdb:dateInfo/cit:CI_Date/cit:dateType/cit:CI_DateTypeCode @codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/codelists.xm#CI_DateTypeCode" @codeListValue=
EMS	N/A

Examples

DIF_9

```
<DIF_Creation_Date>2002-06-25</DIF_Creation_Date>
<Last_DIF_Revision_Date>2015-12-02</Last_DIF_Revision_Date>
<Future_DIF_Review_Date>2005-04-27</Future_DIF_Review_Date>
```

DIF_10

```
<Metadata_Dates>
   <Metadata_Creation>2007-02-26</Metadata_Creation>
   <Metadata_Last_Revision>2015-06-11</Metadata_Last_Revision>
   <Metadata_Future_Review>2017-05-01</Metadata_Future_Review>
...
</Metadata_Dates>
```

SERF

```
<SERF_Creation_Date>2005-06-01</SERF_Creation_Date>

<Last_SERF_Revision_Date>2008-06-03</Last_SERF_Revision_Date>
```

ECHO_10_Collection

```
<RevisionDate>2008-12-02T00:00:00.000Z</RevisionDate>
```

ISO_19115-2

```
<gmd:dateStamp>

  <gco:DateTime>2008-12-02T00:00:00Z</gco:DateTime>

</gmd:dateStamp>



<gmd:date>

<gmd:CI_Date>
```

```
  <gmd:date>

    <gco:DateTime>2008- 12-02T00:00:00.000Z</gco:DateTime>

  </gmd:date>

  <gmd:dateType>

    <gmd:CI_DateTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#CI_DateTypeCode"
codeListValue="revision">revision</gmd:CI_DateTypeCode>

  </gmd:dateType>

</gmd:CI_Date>

</gmd:date>

<gmd:date>

<gmd:CI_Date>

  <gmd:date>

    <gco:DateTime>2008- 12-02T00:00:00.000Z</gco:DateTime>

  </gmd:date>

  <gmd:dateType>

    <gmd:CI_DateTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#CI_DateTypeCode"
codeListValue="creation">creation</gmd:CI_DateTypeCode>

  </gmd:dateType>

</gmd:CI_Date>

</gmd:date>
```


ISO 19115-1

```
<mdb:dateInfo>

 <cit:CI_Date>

  <cit:date>

   <gco:DateTime>2008-12-02T00:00:00Z</gco:DateTime>

  </cit:date>

  <cit:dateType>

   <cit:CI_DateTypeCode
codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/codelis
ts.xm#CI_DateTypeCode"
codeListValue="creation">creation</cit:CI_DateTypeCode>

  </cit:dateType>

 </cit:CI_Date>

</mdb:dateInfo>
```

Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov/search/concepts/C1214608783-SCIOPS
DIF 10 - https://cmr.earthdata.nasa.gov/search/concepts/C1273348636-GES_DISC
SERF - http://gcmd.gsfc.nasa.gov/mws/serf/NASA-Athena

ECHO 10 Collection - https://cmr.earthdata.nasa.gov/search/concepts/C179003030-ORNL_DAAC
ISO 19115-2 - https://cmr.earthdata.nasa.gov/search/concepts/C179003030-ORNL_DAAC.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

A.B.3 Entry Title

Element Specification

EntryTitle

Description

The EntryTitle element represents the title of the resource described by the metadata.

Profile Utilization

Collection, Service, Document

Cardinality

1

Mapping

DIF 9	/DIF/Entry_Title
DIF 10	/DIF/Entry_Title
SERF	/SERF/Entry_Title
ECHO 10 Collection	/Collection/DataSetId
ISO 19115-2	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:citation/gmd:CI_Citation/gmd:title/gco:CharacterString
ISO 19115-1	/gmi:MI_Metadata/mdb:metadataIdentifier/mcc:MD_Identifier/mcc:code/gco:CharacterString and /mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:citation/cit:CI_Citation/cit:title/gco:CharacterString
EMS	MetaDataLongName

Examples

DIF 9

```
<Entry_Title>1-km Water Fraction From National Topographic Data Base Maps, Canada</Entry_Title>
```

DIF 10

```
<Entry_Title>Aerosol Ratio Small MODIS L2 (AQUA Browse Product)</Entry_Title>
```

SERF

```
<Entry_Title>Project 3D-View: Virtual Interactive Environmental Worlds</Entry_Title>
```

ECHO 10 Collection

```
<Collection>

 ...

 <DataSetId>Aquarius L3 Gridded 1-Degree Daily Soil Moisture
V004</DataSetId>

 ...

</Collection>
```

ISO 19115-2

```
<gmd:identificationInfo>

    <gmd:MD_DataIdentification>

      <gmd:citation>

        <gmd:CI_Citation>

          <gmd:title>
             <gco:CharacterString>Aquarius L3 Gridded 1-Degree Daily
Soil Moisture
                  V004</gco:CharacterString>

          </gmd:title>

           ...

         </gmd:CI_Citation>

      </gmd:citation>

      ...

  </gmd:MD_DataIdentification>

</gmd:identificationInfo>
```

ISO 19115-1

```
 <mdb:metadataIdentifier>
```

```
    <mcc:MD_Identifier>
      <mcc:code>
        <gco:CharacterString>Aquarius L3 Gridded 1-Degree Daily Soil Moisture
                    V004</gco:CharacterString>
      </mcc:code>
      <mcc:codeSpace>
        <gco:CharacterString>gov.nasa.echo</gco:CharacterString>
      </mcc:codeSpace>
    </mcc:MD_Identifier>
  </mdb:metadataIdentifier>
  ...
<mdb:identificationInfo>
    <mri:MD_DataIdentification>
      <mri:citation>
        <cit:CI_Citation>
          <cit:title>
            <gco:CharacterString>Aquarius L3 Gridded 1-Degree Daily Soil Moisture
                    V004</gco:CharacterString><gmd:CI_Citation>
          </cit:title>
          ...
        </cit:CI_Citation>
```

```
      </mri:citation>

    ...

    </mri:MD_DataIdentification>

</mdb:identificationInfo>
```

EMS_Flat_File

```
Aquarius_L3_Gridded_1-Degree_Daily_Soil_Moisture
```

Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov/search/concepts/C1214615490-SCIOPS
DIF 10 - https://cmr.earthdata.nasa.gov/search/concepts/C1225368560-LAADS

SERF - http://gcmd.gsfc.nasa.gov/mws/serf/NASA_3D_VIEW
ECHO 10 Collection - https://cmr.earthdata.nasa.gov:443/search/concepts/C1000001602-NSIDC_ECS
ISO 19115-2 - Collection - https://cmr.earthdata.nasa.gov/search/concepts/C179001766-SEDAC.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

EMS - NSIDCV0 flat file

A.B.4 Abstract

Element Specification

Abstract

Description

Abstract provides a brief description of the resource the metadata represents. This element allows markdown-formatted text and line breaks within the text are preserved. Additional information on markdown can be found at http://en.wikipedia.org/wiki/Markdown

Profile Utilization

Collection, Service, Visualization, Variable, Document

Cardinality

1

Mapping

DIF 9	/DIF/Summary/Abstract
DIF 10	/DIF/Summary/Abstract
SERF	/SERF/Summary/Abstract
ECHO 10 Collection	/Collection/Description
ECHO 10 Granule	N/A
ISO 19115-2	/ gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:abstract/gco:CharacterString
ISO 19115-1	/ mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:abstract/gco:CharacterString
EMS	N/A

Examples

DIF 9

<Summary>
<Abstract>The Lambert Glacier Basin (LGB) series of five oversnow traverses were conducted from 1989-95. Ten metre depth (10 m) firn temperatures, as a proxy indicator of annual mean surface temperature at a site, were recorded approximately every 30 km along the 2014 km main traverse route from LGB00 (68.6543 S, 61.1201 E) near Mawson Station, to LGB72 (69.9209 S, 76.4933 E) near Davis Station.

10 m depth firn temperatures were recorded manually in field notebooks and the data transferred to spreadsheet files (MS Excel).

Summary data (30 km spatial resolution) can be obtained from CRC Research Note No.09 &Surface Mass Balance and Snow Surface Properties from the Lambert Glacier Basin Traverses 1990-94&.

This work was completed as part of ASAC projects 3 and 2216.

Some of this data have been stored in a very old format. The majority of files have been updated to current formats, but some files (kaleidograph files in particular) were not able to be modified due to a lack of appropriate software. However, these files are simply figures, and can be regenerated from the raw data (also provided).

The fields in this dataset are:

Latitude
Longitude
Height
Cane
Distance
Elevation
Density
Mass Accumulation
Year
Delta Oxygen-18
Grain Size
Ice Crusts
Depth Hoar</Abstract>

</Summary>

DIF 10


```
<Summary>
  <Abstract>The Atmospheric Infrared Sounder (AIRS) is a grating
spectrometer (R = 1200) aboard the second EOS polar-orbiting platform,
EOS Aqua. In combination with the Advanced Microwave Sounding Unit
(AMSU) and the Humidity Sounder for Brazil (HSB), AIRS constitutes an
innovative atmospheric sounding group of visible, infrared, and microwave
sensors. The AIRS Carbon Dioxide (CO2) Standard Retrieval Product consists
of retrieved estimates of CO2, plus estimates of the errors associated with
the retrieval. In contrast to AIRX2RET, the horizontal resolution of this
standard product is about 110 km (1x1 degree). An AIRS granule has been
set as 6 minutes of data, 15 footprints cross track by 22 lines along
track.</Abstract>
</Summary>
```


SERF


```
<Summary><Abstract>The Minnesota Public Health Data Access Portal
(also called the Data Access Portal) provides access to data on a variety of
environmental and health topics. Minnesota Public Health Data Access
(MNPH Data Access) is an online query and information system designed to
provide public access to Minnesota data about health, the environment, and
other risk factors that may impact public health. Each topic area on the
portal has a web page with information and details about the data. This page
identifies the source of the data, as well as the data's strengths and
limitations.



Minnesota Public Health Data Access (the Data Access portal) is updated
regularly to include new features and data (as data are available). The portal
includes data on air quality, asthma, birth defects, cancer, carbon monoxide
poisoning, chemicals in people: biomonitoring, childhood immunizations,
childhood lead poisoning, chronic obstructive pulmonary disease, drinking
water quality, environmental tobacco smoke, health insurance, heart attacks,
heat-related illness, obesity, poverty & income, reproductive & birth
outcomes, and smoking. Some of the data are available in mapped
format.</Abstract>

</Summary>
```


ECHO 10 Collection

```
<Description>

 The AMSR-E/Aqua Level-3 daily Snow Water Equivalent (SWE) product includes global

 SWE on Northern and Southern Hemisphere 25 km EASE-Grids, generated by the GSFC algorithm

 using Level-2A TBs.

</Description>
```

ISO 19115-2

```
<gmd:abstract>

 <gco:CharacterString>The AMSR-E/Aqua Level-3 daily SWE product

   includes global SWE on Northern and Southern Hemisphere 25 km EASE-Grids, generated

   by the GSFC algorithm using Level-2A TBs. Version Description: Transitional SWE

  corrects for forest attenuation using forest fraction from

   MODIS 1 km IGBP Classes and forest density from MODIS 500 m UMD Vegetation Continuous

   Field; snow density climatology is used to convert snow depth to

   SWE.</gco:CharacterString>

</gmd:abstract>
```

ISO 19115-1

```
<mri:abstract>

 <gco:CharacterString>The AMSR-E/Aqua Level-3 daily SWE product

  includes global SWE on Northern and Southern Hemisphere 25 km EASE-
```

Grids, generated

by the GSFC algorithm using Level-2A TBs. Version Description: Transitional SWE

corrects for forest attenuation using forest fraction from

MODIS 1 km IGBP Classes and forest density from MODIS 500 m UMD Vegetation Continuous

Field; snow density climatology is used to convert snow depth to

SWE.</gco:CharacterString>

</mri:abstract>

Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov/search/concepts/C1214313574-AU_AADC

DIF 10 - https://cmr.earthdata.nasa.gov/search/concepts/C1243477314-GES_DISC

SERF - http://gcmd.gsfc.nasa.gov/mws/serf/Minnesota_Public_Health_Data_Access_Portal

ECHO 10 Collection - https://cmr.earthdata.nasa.gov/search/concepts/C179014688-NSIDC_ECS

ISO 19115-2 - https://cmr.earthdata.nasa.gov/search/concepts/C179014688-NSIDC_ECS.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

A.B.5 Purpose

Element Specification

Purpose

Description

This element contains suggested usage, a description for as to why the resource exists, or a description for what the resource can be used. Any limitations on the resource including, but not limited to special restrictions, legal prerequisites, and terms and conditions should be placed into the UseConstraints element and not the Purpose element.

Profile Utilization

Collection, Service, Visualization, Document

Cardinality

0..1

Mapping

DIF 9	/DIF/Summary/Purpose
DIF 10	/DIF/Summary/Purpose
SERF	/SERF/Summary/Purpose
ECHO 10 Collection	/Collection/SuggestedUsage
ECHO 10 Granule	N/A
ISO 19115-2	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:purpose/gco:CharacterString
ISO 19115-1	/mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:purpose/gco:CharacterString
EMS	N/A

Examples

DIF 9

```
<Summary>
  ...
  <Purpose>To assess species composition, abundance, distribution and biomass of zooplankton within the Bering and Chukchi Seas, 1985-1989</Purpose>
 </Summary>
```

DIF 10

```
 <Summary>
  ...
  <Purpose>To provide VIIRS 375m active fire locations in Near Real-Time in easy to use formats.</Purpose>
 </Summary>
```

SERF

```
<Summary

...

<Purpose>MNPH Data Access may be used to:



-Help people and communities make healthy choices

-Protect children, the environment, and future generations

-Evaluate and measure the effectiveness of public health actions and policy



Ultimately, the goal of MNPH Data Access is to support the Minnesota Department of Health's mission -- to protect, maintain, and improve the health of all Minnesotans.</Purpose></Summary>
```

ECHO 10 Collection

```
<SuggestedUsage>To serve a wide user community by providing composite Landsat images and raw data for urban areas that can be used in interdisciplinary studies of remote sensing and the environment.</SuggestedUsage>
```

ISO 19115-2

```
<gmd:purpose>

 <gco:CharacterString>To serve a wide user community by providing composite Landsat images and raw data for urban areas that can be used in interdisciplinary studies of remote sensing and the environment.</gco:CharacterString>

</gmd:purpose>
```

ISO 19115-1

```
<mri:purpose>

 <gco:CharacterString>To serve a wide user community by providing composite Landsat images and raw data for urban areas that can be used in interdisciplinary studies of remote sensing and the environment.</gco:CharacterString>

</mri:purpose>
```

Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov/search/concepts/C1214595006-SCIOPS
DIF 10 - https://cmr.earthdata.nasa.gov/search/concepts/C1221486837-SCIOPS
SERF - http://gcmd.gsfc.nasa.gov/mws/serf/Minnesota_Public_Health_Data_Access_Portal

ECHO 10 Collection - https://cmr.earthdata.nasa.gov/search/concepts/C179001954-SEDAC
ISO 19115-2 - https://cmr.earthdata.nasa.gov/search/concepts/C179001954-SEDAC.iso
ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

A.B.6 Language

Element Specification

Language

Description

The language used in the dataset. Note: This is different from the language of the metadata.

Profile Utilization

Collection, Granule, Service, Visualization, Document

Cardinality

0..*

Analysis

This element is not controlled. If a language is not supplied - English, the default language, will be assumed.

Mapping

DIF 9	/DIF/Data_Set_Language
DIF 10	/DIF/Data_Set_Language
SERF	/SERF/Service_Language
ECHO 10 Collection	N/A
ECHO 10 Granule	N/A
ISO 19115-2	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:language/gco:CharacterString with /gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:MD_CharacterSetCode codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml#MD_CharacterSetCode" codeListValue=
ISO 19115-1	/mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:defaultLocale/lan:PT_Locale/lan:language/lan:LanguageCode codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/codelists.xml#LanguageCode" codeListValue= /mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:defaultLocale/lan:PT_Locale/lan:characterEncoding/lan:MD_CharacterSetCode codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml#MD_CharacterSetCode" codeListValue=
EMS	N/A

Examples

DIF 9

```
<Data_Set_Language>English</Data_Set_Language>
```

DIF 10

```
<Dataset_Language>English</Dataset_Language>
```

SERF

```
<Service_Language>English</Service_Language>
```

ISO 19115-2

```
<gmd:language>

    <gco:CharacterString>eng</gco:CharacterString>

</gmd:language>

<gmd:MD_CharacterSetCode
codeList=http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.x
ml#MD_CharacterSetCode
codeListValue="utf8">utf8</gmd:MD_CharacterSetCode>

</gmd:characterSet>
```

ISO 19115-1

```
<mdb:identificationInfo>

 <mri:MD_DataIdentification>

  <mri:defaultLocale>

   <lan:PT_Locale>

    <lan:language>

     <lan:LanguageCode  codeList ="codeListLocation#LanguageCode "

            codeListValue ="eng">eng</lan:LanguageCode>

     </lan:language>

    <lan:characterEncoding>

    <lan:MD_CharacterSetCode
codeList ="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#MD_CharacterSetCode "

            codeListValue ="utf8">utf8</lan:MD_CharacterSetCode>

    </lan:characterEncoding>
```

```
    </lan:PT_Locale>

   </mri:defaultLocale>

   <mri:supplementalInformation/>

  </mri:MD_DataIdentification>

</mdb:identificationInfo>
```

Source Data Information :

DIF 9 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1214587974-SCIOPS

DIF 10 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1223726607-GES_DISC

SERF - http://gcmd.gsfc.nasa.gov/mws/serf/NASA-Athena
ISO 19115-2 - https://cmr.earthdata.nasa.gov:443/search/concepts/C179003030-ORNL_DAAC.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

Recommendations

It is recommended that the value for this element be selected from a list of language codes. The ISO standard for language codes that we will use is ISO 639-2. For more information please see the ISO 639-2 language code web site at http://www.loc.gov/standards/iso639-2/php/code_list.php.

A.B.7 Data Date

Element Specification

DataDate/Date (1)
DataDate/Type (1) <"CREATE", "UPDATE", "DELETE", "REVIEW">

Description

There are three types of dates used in the UMM profiles:

- Dates that concern the metadata record - called Metadata Dates in this document.
- Dates that concern the resource itself (collections, granules, services, etc.) - called Data Dates in this document.
- Dates that describe the time period in which the data set was acquired - called Temporal Extent in this document.

Of these three date types this element is comprised of dates for when the *data or resource* itself changed in some way. It does not include the first or third bullets that describe Metadata Dates or Temporal Extent. This element is made of two sub-elements, type and date. The type describes what the date represents: a future review, when the resource was created, last updated, or planned for deletion. The date describes when the resource had an action performed on it or when an action on it will occur as described by the type element.

Profile Utilization

Collection, Granule, Service, Document

Cardinality

0..*

Analysis

The Creation, Last Revision, Future Review, and Planned Deletion dates exist in various places in the different standards.

All data dates have been consolidated under this element. They will be typed and will all be represented by the ISO 8601 date and time conventions as part of the reconciliation process. In DIF 10 both the metadata and data dates are located under the DIF/Metadata_Dates element. The difference is that the sub-elements of Metadata_Creation, Metadata_Last_Revision, Metadata_Future_Review, and Metadata_Delete describe the *metadata* dates and the sub-elements of Data_Creation, Data_Last_Revision, Data_Future_Review, Data_Delete describe the resource dates.

Mapping

DIF 9	N/A
DIF 10	/DIF/Metadata_Dates/Data_Creation /DIF/Metadata_Dates/Data_Last_Revision /DIF/Metadata_Dates/Data_Future_Review /DIF/Metadata_Dates/Data_Delete
SERF	N/A
ECHO 10 Collection	/Collection/InsertTime /Collection/LastUpdate /Collection/DeleteTime
ECHO 10 Granule	/Granule/InsertTime /Granule/LastUpdate /Granule/DeleteTime
ISO 19115-2	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:citation/gmd:CI_Citation/gmd:date/gmd:CI_Date/gmd:date/gco:DateTime with /gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:citation/gmd:CI_Citation/gmd:date/gmd:CI_Date/gmd:dateType/gmd:CI_DateTypeCode codeListValue varies.
ISO 19115-1	/mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:citation/cit:CI_Citation/cit:date/cit:CI_Date/cit:date/gco:DateTime with /mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:citation/cit:CI_Citation/cit:date/cit:CI_Date/cit:dateType/cit:CI_DateTypeCode codeList="codeListLocation#CI_DateTypeCode" codeListValue varies.
EMS	N/A

Examples

<u>DIF 10</u>

```
<Metadata_Dates>
  ...
  <Data_Creation>2015-01-01</Data_Creation>
  <Data_Last_Revision>2015-01-01</Data_Last_Revision>
  <Data_Future_Review>2026-05-12</Data_Future_Review>
```

```
</Metadata_Dates>
```

ECHO_10_Collection

```
<InsertTime>2008-12-02T00:00:00.000Z</InsertTime>

<LastUpdate>2008-12-02T00:00:00.000Z</LastUpdate>
```

ECHO_10_Granule

```
<InsertTime>2011-09-07T06:07:24Z</InsertTime>
<LastUpdate>2012-10-31T20:33:38Z</LastUpdate>
```

ISO_19115-2

```
<gmd:date>

<gmd:CI_Date>

  <gmd:date>

    <gco:DateTime>2008-06-03T00:00:00.000Z</gco:DateTime>

  </gmd:date>

  <gmd:dateType>

    <gmd:CI_DateTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml
#CI_DateTypeCode"
codeListValue="revision">revision</gmd:CI_DateTypeCode>

  </gmd:dateType>

</gmd:CI_Date>

</gmd:date>

<gmd:date>

<gmd:CI_Date>
```

```
  <gmd:date>

    <gco:DateTime>2005- 06-01T00:00:00.000Z</gco:DateTime>

  </gmd:date>

  <gmd:dateType>

    <gmd:CI_DateTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml
#CI_DateTypeCode"
codeListValue="creation">creation</gmd:CI_DateTypeCode>

  </gmd:dateType>

</gmd:CI_Date>

</gmd:date>
```

ISO 19115-1

```
<cit:date>

            <cit:CI_Date>

              <cit:date>

                <gco:DateTime>2008- 12-02T00:00:00Z</gco:DateTime>

              </cit:date>

              <cit:dateType>

                <cit:CI_DateTypeCode
codeList="codeListLocation#CI_DateTypeCode"
codeListValue="revision">revision</cit:CI_DateTypeCode>

              </cit:dateType>

            </cit:CI_Date>

          </cit:date>
```

```
        <cit:date>

          <cit:CI_Date>

            <cit:date>

              <gco:DateTime>2008-12-02T00:00:00Z</gco:DateTime>

            </cit:date>

            <cit:dateType>

              <cit:CI_DateTypeCode
codeList="codeListLocation#CI_DateTypeCode"
codeListValue="creation">creation</cit:CI_DateTypeCode>

            </cit:dateType>

          </cit:CI_Date>

        </cit:date>
```


Source Data Information:

DIF 10 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1246144386-SCIOPS

ECHO 10 Collection - https://cmr.earthdata.nasa.gov:443/search/concepts/C179003030-ORNL_DAAC

ECHO 10 Granule - https://cmr.earthdata.nasa.gov:443/search/concepts/G1223690990-ASF

ISO 19115-2 - https://cmr.earthdata.nasa.gov:443/search/concepts/C179003030-ORNL_DAAC.iso

ISO 19115-1 – Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

A.B.8 Related URL

Element Specification

RelatedURL (0..*)

RelatedURL/URL (1)

RelatedURL/Description (0..1)

RelatedURL/URLContentType (1) <CollectionURL, PublicationURL, DataCenterURL, DistributionURL, DataContactURL, VisualizationURL>

RelatedURL/Type (1) {Valid values shown below}

RelatedURL/Subtype (0..1) {Valid values shown below}

RelatedURL/GetData (0..1)
RelatedURL/GetData/Format (1) <"ascii", "binary", "GRIB", "BUFR", "HDF4", "HDF5", "HDF-EOS4", "HDF-EOS5", "jpeg", "png", "tiff", "geotiff", "kml", "Not provided">

RelatedURL/GetData/Size (1)

RelatedURL/GetData/Unit (1) <"KB", "MB", "GB", "TB", "PB">

RelatedURL/GetData/Fees (0..1)

RelatedURL/GetData/Checksum (0..1)

RelatedURL/GetService (0..1)

RelatedURL/GetService/MimeType (1) {Valid values shown below}

RelatedURL/GetService/Protocol (1) <"ESI", "FTP", "FTPS", "HTTP", "HTTPS", "OPeNDAP", "WCS", "WMS", "Not provided">

RelatedURL/GetService/FullName (1)
RelatedURL/GetService/DataID (1)

RelatedURL/GetService/DataType (1)

RelatedURL/GetService/URI (0..*)

Valid Values for

- URLContentType
  - Type
    - Subtype

DistributionURL

- GET DATA
  - DATACAST URL
  - EARTHDATA SEARCH
  - ECHO
  - EDG
  - EOSDIS DATA POOL
  - GDS
  - GIOVANNI
  - KML
  - LAADS
  - LANCE
  - LAS
  - MIRADOR
  - MODAPS
  - NOAA CLASS
  - ON-LINE ARCHIVE
  - REVERB
- GET SERVICE
  - ACCESS MAP VIEWER
  - ACCESS MOBILE APP
  - ACCESS WEB SERVICE
  - DIF
  - MAP SERVICE
  - NOMADS
  - OPENDAP DATA
  - OPENDAP DATA (DODS)
  - OPENDAP DIRECTORY (DODS)
  - OpenSearch
  - SERF
  - SOFTWARE PACKAGE
  - SSW
  - SUBSETTER
  - THREDDS CATALOG
  - THREDDS DATA
  - THREDDS DIRECTORY

- CollectionURL
  - DATA SET LANDING PAGE
  - DOI
  - EXTENDED METADATA
  - PROFESSIONAL HOME PAGE
  - PROJECT HOME PAGE
- PublicationURL
  - VIEW RELATED INFORMATION
    - ALGORITHM THEORETICAL BASIS DOCUMENT
    - CALIBRATION DATA DOCUMENTATION
    - CASE STUDY
    - DATA QUALITY
    - DATA USAGE
    - DELIVERABLES CHECKLIST
    - GENERAL DOCUMENTATION
    - HOW-TO
    - PI DOCUMENTATION
    - PROCESSING HISTORY
    - PRODUCTION VERSION HISTORY
    - PRODUCT QUALITY ASSESSMENT
    - PRODUCT USAGE
    - PRODUCT HISTORY
    - PUBLICATIONS
    - RADIOMETRIC AND GEOMETRIC CALIBRATION METHODS
    - READ-ME
    - RECIPE
    - REQUIREMENTS AND DESIGN
    - SCIENCE DATA PRODUCT SOFTWARE DOCUMENTATION

- WEB COVERAGE SERVICE (WCS)
- WEB FEATURE SERVICE (WFS)
- WEB MAP FOR TIME SERIES
- WEB MAP SERVICE (WMS)
- WORKFLOW (SERVICE CHAIN)

VisualizationURL

- GET RELATED VISUALIZATION
- GIBS
- GIOVANNI
- MAP
- SCIENCE DATA PRODUCT VALIDATION
- USER FEEDBACK
- USER'S GUIDE

- DataCenterURL
  - HOME PAGE

DataContactURL

- HOME PAGE

Valid values for RelatedURL/GetService/MimeType:

- application/json
- application/xml
- application/x-netcdf
- application/gml+xml
- application/vnd.google-earch.kml+xml
- image/gif
- image/tiff
- image/bmp
- text/csv
- text/xml
- application/pdf
- application/x-hdf
- application/xhdf5
- application/octet-stream
- application/vnd.google-earth.kmz
- image/jpeg
- image/png
- image/vnd.collada+xml
- text/html
- text/plain

Description

This element describes any resource-related URLs that include project home pages, resource information pages, services, related data, archives/servers, metadata extensions, direct links to online software packages, web mapping services, links to images, documents, or other data. When filling out this element URLContentType, Type are required - Description and Subtype are optional. If the URLContentType is "DistributionURL" and the Type is "GET DATA", then the RelatedURL/GetData sub-elements are also filled out. If the

URLContentType is "DistributionURL" and the Type is "GET SERVICE", then the RelatedURL/GetService sub-elements are also filled out.

