Tiling Identification System

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Element Description

The Tiling Identification System element defines a named two-dimensional tiling system related to the collection.

Best Practices

A tiling identification system is a defined 2-D grid which covers the surface of the Earth. An example of a tiling identification system is the Worldwide Reference System (WRS) where the surface of the Earth is split into numbered paths and rows. The WRS-2 system is used to catalog Landsat data and is a popular way to search for Landsat data. Another example are the various MODIS grids, such as the MODIS Sinusoidal Tile Grid system which divides the Earth into 595 10 x 10 degree tiles.

There are five sub-elements used to specify a tiling identification system. If provided, all of the sub-fields are required:

Tiling Identification System Name: This field identifies the name of the tiling identification system. The name must be selected from a controlled enumeration list which includes the following values: CALIPSO, MISR, MODIS Tile EASE, MODIS Tile SIN, WELD Alaska Tile, WELD CONUS Tile, WRS-1, WRS-2, Military Grid Reference System

Coordinate 1/ Minimum Value: Identifies the minimum value for one dimension (e.g. horizontal) of the two dimensional tiling system.

Coordinate 1/ Maximum Value: Identifies the maximum value for one dimension (e.g. horizontal) of the two dimensional tiling system.

Coordinate 2/ Minimum Value: Identifies the minimum value for the other dimension (e.g. vertical) of the two dimensional tiling system.

Coordinate 2/ Maximum Value: Identifies the maximum value for the other dimension (e.g. vertical) of the two dimensional tiling system.

Examples:

TilingIdentificationSystemName: MISR

Coordinate1/MinimumValue: 1

Coordinate2/MaximumValue: 233

Coordinate2/MinimumValue: 1

Coordinate2/MaximumValue: 80

TilingIdentificationSystemName: MODIS Tile SIN

Coordinate1/MinimumValue: 0

Coordinate2/MaximumValue: 35

Coordinate2/MinimumValue: 0

Coordinate2/MaximumValue: 17

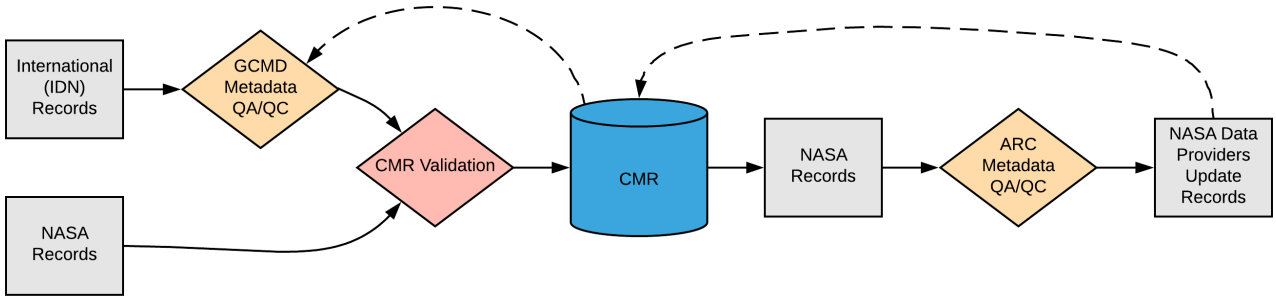
Element Specification

Providing a Tiling Identification System is optional. An unlimited amount of Tiling Identification Systems may be provided (Cardinality: 0..*)

Model	Element	Type	Usable Valid Values	Constraints	Required?	Cardinality	Notes
UMM-C	TilingIdentificationSystem /TilingIdentificationSystemName	Enumeration	CALIPSO MISR MODIS Tile EASE MODIS Tile SIN WELD Alaska Tile WELD CONUS Tile WRS-1 WRS-2 Military Grid Reference System	n/a	Yes, if applicable	1	Location of the TilingIdentificationSystemNameEnum in the UMM version 1.17.2 schema: https://git.earthdata.nasa.gov/projects/EMFD/repos/unified-metadata-model/browse/collection/v1.17.2/umm-c-json-schema.json
UMM-C	TilingIdentificationSystem/Coordinate1 /MinimumValue	String	n/a	n/a	Yes, if applicable	1	
UMM-C	TilingIdentificationSystem/Coordinate1 /MaximumValue	String	n/a	n/a	Yes, if applicable	1	
UMM-C	TilingIdentificationSystem/Coordinate2 /MinimumValue	String	n/a	n/a	Yes, if applicable	1	
UMM-C	TilingIdentificationSystem/Coordinate2 /MaximumValue	String	n/a	n/a	Yes, if applicable	1	

Metadata Validation and QA/QC

All metadata entering the CMR goes through the below process to ensure metadata quality requirements are met. All records undergo CMR validation before entering the system. The process of QA/QC is slightly different for NASA and non-NASA data providers. Non-NASA providers include interagency and international data providers and are referred to as the International Directory Network (IDN).



