

# Citations

I need to provide references for datasets and associated resources.

## Overview

Citations are used to provide information about citing the resource being described in the metadata or to refer to resources outside of the metadata record. These citations are an important part of the identification information and, as such, they are in a special location in the record. In addition, they can provide connection to relevant materials that can not be included in the metadata.

## Structure

The CI\_Citation includes two required and eleven optional elements and introduces several new objects. The CI\_Series object gives the name, issue, and page numbers of an article in a periodical. The ISBN and ISSN elements are internationally recognized identifiers for books and periodicals. The MI\_Identifier and CI\_Date objects are discussed below.



## Usage

CI\_Citation serves two purposes in the ISO 19115 Standard. First, it gives the information required to cite the data or the service (the resource) that is being described in the metadata. This CI\_Citation can be part of the gmd:MD\_DataIdentification or srv:ServiceIdentification objects.

Usage	Description and Xpath
Resource Citation  <b>&lt;&lt;Abstract&gt;&gt;</b> <b>MD_Identification</b>  <b>+ citation : CI_Citation</b> + abstract : CharacterString + purpose [0..1] : CharacterString + credit [0..*] : CharacterString + status [0..*] : MD_ProgressCode + pointOfContact [0..*] : CI_ResponsibleParty	The Resource Citation includes information that should be used when citing the resource that is being described by the metadata record. It includes descriptions of the people involved in the creation of the resource. They usually have roles of originator, author, or principleInvestigator.  An important enhancement to the CI_Citation object occurred in ISO 19115-1. The enhancement includes the addition of OnlineResource and BrowseGraphic fields which enable online digital resources and graphics to be referenced from the CI_Citation object. An expanded description is available in the Revisions section of this page.  /gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:citation  or  /gmi:MI_Metadata/gmd:identificationInfo/srv:ServiceIdentification/gmd:citation

## CI\_Citation++

Second, CI\_Citations provide information about external references that are related to the resource being described and provide additional documentation. This Figure shows most of the places where CI\_Citations occur. Those shown in red were added in ISO 19115-1. In many of these situations the CI\_Citation is in an object with a generally small amount of additional annotation information. This additional information is available to the user so they may not need to look up the resource cited in the CI\_Citation. These objects are termed CI\_Citation++.

The most straightforward member of this group is the MI\_Identifier, which includes a code, the identifier, and a CI\_Citation for the authority for the code. The MD\_Identifier is used throughout the standard to attach a unique identifier to objects, including CI\_Citations.

