

Spatial Extent

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Element Description

The Spatial Extent element describes the geographic coverage of the data. At the collection-level, the spatial extent describes the area of the Earth that a data product covers as a whole. For specific files or granules, the spatial extent describes the area covered by that individual file. Providing accurate spatial extent metadata is critical for allowing spatially-based data searches in Earthdata Search and other data discovery platforms.

The Spatial Extent element may also be used to describe vertical coverage of the data and orbital parameters where appropriate.

The Horizontal Resolution and Coordinate System elements are also included under Spatial Extent. These include fields for [Geodetic Model](#), [Horizontal Data Resolution](#), and [Local Coordinates](#). [Geodetic Model](#) is used to describe data that has been georeferenced to a datum, which is a well defined ellipsoidal/spherical representation of the Earth. [Horizontal Data Resolution](#) Data describes the resolution of data that has been georeferenced to a geodetic datum, and is defined as the smallest horizontal distance between successive elements of data in a dataset. This is synonymous with terms such as ground sample distance, sample spacing and pixel size. It is to be noted that the [Horizontal Data Resolution](#) could be different in the two horizontal dimensions. Also, it is different from the spatial resolution of an instrument, which is the minimum distance between points that an instrument can see as distinct. [Local Coordinate System](#) describes data collected over small or localized areas which have been georeferenced to a custom or highly specialized reference system.

Best Practices

In the CMR, there is the option to describe the horizontal, vertical, and orbital spatial coverage of a dataset along with its coordinate system and resolution. The type of spatial coverage being described in the metadata is identified via the '**Spatial Coverage Type**' metadata element. There are five different controlled vocabulary options for '**Spatial Coverage Type**'. These include:

- Horizontal
- Vertical
- Orbital
- Horizontal and Vertical
- Orbital and Vertical

Each spatial extent type requires different information. The information needed for each type is summarized below:

Horizontal

Horizontal spatial extent refers to data covering the surface of the Earth. For horizontal spatial extent, a coordinate system must be specified with the choice of either a Cartesian or Geodetic coordinate system:

SpatialExtent/HorizontalSpatialDomain/Geometry/CoordinateSystem:

Choice of:

- CARTESIAN
- GEODETIC

Please see the [Coordinate Systems section of the CMR Data Partner User Guide](#) for instructions on how to assign the appropriate coordinate system.

Furthermore, there are four different options for describing horizontal spatial coverage. Only one of these options may be selected, however, the selected option may be repeated as many times as necessary (e.g. you can't provide a bounding rectangle and a point, but you can provide multiple bounding rectangles). The four options are:

(1) Point

- A point location defined by a latitude and longitude coordinate. Multiple points may be provided if necessary.

(2) Bounding Rectangle

- A rectangle defined by a north latitude coordinate, south latitude coordinate, east longitude coordinate, and west longitude coordinate. The north bounding latitude may not exceed 90 degrees, the south bounding coordinate may not be less than -90 degrees, the west bounding coordinate may not be less than -180 degrees, and the east bounding coordinate may not exceed 180 degrees.

(3) GPolygon

- A polygon defined by latitude/longitude point pairs. The more points are provided, the more detailed the polygon will be. Exclusion zones within the polygon can also be identified. Please see the [CMR Data Partner User Guide](#) for more details.

(4) Line

- A width-less line defined by latitude/longitude point pairs. Multiple points may be provided to express a complex line. Please see the [CMR Data Partner User Guide](#) for more details.

It is recommended that the spatial extent of a given file or data collection be specified as precisely as possible in order to limit "false positives" when searching for data. For example, a polygon can provide a more precise spatial extent than a bounding box when the data does not cover a perfectly rectangular area on the Earth's surface.

Horizontal Resolution and Coordinate System

The following sub-elements can be used to describe **Horizontal Resolution and Coordinate System**.