Please see the expandable sections below for flowchart details.

- Manual Review
  - Check that the purpose description is appropriate for the dataset.
- Automated Review
  - Check that the field has been populated.
  - Check that the field length is not greater than 1000 characters.

TBD
ARC Priority Matrix

Priority Categorization	Justification

Red = High Priority Finding	This element is categorized as highest priority when: • The Tiling Identification System Name does not match an enumeration value (CALIPSO, MISR, MODIS Tile EASE, MODIS Tile SIN, WELD Alaska Tile, WELD CONUS Tile, WRS-1, WRS-2). • The Tiling Identification System provided is incorrect for the dataset.
Yellow = Medium Priority Finding	This element is categorized as medium priority when: • The Tiling Identification System Name does not match an enumeration value when the metadata format is anything other than UMM-JSON (this field is not controlled in other metadata dialects).
Blue = Low Priority Finding	This element is categorized as low priority when: • A recommendation is made to add a tiling identification system to the metadata when appropriate.
Green = No Findings/Issues	The element is provided, and follows all applicable criteria specified in the best practices section above.

ARC Automated Checks

ARC uses the pyQuARC library for automated metadata checks. Please see the pyQuARC GitHub for more information.

Dialect Mappings

DIF 9 **(Note: DIF-9 is being phased out and will no longer be supported after 2018)**

DIF 10

Providing a TwoD_Coordinate_System is optional. An unlimited amount of TwoD_Coordinate_Systems may be provided (Cardinality: 0..*)

UMM-C Element	DIF 10 Path	Type	Constraints	Required in DIF 10?	Cardinality
TilingIdentificationSystem /TilingIdentificationSystemName	Spatial_Coverage/Spatial_Info/TwoD_Coordinate_System /TwoD_Coordinate_System_Name	String		Yes, if applicable	1
TilingIdentificationSystem/Coordinate1 /MinimumValue	Spatial_Coverage/Spatial_Info/TwoD_Coordinate_System /Coordinate1/Minimum_Value	Decimal		Yes, if applicable	1
TilingIdentificationSystem/Coordinate1 /MaximumValue	Spatial_Coverage/Spatial_Info/TwoD_Coordinate_System /Coordinate1/Maximum_Value	Decimal		Yes, if applicable	1
TilingIdentificationSystem/Coordinate2 /MinimumValue	Spatial_Coverage/Spatial_Info/TwoD_Coordinate_System /Coordinate2/Minimum_Value	Decimal		Yes, if applicable	1
TilingIdentificationSystem/Coordinate2 /MaximumValue	Spatial_Coverage/Spatial_Info/TwoD_Coordinate_System /Coordinate2/Maximum_Value	Decimal		Yes, if applicable	1

Example Mapping

DIF 10

```
<Spatial_Coverage>
  <Spatial_Info>
    <TwoD_Coordinate_System>
      <TwoD_Coordinate_System_Name>MODIS Tile EASE<
/TwoD_Coordinate_System_Name>
      <Coordinate1>
        <Minimum_Value>0</Minimum_Value>
        <Maximum_Value>18</Maximum_Value>
      </Coordinate1>
      <Coordinate2>
        <Minimum_Value>0</Minimum_Value>
        <Maximum_Value>38</Maximum_Value>
      </Coordinate2>
    </TwoD_Coordinate_System>
  </Spatial_Info>
</Spatial_Coverage>
```

UMM

```
"TilingIdentificationSystems": [
  {
    "TilingIdentificationSystemName": "MODIS Tile
EASE",
    "Coordinate1": {
      "MinimumValue": 0.0,
      "MaximumValue": 18.0
    },
    "Coordinate2": {
      "MinimumValue": 0.0,
      "MaximumValue": 38.0
    }
  }
]
```