Usage	Description and Xpath
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Identifier <pre>&lt;&lt;DataType&gt;&gt; MD_Identifier</pre> <p><b>+ authority [0..1] : CI_Citation</b></p> <p><b>+ code : CharacterString</b></p>	<p>CI_Citation + code = MD_Identifier</p> <p>The MD_Identifier is the simplest of the CI_Citation++ objects. It includes a code and an authority. The code is an alphanumeric value identifying an object in a namespace that is maintained by the authority. In this case the CI_Citation cites the authority for the code. In many ways this is similar to the namespace for the code. It is the authority which understands and can explain or resolve the code. There is no agreed upon approach for how the namespace is described in the CI_Citation.</p> <p>ISO 19115-1 addresses this limitation by adding a codeSpace field to the MD_Identifier object. The codeSpace field unambiguously defines the namespace for the identifier. ISO 19115-1 also includes description and version fields in the MD_Identifier object. The description field enables a brief description of the code to be documented, and the version field enables the Identifier version to be documented.</p> <p>//gmd:MD_Identifier</p>
Reference System Identifier <pre>RS_Identifier</pre> <p><b>+ authority [0..1] : CI_Citation</b></p> <p><b>+ code : CharacterString</b></p> <p><b>+ codeSpace [0..1] : CharacterString</b></p> <p><b>+ version [0..1] : CharacterString</b></p>	<p>CI_Citation + code + codeSpace + version = RS_Identifier</p> <p>The RS_Identifier extends the MD_Identifier by adding a codeSpace and a version for the namespace. These additions address the lack of an agreed upon approach for describing a namespace using the authority /gco:CI_Citation alone. However, the standard only supports RS_Identifiers in the referenceSystemInfo class.</p> <p>Note: In ISO 19115-1 the RS_Identifier object is replaced with an MD_Identifier object which includes codeSpace, version and description fields. See the MD_Identifier description above.</p> <p>//gmd:RS_Identifier</p>
Keyword Thesaurus Citation <pre>MD_Keywords</pre> <p><b>+ keyword [1..*] : CharacterString</b></p> <p><b>+ type [0..1] : MD_KeywordTypeCode</b></p> <p><b>+ thesaurusName [0..1] : CI_Citation</b></p>	<p>CI_Citation + keyword + type = MD_Keywords</p> <p>The MD_Keywords object is similar to an MD_Identifier in that it gives a keyword that is unique in a "namespace" that is maintained by the individual or organization cited in the thesaurusName. In this case, the type codeList is used to group related keywords.</p> <p>Note: In ISO 19115-1, 10 additional GCMD keyword type codes have been added to the codelist. These codes will help improve consistent data discovery, particularly using faceted searches.</p> <p>/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification   srv:ServiceIdentification/gmd:descriptiveKeywords/gmd:MD_Keywords/gmd:thesaurusName</p>
Algorithm Citation <pre>LE_Algorithm</pre> <p><b>+ citation: CI_Citation</b></p> <p><b>+ description : CharacterString</b></p>	<p>CI_Citation + description = LE_Algorithm</p> <p>The Algorithm Citation is straightforward. It includes a description that, like the description in the CI_OnlineResource object, should provide information that identifies the algorithm used to process data so that a user can understand that information without following the citation. The description is similar to an abstract for the algorithm referenced in the CI_Citation.</p> <p>/gmi:MI_Metadata/gmd:dataQualityInfo/gmd:MD_DataQuality/gmd:lineage /gmd:LE_Lineage/gmd:processStep/gmd:LE_ProcessStep/gmd:processingInformation/gmd:LE_Processing/gmd:algorithm/LE_Algorithm /gmd:citation</p>
Conformance Standard Specification Citation <pre>DQ_ConformanceResult</pre> <p><b>+ specification : CI_Citation</b></p> <p><b>+ explanation : CharacterString</b></p> <p><b>+ pass : Boolean</b></p>	<p>CI_Citation + explanation + pass = DQ_ConformanceResult</p> <p>The DQ_ConformanceResult is a good example of including critical information in the standard while referencing an external resource for more information. In this case the critical information is a brief explanation of the conformance test and the result of the test. If a user needs more information about the specifics of the test, they can follow the citation to the specification.</p> <p>/gmi:MI_Metadata/gmd:dataQualityInfo/gmd:MD_DataQuality/gmd:report /gmd:DQ_Element/gmd:result/gmd:DQ_Result/gmd:DQ_ConformanceResult/gmd:specification</p>

<p><b>Source Citation</b></p> <div style="border: 1px solid black; padding: 5px;"> <pre>+ description [0..1] : CharacterString + scaleDenominator [0..1] : MD_RepresentativeFraction + sourceReferenceSystem [0..1] : MD_ReferenceSystem + sourceCitation [0..1] : CI_Citation + sourceExtent [0..*] : EX_Extent + processedLevel [0..1] : MD_Identifer + resolution [0..1] : LE_NominalResolution + sourceStep [0..*] : LE_ProcessStep</pre> </div>	<p>CI_Citation + description + scaleDenominator + sourceReferenceSystem + sourceExtent + processedLevel + resolution + sourceStep = LE_Source. LE_Source fields enable the sources utilized to generate a data product to be described and referenced. Sources are both used and produced by process steps. Documenting the chain of sources and process steps utilized to generated a data product is an important role of high-quality metadata.</p> <p>/gmi:MI_Metadata/gmd:dataQualityInfo/gmd:MD_DataQuality/gmd:lineage /gmd:LE_Lineage/gmd:source   gmd:output/gmd:LE_Source/gmd:sourceCitation</p>
<p><b>Data Quality Evaluation Procedure Citation</b></p> <div style="border: 1px solid black; padding: 5px;"> <pre>&lt;&lt;Abstract&gt;&gt; DQ_Element + nameOfMeasure [0..*] : CharacterString + measuredIdentification [0..1] : MD_Identifer + measureDescription [0..1] : CharacterString + evaluationMethodType [0..1] : DQ_EvaluationMethodTypeCode + evaluationMethodDescription [0..1] : CharacterString + evaluationProcedure [0..1] : CI_Citation + dateTme [0..*] : Date-Time + result [1..2] : DQ_Result</pre> </div>	<p>/gmi:MI_Metadata/gmd:dataQualityInfo/gmd:MD_DataQuality/gmd:report /gmd:DQ_Element/gmd:evaluationProcedure</p>
<p><b>Feature Catalog Citation</b></p> <div style="border: 1px solid black; padding: 5px;"> <pre>MD_FeatureCatalogDescription + complianceCode [0..1] : Boolean + language [0..*] : CharacterString + includeWithDataset : Boolean + featureTypes [0..*] : GenericName + featureCatalogueCitation [1..*] : CI_Citation</pre> </div>	<p>/gmi:MI_Metadata/gmd:contentinfo/gmd:MD_ContentInformation/gmd:MD_FeatureCatalogDescription/gmd:featureCatalogueCitation</p>
<p><b>Application Schema Citation</b></p> <div style="border: 1px solid black; padding: 5px;"> <pre>MD_ApplicationSchemaInformation + name : CI_Citation + schemaLanguage : CharacterString + constraintLanguage : CharacterString + schemaAscii [0..1] : CharacterString + graphicsFile [0..1] : Binary + softwareDevelopmentFile [0..1] : Binary + softwareDevelopmentFileFormat [0..1] : CharacterString</pre> </div>	<p>CI_Citation + schemaLanguage + constraintLanguage + schemaAscii + graphicsFile + softwareDevelopmentFile + softwareDevelopmentFileFormat = MD_ApplicationSchemaInformation</p> <p>/gmi:MI_Metadata/gmd:applicationSchemaInfo/gmd:MD_ApplicationSchemaInformation/gmd:name</p>