- RelatedURL - contains URLs to data or services (e.g. Distribution URLs).
- GetData - information about the data (e.g. format, size, units, fees, checksum).
- GetService - contains URIs to data via services and information about the data and service (e.g. mime type, protocol, name, data IDs, data type).

The valid values for Type and Subtype were derived and tailored from the GCMD RelatedURL Type and Subtype elements. We looked at these values, categorized them, removed duplicates, and tailored them while preserving the mapping between the type and sub-type. It is our intent to work with GCMD and get back to a single set of values that can be controlled through the KMS.

Note: The Distribution class has now been subsumed into the GetData class.

Some use Examples:

I have a DAAC Home page that I would like to put into the metadata:

RelatedURL/URL = http://www.daachomepage.gov

RelatedURL/Description = The DAAC home page

RelatedURL/URLContentType = DataCenterURL

RelatedURL/Type = HOME PAGE

RelatedURL/Subtype =

I have a file that I can distribute to whomever is interested:

RelatedURL/URL = http://www.daachomepage.gov/path/downloadable.doc

RelatedURL/Description = some downloadable resource

RelatedURL/URLContentType = DistributionURL

RelatedURL/Type = GET DATA

RelatedURL/Subtype = ON-LINE ARCHIVE
RelatedURL/GetData/Format = application/msword

RelatedURL/GetData/Size = 40

RelatedURL/GetData/Unit = MB

RelatedURL/GetData/Fees = 0

RelatedURL/GetData/Checksum = f5d30a4f2

I have a service that I can distribute a sub-setted variable:

RelatedURL/URL = http://oco2.gesdisc.eosdis.nasa.gov/opendap/

RelatedURL/Description = An OPeNDAP page to get data through a service

RelatedURL/URLContentType = DistributionURL

RelatedURL/Type = GET SERVICE

RelatedURL/Subtype = OPENDAP DATA

RelatedURL/GetService/MimeType = application/x-netcdf

RelatedURL/GetService/Protocol = http

RelatedURL/GetService/FullName = OCO2_L1B_Science.7r
RelatedURL/GetService/DataID = OCO2_L1B_Science.7r

RelatedURL/GetService/DataType = nc4

RelatedURL/GetService/URI =
http://oco2.gesdisc.eosdis.nasa.gov/opendap/OCO2_L1B_Science.7r/2015/015/oco2_L1bScND_02879a_150115_B7000r_150616093751.h5.nc4?_SoundingGeometry_sounding_latitude[0:1:8363][0:1:7],_SoundingGeometry_sounding_longitude[0:1:8363][0:1:7]

RelatedURL/GetService/URI =
http://oco2.gesdisc.eosdis.nasa.gov/opendap/OCO2_L1B_Science.7r/2015/01

5/oco2_L1bScND_02879a_150115_B7000r_150616093751.h5.nc4?
_SoundingGeometry_sounding_latitude[0:8363]
[0:7],_SoundingGeometry_sounding_longitude[0:8363][0:7]

RelatedURL/GetService/URI =
http://oco2.gesdisc.eosdis.nasa.gov/opendap/OCO2_L1B_Science.7r/2015/015/oco2_L1bScND_02879a_150115_B7000r_150616093751.h5.nc4?
_SoundingGeometry_sounding_latitude,_SoundingGeometry_sounding_longitude

Profile Utilization

Collection, Granule, Service, Document

Cardinality

0..*

Analysis

Related online resource information is found in both GCMD and ECHO.

ECHO (ECHO10) has OnlineAccessURL, OnlineResource, AssociatedBrowseImages, and AssociatedBrowseImageURLs:

• OnlineAccessURL - stores the online URL(s) for present granules. Those URLs either provide the site where granule data can be obtained or instruct the user on how to obtain the granule data.

• AssociatedBrowseImageURLS - contains URLs to browse imagery.

GCMD (DIF 9/10) has RelatedURL and MultimediaSample:

• Related_URL - element provides both documentation and dataset links and they are differentiated by the Related_URL/URLContentType sub-element.

This value is hierarchical using type and sub type elements to organize the kinds of URLs associated with collection metadata.

• Multimedia_Sample - allows the author to provide information that will enable the display of a sample image, movie, or sound clip within the DIF 9/10.

Mapping

DIF 9	/DIF/Related_URL /DIF/Multimedia_Sample /DIF/Distribution
DIF 10	/DIF/Related_URL /DIF/Multimedia_Sample /DIF/Distribution
SERF	/SERF/Related_URL /SERF/Multimedia_Sample
ECHO 10 Collection	/Collection/OnlineAccessURLs/OnlineAccessURL /Collection/AssociatedBrowseImageUrls /Collection/OnlineResources /Collection/Price /Collection/DataFormat
ECHO 10 Granule	/Granule/OnlineAccessURLs/OnlineAccessURL /Granule/OnlineResources/OnlineResource /Granule/AssociatedBrowseImageUrls
ISO 19115-2	/ gmi:MI_Metadata/gmd:distributionInfo/gmd:MD_Distribution/gmd:distributor/gmd:MD_Distributor/gmd:distributorTransferOptions/gmd:MD_DigitalTransferOptions/gmd:onLine/gmd:CI_OnlineResource

	and/or / gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:graphicOverview/gmd:MD_BrowseGraphic/gmd:fileName/gmx:FileName src=
ISO 19115-1	/ mdb:MD_Metadata/mdb:distributionInfo/mrd:MD_Distribution/mrd:distributor/mrd:MD_Distributor/mrd:distributorTransferOptions/mrd:MD_DigitalTransferOptions/mrd:online/cit:CI_OnlineResource and/or / mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:graphicOverview/mcc:MD_BrowseGraphic/mcc:filename/gcx:FileName/@src=
EMS	N/A

Examples

<u>DIF 9</u>

```
  <Related_URL>

    <URL_Content_Type uuid="6e72d128-7d28-4bd0-bac0-8c5ffd8b31f1">

   <Type>VIEW PROJECT HOME PAGE</Type>

    </URL_Content_Type>

    <URL>http://www.waisdivide.unh.edu/</URL>

  </Related_URL>

  <Related_URL>

    <URL_Content_Type uuid="5ec1bb9d-0efc-4099-9b31-
ec791bbd8145">

   <Type>VIEW RELATED INFORMATION</Type>
```

```
    </URL_Content_Type>

    <URL>http://www.homepage.montana.edu/~lkbonney/</URL>

    <Description>

      Website for the Priscu Research Group

    </Description>

  </Related_URL>



<Multimedia_Sample>


<URL>http://www.waisdivide.unh.edu/images/sitemap1_large.jpg</URL>

  </Multimedia_Sample>
```

DIF 10

```
  <Multimedia_Sample>

<URL>http://disc.gsfc.nasa.gov/AIRS/images/G1932015.04.19allL1CBright
nessTemperature_K_at10.9microns_map.png</URL>
     <Format>PNG</Format>
     <Caption>The BT derived from an AIRS Level 1C granule for a
channel at 10.9 microns.</Caption>
     <Description>Sample image of an AIRICRAD channel converted to
brighness temperature</Description>
  </Multimedia_Sample>

  <Related_URL>
     <URL_Content_Type>
        <Type>GET DATA</Type>
        <Subtype>ON-LINE ARCHIVE</Subtype>
     </URL_Content_Type>

<URL>http://airsl1.gesdisc.eosdis.nasa.gov/data/Aqua_AIRS_Level1/AIRIC
RAD.006/</URL>
     <Description>Access the data via HTTP.</Description>
  </Related_URL>
```

```
  <Related_URL>
    <URL_Content_Type>
      <Type>GET DATA</Type>
      <Subtype>MIRADOR</Subtype>
    </URL_Content_Type>
    <URL>http://mirador.gsfc.nasa.gov/cgi-bin/mirador/homepageAlt.pl?
keyword=AIRICRAD</URL>
    <Description>Mirador is a data search interface that allows
searching, browsing, and retrieving of Earth science data archived at
NASA GES DISC.</Description>
  </Related_URL>
  <Related_URL>
    <URL_Content_Type>
      <Type>GET DATA</Type>
      <Subtype>OPENDAP DATA</Subtype>
    </URL_Content_Type>

<URL>http://airsl1.gesdisc.eosdis.nasa.gov/opendap/Aqua_AIRS_Level1/AI
RICRAD.006/contents.html</URL>
    <Description>Access the data via the OPeNDAP
protocol.</Description>
  </Related_URL>
...
  <Related_URL>
    <URL_Content_Type>
      <Type>GET DATA</Type>
      <Subtype>EARTHDATA SEARCH</Subtype>
    </URL_Content_Type>
    <URL>https://search.earthdata.nasa.gov/search?
q=AIRICRAD+006</URL>
    <Description>Use the Earthdata Search Client (EDSC) to find and
retrieve data sets across multiple data centers.</Description>
  </Related_URL>
...
```


SERF


```
<Related_URL>

  <URL_Content_Type uuid="ca8b62c9-5f31-40bd-92a9-8d30081309e2">

   <Type>GET SERVICE</Type>
```

```
    <Subtype>GET SOFTWARE PACKAGE</Subtype>
  </URL_Content_Type>
  <URL>http://www.mezogis.org/download.html</URL>
  <Description>
    Download mezoGIS.
  </Description>
</Related_URL>
<Related_URL>
  <URL_Content_Type uuid="ca04650e-9e65-4ce6-93ac-597b77afcba6">
    <Type>GET RELATED SERVICE METADATA (SERF)</Type>
    </URL_Content_Type>
  <URL>http://gcmd.nasa.gov/getserf.htm?POSTGIS</URL>
  <Description>
    Get metadata for PostGIS: Geographic Objects for PostgreSQL.
  </Description>
</Related_URL>


<Multimedia_Sample>

<URL>http://www.mezogis.org/pictures/screenshot_22_03_06.jpg</URL>
  <Format>JPEG</Format>
</Multimedia_Sample>
```


ECHO 10 Collection

```
<OnlineAccessURLs>

  <OnlineAccessURL>

    <URL>http://sedac.ciesin.columbia.edu/data/set/ulandsat-cities-from-
space/data-download</URL>

    <URLDescription>data download page</URLDescription>

  </OnlineAccessURL>

</OnlineAccessURLs>

<OnlineResources>

  <OnlineResource>

    <URL>http://dx.doi.org/10.7927/H4SQ8XB1</URL>

    <Description>data set DOI and homepage</Description>

    <Type>DOI URL</Type>

  </OnlineResource>

</OnlineResources>



<AssociatedBrowseImageUrls>

   <ProviderBrowseUrl>

      <URL>http://sedac.ciesin.columbia.edu/data/set/ulandsat-cities-from-
space/maps</URL>

   </ProviderBrowseUrl>

</AssociatedBrowseImageUrls>
```


ECHO 10 Granule


```
  <OnlineAccessURLs>
     <OnlineAccessURL>
```

```
<URL>https://datapool.asf.alaska.edu/GEOTIFF/SS/SS_00107_STD_F0373
_tif.zip</URL>
      </OnlineAccessURL>
   </OnlineAccessURLs>
      <Orderable>true</Orderable>
      <Visible>true</Visible>
  <AssociatedBrowseImageUrls>
     <ProviderBrowseUrl>

<URL>https://datapool.asf.alaska.edu/BROWSE/SS/SS_00107_STD_F0373
_BROWSE.jpg</URL>
     </ProviderBrowseUrl>
  </AssociatedBrowseImageUrls>
```


ISO 19115-2


```
<gmd:onLine>

    <gmd:CI_OnlineResource>

      <gmd:linkage>

        <gmd:URL>http://sedac.ciesin.columbia.edu/data/set/ulandsat-
cities-from-space/data-download</gmd:URL>

      </gmd:linkage>

      <gmd:applicationProfile gco:nilReason="missing"/>

      <gmd:description>

        <gco:CharacterString>data download
page</gco:CharacterString>

      </gmd:description>

      <gmd:function>

        <gmd:CI_OnLineFunctionCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#CI_OnLineFunctionCode"
codeListValue="download">download</gmd:CI_OnLineFunctionCode>
```

```
      </gmd:function>

    </gmd:CI_OnlineResource>

  </gmd:onLine>

  <gmd:onLine>

    <gmd:CI_OnlineResource>

      <gmd:linkage>

        <gmd:URL>http://dx.doi.org/10.7927/H4SQ8XB1</gmd:URL>

      </gmd:linkage>

      <gmd:applicationProfile gco:nilReason="missing"/>

      <gmd:name>

        <gco:CharacterString>DOI URL</gco:CharacterString>

      </gmd:name>

      <gmd:description>

        <gco:CharacterString>data set DOI and
homepage</gco:CharacterString>

      </gmd:description>

      <gmd:function>

        <gmd:CI_OnLineFunctionCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#CI_OnLineFunctionCode" codeListValue=""/>

      </gmd:function>

    </gmd:CI_OnlineResource>

  </gmd:onLine>

...
```

```
<gmd:graphicOverview>

 <gmd:MD_BrowseGraphic>

   <gmd:fileName>

     <gmx:FileName
src="http://sedac.ciesin.columbia.edu/data/set/ulandsat-cities-from-
space/maps"/>

   </gmd:fileName>

   <gmd:fileDescription>

     <gco:CharacterString>File Size:</gco:CharacterString>

   </gmd:fileDescription>

   <gmd:fileType gco:nilReason="missing"/>

 </gmd:MD_BrowseGraphic>
```


ISO 19115-1


```
<mrd:onLine>

                <cit:CI_OnlineResource>

                  <cit:linkage>


<gco:CharacterString>http://sedac.ciesin.columbia.edu/data/set/ulandsat-
cities-from-space/data-download</gco:CharacterString>

                  </cit:linkage>

                  <cit:applicationProfile gco:nilReason="missing"/>

                  <cit:description>

                    <gco:CharacterString>data download
page</gco:CharacterString>
```

```
                  </cit:description>

                  <cit:function>

                    <cit:CI_OnLineFunctionCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/reso
urces/Codelist/gmxCodelists.xml#CI_OnLineFunctionCode"


codeListValue="download">download</cit:CI_OnLineFunctionCode>

                  </cit:function>

                </cit:CI_OnlineResource>

              </mrd:onLine>

              <mrd:onLine>

                <cit:CI_OnlineResource>

                  <cit:linkage>


<gco:CharacterString>http://dx.doi.org/10.7927/H4SQ8XB1</gco:Charact
erString>

                  </cit:linkage>

                  <cit:applicationProfile gco:nilReason="missing"/>

                  <cit:name>

                    <gco:CharacterString>DOI
URL</gco:CharacterString>

                  </cit:name>

                  <cit:description>

                    <gco:CharacterString>data set DOI and
homepage</gco:CharacterString>

                  </cit:description>
```

```
                <cit:function>

                  <cit:CI_OnLineFunctionCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/reso
urces/Codelist/gmxCodelists.xml#CI_OnLineFunctionCode"

                                  codeListValue=""/>

                </cit:function>

              </cit:CI_OnlineResource>

            </mrd:onLine>

...

<mri:graphicOverview>

      <mcc:MD_BrowseGraphic>

        <mcc:fileName>

          <gcx:FileName
src="http://sedac.ciesin.columbia.edu/data/set/ulandsat-cities-from-
space/maps"/>

        </mcc:fileName>

        <mcc:fileDescription>

          <gco:CharacterString>File Size:</gco:CharacterString>

        </mcc:fileDescription>

        <mcc:fileType gco:nilReason="missing"/>

      </mcc:MD_BrowseGraphic>

    </mri:graphicOverview>
```


Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1214591041-SCIOPS

DIF 10 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1243477379-GES_DISC
SERF - http://gcmd.gsfc.nasa.gov/mws/serf/mezoGIS

ECHO 10 Collection - https://cmr.earthdata.nasa.gov:443/search/concepts/C179001954- SEDAC
ECHO 10 Granule - https://cmr.earthdata.nasa.gov:443/search/concepts/G1001055217- ASF

ISO 19115-2 - https://cmr.earthdata.nasa.gov:443/search/concepts/C179001954-SEDAC.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

A.B.9 Online Resource

Element Specification

OnlineResource/ (0..1)
OnlineResource/Linkage (1)
OnlineResource/Protocol (0..1)

OnlineResource/ApplicationProfile (0..1)
OnlineResource/Name (1)

OnlineResource/Description (1)

OnlineResource/Function (0..1)

Description

This element describes any online resource which includes citations, publications or references. This element is analogous to CI_Online_Resource from EN ISO 19115-1:2014 Geographic Information – Metadata – Part 1: Fundamentals. This element is not a base element but will be included as a sub-element of resource citation and publication reference. Any mapping to the OnlineResource sub-element will be accomplished through the main element, therefore the mapping section is omitted.

A.B.10 Resource Citation

Element Specification

ResourceCitation/Creators (0..1)
ResourceCitation/Editors (0..1)
ResourceCitation/Title (0..1)
ResourceCitation/SeriesName (0..1)
ResourceCitation/ReleaseDate (0..1)
ResourceCitation/ReleasePlace (0..1)
ResourceCitation/Publisher (0..1)
ResourceCitation/Version (0..1)
ResourceCitation/IssueIdentification (0..1)
ResourceCitation/DataPresentationForm (0..1)
ResourceCitation/OtherCitationDetails (0..1)
ResourceCitation/OnlineResource (0..1) - {See OnlineResource for full specification}

Description

This element instructs the user how to properly cite the provider and specifies how the resource should be cited in professional scientific literature.

This element provides a citation for the item itself, and is not designed for listing bibliographic references of scientific research articles arising from search results. A list of references related to the research results should be in the Publication Reference element. The DataPresentationForm vocabulary is currently not controlled.

Profile Utilization

Collection, Granule, Service, Document

Cardinality

0..*

Analysis

Citation information is found in DIF 9, DIF 10, SERF, and ECHO. The following elements map to this mapping:

Originators -> Either Creator or Editor - The name of the organization(s) or individual(s)
with primary intellectual responsibility for the resource's development.
Title -> Title - The Title of the resource; this is the same as Entry Title.
Release_Date -> ReleaseDate - The date the resource was made available for release.
Provider -> Publisher - The name of the individual or organization that released the resource.
Edition -> Version - The edition or version of the resource.
URL -> RelatedUrl

Mapping

DIF 9	/DIF/Data_Set_Citation/
DIF 10	/DIF/Dataset_Citation/
SERF	/SERF/Service_Citation/
ECHO 10 Collection	/Collection/CitationForExternalPublication
ECHO 10 Granule	N/A
ISO 19115-2	/ gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:citation/gmd:CI_Citation
ISO 19115-1	/ mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:citation/cit:CI_Citation
EMS	N/A

Examples

<u>DIF 9</u>

```
<Data_Set_Citation>
   <Dataset_Creator>Fastook, J. L.</Dataset_Creator>
   <Dataset_Title>Amundsen Sea Sector Data Set</Dataset_Title>
   <Dataset_Series_Name>NSIDC-0312</Dataset_Series_Name>
   <Dataset_Release_Date>2007-01-01</Dataset_Release_Date>
   <Dataset_Release_Place>Boulder, Colorado USA</Dataset_Release_Place>
   <Dataset_Publisher>NSIDC: National Snow and Ice Data
Center</Dataset_Publisher>
   <Version>1</Version>
   <Dataset_DOI>doi:10.7265/N5J9649Q</Dataset_DOI>
   <Online_Resource>http://nsidc.org/data/NSIDC-0312</Online_Resource>
</Data_Set_Citation>
```

<u>DIF 10</u>

```
<Dataset_Citation>
   <Dataset_Creator>AIRS Science Team/Joao Texeira</Dataset_Creator>
   <Dataset_Title>AIRS/Aqua L2 CO2 in the free troposphere (AIRS+AMSU)
V005</Dataset_Title>
   <Dataset_Series_Name>AIRX2STC</Dataset_Series_Name>
   <Dataset_Release_Date>2010-01-01</Dataset_Release_Date>
```

```
  <Dataset_Release_Place>Greenbelt, MD, USA</Dataset_Release_Place>
  <Dataset_Publisher>Goddard Earth Sciences Data and Information Services Center (GES DISC)</Dataset_Publisher>
  <Version>005</Version>
  <Data_Presentation_Form>Digital Science Data</Data_Presentation_Form>
  <Persistent_Identifier>
    <Type>DOI</Type>
    <Identifier>10.5067/AQUA/AIRS/DATA218</Identifier>
  </Persistent_Identifier>

<Online_Resource>http://disc.gsfc.nasa.gov/datacollection/AIRX2STC_005.html</Online_Resource>
</Dataset_Citation>
```


SERF


```
<Service_Citation>

  <Originators>Frederic Back</Originators>

  <Title>mezoGIS: A GIS Application and Graphical Interface To Query and Analyze Spatial Data</Title>

  <Release_Date>2006</Release_Date>

  <URL>http://www.mezogis.org/index.html</URL>

<Service_Citation>
```


ECHO 10 Collection


```
<CitationForExternalPublication>Wood, E. F. 1994. 15 Minute Stream Flow Data: USGS (FIFE). Data set. Available on-line [http://www.daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. Also published in D. E. Strebel, D. R. Landis, K. F. Huemmrich, and B. W. Meeson (eds.), Collected Data of the First ISLSCP Field Experiment, Vol. 1: Surface Observations and Non-Image Data Sets. CD-ROM. National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Maryland, U.S.A. (available from http://www.daac.ornl.gov). doi:10.3334/ORNLDAAC/1</CitationForExternalPublication>
```

ISO 19115-2


```
<gmd:citation>

        <gmd:CI_Citation>

          <gmd:title>

            <gco:CharacterString>CIESIN_CHRR_NDH_CYCLONE_HFD
&gt; Global Cyclone Hazard Frequency and
Distribution</gco:CharacterString>

          </gmd:title>

          <gmd:date>

            ...

          </gmd:date>

          <gmd:edition>

            ...

          </gmd:edition>

          <gmd:identifier>

            ...

          </gmd:identifier>

          <gmd:otherCitationDetails>

            <gco:CharacterString>Center for Hazards and Risk Research -
CHRR - Columbia University, Center for International Earth Science
Information Network - CIESIN - Columbia University, International Bank
for Reconstruction and Development - The World Bank, and United Nations
Environment Programme Global Resource Information Database Geneva -
UNEP GRID-Geneva. 2005. Global Cyclone Hazard Frequency and
Distribution. Palisades, NY:NASA Socioeconomic Data and Applications
Center (SEDAC).
http://dx.doi.org/10.7927/H4CZ353K</gco:CharacterString>
```

```
          </gmd:otherCitationDetails>

        </gmd:CI_Citation>

      </gmd:citation>
```

ISO 19115-1

```
<mri:citation>

        <cit:CI_Citation>

          <cit:title>

            <gco:CharacterString>CIESIN_CHRR_NDH_CYCLONE_HFD
&gt; Global Cyclone Hazard Frequency and
Distribution</gco:CharacterString>

          </cit:title>

          <cit:date>

            ...

          </cit:date>

          <cit:edition>

            ...

          </cit:edition>

          <cit:identifier>

            ...

          </cit:identifier>

          <cit:otherCitationDetails>

            <gco:CharacterString>Center for Hazards and Risk Research -
CHRR - Columbia University, Center for International Earth Science
Information Network - CIESIN - Columbia University, International Bank
for Reconstruction and Development - The World Bank, and United Nations
```

Environment Programme Global Resource Information Database Geneva - UNEP GRID-Geneva. 2005. Global Cyclone Hazard Frequency and Distribution. Palisades, NY:NASA Socioeconomic Data and Applications Center (SEDAC).
http://dx.doi.org/10.7927/H4CZ353K</gco:CharacterString>

</cit:otherCitationDetails>

</cit:CI_Citation>

</mri:citation>

Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov/search/concepts/C1219224107-NSIDCV0

DIF 10 - https://cmr.earthdata.nasa.gov/search/concepts/C1243477314-GES_DISC

SERF - http://gcmd.gsfc.nasa.gov/mws/serf/mezoGIS
ECHO 10 Collection - https://cmr.earthdata.nasa.gov/search/concepts/C179003030-ORNL_DAAC

ISO 19115-2 - https://cmr.earthdata.nasa.gov/search/concepts/C179001766-SEDAC.iso
ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

A.B.11 Quality

Element Specification

QualityAssessment

Description

This element permits the author to provide the following information about a resource (collection, granule, service, etc.) described in the metadata: 1) Quality of the resource, and 2) any quality assurance procedures followed in producing the resource. Examples of appropriate element information

include: A) succinct description; B) indicators of resource quality or quality flags - both validated, invalidated, or unvalidated; C) recognized or potential problems with quality; D) established quality control mechanisms; and E) established quantitative quality measurements.

Profile Utilization

Collection, Granule, Service, Document

Cardinality

0..1

Analysis

This element is found only in GCMD and its value is an uncontrolled block of text describing the quality assessment. Both ISO conventions (19115-1 & 2) have sub-fielded text that more precisely describe the quality assessment of a resource. Please refer to ISO 19157 (Geographic information – Data quality) for more information about data quality in ISO.

Mapping

DIF 9	/DIF/Quality
DIF 10	/DIF/Quality
SERF	/SERF/Quality
ECHO 10 Collection	N/A
ECHO 10 Granule	N/A
ISO 19115-2	/ gmi:MI_Metadata/gmd:dataQualityInfo/ gmd:DQ_DataQuality/gmd:report/gmd:DQ_QuantitativeAttributeAccuracy/gmd:evaluationMethodDescription/gco:CharacterString
ISO 19115-1	/mdb:MD_Metadata/mdb:dataQualityInfo or

	/ mdb:MD_Metadata/mdb:dataQualityInfo/mdq:DQ_DataQuality/mdq:report/mdq:DQ_DomainConsistency/mdq:result/mdq:DQ_DescriptiveResult/mdq:statement/gco:CharacterString
EMS	N/A

Examples

DIF 9

<Quality>The dates provided in temporal coverage are approximate only. Years are correct.

See the referenced paper for full details on steps taken to ensure quality of data.