ECHO 10

Providing a TwoDCoordinateSystem is optional. An unlimited amount of TwoDCoordinateSystems may be provided (Cardinality: 0..*)

UMM-C Element	ECHO 10 Path	Type	Constraints	Required in ECHO10?
TilingIdentificationSystem/Coordinate1	TwoDCoordinateSystems/TwoDCoordinateSystem /TwoDCoordinateSystemName	String	1 - 80 characters	Yes, if applicable
TilingIdentificationSystem/Coordinate1 /MinimumValue	TwoDCoordinateSystems/TwoDCoordinateSystem/Coordinate1 /MinimumValue	Decimal	n/a	Yes, if applicable
TilingIdentificationSystem/Coordinate1 /MaximumValue	TwoDCoordinateSystems/TwoDCoordinateSystem/Coordinate1 /MaximumValue	Decimal	n/a	Yes, if applicable
TilingIdentificationSystem/Coordinate2 /MinimumValue	TwoDCoordinateSystems/TwoDCoordinateSystem/Coordinate2 /MinimumValue	Decimal	n/a	Yes, if applicable
TilingIdentificationSystem/Coordinate2 /MaximumValue	TwoDCoordinateSystems/TwoDCoordinateSystem/Coordinate2 /MaximumValue	Decimal	n/a	Yes, if applicable

Example Mapping

ECHO 10

```
<TwoDCoordinateSystems>
  <TwoDCoordinateSystem>
    <TwoDCoordinateSystemName>MODIS Tile EASE<
/TwoDCoordinateSystemName>
    <Coordinate1>
      <MinimumValue>0</MinimumValue>
      <MaximumValue>18</MaximumValue>
    </Coordinate1>
    <Coordinate2>
      <MinimumValue>0</MinimumValue>
      <MaximumValue>38</MaximumValue>
    </Coordinate2>
  </TwoDCoordinateSystem>
</TwoDCoordinateSystems>
```

UMM

```
"TilingIdentificationSystems": [
  {
    "TilingIdentificationSystemName": "MODIS Tile
EASE",
    "Coordinate1": {
      "MinimumValue": 0.0,
      "MaximumValue": 18.0
    },
    "Coordinate2": {
      "MinimumValue": 0.0,
      "MaximumValue": 38.0
    }
  }
]
```

ISO 19115-2 MENDS

Providing a Tiling Identification System is optional. An unlimited amount of Tiling Identification Systems may be provided (Cardinality: 0..*)

UMM-C Element	ISO 19115-2 MENDS Path	Type	Notes
TilingIdentificationSystem /TilingIdentificationSystemName	/gmi:MI_Metadata/gmd:identificationInfo/gmd: MD_DataIdentification/gmd:extent/gmd:EX_Extent/ gmd: geographicIdentifier/gmd:MD_Identifier/gmd:description/gco: CharacterString with /gmi:MI_Metadata/gmd:identificationInfo/gmd: MD_DataIdentification/gmd:extent/gmd:EX_Extent gmd: EX_Extent id="TilingIdentificationSystem" with /gmi:MI_Metadata/gmd:identificationInfo/gmd: MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd: description/gco:CharacterString="Tiling Identification System" with /gmi:MI_Metadata/gmd:identificationInfo/gmd: MD_DataIdentification/gmd:extent/gmd:EX_Extent/ gmd: geographicElement/gmd:EX_GeographicDescription/gmd: geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco: CharacterString = gov.nasa.esdis.umm.tilingidentificationsystem	String	The actual name of the tiling identification system (e.g. 'MODIS Tile SIN') goes in the first path listed. This field is not controlled in ISO, however, the UMM requires that the name be selected from a controlled enumeration list with the following options: CALIPSO, MISR, MODIS Tile EASE, MODIS Tile SIN, WELD Alaska Tile, WELD CONUS Tile, WRS-1, WRS-2. An EX_Extent id of "TilingIdentificationSystem" should be provided so that CMR can properly parse out the tiling identification system fields. Similarly, a description field with the string "Tiling Identification System" should be provided, and the value of "gov.nasa.esdis.umm. tilingidentificationsystem" should be provided in gmd:CodeSpace field so that CMR can properly parse out the tiling identification system fields.
TilingIdentificationSystem /Coordinate1 /MinimumValue	/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= c1-min:	String	The prefix "c1-min: " must be provided in front of the minimum coordinate to differentiate it from the other coordinate values.
TilingIdentificationSystem /Coordinate1 /Maximum Value	/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= c1-max:	String	The prefix "c1-max: " must be provided in front of the maximum coordinate to differentiate it from the other coordinate values.
TilingIdentificationSystem /Coordinate2 /MinimumValue	/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= c2-min:	String	The prefix "c2-min: " must be provided in front of the minimum coordinate to differentiate it from the other coordinate values.
TilingIdentificationSystem /Coordinate2 /Maximum Value	/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= c2-max:	String	The prefix "c2-max: " must be provided in front of the maximum coordinate to differentiate it from the other coordinate values.