## Citations in CMR Metadata

- Resource Citations
- Acquisition Information Citations

## Notes

### CodeLists as Types

As described earlier, codeLists provide shared vocabularies throughout the ISO Standard. The fact that these vocabularies are shared makes it possible to use them as well known tags for content in the standard. An excellent example of this occurs in the CI\_Date object that gives dates for CI\_Citations. That object includes a date string and the CI\_DateTypeCode codeList that can be either creation, publication, or revision. This single date, along with the codeList, covers three common types of dates that are required in citations. Contrast this with the editionDate attribute that is a single date the purpose of which is expressed in the name of the attribute rather than with a tag.

## Revisions

The ISO 19115 CI\_Citation object works well for citing physical objects (books, articles, scientific papers, etc), but is not well suited for referencing online digital resources. These important resources can only be associated with a CI\_Citation using a rather circuitous path: //gmd:CI\_Citation/gmd:citedResponsibleParty/gmd:CI\_ResponsibleParty/gmd:contactInfo/gmd:CI\_Contact/gmd:onlineResource and it is not at all clear that a URL in the contact information for the citedResponsibleParty is actually the URL for the resource being cited. In short, the ISO 19115 CI\_Citation does not work well for citations to online resources.

ISO 19115-1 has addressed this shortcoming by adding an OnlineResource field to the CI\_Citation object. Also included in the 19115-1 revision is the BrowseGraphic field for referencing online images.

## Examples

### SMAP Level 4

```
<gmd:citation xmlns:gco="http://www.isotc211.org/2005/gco"
    xmlns:gmd="http://www.isotc211.org/2005/gmd" xmlns:gmx="http://www.isotc211.org/2005/gmx"
    xmlns:eos="http://earthdata.nasa.gov/schema/eos" xmlns:xlink="http://www.w3.org/1999/xlink">
<!--
    This sample citation from a SMAP Level 4 Product is included here as a real-world example of
    an ISO citation that addresses the related NASA metadata requirements.
    See https://wiki.earthdata.nasa.gov/display/NASAISO/Citations for more citation information.
-->
<gmd:CI_Citation>
    <gmd:title>
        <!-- Requirement: CI_Citation/title -->
        <gco:CharacterString>SMAP L4 Global Daily 9 km Carbon Net Ecosystem Exchange</gco:
CharacterString>
        </gmd:title>
        <gmd:date>
            <!--
                A citation can include any number of dates.
                ISO supports a variety of date types (https://wiki.earthdata.nasa.gov/display/NASAISO/Dates)
            -->
            <gmd:CI_Date>
                <gmd:date>
                    <gco:Date>2015-06-01</gco:Date>
                </gmd:date>
                <gmd:dateType>
                    <gmd:CI_DateTypeCode codeList="codeListLocation#CI_DateTypeCode" codeListValue="revision">revision</gmd:CI_DateTypeCode>
                    </gmd:dateType>
                </gmd:CI_Date>
            </gmd:date>
            <gmd:edition>
                <!-- Requirement: CI_Citation/edition -->
                <gco:CharacterString>V10002</gco:CharacterString>
            </gmd:edition>
            <!--
                Requirement: CI_Citation/Identifier
                A citation can include any number of identifiers.
                Each identifier includes a code (the identifier) as well as information
                about the source of the identifier (a codeSpace, i.e. namespace, or a
                citation to an authority), and a description..
            -->
            <gmd:identifier>
                <gmd:MD_Identifier>
                    <gmd:code>
                        <gco:CharacterString>SPL4CMDL</gco:CharacterString>
                    </gmd:code>
                    <gmd:codeSpace>
                        <gco:CharacterString>http://gmao.gsfc.nasa.gov</gco:CharacterString>
                    </gmd:codeSpace>
                    <gmd:description>
                        <gco:CharacterString>The ECS Short Name</gco:CharacterString>
                    </gmd:description>
                </gmd:MD_Identifier>
            </gmd:identifier>
        </gmd:date>
    </gmd:CI_Citation>