There are 3 categories for Horizontal Resolution and Coordinate System Data Resolution including:

(1) Geodetic Model

Geodetic Model is used to describe data that has been georeferenced to a datum, which is a well defined ellipsoidal/spherical representation of the Earth. There are many different standard datums. Knowing which datum the data is encoded in is extremely useful for manipulating the data using GIS software. Sub-elements under Geodetic Model are summarized below:

- **Horizontal Datum Name:** The name of the datum the data are encoded in. Also commonly referred to as a geodetic datum. A geodetic datum is a more localized/ specialized version of a simple Ellipsoid model of the Earth (see below). It is recommended that [EPSG Datum names](#) be used.
- **Ellipsoid Name:** An elliptical or spherical shape representing the Earth. An Ellipsoid's shape can be defined by a major axis (longer axis) and a minor axis (shorter axis). There are standard names for different Ellipsoids - it is recommended that [EPSG Ellipsoid names](#) be used.
- **Semi Major Axis:** The radius of the major axis of the Ellipsoid. The length and units of the Semi Major Axis should be defined in the Ellipsoid standard.
- **Denominator Of Flattening Ratio:** The ratio of the Ellipsoid's major axis to the difference between the major and the minor axis. Also referred to as the Inverse Flattening ratio. The smaller the ratio, the 'flatter' or more oval-like the Ellipsoid's shape will be. The units of the Inverse Flattening ratio are also defined by the Ellipsoid standard.

(2) Horizontal Data Resolution

Data that has been georeferenced to a geodetic datum can have resolution information. It is highly recommended that this information be provided if possible since this metadata is now indexed in the Earthdata Search "Horizontal Data Resolution" search facet, allowing users to search by spatial resolution. There are three basic types of spatial coverages: Point Data, Non Gridded Data, and Gridded Data. Depending on which type different set of data is useful to describe the data sets resolution. These are summarized below:

- **Varies Resolution:** The data product's resolution information is varied and not described in the data set's metadata record. For more information the data set's landing pages should be visited.
- **Point Resolution:** The data product's spatial extent is a point and therefore there is no resolution information to describe.
- **Non Gridded Resolutions:** The data product's spatial extent is not gridded and the following set of sub elements apply:
 - **XDimension:** The resolution value on an X axis on a plane - On the Earth this is normally the Longitudinal axis.
 - **YDimension:** The resolution value on a Y axis on a plane - On the Earth this is normally the Latitudinal axis.
 - **Unit:** The unit of measure for the X and Y dimensions. The valid values are controlled and they include: Decimal Degrees, Kilometers, and Meters.
 - **ViewingAngleType:** Describes the sensors angle when the measurements are taken. The valid values are controlled and they include: At Nadir and Scan Extremes.
 - **ScanDirection:** Describes the direction that is scanned by the sensor. The valid values are controlled and they include: Along Track and Cross Track.
- **Non Gridded Range Resolutions:** Resolution ranges are necessary for data that is collected by aircraft and other such vessels. The following set of sub elements apply to describing the data product's resolution:
 - **MinimumXDimension:** The minimum resolution value on an X axis on a plane - On the Earth this is normally the Longitudinal axis.
 - **MinimumYDimension:** The minimum resolution value on a Y axis on a plane - On the Earth this is normally the Latitudinal axis.
 - **MaximumXDimension:** The maximum resolution value on an X axis on a plane - On the Earth this is normally the Longitudinal axis.
 - **MaximumYDimension:** The maximum resolution value on a Y axis on a plane - On the Earth this is normally the Latitudinal axis.
 - **Unit:** The unit of measure for the X and Y dimensions. The valid values are controlled and they include: Decimal Degrees, Kilometers, and Meters.
 - **ViewingAngleType:** Describes the sensors angle when the measurements are taken. The valid values are controlled and they include: At Nadir and Scan Extremes.
 - **ScanDirection:** Describes the direction that is scanned by the sensor. The valid values are controlled and they include: Along Track and Cross Track.
- **Gridded Resolutions:** The data product's spatial extent is gridded and the following set of sub elements apply:
 - **XDimension:** The resolution value on an X axis on a plane - On the Earth this is normally the Longitudinal axis.
 - **YDimension:** The resolution value on a Y axis on a plane - On the Earth this is normally the Latitudinal axis.
 - **Unit:** The unit of measure for the X and Y dimensions. The valid values are controlled and they include: Decimal Degrees, Kilometers, and Meters.
- **Gridded Range Resolutions:** Resolution ranges are necessary for data that is collected by aircraft and other such vessels. The following set of sub elements apply to describing the data product's resolution:

- **MinimumXDimension:** The minimum resolution value on an X axis on a plane - On the Earth this is normally the Longitudinal axis.
- **MinimumYDimension:** The minimum resolution value on a Y axis on a plane - On the Earth this is normally the Latitudinal axis.
- **MaximumXDimension:** The maximum resolution value on an X axis on a plane - On the Earth this is normally the Longitudinal axis.
- **MaximumYDimension:** The maximum resolution value on a Y axis on a plane - On the Earth this is normally the Latitudinal axis.
- **Unit:** The unit of measure for the X and Y dimensions. The valid values are controlled and they include: Decimal Degrees, Kilometers, and Meters.
- **Generic Resolutions:** If it is not known whether the data product is gridded or not, the following set of sub elements apply:
 - **XDimension:** The resolution value on an X axis on a plane - On the Earth this is normally the Longitudinal axis.
 - **YDimension:** The resolution value on a Y axis on a plane - On the Earth this is normally the Latitudinal axis.
 - **Unit:** The unit of measure for the X and Y dimensions. The valid values are controlled and they include: Decimal Degrees, Kilometers, and Meters.

(3) Local Coordinate System

Data collected over small or localized areas may be georeferenced to a custom or highly specialized reference system. In order to accurately compare the local data to other data, the local coordinates must be converted to a standard reference system such as one of the [EPSG geodetic datums](#). The Local Coordinate System fields provide information about the local coordinate system. Sub-elements under Local Coordinate System are summarized below:

- **Geo Reference Information:** Information on how the local system were registered to a standard reference system (e.g. control points, satellite ephemeral data, and inertial navigation data). In some cases, the user may be responsible for georeferencing the data.
- **Description:** A description of the Local Coordinate System and georeference information.

A **Description** sub element is included in the ResolutionAndCoordinateSystem element that allows a CMR data provider to explain to a user the data products horizontal coordinate system and resolution.

Providing the horizontal coverage's resolution and coordinate system data is optional, but encouraged and is used to provide horizontal and/or vertical coordinate system information.

Vertical

Vertical spatial domain can be used to describe the coverage of data with a vertical component. The type of vertical coverage being described in the metadata is identified via the '**Vertical Spatial Domain/Type**' metadata element. There are five different controlled vocabulary options for '**Vertical Spatial Domain/Type**' in UMM-Common. These include:

SpatialExtent/VerticalSpatialDomain/Type:

Choice of:

- Atmosphere Layer
- Maximum Altitude
- Minimum Altitude
- Maximum Depth
- Minimum Depth

Once a Type is selected, an accompanying value in the **SpatialExtent/VerticalSpatialDomain/Value** field must also be provided. For example, if "Maximum Altitude" was selected as the Type, the corresponding Value could be "50 KM."

Orbital

When data is collected via a satellite, the **Orbit Parameters** metadata elements may be used to describe the spatial coverage. Please see the [CMR Data Partner User Guide](#) for additional details on how Orbit Parameters are used by the backtrack search algorithm for conducting spatial searches. **Orbit Parameters** includes the following sub-elements:

Swath Width: The width of the strip of the Earth's surface from which geospatial data are collected by a satellite, in kilometers. Only a number should be provided since the unit of kilometers is put into the SwathWidthUnit element. If providing orbit parameters, One of either the Swath Width or Footprints is required.

Swath Width Unit: The unit of measure for the swath width value. The valid values are Kilometer and Meter. This element is required if SwathWidth is used. The unit of measure for the swath width value. The valid values are Kilometer and Meter. This element is required if SwathWidth is used.

Footprints: A list of the instrument's footprints. The largest value of all the Footprints takes the place of SwathWidth in the Orbit Backtrack Algorithm if SwathWidth does not exist. Zero or more footprints can exist in a collection record.

Footprint: The largest width of an instrument's footprint. This element is required if footprints are used.

FootprintUnit: The unit of measure for the Footprint value. The valid values are Kilometer and Meter. FootprintUnit is required.

Description: An optional element that provides text about the footprint. If more than one footprint is provided it also allows users to be able to distinguish between them.

OrbitPeriod: The time it takes a satellite to complete one complete orbit around the Earth, in decimal minutes. Only a number should be provided since the unit of decimal minutes is provided in the OrbitPeriodUnit element. If providing orbit parameters, OrbitPeriod is required.