Example Mapping

ISO 19115-2 MENDS

```
<gmi:MI_Metadata>
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:extent>
        <gmd:EX_Extent id="
TilingIdentificationSystem">
          <gmd:description>
            <gco:CharacterString>Tiling
Identification System</gco:CharacterString>
          </gmd:description>
          <gmd:geographicElement>
            <gmd:EX_GeographicDescription>
              <gmd:geographicIdentifier>
                <gmd:MD_Identifier>
                  <gmd:code>
                    <gco:CharacterString>c1-min: 0.0
c1-max: 18.0 c2-min: 0.0 c2-max: 38.0</gco:
CharacterString>
                  </gmd:code>
                  <gmd:codeSpace>
                    <gco:CharacterString>gov.nasa.
esdis.umm.tilingidentificationsystem</gco:
CharacterString>
                  </gmd:codeSpace>
                </gmd:MD_Identifier>
              </gmd:geographicIdentifier>
            </gmd:EX_GeographicDescription>
          </gmd:geographicElement>
        </gmd:EX_Extent>
      </gmd:extent>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
</gmi:MI_Metadata>
```

UMM

```
"TilingIdentificationSystems": [
  {
    "TilingIdentificationSystemName": "MODIS Tile
EASE",
    "Coordinate1": {
      "MinimumValue": 0.0,
      "MaximumValue": 18.0
    },
    "Coordinate2": {
      "MinimumValue": 0.0,
      "MaximumValue": 38.0
    }
  }
]
```

ISO 19115-2 SMAP

Providing a Tiling Identification System is optional. An unlimited amount of Tiling Identification Systems may be provided (Cardinality: 0..*)

UMM-C Element	ISO 19115-2 SMAP Path	Type	Notes

TilingIdentificationSystem /TilingIdentificationSystemName	/gmd:DS_Series/gmd:seriesMetadata/ /gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification /gmd:extent/gmd:EX_Extent/ gmd:geographicIdentifier/gmd: MD_Identifier/gmd:description/gco:CharacterString with /gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd: identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd: EX_Extent gmd:EX_Extent id="TilingIdentificationSystem" with /gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd: identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd: EX_Extent/gmd:description/gco:CharacterString="Tiling Identification System" with /gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd: identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd: EX_Extent/ gmd:geographicElement/gmd: EX_GeographicDescription/gmd:geographicIdentifier/gmd: MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm.tilingidentificationsystem	String	The actual name of the tiling identification system (e.g. 'MODIS Tile SIN') goes in the first path listed. This field is not controlled in ISO, however, the UMM requires that the name be selected from a controlled enumeration list with the following options: CALIPSO, MISR, MODIS Tile EASE, MODIS Tile SIN, WELD Alaska Tile, WELD CONUS Tile, WRS-1, WRS-2. An EX_Extent id of "TilingIdentificationSystem" should be provided so that CMR can properly parse out the tiling identification system fields. Similarly, a description field with the string "Tiling Identification System" should be provided, and the value of "gov.nasa.esdis.umm.tilingidentificationsystem" should be provided in gmd:CodeSpace field so that CMR can properly parse out the tiling identification system fields.
TilingIdentificationSystem /Coordinate1 /MinimumValue	/gmd:DS_Series/gmd:seriesMetadata/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= c1-min:	String	The prefix "c1-min: " must be provided in front of the minimum coordinate to differentiate it from the other coordinate values.
TilingIdentificationSystem /Coordinate1 /MinimumValue	/gmd:DS_Series/gmd:seriesMetadata/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= c1-max:	String	The prefix "c1-max: " must be provided in front of the maximum coordinate to differentiate it from the other coordinate values.
TilingIdentificationSystem /Coordinate1 /MinimumValue	/gmd:DS_Series/gmd:seriesMetadata/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= c2-min:	String	The prefix "c2-min: " must be provided in front of the minimum coordinate to differentiate it from the other coordinate values.
TilingIdentificationSystem /Coordinate1 /MinimumValue	/gmd:DS_Series/gmd:seriesMetadata/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= c2-max:	String	The prefix "c2-max: " must be provided in front of the maximum coordinate to differentiate it from the other coordinate values.