To assess extraction efficiency for a range of sediment types, four marine sediments were analysed in detail. Two international certified reference materials (CRMs) and two well-characterised Antarctic sediments were chosen to compare and contrast moderately to strongly contaminated samples (based on total metal digest), with clean samples of similar matrices. One CRM was an uncontaminated continental shelf mud (MESS-2), and the other a contaminated harbour mud (PACS-2) (NRCC, 2002). The two Antarctic sediments were collected as part of a regional hierarchical survey (Stark et al., 2003). One Antarctic sample was from an area of known metal pollution in Brown Bay (BB), which is adjacent to the 'Old' Casey Station waste disposal site (Snape et al., 2001; Stark et al., 2003). The second Antarctic sample was from a non-impacted control site from O'Brien Bay (OBB), 3 km south of Casey Station and the disposal site (Fig. 1). The Antarctic samples, OBB and BB, have similar matrices, proportions of mud (less than 63 microns; 19% and 22% respectively) and total organic carbon contents (1.9% and 2.3% respectively). Both MESS and PACS are sieved, homogenised and dried CRMs that have been ground to ~50 microns (NRCC, 2002). In contrast, OBB and BB were only sieved to less than 2 mm, thereby removing only the very largest particles (less than or equal to 3%). The Antarctic samples were collected using acid-washed PVC coring tubes. The samples were kept frozen at -20 degrees C until wet-sieved with a small amount of clean filtered (0.45 microns cellulose nitrate) O'Brien Bay seawater through 2 mm nylon mesh held in a plastic sieve unit. The sediments were then oven-dried to constant weight at 103 degrees C (Loring and Rantala 1992), and stored in Nalgene HDPE bottles until analysis.</Quality>

DIF 10

<Quality>Nucleic extraction blanks were carried out through amplification steps and sequence analysis quality control measures were followed on data analyzed. Oceanographic instruments were calibrated at SeaBird before the cruise and sample blanks were periodically run for chlorophyll and nutrient analyses.</Quality>

SERF

```
<Quality>

    While some of the data layers included on this site were
    originally developed by the AMC, most were derived from existing
    data obtained from a wide range of publicly available
    sources. Therefore these maps are not guaranteed to be 100%
    accurate.
  </Quality>
```

ISO 19115-2

```
<gmd:dataQualityInfo>

    <gmd:DQ_DataQuality>

      <gmd:scope>

        <gmd:DQ_Scope>

          <gmd:level>

            <gmd:MD_ScopeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#MD_ScopeCode"


codeListValue="series">series</gmd:MD_ScopeCode>

          </gmd:level>

        </gmd:DQ_Scope>

      </gmd:scope>

      <gmd:report>

        <gmd:DQ_AccuracyOfATimeMeasurement>

          <gmd:measureIdentification>

            <gmd:MD_Identifier>

              <gmd:code>


<gco:CharacterString>PrecisionOfSeconds</gco:CharacterString>

              </gmd:code>

            </gmd:MD_Identifier>

          </gmd:measureIdentification>
```

```
        <gmd:result>
          <gmd:DQ_QuantitativeResult>
            <gmd:valueUnit/>
            <gmd:value>
              <gco:Record xsi:type="gco:Real_PropertyType">
                <gco:Real>1</gco:Real>
              </gco:Record>
            </gmd:value>
          </gmd:DQ_QuantitativeResult>
        </gmd:result>
      </gmd:DQ_AccuracyOfATimeMeasurement>
    </gmd:report>
    <gmd:lineage>
      <gmd:LI_Lineage>
        <gmd:processStep>
          <gmi:LE_ProcessStep>
            <gmd:description gco:nilReason="unknown"/>
            <gmd:processor>
              <gmd:CI_ResponsibleParty>
                <gmd:organisationName>
                  <gco:CharacterString>SEDAC</gco:CharacterString>
                </gmd:organisationName>
```

```
                <gmd:role>

                  <gmd:CI_RoleCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#CI_RoleCode"


codeListValue="processor">processor</gmd:CI_RoleCode>

                </gmd:role>

              </gmd:CI_ResponsibleParty>

            </gmd:processor>

          </gmi:LE_ProcessStep>

        </gmd:processStep>

      </gmd:LI_Lineage>

    </gmd:lineage>

  </gmd:DQ_DataQuality>

 </gmd:dataQualityInfo>
```

ISO 19115-1

```
<mdb:dataQualityInfo>

  <mdq:DQ_DataQuality>

    <mdq:scope>

      <mcc:MD_Scope>

        <mcc:level>

          <mcc:MD_ScopeCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/reso
urces/Codelist/gmxCodelists.xml#MD_ScopeCode"
```

```
codeListValue="series">series</mcc:MD_ScopeCode>

          </mcc:level>

        </mcc:MD_Scope>

      </mdq:scope>

      <mdq:report>

        <mdq:DQ_DomainConsistency>

         <mdq:result>

          <mdq:DQ_DescriptiveResult>

            <mdq:statement>

              <gco:CharacterString>Taxonomy has been checked against
ITIS, Catalogue of Life and World Register of Marine Species
databases</gco:CharacterString>

            </mdq:statement >

          </mdq:DQ_DescriptiveResult>

         </mdq:result>

        </mdq:DQ_DomainConsistency>

        <mdq:DQ_AccuracyOfATimeMeasurement>

          <mdq:measure>

            <mdq:DQ_MeasureReference>

              <mdq:measureIdentification>

                <mcc:MD_Identifier>

                  <mcc:code>


<gco:CharacterString>PrecisionOfSeconds</gco:CharacterString>
```

```
            </mcc:code>
          </mcc:MD_Identifier>
        </mdq:measureIdentification>
      </mdq:DQ_MeasureReference>
    </mdq:measure>
    <mdq:evaluationMethod>
      <mdq:DQ_FullInspection>
        <mdq:evaluationProcedure/>
      </mdq:DQ_FullInspection>
    </mdq:evaluationMethod>
    <mdq:result>
      <mdq:DQ_QuantitativeResult>
        <mdq:value>
          <gco:Record xsi:type="gco:Real_PropertyType">
            <gco:Real>1</gco:Real>
          </gco:Record>
        </mdq:value>
        <mdq:valueUnit/>
      </mdq:DQ_QuantitativeResult>
    </mdq:result>
  </mdq:DQ_AccuracyOfATimeMeasurement>
</mdq:report>
```

```
    </mdq:DQ_DataQuality>

  </mdb:dataQualityInfo>
```

Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov/search/concepts/C1214305813-AU_AADC

DIF 10 - https://cmr.earthdata.nasa.gov/search/concepts/C1232343424-SCIOPS

SERF - http://gcmd.gsfc.nasa.gov/mws/serf/AMC_Interactive_Mapping

ISO 19115-2 - https://cmr.earthdata.nasa.gov/search/concepts/C179001954-SEDAC.iso

ISO 19115-1 – Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record and everything within the mdq:DQ_DomainConsistency element is manually generated from DIF 9 record.

Recommendations

The CMR team recommends that a future focus group explore the possibility of enhancing the element to include controlled vocabulary and structured sub-elements. This would align the Quality element more with ISO19157 (Geographic information – Data quality). We would also potentially be incorporating recommendations emerging from the BEDI/CDI metadata quality efforts. It is also recommended that the ISO 19115-1 translation be changed into a descriptive report just as in the example within the mdq:DQ_DomainConsistency element.

A.B.12 Use Constraints

Element Specification

UseConstraints

Description

The UseConstraints element is designed to protect privacy and/or intellectual property by allowing the author to specify how the item (collection, granule, service, visualization, etc.) may or may not be used after access is granted. This includes any special restrictions, legal prerequisites, terms and conditions, and/or limitations on using the item. Providers may request acknowledgement of the item from users and claim no responsibility for quality and completeness. Note: UseConstraints describes how the item may be used once access has been granted; and is distinct from AccessConstraints, which refers to any constraints in accessing the item.

Profile Utilization

Collection, Granule, Service, Visualization, Document

Cardinality

0..1

Analysis

This element's value is an uncontrolled block of text describing the use constraint.

Mapping

DIF 9	/DIF/Use_Constraints

DIF 10	/DIF/Use_Constraints
SERF	/SERF/Use_Constraints
ECHO 10 Collection	N/A
ECHO 10 Granule	N/A
ISO 19115-2	/ gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:resourceConstraints/gmd:MD_LegalConstraints/gmd:useLimitation/gco:CharacterString
ISO 19115-1	/ mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:resourceConstraints/mco:MD_LegalConstraints/mco:useConstraints/mco:MD_RestrictionCode/gco:CharacterString
EMS	N/A

Examples

DIF 9

```
<Use_Constraints>This data set conforms to the PICCCBY Attribution License
(http://creativecommons.org/licenses/by/3.0/).

Please follow instructions listed in the citation reference provided at
http://data.aad.gov.au/aadc/metadata/citation.cfm?
entry_id=ASAC_2201_HCL_0.5 when using these data.</Use_Constraints>
```

DIF 10

```
<Use_Constraints>The distribution of this data set is funded by NASA's
Earth Science Enterprise (ESE). The data are not copyrighted; however,
we request that when you publish data or results using these data, please
acknowledge as follows:

The data used in this study were acquired as part of the Tropical Rainfall
Measuring Mission (TRMM). The algorithms were developed by the TRMM
Science Team. The data were processed by the TRMM Science Data and
Information System (TSDIS) and the TRMM Office; they are archived and
distributed by the Goddard Earth Sciences Data and Information Services
Center. TRMM is an international project jointly sponsored by the Japan
National Space Development Agency (NASDA) and the U.S. National
```

```
Aeronautics and Space Administration (NASA) Office of Earth Sciences.

Please send a copy of your publication to Help Desk, Goddard Earth
Sciences Data and Information Services Center, Code 610.2, NASA GSFC,
Greenbelt, MD 20771 or email the reference of your publication to gsfc-
help-disc@lists.nasa.gov.</Use_Constraints>
```

SERF

```
<Use_Constraints>

  The Tool is written in Java and XML and is distributed under the Apache
Public License (version 2).

</Use_Constraints>
```

ISO 19115-2

```
    <gmd:resourceConstraints>
     <gmd:MD_LegalConstraints>
      <gmd:useLimitation>
       <gco:CharacterString>The distribution of this data set is funded by
NASA's Earth Science Enterprise (ESE). The data are not copyrighted;
however, we request that when you publish data or results using these
data, please acknowledge as follows:

The data used in this study were acquired as part of the Tropical Rainfall
Measuring Mission (TRMM). The algorithms were developed by the TRMM
Science Team. The data were processed by the TRMM Science Data and
Information System (TSDIS) and the TRMM Office; they are archived and
distributed by the Goddard Earth Sciences Data and Information Services
Center. TRMM is an international project jointly sponsored by the Japan
National Space Development Agency (NASDA) and the U.S. National
Aeronautics and Space Administration (NASA) Office of Earth Sciences.

Please send a copy of your publication to Help Desk, Goddard Earth
Sciences Data and Information Services Center, Code 610.2, NASA GSFC,
Greenbelt, MD 20771 or email the reference of your publication to gsfc-
help-disc@lists.nasa.gov.</gco:CharacterString>
      </gmd:useLimitation>
       ...
     </gmd:MD_LegalConstraints>
    </gmd:resourceConstraints>
```

ISO 19115-1

```
<mri:resourceConstraints>

        <mco:MD_LegalConstraints>

          <mri:resourceConstraints>

            <mco:MD_LegalConstraints>

              <mco:useLimitation>

                <gco:CharacterString>The distribution of this data set is funded by
NASA's Earth Science Enterprise (ESE). The data are not copyrighted; however, we
request that when you publish data or results using these data, please acknowledge
as follows:

The data used in this study were acquired as part of the Tropical Rainfall
Measuring Mission (TRMM). The algorithms were developed by the TRMM Science
Team. The data were processed by the TRMM Science Data and Information
System (TSDIS) and the TRMM Office; they are archived and distributed by the
Goddard Earth Sciences Data and Information Services Center. TRMM is an
international project jointly sponsored by the Japan National Space Development
Agency (NASDA) and the U.S. National Aeronautics and Space Administration
(NASA) Office of Earth Sciences.

Please send a copy of your publication to Help Desk, Goddard Earth Sciences Data
and Information Services Center, Code 610.2, NASA GSFC, Greenbelt, MD 20771
or email the reference of your publication to gsfc-help-disc@lists.nasa.gov.

                </gco:CharacterString>

              </mco:useLimitation>

              ...

            </mco:MD_LegalConstraints>

          </mri:resourceConstraints>

        </mco:MD_LegalConstraints>

      </mri:resourceConstraints>
```

Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov/search/concepts/C1214305813-AU_AADC
DIF 10 - https://cmr.earthdata.nasa.gov/search/concepts/C1282032564-GES_DISC

SERF - http://gcmd.gsfc.nasa.gov/mws/serf/met

ISO 19115-2 - https://cmr.earthdata.nasa.gov/search/concepts/C1282032564-GES_DISC.iso

ISO 19115-1 - Example based on schema with data from DIF 10 record

A.B.13 Access Constraints

Element Specification

AccessConstraints/Description (1)
AccessConstraints/Value (0..1)

Description

The Description sub-element allows the author to provide information concerning accessing constraints. This includes any special restrictions, legal prerequisites, limitations and/or warnings on obtaining the data. Examples of values include: Public, In-house, Limited, and None. The Value sub-element is used for special access control list (ACL) rules (http://en.wikipedia.org/wiki/Access_control_list) - for example, to hide metadata when it isn't ready for public consumption.

Profile Utilization

Collection, Granule, Service, Document

Cardinality

0..1

Analysis

Providers use the AccessConstraint/Value element to specify various restriction levels with ACLs. For example: A provider might specify a service Level ACL that hides all items (collections for this example) with a value element set to '15.0'. There is no controlled mapping for what the values represent. ECHO has the exact same feature and there are many ACLs built in off of these types of rules.

Mapping

DIF 9	/DIF/Access_Constraints /DIF/Extended_Metadata/Metadata
DIF 10	/DIF/Access_Constraints /DIF/Extended_Metadata/Metadata
SERF	/SERF/Access_Constraints
ECHO 10 Collection	/Collection/RestrictionComment /Collection/RestrictionFlag
ECHO 10 Granule	/Granule/RestrictionComment /Granule/RestrictionFlag
ISO 19115-2	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:resourceConstraints/gmd:MD_LegalConstraints/gmd:useLimitation/gco:CharacterString (prefix: 'Restriction Comment:') /gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:resourceConstraints/gmd:MD_LegalConstraints/gmd:otherConstraints/gco:CharacterString (prefix: 'Restriction Flag:')

ISO 19115-1	/mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:resourceConstraints/mco:MD_LegalConstraints/mco:useLimitation/gco:CharacterString (prefix:'Restriction Comment: ') /mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:resourceConstraints/mco:MD_LegalConstraints/mco:otherConstraints/gco:CharacterString (prefix:'Restriction Flag: ')
EMS	N/A

Examples

DIF 9

```
<Access_Constraints>None</Access_Constraints>



<Extended_Metadata>
 <Metadata>
  <Group>gov.nasa.earthdata.cmr</Group>
  <Name>Restriction</Name>
  <Value>[0 or 1+]</Value>
 </Metadata>
</Extended_Metadata>
```

DIF 10

```
<Access_Constraints>None.  The paper is open
access.</Access_Constraints>



<Extended_Metadata>
 <Metadata>
  <Group>gov.nasa.earthdata.cmr</Group>
  <Name>Restriction</Name>
  <Value>[0 or 1+]</Value>
 </Metadata>
</Extended_Metadata>
```

SERF

```
<Access_Constraints>

  There are no fees for training, materials, rubrics, and assessments. Each

  participant must complete the online form  to access materials.

</Access_Constraints>
```

ECHO 10 Collection

```
<RestrictionFlag>0</RestrictionFlag>

<RestrictionComment>None</RestrictionComment>
```

ECHO 10 Granule

```
<RestrictionFlag>0</RestrictionFlag>

<RestrictionComment>

    This product has full public access

 </RestrictionComment>
```

ISO 19115-2

```
<gmd:resourceConstraints>

   <gmd:MD_LegalConstraints>

      <gmd:useLimitation>

        <gco:CharacterString>Restriction Comment: There are no fees for
training, materials, rubrics, and assessments. Each

  participant must complete the online form  to access
materials.</gco:CharacterString>

      </gmd:useLimitation>

      <gmd:otherConstraints>

        <gco:CharacterString>Restriction Flag:0</gco:CharacterString>

      </gmd:otherConstraints>

   </gmd:MD_LegalConstraints>

</gmd:resourceConstraints>
```

ISO 19115-1

```
<mri:resourceConstraints>

        <mco:MD_LegalConstraints>

          <mco:useLimitation>

            <gco:CharacterString> Restriction Comment: There are no fees
for training, materials, rubrics, and assessments. Each

  participant must complete the online form  to access
materials.</gco:CharacterString>

          </mco:useLimitation>

          <mco:otherConstraints>

            <gco:CharacterString>Restriction
Flag:0</gco:CharacterString>

          </mco:otherConstraints>

        </mco:MD_LegalConstraints>

      </mri:resourceConstraints>
```


Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov/search/concepts/C1214608509-
SCIOPS - The Extended_Metadata section is manually created.
DIF 10 - https://cmr.earthdata.nasa.gov/search/concepts/C1289077312-
SCIOPS - The Extended_Metadata section is manually created.
SERF - http://gcmd.gsfc.nasa.gov/mws/serf/NASA_3D_VIEW
ECHO 10 Collection - Example manually created from the ECHO 10 schema.

ECHO 10 Granule - Example manually created from the ECHO 10 schema.

ISO 19115-2 - Example manually generated from schema and SERF record

ISO 19115-1 - Example manually generated from schema and SERF record

Recommendations

Metadata that is meant for EMS use only should carry a restricted flag that allows only data provider and EMS to use it.

A.B.14 Metadata Association

Element Specification

MetadataAssociation/EntryId (1)
MetadataAssociation/Type (0..1) <"SCIENCE ASSOCIATED", "DEPENDENT", "INPUT", "PARENT", "CHILD", "RELATED", "LARGER CITATION WORKS">
MetadataAssociation/Description (0..1)

MetadataAssociation/Version (0..1)

Description

This element is used to identify other metadata resources including but not limited to services, collections, visualizations, parameters, granules, documents, etc. that are associated with or dependent on the data described by the metadata. This element is also used to identify a parent metadata record if it exists. This usage should be reserved for instances where a group of metadata records are subsets that can be better represented by one parent metadata record, which describes the entire set. In some instances, a child may point to more than one parent.

Profile Utilization

Collection, Granule, Document

Cardinality

0..*

Analysis

This element represents dependent relationships in the UMM. Since data within the profiles can reference each other, it would be convenient to search for items based on associated items.

In SERF, the metadata associations are not directly mappable. To determine the meta associations, the Related_URL/Content_Type must be read for a string equaling "GET RELATED DATA SET METADATA (DIF)" or "GET RELATED SERVICE METADATA (SERF)", and the URL obtained from the Related_URL/URL element. The element can then be accessed for information.

Mapping

DIF 9	/DIF/Parent_DIF
DIF 10	/DIF/Parent_DIF /DIF/MetadataAssociation/
SERF	/DIF/Parent_SERF Other metadata associations are not directly mappable
ECHO 10 Collection	/Collection/CollectionAssociations/CollectionAssociation/
ECHO 10 Granule	Not yet mapped
ISO 19115-2	/ gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:aggregationInfo/gmd:MD_AggregateInformation/gmd:aggregateDataSetName/gmd:CI_Citation Metadata Associations: / gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:aggregationInfo/gmd:MD_AggregateInformation/gmd:associationType/gmd:DS_AssociationTypeCode codeListValue="Science Associated" Parent Associations: / gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:aggregationInfo/gmd:MD_AggregateInformation/gmd:associationType/gmd:DS_AssociationTypeCode codeListValue="largerWorkCitation"
ISO 19115-1	/ mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:associatedResource/mri:MD_AssociatedResource/mri:name Metadata Associations: / mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:associatedResource/mri:MD_AssociatedResource/mri:associationType/mri:DS_AssociationTypeCode codeList="codeListLocation#DS_AssociationTypeCode" codeListValue="Science Associated" Parent Associations:

	/ mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:associatedResource/mri:MD_AssociatedResource/mri:associationType/mri:DS_AssociationTypeCode codeList="codeListLocation#DS_AssociationTypeCode" codeListValue="largerWorkCitation"
EMS	N/A

Examples

DIF 9

```
<Parent_DIF>CNDP-ESP_IPY_POL2006-11139-C02-01CGL_ESASSI</Parent_DIF>
```

DIF 10

```
<Parent_DIF>CNDP-ESP_IPY_POL2006-11139-C02-01CGL_ESASSI</Parent_DIF>



<DIF>

  <MetadataAssociation>

    <EntryId>CIESIN_SEDAC_E,NTRI_TEXTS_COL</EntryId>

    <Type>Science Associated</Type>

    <Description>Some description of the association</Description>

  </MetadataAssociation>

</DIF>
```

SERF

```
<Parent_SERF>METOFFICE_UKMET</Parent_SERF>
```

ECHO 10 Collection

```
Parent Association:

<CollectionAssociation>

    <ShortName>g3atb</ShortName>

    <VersionId>4</VersionId>

    <CollectionType>Parent Association</CollectionType>

    <CollectionUse>This is the SAGE III Level 1B solar transmission file
containing 85 profiles from zero to 100 km in 0.5 km intervals that are
used in inversion algorithms to extract the measured species associated
with the transmission wavelengths.</CollectionUse>

</CollectionAssociation>



Metadata Association:

<CollectionAssociation>

    <ShortName>g3arepqa</ShortName>

    <VersionId>4</VersionId>

    <CollectionType>Science Associated</CollectionType>

    <CollectionUse>The weekly quality assurance report containing
information that might be useful in gaining insight into the quality of these
data.</CollectionUse>

  </CollectionAssociation>
```

ISO 19115-2

```
Parent Association:

<gmd:aggregationInfo>
```

```
<gmd:MD_AggregateInformation>

  <gmd:aggregateDataSetName>

    <gmd:CI_Citation>

      <gmd:title>

        <gco:CharacterString>g3atb</gco:CharacterString>

      </gmd:title>

      <gmd:date gco:nilReason="unknown"/>

      <gmd:edition>

        <gco:CharacterString>4</gco:CharacterString>

      </gmd:edition>

      <gmd:otherCitationDetails>

        <gco:CharacterString>This is the SAGE III Level 1B solar
transmission file containing 85 profiles from zero to 100 km in 0.5 km
intervals that are used in inversion algorithms to extract the measured
species associated with the transmission
wavelengths.</gco:CharacterString>

      </gmd:otherCitationDetails>

    </gmd:CI_Citation>

  </gmd:aggregateDataSetName>

  <gmd:aggregateDataSetIdentifier>

    <gmd:MD_Identifier>

      <gmd:code>

        <gco:CharacterString>g3atb</gco:CharacterString>

      </gmd:code>
```

```
      </gmd:MD_Identifier>

    </gmd:aggregateDataSetIdentifier>

    <gmd:associationType>

      <gmd:DS_AssociationTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#DS_AssociationTypeCode"


codeListValue="largerWorkCitation">largerWorkCitation</gmd:DS_Associ
ationTypeCode>

    </gmd:associationType>

  </gmd:MD_AggregateInformation>

</gmd:aggregationInfo>
```


Metadata Association:


```
<gmd:aggregationInfo>

  <gmd:MD_AggregateInformation>

    <gmd:aggregateDataSetName>

      <gmd:CI_Citation>

        <gmd:title>

          <gco:CharacterString>g3atb</gco:CharacterString>

        </gmd:title>

        <gmd:date gco:nilReason="unknown"/>

        <gmd:edition>

          <gco:CharacterString>4</gco:CharacterString>
```

```
        </gmd:edition>

        <gmd:otherCitationDetails>

          <gco:CharacterString>This is the SAGE III Level 1B solar
transmission file containing 85 profiles from zero to 100 km in 0.5 km
intervals that are used in inversion algorithms to extract the measured
species associated with the transmission
wavelengths.</gco:CharacterString>

        </gmd:otherCitationDetails>

      </gmd:CI_Citation>

    </gmd:aggregateDataSetName>

    <gmd:aggregateDataSetIdentifier>

      <gmd:MD_Identifier>

        <gmd:code>

          <gco:CharacterString>g3atb</gco:CharacterString>

        </gmd:code>

      </gmd:MD_Identifier>

    </gmd:aggregateDataSetIdentifier>

    <gmd:associationType>

      <gmd:DS_AssociationTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#DS_AssociationTypeCode"

                        codeListValue="Science Associated">Science
Associated</gmd:DS_AssociationTypeCode>

    </gmd:associationType>

  </gmd:MD_AggregateInformation>

</gmd:aggregationInfo>
```

ISO 19115-1

Parent Association:

```
<mri:associatedResource>

        <mri:MD_AssociatedResource>

          <mri:name>

            <cit:CI_Citation>

              <cit:title>

                <gco:CharacterString>g3atb</gco:CharacterString>

              </cit:title>

              <cit:date gco:nilReason="missing"/>

              <cit:edition>

                <gco:CharacterString>4</gco:CharacterString>

              </cit:edition>

              <cit:otherCitationDetails>

                <gco:CharacterString>This is the SAGE III Level 1B solar
transmission file containing 85 profiles from zero to 100 km in 0.5 km
intervals that are used in inversion algorithms to extract the measured
species associated with the transmission
wavelengths.</gco:CharacterString>

              </cit:otherCitationDetails>

            </cit:CI_Citation>

          </mri:name>

          <mri:associationType>

            <mri:DS_AssociationTypeCode
codeList="codeListLocation#DS_AssociationTypeCode"
```

codeListValue="largerWorkCitation">largerWorkCitation</mri:DS_AssociationTypeCode>

</mri:associationType>

</mri:MD_AssociatedResource>

</mri:associatedResource>

Metadata Associaiton:

<mri:associatedResource>

<mri:MD_AssociatedResource>

<mri:name>

<cit:CI_Citation>

<cit:title>

<gco:CharacterString>g3arepqa</gco:CharacterString>

</cit:title>

<cit:date gco:nilReason="missing"/>

<cit:edition>

<gco:CharacterString>4</gco:CharacterString>

</cit:edition>

<cit:otherCitationDetails>

<gco:CharacterString>The weekly quality assurance report containing information that might be useful in gaining insight into the quality of these data.</gco:CharacterString>

</cit:otherCitationDetails>

```
            </cit:CI_Citation>

          </mri:name>

          <mri:associationType>

            <mri:DS_AssociationTypeCode
codeList="codeListLocation#DS_AssociationTypeCode"

                                codeListValue="Science Associated">Science
Associated</mri:DS_AssociationTypeCode>

          </mri:associationType>

        </mri:MD_AssociatedResource>

      </mri:associatedResource>
```

<u>Source Data Information:</u>

DIF 9 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1214591398-SCIOPS

DIF 10 – Parent Assoc. - Example based on schema with data from DIF 9 record.

- Metadata Assoc. - Example manually created based on schema.

SERF - http://gcmd.gsfc.nasa.gov/mws/serf/METOFFICE_UKCP

ECHO 10 Collection – Parent Assoc. – Example manually created from Metadata Assoc.

- Metadata Assoc. - https://cmr.earthdata.nasa.gov/search/concepts/C184964545-LARC

ISO 19115-2 – Parent Assoc. – Example manually created from Metadata Assoc.

- Metadata Assoc. hhttps://cmr.earthdata.nasa.gov/search/concepts/C184964545-LARC.iso

ISO 19115-1 – Parent Assoc. – Example manually created from Metadata Assoc.

- Metadata Assoc. - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

Recommendations

The MetadataAssociation should include a controlled Type attribute used to indicate the basis (justification) for relating one resource to another. A unique identifier and authority should be added to formalize these associations. In a future release we will add and merge the granule parent association mappings. An association type code list needs to be created to use for the ISO 19115-1 translation.