```

```

        </gmd:MD_Identifier>
    </gmd:identifier>
    <gmd:identifier>
        <gmd:MD_Identifier>
            <gmd:code>
                <gco:CharacterString>001</gco:CharacterString>
            </gmd:code>
            <gmd:codeSpace>
                <gco:CharacterString>http://gov.nasa.esdis</gco:CharacterString>
            </gmd:codeSpace>
            <gmd:description>
                <gco:CharacterString>The ECS Version ID</gco:CharacterString>
            </gmd:description>
        </gmd:MD_Identifier>
    </gmd:identifier>
    <gmd:identifier>
        <gmd:MD_Identifier>
        <!--
            The Digital Object Identifier is a special identifier resolved by a well known service
            (http://dx.doi.org).
            It is included in the metadata along with a URL (Anchor) to the landing page for the
            dataset
        -->
        <gmd:code>
            <gmx:Anchor xlink:actuate="onRequest"
                xlink:href="http://dx.doi.org/10.5067/22TFAUSNLO9R">doi:
10.5067/22TFAUSNLO9R</gmx:Anchor>
            </gmd:code>
            <gmd:codeSpace>
                <gco:CharacterString>http://gov.nasa.esdis</gco:CharacterString>
            </gmd:codeSpace>
            <gmd:description>
                <gco:CharacterString>A Digital Object Identifier (DOI) that provides a persistent
interoperable means to
                    locate the SMAP Level 4 Radar data product.</gco:CharacterString>
            </gmd:description>
        </gmd:MD_Identifier>
    </gmd:identifier>
    <!--
        The ISO metadata standards include infomation about individuals and organizations (responsible
        parties) in many roles.
        See https://wiki.earthdata.nasa.gov/display/NASAISO/Individuals%2C+Organizations%2C+and+Roles for
        more information
        Responsible parties in the citation should include originating organizations, authors and
        principle investigators.
    -->
    <gmd:citedResponsibleParty>
        <gmd:CI_ResponsibleParty>
            <gmd:organisationName>
                <gco:CharacterString>National Aeronautics and Space Administration</gco:CharacterString>
            </gmd:organisationName>
            <gmd:role>
                <gmd:CI_RoleCode codeList="codeListLocation#CI_RoleCode" codeListValue="resourceProvider">
resourceProvider</gmd:CI_RoleCode>
                </gmd:role>
            </gmd:CI_ResponsibleParty>
        </gmd:citedResponsibleParty>
        <gmd:citedResponsibleParty>
            <gmd:CI_ResponsibleParty>
                <gmd:organisationName>
                    <gco:CharacterString>Global Modeling and Assimilation Office</gco:CharacterString>
                </gmd:organisationName>
                <gmd:role>
                    <gmd:CI_RoleCode codeList="codeListLocation#CI_RoleCode" codeListValue="originator">
originator</gmd:CI_RoleCode>
                </gmd:role>
            </gmd:CI_ResponsibleParty>
        </gmd:citedResponsibleParty>
        <gmd:presentationForm>
            <gmd:CI_PresentationFormCode codeList="codeListLocation#CI_PresentationFormCode" codeListValue="documentDigital">documentDigital</gmd:CI_PresentationFormCode>

```

```
</gmd:presentationForm>
<gmd:series>
  <gmd:CI_Series>
    <gmd:name>
      <gco:CharacterString>L4_C</gco:CharacterString>
    </gmd:name>
  </gmd:CI_Series>
</gmd:series>
<gmd:otherCitationDetails>
  <gco:CharacterString>The launch ready Release of the SMAP Level 4 Surface and Root Zone Soil  
Moisture Science Processing Software.</gco:CharacterString>
</gmd:otherCitationDetails>
</gmd:CI_Citation>
</gmd:citation>
```