Example Mapping

ISO 19115-2 SMAP

```
<gmd:DS_Series>
<gmd:seriesMetadata>
<gmi:MI_Metadata>
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:extent>
        <gmd:EX_Extent id="
TilingIdentificationSystem">
          <gmd:description>
            <gco:CharacterString>Tiling
Identification System</gco:CharacterString>
          </gmd:description>
          <gmd:geographicElement>
            <gmd:EX_GeographicDescription>
              <gmd:geographicIdentifier>
                <gmd:MD_Identifier>
                  <gmd:code>
                    <gco:CharacterString>c1-min: 0.0
c1-max: 18.0 c2-min: 0.0 c2-max: 38.0</gco:
CharacterString>

                  </gmd:code>
                  <gmd:codeSpace>
                    <gco:CharacterString>gov.nasa.
esdis.umm.tilingidentificationsystem</gco:
CharacterString>
                  </gmd:codeSpace>
                </gmd:MD_Identifier>
              </gmd:geographicIdentifier>
            </gmd:EX_GeographicDescription>
          </gmd:geographicElement>
        </gmd:EX_Extent>
      </gmd:extent>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
</gmi:MI_Metadata>
</gmd:seriesMetadata>
</gmd:DS_Series>
```

UMM

```
"TilingIdentificationSystems": [
  {
    "TilingIdentificationSystemName": "MODIS Tile
EASE",
    "Coordinate1": {
      "MinimumValue": 0.0,
      "MaximumValue": 18.0
    },
    "Coordinate2": {
      "MinimumValue": 0.0,
      "MaximumValue": 38.0
    }
  }
]
```

UMM Migration

None

History

UMM Versioning

Version	Date	What Changed
1.17.2	1/18 /2023	Changed the TilingIdentificationSystems/Coordinate1 and Coordinate2 to be type of string instead of number so that military grid reference system grids can be entered. They use alpha-numeric coordinates.
1.16 - 1.17.1	3/24 /2021 through 8/10 /2022	No changes were made for Tiling Identification System during the transition from version 1.16 to 1.17.1
1.15.5	12/3 /2020	No changes were made for Tiling Identification System during the transition from version 1.15.4 to 1.15.5
1.15.4	9/18 /2020	An additional enum, 'Military Grid Reference System' was added to the Tiling Identification System Name
1.15.3	7/1 /2020	No changes were made for Tiling Identification System during the transition from version 1.15.2 to 1.15.3
1.15.2	5/20 /2020	No changes were made for Tiling Identification System during the transition from version 1.15.1 to 1.15.2
1.15.1	3/25 /2020	No changes were made for Tiling Identification System during the transition from version 1.15.0 to 1.15.1
1.15.0	2/26 /2020	No changes were made for Tiling Identification System during the transition from version 1.14.0 to 1.15.0
1.14.0	10/21 /2019	No changes were made for Tiling Identification System during the transition from version 1.13.0 to 1.14.0
1.13.0	04/11 /2019	No changes were made for Tiling Identification System during the transition from version 1.12.0 to 1.13.0
1.12.0	01/22 /2019	No changes were made for Tiling Identification System during the transition from version 1.11.0 to 1.12.0
1.11.0	11/28 /2018	No changes were made for Tiling Identification System during the transition from version 1.10.0 to 1.11.0
1.10.0	05/02 /2018	During the transition from version 1.9.0 to 1.10.0, an enumeration list was created for Tiling Identification System. Values in the enumeration include: CALIPSO, MISR, MODIS Tile EASE, MODIS Tile SIN, WELD Alaska Tile, WELD CONUS Tile, WRS-1, WRS-2

ARC Documentation

Version	Date	What Changed	Author
1.0	10/26/2018	Recommendations/priority matrix transferred from internal ARC documentation to wiki space	Jeanne' le Roux