A.B.15 Publication Reference

Element Specification

PublicationReference/Authors (0..1)
PublicationReference/PublicationDate (0..1)
PublicationReference/Title (0..1)
PublicationReference/Series (0..1)
PublicationReference/Edition (0..1)
PublicationReference/Volume (0..1)
PublicationReference/Issue (0..1)
PublicationReference/ReportNumber (0..1)
PublicationReference/PublicationPlace (0..1)
PublicationReference/Publisher (0..1)
PublicationReference/Pages (0..1)
PublicationReference/ISBN (0..1)
PublicationReference/DOI (0..1)
PublicationReference/OnlineResource (0..1)
PublicationReference/OtherReferenceDetails (0..1)

Description

This element describes key bibliographic citations pertaining to the data. The Authors element contains all the authors for the publication.

Profile Utilization

Collection, Granule, Service, Visualization, Variable, Document

Cardinality

0..*

Analysis

Reference information is found in GCMD. The Reference element includes a way to specify reference as a block of text or include individual reference attributes as part of the ISO 19115 Reference model.

Mapping

DIF 9	/DIF/Reference/
DIF 10	/DIF/Reference/
SERF	/SERF/Reference/
ECHO 10 Collection	N/A
ECHO 10 Granule	N/A
ISO 19115-2	/ gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/ gmd:aggregationInfo/gmd:MD_AggregateInformation/gmd:aggregateDataSetName/gmd:CI_Citation
ISO 19115-1	/ mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/ mri:additionalDocumentation/cit:CI_Citation
EMS	N/A

Examples

<u>DIF 9</u>

```
<Reference>

  <Author>International Union for the Conservation of Nature and Natural Resources - IUCN</Author>

  <Publication_Date>2012</Publication_Date>

  <Title>Environmental Treaty Status Data Set, 2012 Release</Title>
```

```
    <Publication_Place>Palisades, NY</Publication_Place>

    <Publisher>NASA Socioeconomic Data and Applications Center
(SEDAC)</Publisher>

    <DOI>http://dx.doi.org/10.7927/H4DZ067Z</DOI>

  </Reference>
```


DIF 10


```
  <Reference>

    <Author>International Union for the Conservation of Nature and Natural
Resources - IUCN</Author>

    <Publication_Date>2012</Publication_Date>

    <Title>Environmental Treaty Status Data Set, 2012 Release</Title>

    <Publication_Place>Palisades, NY</Publication_Place>

    <Publisher>NASA Socioeconomic Data and Applications Center
(SEDAC)</Publisher>

    <DOI>http://dx.doi.org/10.7927/H4DZ067Z</DOI>

  </Reference>
```


SERF


```
<Reference>

  <Author>P.J. Werdell, S.W. Bailey, G.S. Fargion, C. Pietras, K.D.
Knobelspiesse, G.C. Feldman, and C.R. McClain</Author>

  <Publication_Date>2003</Publication_Date>

  <Title>Unique data repository facilitates ocean color satellite
validation</Title>

  <Series>EOS Trans</Series>
```

```
  <Volume>84</Volume>

  <Issue>38</Issue>

  <Publisher>AGU</Publisher>

  <Pages>377</Pages>

</Reference>
```


ISO 19115-2


```
<gmd:aggregateDataSetName>

 <gmd:CI_Citation>

  <gmd:title>

   <gco:CharacterString>

    Unique data repository facilitates ocean color satellite validation

   </gco:CharacterString>

  </gmd:title>

  <gmd:date>

   <gmd:CI_Date>

    <gmd:date>

     <gco:Date>2003</gco:Date>

    </gmd:date>

    <gmd:dateType>

     <gmd:CI_DateTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml#CI_DateTypeCode"
codeListValue="publication">publication</gmd:CI_DateTypeCode>
```

```
      </gmd:dateType>
    </gmd:CI_Date>
  </gmd:date>
  <gmd:citedResponsibleParty>
    <gmd:CI_ResponsibleParty>
     ...
    </gmd:CI_ResponsibleParty>
  </gmd:citedResponsibleParty>
  <gmd:series>
    <gmd:CI_Series>
      <gmd:name>
        <gco:CharacterString>EOS  Trans</gco:CharacterString>
      </gmd:name>
      <gmd:issueIdentification>
        <gco:CharacterString>38</gco:CharacterString>
      </gmd:issueIdentification>
    </gmd:CI_Series>
  </gmd:series>
  <gmd:otherCitationDetails>
    <gco:CharacterString>337</gco:CharacterString>
  </gmd:otherCitationDetails>
 </gmd:CI_Citation>
</gmd:aggregateDataSetName>
```

ISO 19115-1


```
<mri:additionalDocumentation >

            <cit:CI_Citation>

              <cit:title>

                <gco:CharacterString>Spline functions, interpolation, and
numerical quadrature</gco:CharacterString>

              </cit:title>

              <cit:date>

                <cit:CI_Date>

                  <cit:date>

                    <gco:DateTime>1967-01-01T00:00:00</gco:DateTime>

                  </cit:date>

                  <cit:dateType>

                    <cit:CI_DateTypeCode
codeList="codeListLocation#CI_DateTypeCode"
codeListValue="publication">publication</cit:CI_DateTypeCode>

                  </cit:dateType>

                </cit:CI_Date>

              </cit:date>

              <cit:citedResponsibleParty>

                <cit:CI_Responsibility>

                  <cit:role>

                    <cit:CI_RoleCode
codeList="codeListLocation#CI_RoleCode"
```

```
codeListValue="publisher">publisher</cit:CI_RoleCode>

                  </cit:role>

                  <cit:party>

                    <cit:CI_Organisation>

                      <cit:name>

                        <gco:CharacterString>John Wiley and Sons,
Inc.</gco:CharacterString>

                      </cit:name>

                      <cit:contactInfo>

                        <cit:CI_Contact>

                          <cit:address>

                            <cit:CI_Address>

                              <cit:administrativeArea>


<gco:CharacterString>NY</gco:CharacterString>

                              </cit:administrativeArea>

                            </cit:CI_Address>

                          </cit:address>

                        </cit:CI_Contact>

                      </cit:contactInfo>

                    </cit:CI_Organisation>

                  </cit:party>

                </cit:CI_Responsibility>
```

```
            </cit:citedResponsibleParty>

            <cit:citedResponsibleParty>

              <cit:CI_Responsibility>

                <cit:role>

                  <cit:CI_RoleCode
codeList="codeListLocation#CI_RoleCode"
codeListValue="originator">originator</cit:CI_RoleCode>

                </cit:role>

                <cit:party>

                  <cit:CI_Organisation>

                    <cit:name>

                      <gco:CharacterString>Greville,
T.N.E.</gco:CharacterString>

                    </cit:name>

                  </cit:CI_Organisation>

                </cit:party>

              </cit:CI_Responsibility>

            </cit:citedResponsibleParty>

            <cit:citedResponsibleParty>

              <cit:CI_Responsibility>

                <cit:role>

                  <cit:CI_RoleCode
codeList="codeListLocation#CI_RoleCode"
codeListValue="originator">originator</cit:CI_RoleCode>

                </cit:role>
```

```
                <cit:party>

                  <cit:CI_Organisation>

                    <cit:name>

                      <gco:CharacterString>Ralston, A.
(ed.)</gco:CharacterString>

                    </cit:name>

                  </cit:CI_Organisation>

                </cit:party>

              </cit:CI_Responsibility>

            </cit:citedResponsibleParty>

            <cit:citedResponsibleParty>

              <cit:CI_Responsibility>

                <cit:role>

                  <cit:CI_RoleCode
codeList="codeListLocation#CI_RoleCode"
codeListValue="originator">originator</cit:CI_RoleCode>

                </cit:role>

                <cit:party>

                  <cit:CI_Organisation>

                    <cit:name>

                      <gco:CharacterString>Wilf, H.S.
(ed.)</gco:CharacterString>

                    </cit:name>

                  </cit:CI_Organisation>
```

```
                </cit:party>

              </cit:CI_Responsibility>

            </cit:citedResponsibleParty>

            <cit:series>

              <cit:CI_Series>

                <cit:name>

                  <gco:CharacterString>MATHEMATICAL METHODS OF
DIGITAL COMPUTERS</gco:CharacterString>

                </cit:name>

                <cit:issueIdentification>

                  <gco:CharacterString>Volume 2</gco:CharacterString>

                </cit:issueIdentification>

              </cit:CI_Series>

            </cit:series>

          </cit:CI_Citation>

</mri:additionalDocumentation>
```


Source Data Information:

DIF 9 -
http://gcmd.gsfc.nasa.gov/mws/dif/CIESIN_SEDAC_ENTRI_TEXTS_COL

DIF 10 - Example based on schema with data from DIF 9 record.

SERF - http://gcmd.gsfc.nasa.gov/mws/serf/SeaBASS
ISO 19115-2 - Example manually generated from schema and SERF

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of
http://www.ngdc.noaa.gov/metadata/published/NOAA/NESDIS/NCDC/Geoportal/iso/xml/C00823.xml record

Recommendations

During the UMM-C review, it was decided that the text inside this element must be deconstructed and the various components placed into the correct elements. If the metadata still retains a block of text in this element upon migration to the CMR, the text will be placed into the PublicationReference/OtherReferenceDetails element.

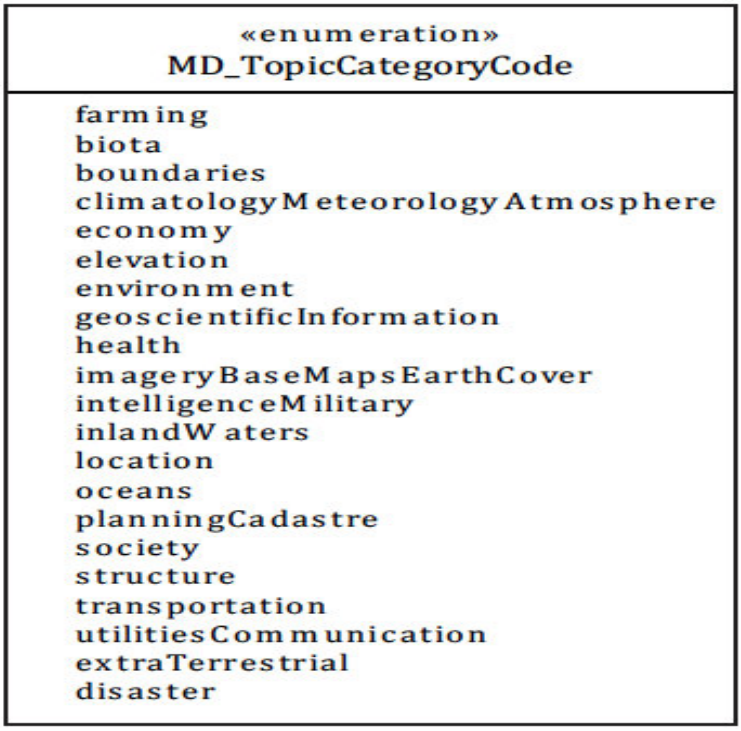
A.B.16 ISO Topic Category

Element Specification

ISOTopicCategory

Description

This element is used to identify the keywords from the EN ISO 19115-1:2014 Geographic Information – Metadata – Part 1: Fundamentals (http://www.isotc211.org/) Topic Category Code List. It is a high-level thematic classification to assist in the grouping and search of available services.



Source: EN ISO 19115-1:2014 Geographic Information – Metadata – Part 1: Fundamentals

Figure A.1. MD_TopicCategoryCode List

Profile Utilization

Collection, Granule, Service, Document

Cardinality

0..*

Analysis

Based on selected science keywords, the ISO Topic Category keywords should be auto-populated into the metadata by the CMR at ingest time. Metadata authors will also have the option to manually add/edit the ISOTopicCategory keywords in the metadata record using docBUILDER, Metadata Management Tool (MMT), or any alternate preferred XML editor.

Mapping

DIF 9	/DIF/ISO_Topic_Category
DIF 10	/DIF/ISO_Topic_Category
SERF	/SERF/ISO_Topic_Category
ECHO 10 Collection	N/A
ECHO 10 Granule	N/A
ISO 19115-2	/ gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:topicCategory/gmd:MD_TopicCategoryCode
ISO 19115-1	/ mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:topicCategory/mri:MD_TopicCategoryCode
EMS	N/A

Examples

DIF 9

```
<ISO_Topic_Category uuid="d9cd5b7e-e9e7-4746-bbc8-

bc69f7b606c7">GEOSCIENTIFIC INFORMATION</ISO_Topic_Category>

<ISO_Topic_Category uuid="0353d44f-2fc2-44df-9143-

b1a3b86d5aa1">INLAND WATERS</ISO_Topic_Category>
```

DIF 10

```
<ISO_Topic_Category uuid="1ebf71bd-d007-42f8-8f9b-
8c44a6b65a28">CLIMATOLOGY/METEOROLOGY/ATMOSPHERE</ISO_Topic_Category>
```

SERF

```
<ISO_Topic_Category uuid="26173055-5433-42b3-bd00-
```

```
9a1f6ba294e1">FARMING</ISO_Topic_Category>

<ISO_Topic_Category uuid="c3d9cf68-90b1-46be-914c-38ecb2e70097">BIOTA</ISO_Topic_Category>
```

ISO 19115-2

```
<gmd:topicCategory>

  <gmd:MD_TopicCategoryCode>farming</gmd:MD_TopicCategoryCode>

  <gmd:MD_TopicCategoryCode>biota</gmd:MD_TopicCategoryCode>

</gmd:topicCategory>
```

ISO 19115-1

```
<mri:topicCategory>

   <mri:MD_TopicCategoryCode>farming</mri:MD_TopicCategoryCode>

   <mri:MD_TopicCategoryCode>biota</mri:MD_TopicCategoryCode>

</mri:topicCategory>
```

Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov/search/concepts/C1214313574-AU_AADC
DIF 10 - https://cmr.earthdata.nasa.gov/search/concepts/C1225368560-LAADS

SERF - http://gcmd.gsfc.nasa.gov/mws/serf/NASA_3D_VIEW
ISO 19115-2 - Example manually generated from schema and SERF

ISO 19115-1 - Example manually generated from schema and SERF

A.B.17 Science Keywords

Element Specification

ScienceKeywords/Category (1)
ScienceKeywords/Topic (1)

ScienceKeywords/Term (1)
ScienceKeywords/VariableLevel1 (0..1)
ScienceKeywords/VariableLevel2 (0..1)
ScienceKeywords/VariableLevel3 (0..1)
ScienceKeywords/DetailedVariable (0..1)

Description

This element enables specification of Earth Science keywords. All of the sub-elements except for DetailedVariable are controlled and use the GCMD Science Keyword vocabulary. The vocabulary is managed by the Keyword Management System (KMS) and it can be found at this location: http://gcmdservices.gsfc.nasa.gov/static/kms/sciencekeywords/sciencekeywords.csv. The DetailedVariable is an uncontrolled free text element that allows the metadata author to include another keyword to more fully describe the data.

Profile Utilization

Collection, Granule, Service, Document

Cardinality

1..*

Mapping

DIF 9	/DIF/Parameters/
DIF 10	/DIF/Science_Keywords/
SERF	/SERF/Science_Parameters/
ECHO 10 Collection	/Collection/ScienceKeywords/ScienceKeyword/
ECHO 10 Granule	N/A
ISO 19115-2	/ gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword/gco:CharacterString with / gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword/gmd:type/MD_KeywordTypeCode[@codeListValue="theme"]
ISO 19115-1	/ mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:descriptiveKeywords/mri:MD_Keywords/mri:keyword/gco:CharacterString with / mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:descriptiveKeywords/mri:MD_Keywords/mri:keyword/mri:type/mri:MD_KeywordTypeCode codeList=http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml#MD_KeywordTypeCodecodeListValue="theme"
EMS	N/A

Examples

<u>DIF 9</u>

```
<Parameters>
  <Category>EARTH SCIENCE</Category>
  <Topic>BIOSPHERE</Topic>
  <Term>ECOLOGICAL DYNAMICS</Term>
  <Variable_Level_1>ECOTOXICOLOGY</Variable_Level_1>
  <Variable_Level_2>SPECIES BIOACCUMULATION</Variable_Level_2>
```

```
</Parameters>
```

DIF 10

```
<Science_Keywords>
  <Category>EARTH SCIENCE</Category>
  <Topic>ATMOSPHERE</Topic>
  <Term>ATMOSPHERIC CHEMISTRY</Term>
  <Variable_Level_1>CARBON AND HYDROCARBON
COMPOUNDS</Variable_Level_1>
  <Variable_Level_2>CARBON DIOXIDE</Variable_Level_2>
</Science_Keywords>
```

SERF


```
<Science_Parameters uuid="5066def0-b14b-4a2c-b40f-dc9953860366">

  <Science_Category>EARTH SCIENCE</Science_Category>

  <Science_Topic>HUMAN DIMENSIONS</Science_Topic>

  <Science_Term>ENVIRONMENTAL
GOVERNANCE/MANAGEMENT</Science_Term>

  <Science_Variable_Level_1>LAND
MANAGEMENT</Science_Variable_Level_1>

  <Science_Variable_Level_2>LAND USE/LAND COVER
CLASSIFICATION</Science_Variable_Level_2>

</Science_Parameters>

<Science_Parameters uuid="ec0e2762-f57a-4fdc-b395-c8d7d5590d18">

  <Science_Category>EARTH SCIENCE</Science_Category>

  <Science_Topic>HUMAN DIMENSIONS</Science_Topic>

  <Science_Term>NATURAL HAZARDS</Science_Term>

</Science_Parameters>
```


ECHO 10 Collection


```
<ScienceKeywords>

 <ScienceKeyword>

  <CategoryKeyword>EARTH SCIENCE</CategoryKeyword>

  <TopicKeyword>HYDROSPHERE</TopicKeyword>

  <TermKeyword>SURFACE WATER</TermKeyword>

  <VariableLevel1Keyword>
```

```
  <Value>DISCHARGE/FLOW</Value>

 </VariableLevel1Keyword>

</ScienceKeyword>

<ScienceKeyword>

 <CategoryKeyword>EARTH SCIENCE</CategoryKeyword>

 <TopicKeyword>HYDROSPHERE</TopicKeyword>

 <TermKeyword>SURFACE WATER</TermKeyword>

 <VariableLevel1Keyword>

  <Value>STAGE HEIGHT</Value>

 </VariableLevel1Keyword>

</ScienceKeyword>

</ScienceKeywords>
```


ISO 19115-2


```
<gmd:descriptiveKeywords>

        <gmd:MD_Keywords>

          <gmd:keyword>

            <gco:CharacterString>EARTH
SCIENCE&gt;HYDROSPHERE&gt;SURFACE
WATER&gt;DISCHARGE/FLOW&gt;NONE&gt;NONE&gt;NONE</gco:Charact
erString>

          </gmd:keyword>

          <gmd:keyword>

            <gco:CharacterString>EARTH
SCIENCE&gt;HYDROSPHERE&gt;SURFACE WATER&gt;STAGE
```

```
HEIGHT&gt;NONE&gt;NONE&gt;NONE</gco:CharacterString>

          </gmd:keyword>

          <gmd:type>

            <gmd:MD_KeywordTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml
#MD_KeywordTypeCode"


codeListValue="theme">theme</gmd:MD_KeywordTypeCode>

          </gmd:type>

          <gmd:thesaurusName>

            <gmd:CI_Citation>

              <gmd:title>

                <gco:CharacterString>NASA/GCMD Science
Keywords</gco:CharacterString>

              </gmd:title>

                ...

            </gmd:CI_Citation>

          </gmd:thesaurusName>

        </gmd:MD_Keywords>

      </gmd:descriptiveKeywords>
```


ISO 19115-1


```
<mri:descriptiveKeywords>

        <mri:MD_Keywords>

          <mri:keyword>
```

```
            <gco:CharacterString>EARTH
SCIENCE&gt;HYDROSPHERE&gt;SURFACE
WATER&gt;DISCHARGE/FLOW&gt;NONE&gt;NONE&gt;NONE</gco:Charac
terString>

          </mri:keyword>

          <mri:keyword>

            <gco:CharacterString>EARTH
SCIENCE&gt;HYDROSPHERE&gt;SURFACE WATER&gt;STAGE
HEIGHT&gt;NONE&gt;NONE&gt;NONE</gco:CharacterString>

          </mri:keyword>

          <mri:type>

            <mri:MD_KeywordTypeCode
codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resourc
es/Codelist/gmxCodelists.xml#MD_KeywordTypeCode"


codeListValue="theme">theme</mri:MD_KeywordTypeCode>

          </mri:type>

          <mri:thesaurusName>

            ...

          </mri:thesaurusName>

        </mri:MD_Keywords>

      </mri:descriptiveKeywords>
```


Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov/search/concepts/C1214305884-AU_AADC
DIF 10 - https://cmr.earthdata.nasa.gov/search/concepts/C1223726607-GES_DISC
SERF - http://gcmd.gsfc.nasa.gov/mws/serf/NASA_3D_VIEW

ECHO 10 Collection - https://cmr.earthdata.nasa.gov/search/concepts/C179003030-ORNL_DAAC
ISO 19115-2- https://cmr.earthdata.nasa.gov/search/concepts/C179003030-ORNL_DAAC.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

Recommendations

EMS should drop its discipline element from product requirements in favor of using these keywords and mapping them to existing discipline elements.

CMR should look to create components for common data and permit users to manage them through the MMT. For more information about components please see https://geo-ide.noaa.gov/wiki/index.php?title=ISO_Components

A.B.18 Ancillary Keywords

Element Specification

AncillaryKeywords

Description

This element allows authors to provide words or phrases to further describe the data and therefore its vocabulary is not controlled.

Profile Utilization

Collection, Granule, Service, Visualization, Variable, Document

Cardinality

0..*

Mapping

DIF 9	/DIF/Keyword
DIF 10	/DIF/Ancillary_Keyword
SERF	/SERF/Keyword
ECHO 10 Collection	N/A
ECHO 10 Granule	N/A
ISO 19115-2	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword/gco:CharacterString
ISO 19115-1	/mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:descriptiveKeywords/mri:MD_Keywords/mri:keyword/gco:CharacterString
EMS	discipline

Examples

<u>DIF 9</u>

```
<Keyword>ANTARCTICA</Keyword>
<Keyword>ORGANOCHLORINES</Keyword>
<Keyword>SEABIRDS</Keyword>
<Keyword>fulmar</Keyword>
<Keyword>Adelie penguin</Keyword>
<Keyword>preenoil</Keyword>
<Keyword>polychlorinated biphenyls</Keyword>
<Keyword>hexachlorobenzene</Keyword>
<Keyword>dieldrin</Keyword>
<Keyword>PCB</Keyword>
<Keyword>HCB</Keyword>
<Keyword>DDE</Keyword>
<Keyword>Pygoscelis adeliae</Keyword>
<Keyword>Fulmarus glacialoides</Keyword>
<Keyword>morphometrics</Keyword>
```

DIF 10

```
<Ancillary_Keyword>RADIANCE</Ancillary_Keyword>
<Ancillary_Keyword>INFRARED</Ancillary_Keyword>
<Ancillary_Keyword>CALIBRATED</Ancillary_Keyword>
<Ancillary_Keyword>GEOLOCATED</Ancillary_Keyword>
<Ancillary_Keyword>EOSDIS</Ancillary_Keyword>
```

SERF

```
<Keyword>Science Curriculum</Keyword>

<Keyword>Science Studies</Keyword>

<Keyword>Classroom Activities</Keyword>
```

ISO 19115-2

```
<gmd:descriptiveKeywords>

  <gmd:MD_Keywords>

    <gmd:keyword>

      <gco:CharacterString>Science Curriculum</gco:CharacterString>

    </gmd:keyword>

    <gmd:keyword>

      <gco:CharacterString>Science Studies</gco:CharacterString>

    </gmd:keyword>

    <gmd:keyword>

      <gco:CharacterString>Classroom Activities</gco:CharacterString>

    </gmd:keyword>

    ...
```

```
  </gmd:MD_Keywords>

</gmd:descriptiveKeywords>
```

ISO 19115-1

```
<mri:descriptiveKeywords>

 <mri:MD_Keywords>

  <mri:keyword>

   <gco:CharacterString>Science Curriculum</gco:CharacterString>

  </mri:keyword>

  <mri:keyword>

   <gco:CharacterString>Science Studies</gco:CharacterString>

  </mri:keyword>

  <mri:keyword>

   <gco:CharacterString>Classroom Activities</gco:CharacterString>

  </mri:keyword>

   ...

 </mri:MD_Keywords>

</mri:descriptiveKeywords>
```

Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov/search/concepts/C1214305884-AU_AADC

DIF 10 - https://cmr.earthdata.nasa.gov/search/concepts/C1243477316-GES_DISC

SERF - http://gcmd.gsfc.nasa.gov/mws/serf/NASA_3D_VIEW
ISO 19115-2 - Example manually generated from schema and SERF

ISO 19115-1 - Example manually generated from schema and SERF

Recommendations

The UMM should include an attribute as part of the AncillaryKeyword element that can specify a Uniform Resource Identifier (URI) to reference an external vocabulary system's keyword.

A.B.19 Additional Attributes

Element Specification

AdditionalAttribute/Name (1)

AdditionalAttribute/Type (0..1)

AdditionalAttribute/Identifier (0..1)
AdditionalAttribute/DataType (1)
AdditionalAttribute/Description (1)
AdditionalAttribute/MeasurementResolution (0..1)
AdditionalAttribute/RangeBegin (0..1)
AdditionalAttribute/RangeEnd (0..1)
AdditionalAttribute/UnitsOfMeasure (0..1)
AdditionalAttribute/ValueAccuracy (0..1)
AdditionalAttribute/ValueAccuracyExplanation (0..1)
AdditionalAttribute/Value (0..1)
AdditionalAttribute/Group (0..1)
AdditionalAttribute/UpdateDate (0..1)

Description

This entity stores the data's distinctive attributes (i.e. attributes used to describe the unique characteristics of the resource which extend beyond those defined in this mapping).

Profile Utilization

Collection, Granule, Service, Visualization, Variable, Document

Cardinality

0..*

Analysis

ECHO uses AdditionalAttributes to describe the data represented in each granule within a collection. These values are important search criteria for the granules. Example attributes include values for cloud cover, MODIS Tile grid coordinates, and elevation information. All additional attribute definitions are included in the collection metadata. A collection may also specify a value, to be understood as the value for all granules. Granules reference defined additional attributes and supply a value that is associated to that granule. Granules may not define a new additional attribute that is not defined by the collection. In DIF 9 and SERF there is no AdditionalAttributes element similar to ECHO. Recognizing there is no equivalence between Extended Metadata, that does not have a well defined structure, and additional attributes which does, there still needs to be a way to translate the data from one standard to DIF 9 or SERF. The proposal is to use ExtendedMetadata to store this kind of information in key value pairs. DIF 10 has additional attributes and is directly mappable. If the additional attribute type is known it can be mapped to the correct section of ISO. Currently additional attributes are mapped to several sections within ISO depending if the attribute is geographical, describes coverage, describes data quality, describes acquisition, or maps to a keyword.

Mapping

DIF 9	/DIF/ExtendedMetadata/Metadata/
DIF 10	/DIF/Additional_Attributes/
SERF	/SERF/ExtendedMetadata/Metadata/
ECHO 10 Collection	/Collection/AdditionalAttributes/AdditionalAttribute/
ECHO 10	/Granule/AdditionalAttributes/AdditionalAttribute/

Granule	
ISO 19115-2	/ gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword/gco:CharacterString or / gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier or / gmi:MI_Metadata/gmd:contentInfo/gmd:MD_CoverageDescription/gmd:dimension/gmd:MD_Band/gmd:otherProperty/gco:Record/eos:AdditionalAttributes/eos:AdditionalAttribute or / gmi:MI_Metadata/gmd:dataQualityInfo/gmd:DQ_DataQuality/gmd:report/gmd:DQ_QuantitativeAttributeAccuracy/gmd:result/gmd:DQ_QuantitativeResult/gmd:value/gco:Record/eos:AdditionalAttributes/eos:AdditionalAttribute or / gmi:MI_Metadata/gmi:acquisitionInformation/gmi:MI_AcquisitionInformation/gmi:instrument/eos:EOS_Instrument/eos:otherProperty/gco:Record/eos:AdditionalAttributes/eos:AdditionalAttribute or / gmi:MI_Metadata/gmi:acquisitionInformation/gmi:MI_AcquisitionInformation/gmi:platform/eos:EOS_Platform/eos:otherProperty/gco:Record/eos:AdditionalAttributes/eos:AdditionalAttribute
ISO 19115-1	/ mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:descriptiveKeywords/mri:MD_Keywords/mri:keyword/gco:CharacterString or / mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:extent/gex:EX_Extent id="boundingExtent"/gex:geographicElement/gex:EX_GeographicDescription/gex:geographicIdentifier/mcc:MD_Identifier or / mdb:MD_Metadata/mdb:contentInfo/mrc:MD_CoverageDescription/mrc:a

	ttributeDescription/mrc:attributeGroup/mrc:MD_AttributeGroup/mrc:attribute/mrc:MD_SampleDimension/mrc:otherProperty/gco:Record/mrc:AdditionalAttributes/mrc:AdditionalAttribute or / mdb:MD_Metadata/mdb:dataQualityInfo/mdq:DQ_DataQuality/mdq:report/mdq:DQ_QuantitativeAttributeAccuracy/mdq:result/mdq:DQ_QuantitativeResult/mdq:value/gco:Record/mdq:AdditionalAttributes/mdq:AdditionalAttribute or / mdb:MD_Metadata/mdb:acquisitionInformation/mac:MI_AcquisitionInformation/mac:instrument/mac:EOS_Instrument id="d226e165"/mac:otherPropertyType/mac:otherProperty/gco:Record/mac:AdditionalAttributes/mac:AdditionalAttribute or / mdb:MD_Metadata/mdb:acquisitionInformation/mac:MI_AcquisitionInformation/mac:platform/mac:EOS_Platform id="d226e145"/mac:otherPropertyType/mac:otherProperty/gco:Record/mac:AdditionalAttributes/mac:AdditionalAttribute
EMS	N/A

Examples

<u>DIF 9</u>

```
<Extended_Metadata>
    ...
    <Metadata>
      <Group>EMS</Group>
      <Name>EMS_Product</Name>
      <Value>MOD09Q1N</Value>
    </Metadata>
    <Metadata>
     <Group>gov.nasa.gsfc.gcmd</Group>
     <Name>metadata.extraction_date</Name>
     <Value>2014-11-05 10:00:22</Value>
    </Metadata>
    <Metadata>
     <Group>gov.nasa.gsfc.gcmd</Group>
     <Name>metadata.keyword_version</Name>
     <Value>8.0</Value>
    </Metadata>
```

```
</Extended_Metadata>
```

DIF_10

```
<Additional_Attributes>
 <Name>SuccessCloudPhaseRtrPct_IR</Name>
 <DataType>FLOAT</DataType>
 <Description>None</Description>
</Additional_Attributes>
```

SERF

```
<Extended_Metadata>
   <Extended_Metadata>/n     <Metadata>
     <Group>gov.nasa.gsfc.gcmd</Group>
     <Name>metadata.extraction_date</Name>
     <Value>2014-12-05 10:36:11</Value>
   </Metadata>
   <Metadata>
     <Group>gov.nasa.gsfc.gcmd</Group>
     <Name>metadata.keyword_version</Name>
     <Value>8.0</Value>
   </Metadata>
 </Extended_Metadata>
```

ECHO_10_Collection

```
<AdditionalAttribute>
 <Name>SuccessCloudPhaseRtrPct_IR</Name>
 <DataType>FLOAT</DataType>
 <Description>None</Description>
</AdditionalAttribute>
```

ECHO_10_Granule

```
<AdditionalAttributes>
 <AdditionalAttribute>
  <Name>AIRSAR_FLIGHT_LINE</Name>
  <Values>
   <Value>mammoth_138.90021</Value>
  </Values>
 </AdditionalAttribute>
</AdditionalAttributes>
```

ISO_19115-2

```
<eos:AdditionalAttribute>
 <eos:reference>
  <eos:EOS_AdditionalAttributeDescription>
   <eos:type>
    <eos:EOS_AdditionalAttributeTypeCode

codeList=http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
```

```
S_AdditionalAttributeTypeCode"

          codeListValue="contentInformation"

          >contentInformation</eos:EOS_AdditionalAttributeTypeCode>

      </eos:type>

      <eos:name>


<gco:CharacterString>SuccessCloudPhaseRtrPct_IR</gco:CharacterStrin
g>

      </eos:name>

      <eos:description>

        <gco:CharacterString>None</gco:CharacterString>

      </eos:description>

      <eos:dataType>

        <eos:EOS_AdditionalAttributeDataTypeCode


codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeDataTypeCode"


codeListValue="FLOAT">FLOAT</eos:EOS_AdditionalAttributeDataTypeC
ode>

      </eos:dataType>

    </eos:EOS_AdditionalAttributeDescription>

  </eos:reference>

</eos:AdditionalAttribute>
```


ISO 19115-1

```
<mrc:AdditionalAttributes>

 <mrc:AdditionalAttribute>

  <mrc:reference>

   <mrc:EOS_AdditionalAttributeDescription>

    <mrc:type>

     <mrc:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="contentInformation">contentInformation</mrc:EOS_Addit
ionalAttributeTypeCode>

    </mrc:type>

    <mrc:name>


<gco:CharacterString>SuccessCloudPhaseRtrPct_IR</gco:CharacterStrin
g>

    </mrc:name>

    <mrc:description>

     <gco:CharacterString>None</gco:CharacterString>

    </mrc:description>

    <mrc:dataType>

     <mrc:EOS_AdditionalAttributeDataTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeDataTypeCode"


codeListValue="FLOAT">FLOAT</mrc:EOS_AdditionalAttributeDataType
Code>
```

```
      </mrc:dataType>

     </mrc:EOS_AdditionalAttributeDescription>

   </mrc:reference>

  </mrc:AdditionalAttribute>

   ...

</ mrc:AdditionalAttributes>
```

Source Data Information:

DIF 9 - http://gcmd.gsfc.nasa.gov/mws/dif/MOD09Q1N_C5_NRT
DIF 10 - Example manually generated based on schema and ECHO data.
SERF - http://gcmd.gsfc.nasa.gov/mws/serf/NASA_3D_VIEW

ECHO 10 Collection - https://api.echo.nasa.gov:443/catalog-rest/echo_catalog/datasets/C90762185-LAADS
ECHO 10 Granule – https://api.echo.nasa.gov/catalog-rest/echo_catalog/granules/G181127451-ASF

ISO 19115-2 - https://api.echo.nasa.gov:443/catalog-rest/echo_catalog/datasets/C90762185-LAADS.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

A.B.20 Platform

Element Specification

Platform (1..*)
Platform/Type (0..1)
Platform/ShortName (1)
Platform/LongName (0..1)
Platform/Characteristics (0..*)
Platform/Characteristics/Name (1)
Platform/Characteristics/Description (1)
Platform/Characteristics/DataType (1)
Platform/Characteristics/Unit (1)
Platform/Characteristics/Value (1)
Platform/Instrument (1..*) {See Instrument for full specification}

Description

This element describes the relevant platforms used to acquire the data. Platform types are controlled and since there are to many valid values to list here the following URL is provided: http://gcmdservices.gsfc.nasa.gov/static/kms/platforms/platforms.csv. The types of platforms covered include but are not limited to Aircraft, Earth Observation Satellites, In Situ Land-based Platforms, etc.

Profile Utilization

Collection, Granule, Service

Cardinality

0..*

Analysis

This class is found in ECHO, GCMD, and EMS. It is controlled within GCMD and EMS, but not within ECHO. ECHO and GCMD DIF 10's Platform includes the following attributes: ShortName, LongName, Type, Characteristics, and Instruments. GCMD's DIF 9 Platform does not nest the Instrument attributes or include a Characteristics attribute. Some of the characteristics information is captured in the GCMD DIF 9 ancillary platform metadata document. The EMS attribute "Mission" is mapped to UMM/Platform/ShortName; EMS "Mission" can also be mapped to UMM/Project/Campaign if applicable. EMS intends to use only one value - and employ mission, platform and project (in this order) based on the availability of the information.

The ISO 19115-2 MI_Platform class was extended to EOS_Platform in order to facilitate the addition of ECHO additional attributes and sensors to the platform descriptions.

Mapping

DIF 9	/DIF/Source_Name
DIF 10	/DIF/Platform/
SERF	/SERF/Source_Name
ECHO 10 Collection	/Collection/Platforms/Platform/
ECHO 10 Granule	/Granule/Platforms/Platform/
ISO 19115-2	/ gmi:MI_Metadata/gmi:acquisitionInformation/gmi:MI_AcquisitionInformation/gmi:platform/eos:EOS_Platform/ and / gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword/gco:CharacterString with / gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword/gmd:type/MD_KeywordTypeCode[@codeListValue="platform"]
ISO 19115-1	/ mdb:MD_Metadata/mdb:acquisitionInformation/mac:MI_AcquisitionInformation/mac:platform/eos:EOS_Platform and / mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:descriptiveKeywords/mri:MD_Keywords/mri:keyword/gco:CharacterString with / mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:descriptiveKeywords/mri:MD_Keywords/mri:keyword/mri:type/mri:MD_KeywordTypeCode codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCodelists.xml#MD_KeywordTypeCode" codeListValue="platform"

Examples

<u>DIF 9</u>

```
<Source_Name uuid="e66a90c4-3a5c-4e52-b039-bc93857642bf">

  <Short_Name>GPS</Short_Name>

  <Long_Name>Global Positioning System Satellites</Long_Name>

</Source_Name>
```

DIF 10

```
<Platform>
  <Type>Earth Observation Satellites</Type>
  <Short_Name>AQUA</Short_Name>
  <Long_Name>Earth Observing System, AQUA</Long_Name>
  <Characteristics>
    <Name>EquatorCrossingTime</Name>
    <Description>Local time of the equator crossing and direction
(ascending or descending </Description>
    <DataType>Time/direction (ascending)</DataType>
    <Unit>Local Mean Time</Unit>
    <Value>3:30, ascending</Value>
  </Characteristics>
  <Instrument>
    <Short_Name>MODIS</Short_Name>
    <Long_Name>Moderate-Resolution Imaging
Spectroradiometer</Long_Name>
    <Technique>Imaging Spectroradiometry</Technique>
    <Sensor>
      <Short_Name>MODIS</Short_Name>
      <Long_Name>Cross-track Scanning Radiometer</Long_Name>
      <Technique>Radiometry</Technique>
    </Sensor>
  </Instrument>
</Platform>
```

SERF

```
<Source_Name uuid="3c5df34c-b231-460d-b3b6-4145c1fa8f25">

  <Short_Name>BUOYS</Short_Name>

</Source_Name>
```

ECHO 10 Collection


```
<Platforms>

    <Platform>

      <ShortName>ICESat</ShortName>

      <LongName>Ice, Cloud, and Land Elevation
Satellite</LongName>

      <Type>Spacecraft</Type>

      <Characteristics>

        <Characteristic>

          <Name>OrbitInclination</Name>

          <Description>Angle between the orbit plane and the Earth's
equatorial

            plane</Description>

          <DataType>float</DataType>

          <Unit>Degrees</Unit>

          <Value>94.0</Value>

        </Characteristic>

        <Characteristic>

          <Name>OrbitalPeriod</Name>

          <Description>Orbital period in decimal
minutes.</Description>

          <DataType>float</DataType>

          <Unit>Minutes</Unit>

          <Value>96.7</Value>
```

```
          </Characteristic>

        </Characteristics>

        <Instruments>

          ...

        </Instruments>

      </Platform>

    </Platforms>
```

ECHO_10_Granule

```
<Platforms>

  <Platform>

    <ShortName>AIRCRAFT</ShortName>

    <Instruments...</Instruments>

  </Platform>
</Platforms>
```

ISO_19115-2

```
<gmi:platform>

        <eos:EOS_Platform_id="d142e304">

          <gmi:identifier>

            <gmd:MD_Identifier>

              <gmd:code>

                <gco:CharacterString>ICESat</gco:CharacterString>

              </gmd:code>
```

```
            <gmd:description>

              <gco:CharacterString>Ice, Cloud, and Land Elevation
Satellite</gco:CharacterString>

            </gmd:description>

          </gmd:MD_Identifier>

        </gmi:identifier>

        <gmi:description>

          <gco:CharacterString>Spacecraft</gco:CharacterString>

        </gmi:description>

        <gmi:instrument xlink:href="#d142e335"/>

        <gmi:instrument xlink:href="#d142e423"/>

        <eos:otherPropertyType>

          <gco:RecordType
xlink:href="http://earthdata.nasa.gov/metadata/schema/eos/1.0/eos.xsd#xp
ointer(//element[@name='AdditionalAttributes'])">Echo Additional
Attributes</gco:RecordType>

        </eos:otherPropertyType>

        <eos:otherProperty>

          <gco:Record>

            <eos:AdditionalAttributes><!- -Platform Characteristic- ->

              <eos:AdditionalAttribute>

                <eos:reference>

                  <eos:EOS_AdditionalAttributeDescription>

                    <eos:type>

                      <eos:EOS_AdditionalAttributeTypeCode
```

codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EOS_AdditionalAttributeTypeCode"

codeListValue="platformInformation">platformInformation</eos:EOS_AdditionalAttributeTypeCode>

</eos:type>

<eos:name>

<gco:CharacterString>OrbitInclination</gco:CharacterString>

</eos:name>

<eos:description>

<gco:CharacterString>Angle between the orbit plane and the Earth's equatorial plane</gco:CharacterString>

</eos:description>

<eos:dataType>

<eos:EOS_AdditionalAttributeDataTypeCode codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EOS_AdditionalAttributeDataTypeCode"

codeListValue="float">float</eos:EOS_AdditionalAttributeDataTypeCode>

</eos:dataType>

<eos:parameterUnitsOfMeasure>

<gco:CharacterString>Degrees</gco:CharacterString>

</eos:parameterUnitsOfMeasure>

</eos:EOS_AdditionalAttributeDescription>

</eos:reference>

```
                <eos:value>
                  <gco:CharacterString>94.0</gco:CharacterString>
                </eos:value>
              </eos:AdditionalAttribute>
              ...
            </eos:AdditionalAttributes>
          </gco:Record>
        </eos:otherProperty>
      </eos:EOS_Platform>
    </gmi:platform>
```

```
<gmd:descriptiveKeywords>
      <gmd:MD_Keywords>
        <gmd:keyword>
          <gco:CharacterString>ICESat &gt; Ice, Cloud, and Land Elevation Satellite</gco:CharacterString>
        </gmd:keyword>
        <gmd:type>
          <gmd:MD_KeywordTypeCode codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.xml#MD_KeywordTypeCode"

codeListValue="platform">platform</gmd:MD_KeywordTypeCode>
        </gmd:type>
```

```
        <gmd:thesaurusName>

      ...

     </gmd:thesaurusName>

   </gmd:MD_Keywords>

</gmd:descriptiveKeywords>
```

ISO 19115-1

```
<mdb:MD_Metadata>

  <mdb:acquisitionInformation>

    <mac:MI_AcquisitionInformation>

      <mac:platform>

        <mac:EOS_Platform id="d142e304">

          <mac:identifier>

            <mcc:MD_Identifier>

              <mcc:code>

                <gco:CharacterString>ICESat</gco:CharacterString>

              </mcc:code>

              <mcc:description>

                <gco:CharacterString>Ice, Cloud, and Land Elevation
Satellite</gco:CharacterString>

              </mcc:description>

            </mcc:MD_Identifier>

          </mac:identifier>
```

```
          <mac:description>

            <gco:CharacterString>Spacecraft</gco:CharacterString>

          </mac:description>

          <mac:instrument xlink:href="#d142e335"/>

          <mac:instrument xlink:href="#d142e423"/>

          <mac:otherPropertyType>

            <gco:RecordType
xlink:href="http://earthdata.nasa.gov/metadata/schema/eos/1.0/eos.xsd#xpointer(//element[@name='AdditionalAttributes'])">Echo Additional
Attributes</gco:RecordType>

          </mac:otherPropertyType>

          <mac:otherProperty>

            <gco:Record>

              <mac:AdditionalAttributes>

                <mac:AdditionalAttribute>

                  <mac:reference>

                    <mac:EOS_AdditionalAttributeDescription>

                      <mac:type>

                        <mac:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EOS_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</mac:EOS_AdditionalAttributeTypeCode>

                      </mac:type>

                      <mac:name>
```

```
<gco:CharacterString>OrbitInclination</gco:CharacterString>

                    </mac:name>

                    <mac:description>

                      <gco:CharacterString>Angle between the orbit
plane and the Earth's equatorial plane</gco:CharacterString>

                    </mac:description>

                    <mac:dataType>

                      <mac:EOS_AdditionalAttributeDataTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeDataTypeCode"


codeListValue="float">float</mac:EOS_AdditionalAttributeDataTypeCode
>

                    </mac:dataType>

                    <mac:parameterUnitsOfMeasure>


<gco:CharacterString>Degrees</gco:CharacterString>

                    </mac:parameterUnitsOfMeasure>

                  </mac:EOS_AdditionalAttributeDescription>

                </mac:reference>

                <mac:value>

                  <gco:CharacterString>94.0</gco:CharacterString>

                </mac:value>

              </mac:AdditionalAttribute>

               ...
```

```
              </mac:AdditionalAttributes>

            </gco:Record>

          </mac:otherProperty>

        </mac:EOS_Platform>

      </mac:platform>

    </mac:MI_AcquisitionInformation>

  </mdb:acquisitionInformation>

</mdb:MD_Metadata>
```

```
<mri:descriptiveKeywords>

        <mri:MD_Keywords>

          <mri:keyword>

            <gco:CharacterString>ICESat &gt; Ice, Cloud, and Land
Elevation Satellite</gco:CharacterString>

          </mri:keyword>

          <mri:type>

            <mri:MD_KeywordTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#MD_KeywordTypeCode"


codeListValue="platform">platform</mri:MD_KeywordTypeCode>

          </mri:type>

          <mri:thesaurusName>
```

```
            ...

          </mri:thesaurusName>

      </mri:MD_Keywords>

</mri:descriptiveKeywords>
```


EMS

AQUARIUS

Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1214591238-SCIOPS

DIF 10 - https://cmr.earthdata.nasa.gov:443/search/concepts/C186802661-LAADS

SERF - http://gcmd.gsfc.nasa.gov/mws/serf/01-buoy-99

ECHO 10 Collection - https://cmr.earthdata.nasa.gov:443/search/concepts/C1000000444-NSIDC_ECS

ECHO 10 Granule - https://cmr.earthdata.nasa.gov:443/search/concepts/G7108549-LARC_ASDC

ISO 19115-2 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1000000444-NSIDC_ECS.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record
EMS - NSIDCV0 flat file

Recommendations

Platforms should be reconciled so all keywords are controlled within the CMR through the keyword management system. To be consistent, UMM Platform structure should be used.

A.B.20.1 Instrument

Element Specification

Platform/Instrument (1..*)
Platform/Instrument/ShortName (1)
Platform/Instrument/LongName (0..1)
Platform/Instrument/Technique (0..1)
Platform/Instrument/Characteristics (0..*)
Platform/Instrument/Characteristics/Name (1)
Platform/Instrument/Characteristics/Description (1)
Platform/Instrument/Characteristics/DataType (1)
Platform/Instrument/Characteristics/Unit (1)
Platform/Instrument/Characteristics/Value (1)
Platform/Instrument/OperationalMode (0..*)

Platform/Instrument/NumberOfInstruments (0..1)

Platform/Instrument/ComposedOf/Instrument (0..*)

Description

The Instrument element is nested within the Platform element and is used to register the device that measured or recorded the data, including direct human observation. This is useful to find data from a specific instrument. Note that the use of the "Sensor" object has been removed from UMM to avoid confusion between the names "Sensor" and "Instrument" as well as rationalizing the use of Instrument with the ISO Instrument representation. To provide compatability with DIF 10 we map /DIF/Platform/Instrument/Sensor to Platform/Instrument/Instrument in UMM. For ECHO 10, we also map Sensor objects to UMM Instrument objects.

The "ComposedOf" relationship shown above provides the ability for an instrument to be composed of one of more other instruments. This hierarchical representation of Instrument composition provides the mechanism for modeling the complexity of modern instruments. The nesting

of instruments within an instrument is currently limited to 1 level and all instrument short names within a platform must be unique.

Profile Utilization

Collection, Granule, Service, Document

Cardinality

0..*

Analysis

This element is found in ECHO, GCMD, and EMS. It is controlled within GCMD but not within ECHO or EMS. ECHO and GCMD DIF 10's Instrument element includes the following sub-elements: ShortName, LongName, Technique, NumberOfSensors, Characteristics, Sensors, and OperationModes. GCMD's DIF 9 Source_Name element does not nest the Instrument sub-element or include any of the other elements found in ECHO. Some of the characteristics information is captured in the GCMD DIF 9 ancillary instrument metadata document. Because this is a newly required element in the UMM and not all collections have associated instruments, the keywords "Not Available", "Not Applicable", and "Unknown" will be added to the controlled keyword list for collections that are not associated with an instrument.

The ISO 19115-2 MI_Instrument class was extended to EOS_Instrument in order to facilitate the addition of ECHO additional attributes to the instrument descriptions.

Significant changes in UMM Version 1.3

The use of the terms "Instrument" and "Sensor" has been a source of confusion and debate throughout the evolution of ESDIS metadata standards development. GCMD's DIF standard used SensorName to represent an instrument. ECHO-10 later attempted to model the complexity

of modern instruments by creating an instrument object that can be composed of multiple sensors. During the development of UMM, both approaches were supported by creating both Instrument and Sensor objects. Beginning with Version 1.3 of UMM-Common, the Sensor object was removed in favor of using Instrument as the generalization of both Instrument and Sensor. There was little semantic difference between the objects, so removing the Sensor class while retaining the ECHO-like relationships between instruments provides a rich structure for describing the instruments provided on a modern platform and eliminates the Sensor/Instrument debate for the entire CMR community.

The ECHO model of an Instrument that is composed of Sensors is implemented in UMM by using instrument composition. Figure A.2 below shows the relationships between the Acquisition Information, Platform and Instrument objects. Note that the Instrument object now has a recursive relationship that is titled "ComposedOf". This relationship enables a hierarchy of Instrument objects where each instrument can be composed of one or more other instruments. This provides the capability to model complex instruments without resorting to a Sensor object.

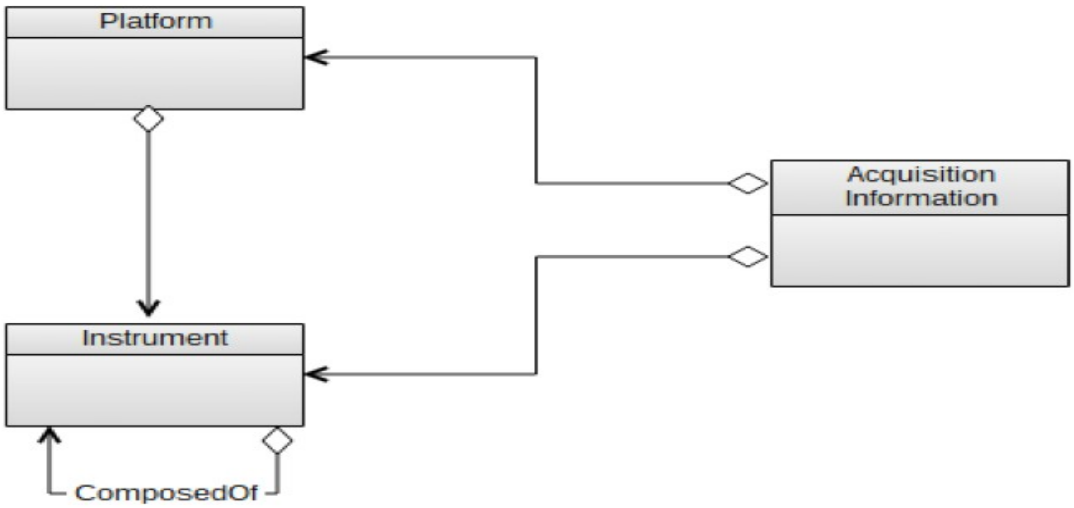


Figure A.2. Platform and Instrument Relationships

Using the ECHO 10 example from below, a UMM-C representation written in JSON, as is implemented in the CMR, would look like the following:

```
...

"Instruments": [
   {
      "ShortName": "GLAS",
```

"LongName": "Geoscience Laser Altimeter System",
"Technique": "Laser Altimetry and Light Detection and Radar",
"Characteristics": [
{
"DataType": "int",
"Description": "The width of the sensor scan as the satellite moves along the ground track.",
"Name": "SwathWidth",
"Unit": "kilometers",
"Value": "2"
}
],
"ComposedOf": {
"Instruments": [
{
"ShortName": "LA",
"LongName": "Laser Altimeter",
"Technique": "Exact Measurement of Time between Transmit Pulse and receive ground return",
"Characteristics": [
{
"DataType": "varchar",
"Description": "transmission",
"Name": "wavelength",
"Unit": "nanometer",
"Value": "1064 nm"
},
{
"DataType": "varchar",
"Description": "digitizer",
"Name": "waveform",
"Unit": "counts",
"Value": "0-255"
}
]
},
{
"ShortName": "PC",
"LongName": "Photon Counter for the 532 nm Aerosol Returns",
"Technique": "Counting of 532nm photon return in 75m bins 40km to surface",
"Characteristics": [
{
"DataType": "varchar",
"Description": "detector",

```
                "Name": "wavelength",
                "Unit": "nanometer",
                "Value": "532nm"
            }
        ]
    }
    ...
  ]
}
},
{
  "ShortName": "GPS",
  "LongName": "Global Positioning System Receiver",
  "Technique": "Radionavigation",
  "ComposedOf": {
    "Instruments": [
      {
        "ShortName": "GPS Receiver",
        "LongName": "Dual frequency GPS receiver",
        "Technique": "Pseudorange and carrier phase"
      }
    ]
  }
}
]

...
```


Mapping

DIF 9	/DIF/Sensor_Name/
DIF 10	/DIF/Platform/Instrument/ and /DIF/Platform/Instrument/Sensor
SERF	/SERF/Sensor_Name/
ECHO 10 Collection	/Collection/Platforms/Platform/Instruments/Instrument/ and / Collection/Platforms/Platform/Instruments/Instrument/Sensors/Sensor/
ECHO 10 Granule	/Granule/Platforms/Platform/Instruments/Instrument/

ISO 19115-2	/ gmi:MI_Metadata/gmi:acquisitionInformation/gmi:MI_AcquisitionInformation/gmi:instrument/eos:EOS_Instrument/ and / gmi:MI_Metadata/gmi:acquisitionInformation/gmi:MI_AcquisitionInformation/gmi:instrument/eos:EOS_Instrument/eos:sensor/eos:EOS_Sensor/ and / gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword/gco:CharacterString with / gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword/gmd:type/MD_KeywordTypeCode[@codeListValue="instrument"]
ISO 19115-1	/ mdb:MD_Metadata/mdb:acquisitionInformation/mac:MI_AcquisitionInformation/mac:instrument/eos:EOS_Instrument and / mdb:MD_Metadata/mdb:acquisitionInformation/mac:MI_AcquisitionInformation/mac:instrument/eos:EOS_Instrument/eos:sensor/eos:EOS_Sensor/ and / mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:descriptiveKeywords/mri:MD_Keywords/mri:keyword/gco:CharacterString with / mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:descriptiveKeywords/mri:MD_Keywords/mri:keyword/mri:type/mri:MD_KeywordTypeCode codeList="http://www.ngdc.noaa.gov/metadata/published/xsd/schema/resources/Codelist/gmxCodelists.xml#MD_KeywordTypeCode" codeListValue="instrument"
EMS	instrument

Examples

DIF 9

```
<Sensor_Name uuid="e5fde4c4-15cd-4278-b922-005488df096f">
```

```
  <Short_Name>GPS</Short_Name>

  <Long_Name>Global Positioning System</Long_Name>

</Sensor_Name>

<Sensor_Name uuid="029feed6-79dc-4316-b8ac-be8f1e557f89">

  <Short_Name>GPS RECEIVERS</Short_Name>

</Sensor_Name>
```


DIF 10


```
<Platform>
 <Type>Earth Observation Satellites</Type>
 <Short_Name>AQUA</Short_Name>
 <Long_Name>Earth Observing System, AQUA</Long_Name>
 <Characteristics>
  <Name>EquatorCrossingTime</Name>
  <Description>Local time of the equator crossing and direction
(ascending or descending)</Description>
  <DataType>Time/direction (ascending)</DataType>
  <Unit>Local Mean Time</Unit>
  <Value>3:30, ascending</Value>
 </Characteristics>
 <Instrument>
  <Short_Name>MODIS</Short_Name>
  <Long_Name>Moderate-Resolution Imaging
Spectroradiometer</Long_Name>
  <Technique>Imaging Spectroradiometry</Technique>
  <Sensor>
   <Short_Name>MODIS</Short_Name>
   <Long_Name>Cross-track Scanning Radiometer</Long_Name>
   <Technique>Radiometry</Technique>
  </Sensor>
 </Instrument>
</Platform>
```


SERF

```
<Sensor_Name uuid="d0cf9340-dc51-447f-a151-f6cdad265d9a">

  <Short_Name>ANEMOMETERS</Short_Name>

</Sensor_Name>
```


ECHO 10 Collection


```
<Instruments>

          <Instrument>

            <ShortName>GLAS</ShortName>

            <LongName>Geoscience Laser Altimeter
System</LongName>

            <Technique>Laser Altimetry and Light Detection and
Radar</Technique>

            <Characteristics>

              <Characteristic>

                <Name>SwathWidth</Name>

                <Description>The width of the sensor scan as the
satellite moves along

                  the ground track.</Description>

                <DataType>int</DataType>

                <Unit>kilometers</Unit>

                <Value>2</Value>

              </Characteristic>

            </Characteristics>

            <Sensors>
```

```
                ...

            </Sensors>

          </Instrument>

          <Instrument>

            <ShortName>GPS</ShortName>

            <LongName>Global Positioning System
Receiver</LongName>

            <Technique>Radionavigation</Technique>

            <Sensors>

              <Sensor>

                <ShortName>GPS Receiver</ShortName>

                <LongName>Dual frequency GPS receiver</LongName>

                <Technique>Pseudorange and carrier
phase</Technique>

              </Sensor>

            </Sensors>

          </Instrument>

        </Instruments>
```

ECHO 10 Granule

```
<Instruments>

 <Instrument>

  <ShortName>AIRMSPI INSTRUMENT</ShortName>

  <Characteristics/>
```

```
  <Sensors...</Sensors

 </Instrument>

</Instruments>
```

EOS_Extension_of_ISO_19115-2

```
<gmi:instrument>

       <eos:EOS_Instrument id="d142e335">

         <gmi:citation>

           <gmd:CI_Citation>

             <gmd:title>

               <gco:CharacterString>GLAS&gt;Geoscience Laser
Altimeter System</gco:CharacterString>

             </gmd:title>

             <gmd:date gco:nilReason="unknown"/>

           </gmd:CI_Citation>

         </gmi:citation>

         <gmi:identifier>

           <gmd:MD_Identifier>

             <gmd:code>

               <gco:CharacterString>GLAS</gco:CharacterString>

             </gmd:code>

             <gmd:description>

               <gco:CharacterString>Geoscience Laser Altimeter
System</gco:CharacterString>
```

```
            </gmd:description>

          </gmd:MD_Identifier>

        </gmi:identifier>

        <gmi:type>

          <gco:CharacterString>Laser Altimetry and Light Detection and
Radar</gco:CharacterString>

        </gmi:type>

        <gmi:description gco:nilReason="missing"/>

        <gmi:mountedOn xlink:href="#d142e304"/>

        <eos:otherPropertyType>

          <gco:RecordType
xlink:href="http://earthdata.nasa.gov/metadata/schema/eos/1.0/eos.xsd#xp
ointer(//element[@name='AdditionalAttributes'])">Echo Additional
Attributes</gco:RecordType>

        </eos:otherPropertyType>

        <eos:otherProperty>

          <gco:Record>

            <eos:AdditionalAttributes><!--Instrument Characteristic-->

              <eos:AdditionalAttribute>

                <eos:reference>

                  <eos:EOS_AdditionalAttributeDescription>

                    <eos:type>

                      <eos:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"
```

codeListValue="instrumentInformation">instrumentInformation</eos:EOS_AdditionalAttributeTypeCode>

</eos:type>

<eos:name>

<gco:CharacterString>SwathWidth</gco:CharacterString>

</eos:name>

<eos:description>

<gco:CharacterString>The width of the sensor scan as the satellite moves along the ground track.</gco:CharacterString>

</eos:description>

<eos:dataType>

<eos:EOS_AdditionalAttributeDataTypeCode codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EOS_AdditionalAttributeDataTypeCode"

codeListValue="int">int</eos:EOS_AdditionalAttributeDataTypeCode>

</eos:dataType>

<eos:parameterUnitsOfMeasure>

<gco:CharacterString>kilometers</gco:CharacterString>

</eos:parameterUnitsOfMeasure>

</eos:EOS_AdditionalAttributeDescription>

</eos:reference>

<eos:value>

<gco:CharacterString>2</gco:CharacterString>

```
                  </eos:value>

                </eos:AdditionalAttribute>

                ...

              </eos:AdditionalAttributes>

            </gco:Record>

          </eos:otherProperty>

          ...

   </eos:EOS_Instrument>

</gmi:instrument>
```

```
<gmd:descriptiveKeywords>

        <gmd:MD_Keywords>

          <gmd:keyword>

            <gco:CharacterString>GLAS &gt; Geoscience Laser Altimeter
System</gco:CharacterString>

          </gmd:keyword>

          <gmd:keyword>

            <gco:CharacterString>GPS &gt; Global Positioning System
Receiver</gco:CharacterString>

          </gmd:keyword>

          <gmd:type>

            <gmd:MD_KeywordTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#MD_KeywordTypeCode"
```

```
codeListValue="instrument">instrument</gmd:MD_KeywordTypeCode>

          </gmd:type>

    <gmd:thesaurusName>

     ...

    </gmd:thesaurusName>

  </gmd:MD_Keywords>

</gmd:descriptiveKeywords>
```

ISO 19115-1

```
<mdb:acquisitionInformation>

    <mac:MI_AcquisitionInformation>

      <mac:instrument>

        <mac:EOS_Instrument id="d142e335">

          <mac:citation>

            <cit:CI_Citation>

              <cit:title>

                <gco:CharacterString>GLAS&gt;Geoscience Laser
Altimeter System</gco:CharacterString>

              </cit:title>

              <cit:date gco:nilReason="missing"/>

            </cit:CI_Citation>

          </mac:citation>

          <mac:identifier>
```

```
          <mcc:MD_Identifier>

            <mcc:code>

              <gco:CharacterString>GLAS</gco:CharacterString>

            </mcc:code>

            <mcc:description>

              <gco:CharacterString>Geoscience Laser Altimeter
System</gco:CharacterString>

            </mcc:description>

          </mcc:MD_Identifier>

        </mac:identifier>

        <mac:type>

          <gco:CharacterString>Laser Altimetry and Light Detection and
Radar</gco:CharacterString>

        </mac:type>

        <mac:description gco:nilReason="missing"/>

        <mac:mountedOn xlink:href="#d142e304"/>

        <mac:otherPropertyType>

          <gco:RecordType
xlink:href="http://earthdata.nasa.gov/metadata/schema/eos/1.0/eos.xsd#xp
ointer(//element[@name='AdditionalAttributes'])">Echo Additional
Attributes</gco:RecordType>

        </mac:otherPropertyType>

        <mac:otherProperty>

          <gco:Record>

            <mac:AdditionalAttributes>
```

```
                <mac:AdditionalAttribute>

                  <mac:reference>

                    <mac:EOS_AdditionalAttributeDescription>

                      <mac:type>

                        <mac:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="instrumentInformation">instrumentInformation</mac:EO
S_AdditionalAttributeTypeCode>

                      </mac:type>

                      <mac:name>


<gco:CharacterString>SwathWidth</gco:CharacterString>

                      </mac:name>

                      <mac:description>

                        <gco:CharacterString>The width of the sensor scan
as the satellite moves along the ground track.</gco:CharacterString>

                      </mac:description>

                      <mac:dataType>

                        <mac:EOS_AdditionalAttributeDataTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeDataTypeCode"


codeListValue="int">int</mac:EOS_AdditionalAttributeDataTypeCode>

                      </mac:dataType>

                      <mac:parameterUnitsOfMeasure>
```

```
<gco:CharacterString>kilometers</gco:CharacterString>
                    </mac:parameterUnitsOfMeasure>
                  </mac:EOS_AdditionalAttributeDescription>
                </mac:reference>
                <mac:value>
                  <gco:CharacterString>2</gco:CharacterString>
                </mac:value>
              </mac:AdditionalAttribute>
              ...
            </mac:AdditionalAttributes>
          </gco:Record>
        </mac:otherProperty>
        <mac:sensor>
          ...
        </mac:sensor>
      </mac:EOS_Instrument>
    </mac:instrument>
--------------------------------
<mri:descriptiveKeywords>
      <mri:MD_Keywords>
        <mri:keyword>
          <gco:CharacterString>GLAS &gt; Geoscience Laser Altimeter
```

```
System</gco:CharacterString>

          </mri:keyword>

          <mri:keyword>

            <gco:CharacterString>GPS &gt; Global Positioning System
Receiver</gco:CharacterString>

          </mri:keyword>

          <mri:type>

            <mri:MD_KeywordTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#MD_KeywordTypeCode"


codeListValue="instrument">instrument</mri:MD_KeywordTypeCode>

          </mri:type>

         ....

    </mri:MD_Keywords>
 </mri:descriptiveKeywords>
```


EMS

```
AQUARIUS_RADIOMETER,AQUARIUS_SCATTEROMETER
```

Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1214591238-SCIOPS
DIF 10 - https://cmr.earthdata.nasa.gov:443/search/concepts/C186802661-LAADS
SERF - http://gcmd.gsfc.nasa.gov/mws/serf/CLIMLIST

ECHO 10 Collection - https://cmr.earthdata.nasa.gov:443/search/concepts/C1000000444-NSIDC_ECS

ECHO 10 Granule - https://cmr.earthdata.nasa.gov:443/search/concepts/G7108549-LARC_ASDC

ISO 19115-2 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1000000444-NSIDC_ECS.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

EMS - NSIDCV0 flat file

Recommendations

Instruments should be reconciled so all keywords are controlled within the CMR through the keyword management system.

A.B.21 Project

Element Specification

Project
Project/ShortName (1)
Project/Campaign (0..*)
Project/LongName (0..1)
Project/StartDate (0..1)
Project/EndDate (0..1)

Description

The project element describes the name of the scientific program, field campaign, or project from which the data were collected. This element may also cover a long term project that continuously creates new data sets - like MEaSUREs from ISCCP and NVAP or CMARES from MISR.

Project also includes the Campaign sub-element to support multiple campaigns under the same project.

Profile Utilization

Collection, Granule, Service, Document

Cardinality

0..*

Analysis

This element is found in both ECHO, where it is not controlled, and within GCMD, where it is controlled. Multiple campaigns can be associated with the same project, which is not represented in either GCMD or ECHO (keyword with no hierarchy in either format). The EMS element is mapped to UMM/Platform/ShortName; EMS "Mission" can also be mapped to UMM/Project/Campaign if applicable. EMS intends to use only one value and employ mission, platform, and project (in this order) based on the availability of the information. Because the Project element is required in the UMM-C, EMS may not have to use platform or any other element; thus, no mapping is required.

Mapping

DIF 9	/DIF/Project/
DIF 10	/DIF/Project/
SERF	/SERF/Project/
ECHO 10 Collection	/Collection/Campaigns/Campaign/
ECHO 10 Granule	/Granule/Campaigns/Campaign/
ISO 19115-2	/ gmi:MI_Metadata/gmi:acquisitionInformation/gmi:MI_AcquisitionInformation/gmi:operation/gmi:MI_Operation/ and / gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword/gco:CharacterString with / gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:keyword/gmd:type/MD_KeywordTypeCode[@codeListValue="project"]
ISO 19115-1	/ mdb:MD_Metadata/mdb:acquisitionInformation/mac:MI_AcquisitionInformation/mac:operation/mac:MI_Operation and / mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:descriptiveKeywords/mri:MD_Keywords/mri:keyword/gco:CharacterString with / mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:descriptiveKeywords/mri:MD_Keywords/mri:keyword/mri:type/mri:MD_KeywordTypeCode codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/codelists.xml#MD_KeywordTypeCode" codeListValue="project"
EMS	mission

Examples

<u>DIF 9</u>

```
<Project uuid="f560fb6c-341d-4626-969f-2978d261f161">

  <Short_Name>OBIS</Short_Name>

  <Long_Name>OCEAN BIOGEOGRAPHIC INFORMATION
SYSTEM</Long_Name>

</Project>

<Project uuid="bb4e35cc-520c-4d24-984f-d81cb2965a85">

  <Short_Name>COML</Short_Name>

  <Long_Name>CENSUS OF MARINE LIFE</Long_Name>

</Project>
```

DIF 10

```
<Project>

  <Short_Name>MEASURES</Short_Name>
  <Campaign>SO2</Campaign>
  <Long_Name>Making Earth Science Data Records for Use in Research
Environments</Long_Name>
</Project>
```

SERF

```
<Project uuid="687d4231-8da8-4236-9cc4-26d7ff198578">

   <Short_Name>UNEP/GRID</Short_Name>

   <Long_Name>UNEP/Global Resources Information
Database</Long_Name>

</Project>
```

ECHO 10 Collection

```
 <Campaigns>
  <Campaign>
    <ShortName>2009_AN_NASA</ShortName>
    <LongName>Operation IceBridge West Antarctica/Antarctic Sea Ice
```

```
2009</LongName>
    <StartDate>2009-01-01T00:00:00Z</StartDate>
    <EndDate>2009-12-31T00:00:00Z</EndDate>
  </Campaign>
  <Campaign>
    <ShortName>2010_GR_NASA</ShortName>
    <LongName>Operation IceBridge Greenland/Arctic Sea Ice
2010</LongName>
    <StartDate>2010-01-01T00:00:00Z</StartDate>
    <EndDate>2010-12-31T00:00:00Z</EndDate>
  </Campaign>
  <Campaign>
    <ShortName>2010_AN_NASA</ShortName>
    <LongName>Operation IceBridge West Antarctica/Antarctic Sea Ice
2010</LongName>
    <StartDate>2010-01-01T00:00:00Z</StartDate>
    <EndDate>2010-12-31T00:00:00Z</EndDate>
  </Campaign>
  <Campaign>
    <ShortName>2011_GR_NASA</ShortName>
    <LongName>Operation IceBridge Greenland/Arctic Sea Ice
2011</LongName>
    <StartDate>2011-01-01T00:00:00Z</StartDate>
    <EndDate>2011-12-31T00:00:00Z</EndDate>
  </Campaign>
 ...
 </Campaigns>
```


ECHO 10 Granule


```
<Campaigns><Campaign><ShortName>AIRMSPI</ShortName></Camp
aign></Campaigns>
```


ISO 19115-2


```
...

    <gmi:operation>
      <gmi:MI_Operation>
        <gmi:description>
          <gco:CharacterString>2009_AN_NASA &gt; Operation IceBridge
West Antarctica/Antarctic Sea Ice 2009 2009-01-01T00:00:00Z to 2009-12-
31T00:00:00Z</gco:CharacterString>
```

```
      </gmi:description>
      <gmi:identifier>
        <gmd:MD_Identifier>
          <gmd:code>
            <gco:CharacterString>2009_AN_NASA</gco:CharacterString>
          </gmd:code>
        </gmd:MD_Identifier>
      </gmi:identifier>
      <gmi:status/>
      <gmi:parentOperation gco:nilReason="inapplicable"/>
    </gmi:MI_Operation>
  </gmi:operation>
  <gmi:operation>
    <gmi:MI_Operation>
      <gmi:description>
        <gco:CharacterString>2010_GR_NASA &gt; Operation IceBridge
Greenland/Arctic Sea Ice 2010 2010-01-01T00:00:00Z to 2010-12-
31T00:00:00Z</gco:CharacterString>
      </gmi:description>
      <gmi:identifier>
        <gmd:MD_Identifier>
          <gmd:code>
            <gco:CharacterString>2010_GR_NASA</gco:CharacterString>
          </gmd:code>
        </gmd:MD_Identifier>
      </gmi:identifier>
      <gmi:status/>
      <gmi:parentOperation gco:nilReason="inapplicable"/>
    </gmi:MI_Operation>
  </gmi:operation>
  <gmi:operation>
    <gmi:MI_Operation>
      <gmi:description>
        <gco:CharacterString>2010_AN_NASA &gt; Operation IceBridge
West Antarctica/Antarctic Sea Ice 2010 2010-01-01T00:00:00Z to 2010-12-
31T00:00:00Z</gco:CharacterString>
      </gmi:description>
      <gmi:identifier>
        <gmd:MD_Identifier>
          <gmd:code>
            <gco:CharacterString>2010_AN_NASA</gco:CharacterString>
          </gmd:code>
        </gmd:MD_Identifier>
      </gmi:identifier>
      <gmi:status/>
```

```
      <gmi:parentOperation gco:nilReason="inapplicable"/>
     </gmi:MI_Operation>
    </gmi:operation>
    <gmi:operation>
     <gmi:MI_Operation>
      <gmi:description>
       <gco:CharacterString>2011_GR_NASA &gt; Operation IceBridge
Greenland/Arctic Sea Ice 2011 2011-01-01T00:00:00Z to 2011-12-
31T00:00:00Z</gco:CharacterString>
      </gmi:description>
      <gmi:identifier>
       <gmd:MD_Identifier>
        <gmd:code>
         <gco:CharacterString>2011_GR_NASA</gco:CharacterString>
        </gmd:code>
       </gmd:MD_Identifier>
      </gmi:identifier>
      <gmi:status/>
      <gmi:parentOperation gco:nilReason="inapplicable"/>
     </gmi:MI_Operation>
    </gmi:operation>

...

----------------------

    <gmd:descriptiveKeywords>
     <gmd:MD_Keywords>
      <gmd:keyword>
       <gco:CharacterString>2009_AN_NASA &gt; Operation IceBridge
West Antarctica/Antarctic Sea Ice 2009</gco:CharacterString>
      </gmd:keyword>
      <gmd:keyword>
       <gco:CharacterString>2010_GR_NASA &gt; Operation IceBridge
Greenland/Arctic Sea Ice 2010</gco:CharacterString>
      </gmd:keyword>
      <gmd:keyword>
       <gco:CharacterString>2010_AN_NASA &gt; Operation IceBridge
West Antarctica/Antarctic Sea Ice 2010</gco:CharacterString>
      </gmd:keyword>
      <gmd:keyword>
       <gco:CharacterString>2011_GR_NASA &gt; Operation IceBridge
Greenland/Arctic Sea Ice 2011</gco:CharacterString>
      </gmd:keyword>
      ...
```

```
      </gmd:keyword>
      <gmd:type>
        <gmd:MD_KeywordTypeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#MD_KeywordTypeCode"
codeListValue="project">project</gmd:MD_KeywordTypeCode>
      </gmd:type>
      <gmd:thesaurusName>
        <gmd:CI_Citation>
          <gmd:title>
            <gco:CharacterString>NASA/GCMD Project
Keywords</gco:CharacterString>
          </gmd:title>
          <gmd:date gco:nilReason="unknown"/>
          <gmd:citedResponsibleParty>
            ...
          </gmd:citedResponsibleParty>
        </gmd:CI_Citation>
      </gmd:thesaurusName>
    </gmd:MD_Keywords>
  </gmd:descriptiveKeywords>
```

ISO 19115-1

```
...

<mac:operation>

  <mac:MI_Operation>

    <mac:description>

      <gco:CharacterString>2009_AN_NASA &gt; Operation IceBridge
West Antarctica/Antarctic Sea Ice 2009 2009-01-01T00:00:00Z to 2009-12-
31T00:00:00Z</gco:CharacterString>

    </mac:description>

    <mac:identifier>

      <mcc:MD_Identifier>
```

```
        <mcc:code>
          <gco:CharacterString>2009_AN_NASA</gco:CharacterString>
        </mcc:code>
      </mcc:MD_Identifier>
    </mac:identifier>
    <mac:status/>
    <mac:parentOperation gco:nilReason="inapplicable"/>
  </mac:MI_Operation>
</mac:operation>
<mac:operation>
  <mac:MI_Operation>
    <mac:description>
      <gco:CharacterString>2010_GR_NASA &gt; Operation IceBridge Greenland/Arctic Sea Ice 2010 2010-01-01T00:00:00Z to 2010-12-31T00:00:00Z</gco:CharacterString>
    </mac:description>
    <mac:identifier>
      <mcc:MD_Identifier>
        <mcc:code>
          <gco:CharacterString>2010_GR_NASA</gco:CharacterString>
        </mcc:code>
      </mcc:MD_Identifier>
    </mac:identifier>
```

```
    <mac:status/>

    <mac:parentOperation gco:nilReason="inapplicable"/>

  </mac:MI_Operation>

</mac:operation>

<mac:operation>

  <mac:MI_Operation>

    <mac:description>

      <gco:CharacterString>2010_AN_NASA &gt; Operation IceBridge
West Antarctica/Antarctic Sea Ice 2010 2010-01-01T00:00:00Z to 2010-12-
31T00:00:00Z</gco:CharacterString>

    </mac:description>

    <mac:identifier>

      <mcc:MD_Identifier>

        <mcc:code>

          <gco:CharacterString>2010_AN_NASA</gco:CharacterString>

        </mcc:code>

      </mcc:MD_Identifier>

    </mac:identifier>

    <mac:status/>

    <mac:parentOperation gco:nilReason="inapplicable"/>

  </mac:MI_Operation>

</mac:operation>

<mac:operation>
```

```
  <mac:MI_Operation>

    <mac:description>

      <gco:CharacterString>2011_GR_NASA &gt; Operation IceBridge
Greenland/Arctic Sea Ice 2011 2011-01-01T00:00:00Z to 2011-12-
31T00:00:00Z</gco:CharacterString>

    </mac:description>

    <mac:identifier>

      <mcc:MD_Identifier>

        <mcc:code>

          <gco:CharacterString>2011_GR_NASA</gco:CharacterString>

        </mcc:code>

      </mcc:MD_Identifier>

    </mac:identifier>

    <mac:status/>

    <mac:parentOperation gco:nilReason="inapplicable"/>

  </mac:MI_Operation>

</mac:operation>

...

----------------------------------

<mri:descriptiveKeywords>

      <mri:MD_Keywords>

        <mri:keyword>

          <gco:CharacterString>2009_AN_NASA &gt; Operation
IceBridge West Antarctica/Antarctic Sea Ice 2009</gco:CharacterString>
```

```
        </mri:keyword>
       <mri:keyword>
        <gco:CharacterString>2010_GR_NASA &gt; Operation IceBridge
Greenland/Arctic Sea Ice 2010</gco:CharacterString>
       </mri:keyword>
       <mri:keyword>
        <gco:CharacterString>2010_AN_NASA &gt; Operation IceBridge
West Antarctica/Antarctic Sea Ice 2010</gco:CharacterString>
       </mri:keyword>
       <mri:keyword>
        <gco:CharacterString>2011_GR_NASA &gt; Operation IceBridge
Greenland/Arctic Sea Ice 2011</gco:CharacterString>

       </mri:keyword>

      ....



        <mri:type>

          <mri:MD_KeywordTypeCode
codeList="http://standards.iso.org/iso/19115/resources/Codelist/cat/codelis
ts.xml#MD_KeywordTypeCode"codeListValue="project">project</mri:MD
_KeywordTypeCode>

        </mri:type>

           ...

    </mri:MD_Keywords>

</mri:descriptiveKeywords>
```


EMS_Flat_File

```
IceBridge
```

Source_Data_Information:

DIF 9 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1214591412-SCIOPS
DIF 10 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1224770842-

GES_DISC
SERF - http://gcmd.gsfc.nasa.gov/mws/serf/01-Arctic_Atlas-00

ECHO 10 Collection - https://cmr.earthdata.nasa.gov:443/search/concepts/C190766021-NSIDC_ECS
ECHO 10 Granule - https://cmr.earthdata.nasa.gov:443/search/concepts/G7108549-LARC_ASDC

ISO 19115-2 - https://cmr.earthdata.nasa.gov:443/search/concepts/C190766021-NSIDC_ECS.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

EMS - NSIDCV0 flat file

Recommendations

Project keywords should be reconciled with the GCMD project keywords so all keywords are controlled within the CMR through the keyword management system.

A.B.22 Temporal Extent

Element Specification

TemporalExtent/TemporalRangeType (0..1)
TemporalExtent/PrecisionOfSeconds (0..1)
TemporalExtent/EndsAtPresentFlag (0..1)

{Choice of 1}
1) TemporalExtent/RangeDateTime (0..*)

TemporalExtent/RangeDateTime/BeginningDateTime (1)

TemporalExtent/RangeDateTime/EndingDateTime (0..1)

2) TemporalExtent/SingleDateTime (0..*)

3) TemporalExtent/PeriodicDateTime (1..*)

TemporalExtent/PeriodicDateTime/Name (1)

TemporalExtent/PeriodicDateTime/StartDate (1)

TemporalExtent/PeriodicDateTime/EndDate (1)

TemporalExtent/PeriodicDateTime/DurationUnit (1)

TemporalExtent/PeriodicDateTime/DurationValue (1)

TemporalExtent/PeriodicDateTime/PeriodCycleDurationUnit (1)

TemporalExtent/PeriodicDateTime/PeriodCycleDurationValue (1)

Description

This element contains sub-elements, which describe the time period in which the data set was acquired or when the measurements occured for a specific collection. This extent can be represented in a variety of ways: RangeDateTime, SingleDateTime, or PeriodicDateTime.

Profile Utilization

Collection, Granule

Cardinality

1..*

Analysis

This element is found in both ECHO and GCMD. The GCMD Temporal_Coverage element is described here: http://gcmd.gsfc.nasa.gov/add/difguide/temporal_coverage.html and supports range date and times.

ECHO's Temporal element is defined here: https://api.echo.nasa.gov/ingest/schema/collection/Temporal.html and supports single date and time, range date and times, and period date and times, among other attributes. The Temporal element also supports temporal resolution data.

Mapping

DIF 9	/DIF/Temporal_Coverage
DIF 10	{Choice of one} 1) /DIF/Temporal_Coverage/Range_DateTime/ 2) /DIF/Temporal_Coverage/Single_DateTime/ 3) /DIF/Temporal_Coverage/Periodic_DateTime/
SERF	N/A
ECHO 10 Collection	/Collection/Temporal/TimeType /Collection/Temporal/DateType

	/Collection/Temporal/TemporalRangeType /Collection/Temporal/PrecisionOfSeconds /Collection/Temporal/EndsAtPresentFlag {Choice of one} 1) /Collection/Temporal/RangeDateTime 2) /Collection/Temporal/SingleDateTime 3) /Collection/Temporal/PeriodicDateTime
ECHO 10 Granule	{Choice of one} 1)/Granule/Temporal/RangeDateTime/BeginningDateTime /Granule/Temporal/RangeDateTime/EndingDateTime 2)/Granule/Temporal/SingleDateTime
ISO 19115-2	/ gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:description/gco:CharacterString - TimeType and TemporalRangeType / gmi:MI_Metadata/gmd:dataQualityInfo/gmd:DQ_DataQuality/gmd:report/gmd:DQ_AccuracyOfATimeMeasurement/gmd:measureIdentification/gmd:MD_Identifier/gmd:code/gco:CharacterString PrecisionOfSeconds / gmi:MI_Metadata/gmd:dataQualityInfo/gmd:DQ_DataQuality/gmd:report/gmd:DQ_AccuracyOfATimeMeasurement/gmd:result/gmd:DQ_QuantitativeResult/gmd:value/gco:Record xsi:type="gco:Real_PropertyType"/gco:Real - PrecisionOfSeconds Value 1)/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:temporalElement/gmd:EX_TemporalExtent/gmd:extent/gml:TimePeriod/gml:beginPosition /gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:temporalElement/gmd:EX_TemporalExtent/gmd:extent/gml:TimePeriod/gml:endPosition 2/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:temporalElement/gmd:EX_TemporalExtent/gmd:extent/gml:TimeInstant/gml:timePosition
ISO 19115-1	/ mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:extent/gex:EX_Extent/gex:description/gco:CharacterString / mdb:MD_Metadata/mdb:dataQualityInfo/mdq:DQ_DataQuality/mdq:report/mdq:DQ_AccuracyOfATimeMeasurement/mdq:measure/mdq:DQ_MeasureReference/mdq:measureIdentification/mcc:MD_Identifier/mcc:code/gco:CharacterString PrecisionOfSeconds

	/ mdb:MD_Metadata/mdb:dataQualityInfo/mdq:DQ_DataQuality/mdq:report/mdq:DQ_AccuracyOfATimeMeasurement/mdq:result/mdq:DQ_QuantitativeResult/mdq:value/gco:Record xsi:type="gco:Real_PropertyType"/gco:Real PrecisionOfSeconds Value 1)/mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:extent/gex:EX_Extent/gex:temporalElement/gex:EX_TemporalExtent/gex:extent/gml:TimePeriod/gml:beginPosition / mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:extent/gex:EX_Extent/gex:temporalElement/gex:EX_TemporalExtent/gex:extent/gml:TimePeriod/gml:endPosition 2)/mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:extent/gex:EX_Extent/gex:temporalElement/gex:EX_TemporalExtent/gex:extent/ gml:TimeInstant/gml:timePosition
EMS	N/A

Examples

DIF 9

```
<Temporal_Coverage>

  <Start_Date>2005- 10-29</Start_Date>

  <Stop_Date>2005- 11-21</Stop_Date>

</Temporal_Coverage>
```

DIF 10

```
<Temporal_Coverage>
 <Time_Type>UTC</Time_Type>
 <Date_Type>Gregorian</Date_Type>
 <Temporal_Range_Type>Continuous Range</Temporal_Range_Type>
 <Precision_Of_Seconds>1</Precision_Of_Seconds>
 <Range_DateTime>
   <Beginning_Date_Time>2002- 05-
04T00:00:00.000Z</Beginning_Date_Time>
 </Range_DateTime>
</Temporal_Coverage>
```

ECHO 10 Collection

```
<Temporal>
  <TimeType>Universal Time</TimeType>
  <DateType>Eastern Daylight</DateType>
  <TemporalRangeType>Long Range</TemporalRangeType>
  <PrecisionOfSeconds>1</PrecisionOfSeconds>
  <EndsAtPresentFlag>true</EndsAtPresentFlag>
  <RangeDateTime>
    <BeginningDateTime>1990-01-01T00:00:00Z</BeginningDateTime>
    <EndingDateTime>2003-12-31T00:00:00Z</EndingDateTime>
  </RangeDateTime>
</Temporal>
```

ECHO 10 Granule

```
<RangeDateTime>
 <BeginningDateTime>2006-01-15T00:00:00.000Z</BeginningDateTime>
 <EndingDateTime>2006-01-23T00:00:00.000Z</EndingDateTime>
</RangeDateTime>


<SingleDateTime>2002-02-27T23:49:24.0000000Z</SingleDateTime>
```

ISO 19115-2

```
<gmd:extent>
```

```
        <gmd:EX_Extent id="boundingExtent">

          <gmd:description>

            <gco:CharacterString>SpatialCoverageType=Horizontal,
SpatialInfoCoverageType=Horizontal,
SpatialGranuleSpatialRepresentation=CARTESIAN, Temporal Range
Type=Long Range, Time Type=Universal Time</gco:CharacterString>

          </gmd:description>

          <!--Bounding Rectangle-->><gmd:geographicElement>

            <gmd:EX_GeographicBoundingBox>

              <gmd:westBoundLongitude>

                <gco:Decimal>-180</gco:Decimal>

              </gmd:westBoundLongitude>

              <gmd:eastBoundLongitude>

                <gco:Decimal>180</gco:Decimal>

              </gmd:eastBoundLongitude>

              <gmd:southBoundLatitude>

                <gco:Decimal>-55</gco:Decimal>

              </gmd:southBoundLatitude>

              <gmd:northBoundLatitude>

                <gco:Decimal>90</gco:Decimal>

              </gmd:northBoundLatitude>

            </gmd:EX_GeographicBoundingBox>

          </gmd:geographicElement>

          <gmd:temporalElement><!--RangeDateTime--
```

```
><gmd:EX_TemporalExtent id="boundingTemporalExtent">

            <gmd:extent>

              <gml:TimePeriod gml:id="w16aac43c11">

                <gml:beginPosition frame="Eastern Daylight">1990-01-
01T00:00:00Z</gml:beginPosition>

                <gml:endPosition frame="Eastern Daylight"
indeterminatePosition="now"/>

              </gml:TimePeriod>

            </gmd:extent>

           </gmd:EX_TemporalExtent>

         </gmd:temporalElement>

       </gmd:EX_Extent>

      </gmd:extent>



<gmd:dataQualityInfo>

    <gmd:DQ_DataQuality>

      <gmd:scope>

        <gmd:DQ_Scope>

          <gmd:level>

            <gmd:MD_ScopeCode
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#MD_ScopeCode"


codeListValue="series">series</gmd:MD_ScopeCode>

          </gmd:level>
```

```
        </gmd:DQ_Scope>
      </gmd:scope>
      <gmd:report>
        <gmd:DQ_AccuracyOfATimeMeasurement>
          <gmd:measureIdentification>
            <gmd:MD_Identifier>
              <gmd:code>
<gco:CharacterString>PrecisionOfSeconds</gco:CharacterString>
              </gmd:code>
            </gmd:MD_Identifier>
          </gmd:measureIdentification>
          <gmd:result>
            <gmd:DQ_QuantitativeResult>
              <gmd:valueUnit/>
              <gmd:value>
                <gco:Record xsi:type="gco:Real_PropertyType">
                  <gco:Real>1</gco:Real>
                </gco:Record>
              </gmd:value>
            </gmd:DQ_QuantitativeResult>
          </gmd:result>
        </gmd:DQ_AccuracyOfATimeMeasurement>
```

```
      </gmd:report>
```

ISO 19115-1

```
<mri:extent>

        <gex:EX_Extent id="boundingExtent">

          <gex:description>

            <gco:CharacterString>SpatialCoverageType=Horizontal,
SpatialInfoCoverageType=Horizontal,
SpatialGranuleSpatialRepresentation=CARTESIAN, Temporal Range
Type=Long Range, Time Type=Universal Time</gco:CharacterString>

          </gex:description>

          <gex:geographicElement>

            <gex:EX_GeographicBoundingBox>

              <gex:westBoundLongitude>

                <gco:Decimal>-180</gco:Decimal>

              </gex:westBoundLongitude>

              <gex:eastBoundLongitude>

                <gco:Decimal>180</gco:Decimal>

              </gex:eastBoundLongitude>

              <gex:southBoundLatitude>

                <gco:Decimal>-55</gco:Decimal>

              </gex:southBoundLatitude>

              <gex:northBoundLatitude>

                <gco:Decimal>90</gco:Decimal>
```

```
            </gex:northBoundLatitude>

          </gex:EX_GeographicBoundingBox>

        </gex:geographicElement>

        <gex:temporalElement>

          <gex:EX_TemporalExtent id="boundingTemporalExtent">

            <gex:extent>

              <gml:TimePeriod gml:id="d94e190">

                <gml:beginPosition frame="Eastern Daylight">1990-01-
01T00:00:00Z</gml:beginPosition>

                <gml:endPosition frame="Eastern Daylight"
indeterminatePosition="now"/>

              </gml:TimePeriod>

            </gex:extent>

          </gex:EX_TemporalExtent>

        </gex:temporalElement>

      </gex:EX_Extent>

    </mri:extent>



<mdb:dataQualityInfo>

  <mdq:DQ_DataQuality>

    <mdq:scope>

      <mcc:MD_Scope>

        <mcc:level>

          <mcc:MD_ScopeCode
```

```
codeList="http://www.isotc211.org/2005/resources/Codelist/gmxCodelists.
xml#MD_ScopeCode"


codeListValue="series">series</mcc:MD_ScopeCode>

          </mcc:level>

        </mcc:MD_Scope>

      </mdq:scope>

      <mdq:report>

        <mdq:DQ_AccuracyOfATimeMeasurement>

          <mdq:measure>

            <mdq:DQ_MeasureReference>

              <mdq:measureIdentification>

                <mcc:MD_Identifier>

                  <mcc:code>


<gco:CharacterString>PrecisionOfSeconds</gco:CharacterString>

                  </mcc:code>

                </mcc:MD_Identifier>

              </mdq:measureIdentification>

            </mdq:DQ_MeasureReference>

          </mdq:measure>

          <mdq:evaluationMethod>

            <mdq:DQ_FullInspection>

              <mdq:evaluationProcedure/>
```

```
          </mdq:DQ_FullInspection>
        </mdq:evaluationMethod>
        <mdq:result>
          <mdq:DQ_QuantitativeResult>
            <mdq:value>
              <gco:Record xsi:type="gco:Real_PropertyType">
                <gco:Real>1</gco:Real>
              </gco:Record>
            </mdq:value>
            <mdq:valueUnit/>
          </mdq:DQ_QuantitativeResult>
        </mdq:result>
      </mdq:DQ_AccuracyOfATimeMeasurement>
    </mdq:report>
```


Source Data Information:

DIF 9 - https://cmr.earthdata.nasa.gov:443/search/concepts/C1214591238-SCIOPS
DIF 10 - https://cmr.earthdata.nasa.gov:443/search/concepts/C90764068-LAADS

ECHO 10 Collection - https://cmr.earthdata.nasa.gov:443/search/concepts/C179001954- SEDAC
ECHO 10 Granule - https://cmr.earthdata.nasa.gov:443/search/concepts/G187435093- LARC

ISO 19115-2 - https://cmr.earthdata.nasa.gov:443/search/concepts/C179001954-SEDAC.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

Recommendations

ECHO's Temporal element should be adopted by the UMM - as it is a superset of what GCMD supports and can capture single date and times, range date and times, and periodic date and times, as well as temporal resolution data.

Finally, any dates, times, or temporal ranges specified in the TemporalCoverage element should use the ISO 8601 format. Unknown dates can also be represented in the ISO 8601 format.

There are several elements in the ECHO schema (such as /Collection/Temporal/DateType and TimeType) that need cleanup, revision, or deprecation.

A.B.23 Spatial Extent

Element Specification

SpatialExtent/SpatialCoverageType (0..1) <HORIZONTAL, VERTICAL, ORBITAL, HORIZONTAL_VERTICAL, ORBITAL_VERTICAL>
SpatialExtent/HorizontalSpatialDomain (0..1)

SpatialExtent/HorizontalSpatialDomain/ZoneIdentifier (0..1)
SpatialExtent/HorizontalSpatialDomain/Geometry (1)
SpatialExtent/HorizontalSpatialDomain/Geometry/CoordinateSystem (1) <CARTESIAN, GEODETIC>

{choice of 1..*}

1)SpatialExtent/HorizontalSpatialDomain/Geometry/Points

2)SpatialExtent/HorizontalSpatialDomain/Geometry/BoundingRectangles

3)SpatialExtent/HorizontalSpatialDomain/Geometry/GPolygons

4)SpatialExtent/HorizontalSpatialDomain/Geometry/Lines

SpatialExtent/VerticalSpatialDomain (0..*)

SpatialExtent/VerticalSpatialDomain/Type (1)

SpatialExtent/VerticalSpatialDomain/Value (1)

SpatialExtent/VerticalSpatialDomain/Unit (1)

SpatialExtent/OrbitParameters (0..1)

SpatialExtent/OrbitParameters/SwathWidth (1)

SpatialExtent/OrbitParameters/Period (1)

SpatialExtent/OrbitParameters/InclinationAngle (1)

SpatialExtent/OrbitParameters/NumberOfOrbits (1)

SpatialExtent/OrbitParameters/StartCircularLatitude (0..1)

SpatialExtent/GranuleSpatialRepresentation (1) <CARTESIAN, GEODETIC, ORBIT, NO_SPATIAL>

Description

Specifies the geographic and vertical (altitude, depth) coverage of the data.

Profile Utilization

Collection, Granule

Cardinality

1

Analysis

This element is found in both GCMD and ECHO. Spatial metadata describes the area of Earth that a collection covers. In DIF 9, the spatial extent is represented as a bounding box using a Cartesian coordinate system. In ECHO, spatial data can be represented in both Cartesian and Geodetic coordinate systems or as orbits. The Cartesian and Geodetic (World Geodetic System (WGS) 84) coordinate systems accept spatial data types of Point, Line, Bounding Rectangle and Polygon. See ECHO's Data Partner User Guide for more details on ECHO's support for spatial data.

Mapping

DIF 9	The first four are Bounding_Rectangle in DIF 10. /DIF/Spatial_Coverage/Southernmost_Latitude /DIF/Spatial_Coverage/Northernmost_Latitude /DIF/Spatial_Coverage/Westernmost_Longitude /DIF/Spatial_Coverage/Easternmost_Longitude Minimum_Altitude Maximum_Altitude Maximum_Depth or /DIF/Extended_Metadata for more complicated geometries
DIF 10	/DIF/Spatial_Coverage/Spatial_Coverage_Type /DIF/Spatial_Coverage/Granule_Spatial_Representation /DIF/Spatial_Coverage/Zone_Identifier /DIF/Spatial_Coverage/Geometry/Coordinate_System {Choice of 1} 1)/DIF/Spatial_Coverage/Geometry/Bounding_Rectangle 2)/DIF/Spatial_Coverage/Geometry/Point 3)/DIF/Spatial_Coverage/Geometry/Line 4)/DIF/Spatial_Coverage/Geometry/Polygon /DIF/Spatial_Coverage/Orbit_Parameters/Swath_Width /DIF/Spatial_Coverage/Orbit_Parameters/Period /DIF/Spatial_Coverage/Orbit_Parameters/Inclination_Angle /DIF/Spatial_Coverage/Orbit_Parameters/Number_Of_Orbits /DIF/Spatial_Coverage/Orbit_Parameters/Start_Circular_Latitude /DIF/Spatial_Coverage/Vertical_Spatial_Info/Type /DIF/Spatial_Coverage/Vertical_Spatial_Info/Value /DIF/Spatial_Coverage/Minimum_Altitude /DIF/Spatial_Coverage/Maximum_Altitude /DIF/Spatial_Coverage/Altitude_Unit /DIF/Spatial_Coverage/Minimum_Depth /DIF/Spatial_Coverage/Maximum_Depth /DIF/Spatial_Coverage/Depth_Unit /DIF/Spatial_Coverage/Spatial_Info
SERF	N/A
ECHO 10 Collection	/Collection/Spatial/SpatialCoverageType /Collection/Spatial/HorizontalSpatialDomain /Collection/Spatial/HorizontalSpatialDomain/ZoneIdentifier / Collection/Spatial/HorizontalSpatialDomain/Geometry/CoordinateSystem

	{Choice of 1..*} 1) /Collection/Spatial/HorizontalSpatialDomain/Geometry/Point 2) /Collection/Spatial/HorizontalSpatialDomain/Geometry/BoundingRectagle 3) /Collection/Spatial/HorizontalSpatialDomain/Geometry/GPolygon 4) /Collection/Spatial/HorizontalSpatialDomain/Geometry/Line /Collection/Spatial/VerticalSpatialDomain /Collection/Spatial/VerticalSpatialDomain/Type /Collection/Spatial/VerticalSpatialDomain/Value /Collection/Spatial/OrbitParameters/SwathWidth /Collection/Spatial/OrbitParameters/Period /Collection/Spatial/OrbitParameters/InclinationAngle /Collection/Spatial/OrbitParameters/NumberOfOrbits /Collection/Spatial/OrbitParameters/StartCircularLatitude /Collection/Spatial/GranuleSpatialRepresentation
ECHO 10 Granule	/Granule/Spatial/VerticalSpatialDomains/VerticalSpatialDomain/Type /Granule/Spatial/VerticalSpatialDomains/VerticalSpatialDomain/Value OPTION 1)/Granule/Spatial/HorizontalSpatialDomain/Geometry/Point/PointLongitude /Granule/Spatial/HorizontalSpatialDomain/Geometry/Point/PointLatitude 2)/Granule/Spatial/HorizontalSpatialDomain/Geometry/Line/Point/PointLongitude /Granule/Spatial/HorizontalSpatialDomain/Geometry/Line/Point/PointLatitude 3)/Granule/Spatial/HorizontalSpatialDomain/Geometry/GPolygon/Boundary/Point/PointLongitude / Granule/Spatial/HorizontalSpatialDomain/Geometry/GPolygon/Boundary/Point/PointLatitude 4)/Granule/Spatial/HorizontalSpatialDomain/Geometry/BoundingRectangle/WestBoundingCoordinate / Granule/Spatial/HorizontalSpatialDomain/Geometry/BoundingRectangle/NorthBoundingCoordinate / Granule/Spatial/HorizontalSpatialDomain/Geometry/BoundingRectangle/EastBoundingCoordinate / Granule/Spatial/HorizontalSpatialDomain/Geometry/BoundingRectangle/SouthBoundingCoordinate

	5)/Granule/Spatial/HorizontalSpatialDomain/Geometry/BoundingRectangle/CenterPoint/PointLongitude /Granule/Spatial/HorizontalSpatialDomain/Geometry/BoundingRectangle/CenterPoint/PointLatitude 6)/Granule/Spatial/HorizontalSpatialDomain/Geometry/GPolygon/CenterPoint/PointLongitude / Granule/Spatial/HorizontalSpatialDomain/Geometry/GPolygon/CenterPoint/PointLatitude 7)/Granule/Spatial/HorizontalSpatialDomain/Geometry/GPolygon/Boundary with /Granule/Spatial/HorizontalSpatialDomain/Geometry/GPolygon/ExclusiveZone/Boundary 8)/Granule/Spatial/HorizontalSpatialDomain/Orbit
ISO 19115-2	/ gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:description/gco:CharacterString with format: VerticalSpatialDomainType= {type}, VerticalSpatialDomainValue= {value} BASE_XPATH=/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:geographicElement This section is used by collections – used by granules options 1-7 BASE_XPATH/gmd:EX_GeographicBoundingBox/gmd:westBoundLongitude/gco:Decimal BASE_XPATH/gmd:EX_GeographicBoundingBox/gmd:eastBoundLongitude/gco:Decimal BASE_XPATH/gmd:EX_GeographicBoundingBox/gmd:southBoundLatitude/gco:Decimal BASE_XPATH/gmd:EX_GeographicBoundingBox/gmd:northBoundLatitude/gco:Decimal and BASE_XPATH/gmd:EX_BoundingPolygon/gmd:polygon/gml:Point/gml:pos - Used by Granule Option 1,5 or BASE_XPATH/gmd:EX_BoundingPolygon/gmd:polygon/gml:LineString/gml:posList - Used by Granule Option 2,6 or BASE_XPATH/gmd:EX_BoundingPolygon/gmd:polygon/gml:Polygon/gml:exterior/gml:LinearRing/gml:posList - Used by Granule Option 3,6,7

	BASE_XPATH/gmd:EX_BoundingPolygon/gmd:polygon/gml:Polygon/gml:exterior/gml:LinearRing/gml:posList - Used by Granule Option 7 BASE_XPATH/gmd:EX_BoundingPolygon/gmd:extentTypeCode/gco:Boolean set to 0 (Holes) - Used by Granule Option 7 Granule Option 8 / gmi:MI_Metadata/gmi:acquisitionInformation/gmi:MI_AcquisitionInformation/gmi:platform/eos:EOS_Platform/eos:otherProperty/gco:Record/eos:AdditionalAttributes/eos:AdditionalAttribute/eos:value/gco:CharacterString with eos:EOS_AdditionalAttributeTypeCode[@codeListValue="platformInformation"]
ISO 19115-1	/ mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:extent/gex:EX_Extent[@id='boundingExtent']/gex:description/gco:CharacterString with format: VerticalSpatialDomainType= {type}, VerticalSpatialDomainValue= {value} BASE_XPATH=/mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:extent/EX_Extent[@id='boundingExtent']/gex:geographicElement/ This section is used by collections – used by granules options 1-7 / BASE_XPATH/gex:EX_GeographicBoundingBox/gex:westBoundLongitude/gco:Decimal / BASE_XPATH/gex:EX_GeographicBoundingBox/gex:eastBoundLongitude/gco:Decimal / BASE_XPATH/gex:EX_GeographicBoundingBox/gex:southBoundLatitude/gco:Decimal / BASE_XPATH/gex:EX_GeographicBoundingBox/gex:northBoundLatitude/gco:Decimal and /BASE_XPATH/gex:EX_BoundingPolygon/gex:polygon/gml:Point/gml:pos - Used by Granule Option 1,5 / BASE_XPATH/gex:EX_BoundingPolygon/gex:polygon/gml:LineString/gml:posList - Used by Granule Option 2,6

	BASE_XPATH/gex:EX_BoundingPolygon/gex:polygon/gml:Polygon/gml:exterior/gml:LinearRing/gml:posList - Used by Granule Option 3,6,7 BASE_XPATH/gex:EX_BoundingPolygon/gex:polygon/gml:Polygon/gml:interior/gml:LinearRing/gml:posList - Used by Granule Option 7 Granule Option 8 / mdb:MD_Metadata/mdb:acquisitionInformation/mac:MI_AcquisitionInformation/mac:platform/eos:EOS_Platform/mac:otherProperty/gco:Record/mac:AdditionalAttributes/mac:AdditionalAttribute/mac:value/gco:CharacterString with eos:EOS_AdditionalAttributeTypeCode[@codeListValue="platformInformation"] eos:EOS_AdditionalAttributeTypeCode[@codeListValue="AscendingCrossing "] eos:EOS_AdditionalAttributeTypeCode[@codeListValue="StartLat"] eos:EOS_AdditionalAttributeTypeCode[@codeListValue="StartDirection"] eos:EOS_AdditionalAttributeTypeCode[@codeListValue="EndLat"] eos:EOS_AdditionalAttributeTypeCode[@codeListValue="EndDirection"]
EMS	N/A

Examples

DIF 9

```
<Spatial_Coverage>

  <Southernmost_Latitude>- 78.0</Southernmost_Latitude>

  <Northernmost_Latitude>- 78.0</Northernmost_Latitude>

  <Westernmost_Longitude>- 178.0</Westernmost_Longitude>

  <Easternmost_Longitude>- 178.0</Easternmost_Longitude>

</Spatial_Coverage>
```

DIF 10

```
<Spatial_Coverage>
  <Spatial_Coverage_Type>Horizontal</Spatial_Coverage_Type>
    <Geometry>
      <Coordinate_System>CARTESIAN</Coordinate_System>
      <Bounding_Rectangle>
        <Southernmost_Latitude>20</Southernmost_Latitude>
        <Northernmost_Latitude>53</Northernmost_Latitude>
        <Westernmost_Longitude>- 130</Westernmost_longituge>
        <Easternmost_Longitude>- 60</Easternmost_Longitude>
      </Bounding_Rectangle>
    </Geometry>
<Granule_Spatial_Representation>CARTESIAN</Granule_Spatial_Represe
ntation>
</Spatial_Coverage>
```

ECHO 10 Collection

```
<Spatial>
  <SpatialCoverageType>Horizontal</SpatialCoverageType>
  <HorizontalSpatialDomain>
    <Geometry>
      <CoordinateSystem>CARTESIAN</CoordinateSystem>
      <BoundingRectangle>
        <WestBoundingCoordinate>- 130</WestBoundingCoordinate>
```

```
        <NorthBoundingCoordinate>53</NorthBoundingCoordinate>

        <EastBoundingCoordinate>- 60</EastBoundingCoordinate>

        <SouthBoundingCoordinate>20</SouthBoundingCoordinate>

      </BoundingRectangle>

    </Geometry>

  </HorizontalSpatialDomain>


<GranuleSpatialRepresentation>CARTESIAN</GranuleSpatialRepresentat
ion>

</Spatial>
```

ECHO 10 Granule

```
<VerticalSpatialDomain>

  <Type>Maximum Altitude</Type>

  <Value>0.1mb, or appr. 50km</Value>

</VerticalSpatialDomain>



<Spatial>

   ...

   <HorizontalSpatialDomain>

    <ZoneIdentifier>Universal Transverse Mercator
(UTM)</ZoneIdentifier>

   </HorizontalSpatialDomain>

    ...
```

```
 </Spatial>


Option 1

<Point>

 <PointLongitude>-80.1187</PointLongitude>

 <PointLatitude>72.5477</PointLatitude>

</Point>


Option 8

<Orbit>

 <AscendingCrossing>-118.11119</AscendingCrossing>

 <StartLat>50.0</StartLat>

 <StartDirection>A</StartDirection>

 <EndLat>50.0</EndLat>

 <EndDirection>A</EndDirection>

</Orbit>
```

ISO 19115-2

```
<gmd:extent>

        <gmd:EX_Extent id="boundingExtent">

          <gmd:description>

            <gco:CharacterString>SpatialCoverageType=Horizontal,
SpatialGranuleSpatialRepresentation=CARTESIAN</gco:CharacterString
```

```
>

        </gmd:description>

        <!--Bounding Rectangle--><gmd:geographicElement>

          <gmd:EX_GeographicBoundingBox>

            <gmd:westBoundLongitude>

              <gco:Decimal>-130</gco:Decimal>

            </gmd:westBoundLongitude>

            <gmd:eastBoundLongitude>

              <gco:Decimal>-60</gco:Decimal>

            </gmd:eastBoundLongitude>

            <gmd:southBoundLatitude>

              <gco:Decimal>20</gco:Decimal>

            </gmd:southBoundLatitude>

            <gmd:northBoundLatitude>

              <gco:Decimal>53</gco:Decimal>

            </gmd:northBoundLatitude>

          </gmd:EX_GeographicBoundingBox>

        </gmd:geographicElement>

        <gmd:temporalElement><!--RangeDateTime--
><gmd:EX_TemporalExtent id="boundingTemporalExtent">

            <gmd:extent>

              <gml:TimePeriod gml:id="w16aac14a">

                <gml:beginPosition>1995-01-
```

01T00:00:00.000Z</gml:beginPosition>

<gml:endPosition/>

</gml:TimePeriod>

</gmd:extent>

</gmd:EX_TemporalExtent>

</gmd:temporalElement>

</gmd:EX_Extent>

</gmd:extent>

Granule

Vertical:

<gmd:description>

<gco:CharacterString>VerticalSpatialDomainType=Maximum Altitude,
VerticalSpatialDomainValue=0.1mb, or appr. 50km,
VerticalSpatialDomainType=Minimum Altitude,
VerticalSpatialDomainValue=SFC,
VerticalSpatialDomainType=Atmosphere Layer,
VerticalSpatialDomainValue=Atmosphere Profile</gco:CharacterString>

</gmd:description>

ZoneIdentifier:

<gmd:geographicElement>

<gmd:EX_GeographicDescription>

<gmd:geographicIdentifier>

<gmd:MD_Identifier>

```
            <gmd:code>

              <gco:CharacterString>Universal Transverse Mercator
(UTM)</gco:CharacterString>

            </gmd:code>

            <gmd:description>


<gco:CharacterString>ZoneIdentifier</gco:CharacterString>

            </gmd:description>

           </gmd:MD_Identifier>

         </gmd:geographicIdentifier>

       </gmd:EX_GeographicDescription>

     </gmd:geographicElement>
```


Option 1


```
<gmd:geographicElement><!- -Point Bounds- ->

 <gmd:EX_GeographicBoundingBox>

   <gmd:westBoundLongitude>

     <gco:Decimal>- 80.1187</gco:Decimal>

   </gmd:westBoundLongitude>

   <gmd:eastBoundLongitude>

     <gco:Decimal>- 80.1187</gco:Decimal>

   </gmd:eastBoundLongitude>

   <gmd:southBoundLatitude>
```

```
      <gco:Decimal>72.5477</gco:Decimal>

    </gmd:southBoundLatitude>

    <gmd:northBoundLatitude>

      <gco:Decimal>72.5477</gco:Decimal>

    </gmd:northBoundLatitude>

  </gmd:EX_GeographicBoundingBox>

</gmd:geographicElement>

<gmd:geographicElement><!- -Point- ->

  <gmd:EX_BoundingPolygon>

    <gmd:polygon>

      <gml:Point gml:id="d2e39">

        <gml:pos srsName="http://www.opengis.net/def/crs/EPSG/4326"
srsDimension="2">72.5477 -80.1187</gml:pos>

      </gml:Point>

    </gmd:polygon>

  </gmd:EX_BoundingPolygon>

</gmd:geographicElement>
```


Option 8


```
<eos:AdditionalAttribute>

  <eos:reference>

    <eos:EOS_AdditionalAttributeDescription>

      <eos:type>
```

```
        <eos:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</eos:EOS_Add
itionalAttributeTypeCode>

      </eos:type>

      <eos:name>

        <gco:CharacterString>AscendingCrossing</gco:CharacterString>

      </eos:name>

    </eos:EOS_AdditionalAttributeDescription>

  </eos:reference>

  <eos:value>

    <gco:CharacterString>- 118.11119</gco:CharacterString>

  </eos:value>

</eos:AdditionalAttribute>

<eos:AdditionalAttribute>

  <eos:reference>

    <eos:EOS_AdditionalAttributeDescription>

      <eos:type>

        <eos:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</eos:EOS_Add
itionalAttributeTypeCode>
```

```
      </eos:type>

      <eos:name>

        <gco:CharacterString>StartLat</gco:CharacterString>

      </eos:name>

    </eos:EOS_AdditionalAttributeDescription>

  </eos:reference>

  <eos:value>

    <gco:CharacterString>50.0</gco:CharacterString>

  </eos:value>

</eos:AdditionalAttribute>

<eos:AdditionalAttribute>

  <eos:reference>

    <eos:EOS_AdditionalAttributeDescription>

      <eos:type>

        <eos:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EOS_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</eos:EOS_AdditionalAttributeTypeCode>

      </eos:type>

      <eos:name>

        <gco:CharacterString>StartDirection</gco:CharacterString>

      </eos:name>
```

```
    </eos:EOS_AdditionalAttributeDescription>

  </eos:reference>

  <eos:value>

    <gco:CharacterString>A</gco:CharacterString>

  </eos:value>

</eos:AdditionalAttribute>

<eos:AdditionalAttribute>

  <eos:reference>

    <eos:EOS_AdditionalAttributeDescription>

      <eos:type>

        <eos:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</eos:EOS_Add
itionalAttributeTypeCode>

      </eos:type>

      <eos:name>

        <gco:CharacterString>EndLat</gco:CharacterString>

      </eos:name>

    </eos:EOS_AdditionalAttributeDescription>

  </eos:reference>

  <eos:value>

    <gco:CharacterString>50.0</gco:CharacterString>
```

```
  </eos:value>

</eos:AdditionalAttribute>

<eos:AdditionalAttribute>

  <eos:reference>

    <eos:EOS_AdditionalAttributeDescription>

      <eos:type>

        <eos:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</eos:EOS_Add
itionalAttributeTypeCode>

      </eos:type>

      <eos:name>

        <gco:CharacterString>EndDirection</gco:CharacterString>

      </eos:name>

    </eos:EOS_AdditionalAttributeDescription>

  </eos:reference>

  <eos:value>

    <gco:CharacterString>A</gco:CharacterString>

  </eos:value>

</eos:AdditionalAttribute>
```


ISO 19115-1

```
<mri:extent>

        <gex:EX_Extent id="boundingExtent">

          <gex:description>

            <gco:CharacterString>SpatialCoverageType=Horizontal,
SpatialGranuleSpatialRepresentation=CARTESIAN</gco:CharacterString
>

          </gex:description>

          <gex:geographicElement>

            <gex:EX_GeographicBoundingBox>

              <gex:westBoundLongitude>

                <gco:Decimal>-130</gco:Decimal>

              </gex:westBoundLongitude>

              <gex:eastBoundLongitude>

                <gco:Decimal>-60</gco:Decimal>

              </gex:eastBoundLongitude>

              <gex:southBoundLatitude>

                <gco:Decimal>20</gco:Decimal>

              </gex:southBoundLatitude>

              <gex:northBoundLatitude>

                <gco:Decimal>53</gco:Decimal>

              </gex:northBoundLatitude>

            </gex:EX_GeographicBoundingBox>

          </gex:geographicElement>
```

```
          <gex:temporalElement>

            <gex:EX_TemporalExtent id="boundingTemporalExtent">

              <gex:extent>

                <gml:TimePeriod gml:id="d13e34">

                  <gml:beginPosition>1995-01-
01T00:00:00.000Z</gml:beginPosition>

                  <gml:endPosition/>

                </gml:TimePeriod>

              </gex:extent>

            </gex:EX_TemporalExtent>

          </gex:temporalElement>

        </gex:EX_Extent>

      </mri:extent>
```


Granule

Vertical:


```
<gex:description>

 <gco:CharacterString>VerticalSpatialDomainType=Maximum Altitude,
VerticalSpatialDomainValue=0.1mb, or appr. 50km,
VerticalSpatialDomainType=Minimum Altitude,
VerticalSpatialDomainValue=SFC,
VerticalSpatialDomainType=Atmosphere Layer,
VerticalSpatialDomainValue=Atmosphere Profile</gco:CharacterString>

</gex:description>
```

ZoneIdentifier:

```
<gex:geographicElement>
      <gex:EX_GeographicDescription>
        <gex:geographicIdentifier>
          <mcc:MD_Identifier>
            <gex:code>
              <gco:CharacterString>Universal Transverse Mercator
(UTM)</gco:CharacterString>
            </gex:code>
            <gex:description>

<gco:CharacterString>ZoneIdentifier</gco:CharacterString>
            </gex:description>
          </mcc:MD_Identifier>
        </gex:geographicIdentifier>
      </gex:EX_GeographicDescription>
    </gex:geographicElement>
```

Option 1

```
<gex:geographicElement><!- -Point Bounds- ->
 <gex:EX_GeographicBoundingBox>
   <gex:westBoundLongitude>
     <gco:Decimal>- 80.1187</gco:Decimal>
```

```
    </gex:westBoundLongitude>
    <gex:eastBoundLongitude>
      <gco:Decimal>- 80.1187</gco:Decimal>
    </gex:eastBoundLongitude>
    <gex:southBoundLatitude>
      <gco:Decimal>72.5477</gco:Decimal>
    </gex:southBoundLatitude>
    <gex:northBoundLatitude>
      <gco:Decimal>72.5477</gco:Decimal>
    </gex:northBoundLatitude>
  </gex:EX_GeographicBoundingBox>
</gex:geographicElement>
<gex:geographicElement><!- -Point- ->
  <gex:EX_BoundingPolygon>
    <gex:polygon>
      <gml:Point gml:id="d2e39">
        <gml:pos srsName="http://www.opengis.net/def/crs/EPSG/4326"
srsDimension="2">72.5477 -80.1187</gml:pos>
      </gml:Point>
    </gex:polygon>
  </gex:EX_BoundingPolygon>
</gex:geographicElement>
```

Option 8


```
<mdb:acquisitionInformation>

    <mac:MI_AcquisitionInformation>

      <mac:platform>

        <mac:EOS_Platform>

          <mac:identifier gco:nilReason="missing"/>

          <mac:description gco:nilReason="missing"/>

          <mac:instrument gco:nilReason="missing"/>

          <mac:otherPropertyType>

            <gco:RecordType
xlink:href="http://earthdata.nasa.gov/metadata/schema/eos/1.0/eos.xsd#xpointer(//element[@name='AdditionalAttributes'])">Echo Additional
Attributes</gco:RecordType>

          </mac:otherPropertyType>

          <mac:otherProperty>

            <gco:Record>

              <mac:AdditionalAttributes>

                <mac:AdditionalAttribute>

                  <mac:reference>

                    <mac:EOS_AdditionalAttributeDescription>

                      <mac:type>

                        <mac:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EOS_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</mac:EOS_Ad
```

ditionalAttributeTypeCode>

</mac:type>

<mac:name>

<gco:CharacterString>OrbitalModelName</gco:CharacterString>

</mac:name>

</mac:EOS_AdditionalAttributeDescription>

</mac:reference>

<mac:value>

<gco:CharacterString>WRS-2</gco:CharacterString>

</mac:value>

</mac:AdditionalAttribute>

<mac:AdditionalAttribute>

<mac:reference>

<mac:EOS_AdditionalAttributeDescription>

<mac:type>

<mac:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EOS_AdditionalAttributeTypeCode"

codeListValue="platformInformation">platformInformation</mac:EOS_AdditionalAttributeTypeCode>

</mac:type>

<mac:name>

```
<gco:CharacterString>StartOrbitNumber</gco:CharacterString>

                    </mac:name>

                  </mac:EOS_AdditionalAttributeDescription>

                </mac:reference>

                <mac:value>

                  <gco:CharacterString>667</gco:CharacterString>

                </mac:value>

              </mac:AdditionalAttribute>

              <mac:AdditionalAttribute>

                <mac:reference>

                  <mac:EOS_AdditionalAttributeDescription>

                    <mac:type>

                      <mac:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</mac:EOS_Ad
ditionalAttributeTypeCode>

                    </mac:type>

                    <mac:name>


<gco:CharacterString>StopOrbitNumber</gco:CharacterString>

                    </mac:name>

                  </mac:EOS_AdditionalAttributeDescription>

                </mac:reference>
```

```
                <mac:value>

                  <gco:CharacterString>667</gco:CharacterString>

                </mac:value>

              </mac:AdditionalAttribute>

              <mac:AdditionalAttribute>

                <mac:reference>

                  <mac:EOS_AdditionalAttributeDescription>

                    <mac:type>

                      <mac:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</mac:EOS_Ad
ditionalAttributeTypeCode>

                    </mac:type>

                    <mac:name>


<gco:CharacterString>EquatorCrossingLongitude</gco:CharacterString>

                    </mac:name>

                  </mac:EOS_AdditionalAttributeDescription>

                </mac:reference>

                <mac:value>

                  <gco:CharacterString>9.54</gco:CharacterString>

                </mac:value>

              </mac:AdditionalAttribute>
```

```
                <mac:AdditionalAttribute>

                  <mac:reference>

                    <mac:EOS_AdditionalAttributeDescription>

                      <mac:type>

                        <mac:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</mac:EOS_Ad
ditionalAttributeTypeCode>

                      </mac:type>

                      <mac:name>


<gco:CharacterString>EquatorCrossingDateTime</gco:CharacterString>

                      </mac:name>

                    </mac:EOS_AdditionalAttributeDescription>

                  </mac:reference>

                  <mac:value>

                    <gco:CharacterString>2002-06-
19T00:56:48.48Z</gco:CharacterString>

                  </mac:value>

                </mac:AdditionalAttribute>

                <mac:AdditionalAttribute>

                  <mac:reference>

                    <mac:EOS_AdditionalAttributeDescription>
```

```
                    <mac:type>

                      <mac:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</mac:EOS_Ad
ditionalAttributeTypeCode>

                    </mac:type>

                    <mac:name>


<gco:CharacterString>AscendingCrossing</gco:CharacterString>

                    </mac:name>

                  </mac:EOS_AdditionalAttributeDescription>

                </mac:reference>

                <mac:value>

                  <gco:CharacterString>- 158.10</gco:CharacterString>

                </mac:value>

              </mac:AdditionalAttribute>

              <mac:AdditionalAttribute>

                <mac:reference>

                  <mac:EOS_AdditionalAttributeDescription>

                    <mac:type>

                      <mac:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</mac:EOS_Ad
```

ditionalAttributeTypeCode>

</mac:type>

<mac:name>

<gco:CharacterString>StartLat</gco:CharacterString>

</mac:name>

</mac:EOS_AdditionalAttributeDescription>

</mac:reference>

<mac:value>

<gco:CharacterString>81.8</gco:CharacterString>

</mac:value>

</mac:AdditionalAttribute>

<mac:AdditionalAttribute>

<mac:reference>

<mac:EOS_AdditionalAttributeDescription>

<mac:type>

<mac:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EOS_AdditionalAttributeTypeCode"

codeListValue="platformInformation">platformInformation</mac:EOS_AdditionalAttributeTypeCode>

</mac:type>

<mac:name>

```
<gco:CharacterString>StartDirection</gco:CharacterString>

                    </mac:name>

                  </mac:EOS_AdditionalAttributeDescription>

                </mac:reference>

                <mac:value>

                  <gco:CharacterString>D</gco:CharacterString>

                </mac:value>

              </mac:AdditionalAttribute>

              <mac:AdditionalAttribute>

                <mac:reference>

                  <mac:EOS_AdditionalAttributeDescription>

                    <mac:type>

                      <mac:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</mac:EOS_Ad
ditionalAttributeTypeCode>

                    </mac:type>

                    <mac:name>


<gco:CharacterString>EndLat</gco:CharacterString>

                    </mac:name>

                  </mac:EOS_AdditionalAttributeDescription>

                </mac:reference>
```

```
                <mac:value>

                  <gco:CharacterString>- 81.8</gco:CharacterString>

                </mac:value>

              </mac:AdditionalAttribute>

              <mac:AdditionalAttribute>

                <mac:reference>

                  <mac:EOS_AdditionalAttributeDescription>

                    <mac:type>

                      <mac:EOS_AdditionalAttributeTypeCode
codeList="http://earthdata.nasa.gov/metadata/resources/Codelists.xml#EO
S_AdditionalAttributeTypeCode"


codeListValue="platformInformation">platformInformation</mac:EOS_Ad
ditionalAttributeTypeCode>

                    </mac:type>

                    <mac:name>


<gco:CharacterString>EndDirection</gco:CharacterString>

                    </mac:name>

                  </mac:EOS_AdditionalAttributeDescription>

                </mac:reference>

                <mac:value>

                  <gco:CharacterString>D</gco:CharacterString>

                </mac:value>

              </mac:AdditionalAttribute>
```

```
            </mac:AdditionalAttributes>

          </gco:Record>

        </mac:otherProperty>

      </mac:EOS_Platform>

    </mac:platform>

  </mac:MI_AcquisitionInformation>

</mdb:acquisitionInformation>
```

Source Data Information:

DIF 9 - http://gcmd.gsfc.nasa.gov/mws/dif/macayeal_cont_GPS_Ross_Ice_Shelf_0229546
DIF 10 - Example based on schema with data from ECHO10 record.

ECHO 10 Collection - https://api.echo.nasa.gov:443/catalog-rest/echo_catalog/datasets/C230264-GHRC
ECHO 10 Granule - https://api.echo.nasa.gov:443/catalog-rest/echo_catalog/granules/G205050987-GSFCS4PA, ZoneIdentifier – Manually created, https://api.echo.nasa.gov:443/catalog-rest/echo_catalog/granules/G187452045-LARC, https://api.echo.nasa.gov:443/catalog-rest/echo_catalog/granules/G183870388-NSIDC_ECS

ISO 19115-2- https://api.echo.nasa.gov:443/catalog-rest/echo_catalog/datasets/C230264-GHRC.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

Recommendations

ECHO's Spatial element should be used in the UMM - as it is a superset of what GCMD includes. DIF 10 has included extra elements to allow for more complicated geometries and granule spatial information.

A.B.24 Tiling Identification System

Element Specification

TilingIdentificationSystem/TilingIdentificationSystemName (1)
< CALIPSO, MISR, MODIS Tile EASE, MODIS Tile SIN, WELD Alaska Tile, WELD CONUS Tile, WRS-1,WRS-2>
TilingIdentificationSystem/Coordinate1 (1)

TilingIdentificationSystem/Coordinate1/MinimumValue (1)

TilingIdentificationSystem/Coordinate1/MaximumValue (0..1)

TilingIdentificationSystem/Coordinate2 (1)

TilingIdentificationSystem/Coordinate2/MinimumValue (1)

TilingIdentificationSystem/Coordinate2/MaximumValue (0..1)

Description

Defines a named two-dimensional tiling system.

Profile Utilization

Collection, Granule

Cardinality

0..*

Analysis

This element exists in ECHO and has been added to DIF 10. See the TilingIdentificationSystem Appendix for more information about specific coordinate system translations.

Mapping

DIF 9	N/A
DIF 10	/DIF/Spatial_Coverage/Spatial_Info/TwoD_Coordinate_System
SERF	N/A
ECHO 10 Collection	/Collection/TwoDCoordinateSystems/TwoDCoordinateSystem
ECHO 10 Granule	/Granule/TwoDCoordinateSystem/StartCoordinate1 /Granule/TwoDCoordinateSystem/EndCoordinate1 /Granule/TwoDCoordinateSystem/StartCoordinate2 /Granule/TwoDCoordinateSystem/EndCoordinate2
ISO 19115-2	/ gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:code/gco:CharacterString / gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:description/gco:CharacterString
ISO 19115-1	/ mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:extent/gex:EX_Extent/gex:geographicElement/gex:EX_GeographicDescription/gex:geographicIdentifier/mcc:MD_Identifier/mcc:code/gco:CharacterString / mdb:MD_Metadata/mdb:identificationInfo/mri:MD_DataIdentification/mri:extent/gex:EX_Extent/gex:geographicElement/gex:EX_GeographicDescription/gex:geographicIdentifier/mcc:MD_Identifier/mcc:description/gco:CharacterString
EMS	N/A

Examples

<u>DIF 10</u>

```
<Spatial_Coverage>

 ...
```

```
 <Spatial_Info>
  <Spatial_Coverage_Type>Horizontal</Spatial_Coverage_Type>
  <TwoD_Coordinate_System>

<TwoD_Coordinate_System_Name>MISR</TwoD_Coordinate_System_Na
me>
    <Coordinate1>
      <Minimum_Value>1</Minimum_Value>
      <Maximum_Value>233</Maximum_Value>
    </Coordinate1>
    <Coordinate2>
      <Minimum_Value>1</Minimum_Value>
      <Maximum_Value>180</Maximum_Value>
    </Coordinate2>
  </TwoD_Coordinate_System>
 </Spatial_Info>
</Spatial_Coverage>
```

ECHO 10 Collection

```
<TwoDCoordinateSystems>

 <TwoDCoordinateSystem>


<TwoDCoordinateSystemName>CALIPSO</TwoDCoordinateSystemName
>

  <Coordinate1>

    <MinimumValue>1</MinimumValue>

    <MaximumValue>75000</MaximumValue>

  </Coordinate1>

  <Coordinate2>

    <MinimumValue>1</MinimumValue>

    <MaximumValue>233</MaximumValue>

  </Coordinate2>
```

```
  </TwoDCoordinateSystem>

</TwoDCoordinateSystems>
```

ECHO_10_Granule

```
<TwoDCoordinateSystem>

  <StartCoordinate1>116</StartCoordinate1>

  <StartCoordinate2>24</StartCoordinate2>

  <EndCoordinate2>167</EndCoordinate2>

  <TwoDCoordinateSystemName>MISR</TwoDCoordinateSystemName>

</TwoDCoordinateSystem>
```

ISO_19115-2

```
<gmd:geographicElement>

  <gmd:EX_GeographicDescription>

    <gmd:geographicIdentifier>

      <gmd:MD_Identifier>

        <gmd:code>

          <gco:CharacterString>o1,75000p1,233</gco:CharacterString>

        </gmd:code>

        <gmd:description>

          <gco:CharacterString>CALIPSO</gco:CharacterString>

        </gmd:description>

      </gmd:MD_Identifier>
```

```
    </gmd:geographicIdentifier>
  </gmd:EX_GeographicDescription>
</gmd:geographicElement>
```

-Granule

```
<gmd:geographicElement>
  <gmd:EX_GeographicDescription>
    <gmd:geographicIdentifier>
      <gmd:MD_Identifier>
        <gmd:code>
          <gco:CharacterString>p116b24-167</gco:CharacterString>
        </gmd:code>
        <gmd:description>
          <gco:CharacterString>MISR</gco:CharacterString>
        </gmd:description>
      </gmd:MD_Identifier>
    </gmd:geographicIdentifier>
  </gmd:EX_GeographicDescription>
</gmd:geographicElement>
```

ISO 19115-1

```
<gex:geographicElement>
  <gex:EX_GeographicDescription>
```

```
    <gex:geographicIdentifier>
      <mcc:MD_Identifier>
        <mcc:code>
          <gco:CharacterString>  o1,75000p1,233</gco:CharacterString>
        </mcc:code>
        <gex:description>
          <gco:CharacterString>CALIPSO</gco:CharacterString>
        </gex:description>
      </mcc:MD_Identifier>
    </gex:geographicIdentifier>
  </gex:EX_GeographicDescription>
</gex:geographicElement>
```


- Granule


```
<gex:geographicElement>
  <gex:EX_GeographicDescription>
    <gex:geographicIdentifier>
      <mcc:MD_Identifier>
        <mcc:code>
          <gco:CharacterString>p116b24- 167</gco:CharacterString>
        </mcc:code>
        <gex:description>
```

```
        <gco:CharacterString>MISR</gco:CharacterString>

      </gex:description>

    </mcc:MD_Identifier>

  </gex:geographicIdentifier>

 </gex:EX_GeographicDescription>

</gex:geographicElement>
```


Source Data Information:

DIF 10 - https://cmr.earthdata.nasa.gov:443/search/concepts/C183897339-LARC

ECHO 10 Collection - https://cmr.earthdata.nasa.gov:443/search/concepts/C5862864-LARC_ASDC
ECHO 10 Granule - https://cmr.earthdata.nasa.gov:443/search/concepts/G183655594-LARC

ISO 19115-2- https://cmr.earthdata.nasa.gov:443/search/concepts/C5862864-LARC_ASDC.iso

https://cmr.earthdata.nasa.gov:443/search/concepts/G183655594-LARC.iso

ISO 19115-1 - Example based on ISO19139to19115-3.xsl translation of ISO 19115-2 record

Appendix A-1 Tiling Identification System

Table A.4 outlines all tiling identification systems (formerly 2D coordinate systems) used currently in the CMR and their corresponding format in the ISO translation. This table also includes information on a generic translation used if none of the known systems are applicable.

Table A.4: Tiling Identification Systems Translation

Tiling Identification System	Sample ISO Translated Format
CALIPSO	o29309,29310p171,171
MISR	p232b1-180
MODIS Tile EASE	h12v14
MODIS Tile SIN	h0v9
WRS-2	p158r4
WRS-1	p24-24r28-28
WELD Alaska Tile	uses generic translation
WELD CONUS Tile	uses generic translation
generic ISO to ECHO translation	x2-12y3-18

More information may be found at the following link related to the Metadata Evolution for NASA Data Systems (MENDS) Working Group documentation (Earthdata Login Required):
https://wiki.earthdata.nasa.gov/display/NASAISO/Two-Dimensional+Coordinate+Systems

Appendix A-2 Abbreviations and Acronyms

ACL	Access Control List
CMR	Common Metadata Repository
DAAC	Distributed Active Archive Center
DIF	Directory Interchange Format
DOI	Digital Object Identifier
ECHO	Earth Observing System (EOS) Clearing House
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ESDIS	Earth Science Data and Information System
ESO	ESDIS Standards Office
GCMD	Global Change Master Directory
ISO	International Organization for Standardization
KMS	Keyword Management System
MAS	Metadata Architecture Studies
MENDS	Metadata Evolution for NASA Data Systems
MMT	Metadata Management Tool
NASA	National Aeronautics and Space Administration
SERF	Service Entry Resource Format
UMM	Unified Metadata Model
UMM - C	Unified Metadata Model Collections
UMM - Common	Unified Metadata Model Common Elements

UMM-D	Unified Metadata Model Documents
UMM-G	Unified Metadata Model Granules
UMM-M	Unified Metadata Model Meta
UMM-S	Unified Metadata Model Services
UMM-Var	Unified Metadata Model Variables
UMM-Vis	Unified Metadata Model Visualization
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
URS	User Registration System
XML	Extensible Markup Language
XPath	XML Path Language