OrbitPeriodUnit: The unit of measure for the OrbitPeriod element. This is a required element and the only valid value is Decimal Minute.

Inclination Angle: The angle between the equatorial plane of the Earth and the orbital plane of a satellite, in degrees. Only a number should be provided since the unit of degrees is put into the InclinationAngleUnit element. If providing orbit parameters, Inclination Angle is required.

Inclination Angle Unit: The unit of measure for the InclinationAngle element. This element is required and the only valid value is Degree.

Number of Orbits: Indicates the number of orbits.

Start Circular Latitude: The latitude start of the orbit relative to the equator. This is used by the backtrack search algorithm to treat the orbit as if it starts from the specified latitude. This is optional and will default to 0 if not specified.

Start Circular Latitude Unit: The unit of measure for the StartCircularLatitude element. This element is required if the StartCircularLatitude element is used. The only valid value is Degree.

Furthermore, the **Granule Spatial Representation** element is a required element. This element identifies how the spatial extent is expressed in the granule metadata associated with a collection. The spatial representation used in the collection metadata can be different than what is used in the granule metadata. **Granule Spatial Representation** is a controlled vocabulary field in the UMM-Common schema and includes the following options:

- CARTESIAN
- GEODETIC
- ORBIT
- NO_SPATIAL

The granule spatial representation selected at the collection level must be utilized by the granules. Please see the [Collection & Granule Spatial Relationships section of the CMR Data Partner User Guide](#) for additional details.

The spatial extent of the granules should always fall within the spatial extent specified in the collection level metadata (and vice versa). It is the responsibility of the metadata author to ensure that collection-granule spatial relationships are compatible.

Element Specification

Model	Element	Type	Usable Valid Values	Constraints	Required?	Cardinality
UMM-C	SpatialExtent/SpatialCoverageType	Enumeration	HORIZONTAL VERTICAL ORBITAL HORIZONTAL_VERTICAL ORBITAL_VERTICAL	n/a	No	0..1
UMM-C	SpatialExtent/HorizontalSpatialDomain/ ZoneIdentifier	String	n/a	1 - 80 characters	No	0..1
UMM-C	SpatialExtent/HorizontalSpatialDomain/ Geometry/CoordinateSystem	Enumeration	CARTESIAN GEODETIC	n/a	Yes	1
UMM-C	SpatialExtent/ GranuleSpatialRepresentation	Enumeration	CARTESIAN GEODETIC ORBIT NO_SPATIAL	n/a	Yes	1

Choice of one of the following for Horizontal Spatial Domain/ Geometry:

(1) Point

If Point is selected, the cardinality is 1..*

Model	Element	Type	Constraints	Required?	Cardinality	Notes
UMM-C	SpatialExtent/HorizontalSpatialDomain/ Geometry/Point/Longitude	Number	-180 to 180	Yes, if applicable	1	Number in degrees
UMM-C	SpatialExtent/HorizontalSpatialDomain/ Geometry/Point/Latitude	Number	-90 to 90	Yes, if applicable	1	Number in degrees

(2) Bounding Rectangle

If BoundingRectangle is selected, the cardinality is 1..*

Model	Element	Type	Constraints	Required?	Cardinality	Notes
UMM-C	SpatialExtent/HorizontalSpatialDomain/Geometry/ BoundingRectangles/WestBoundingCoordinate	Number	-180 to 180	Yes, if applicable	1	Number in degrees
UMM-C	SpatialExtent/HorizontalSpatialDomain/Geometry/ BoundingRectangles/NorthBoundingCoordinate	Number	-90 to 90	Yes, if applicable	1	Number in degrees
UMM-C	SpatialExtent/HorizontalSpatialDomain/Geometry/ BoundingRectangles/EastBoundingCoordinate	Number	-180 to 180	Yes, if applicable	1	Number in degrees
UMM-C	SpatialExtent/HorizontalSpatialDomain/Geometry/ BoundingRectangles/SouthBoundingCoordinate	Number	-90 to 90	Yes, if applicable	1	Number in degrees

(3) GPolygon

If GPolygon is selected, the cardinality is 1..*

Model	Element	Type	Constraints	Required?	Cardinality	Notes
UMM-C	SpatialExtent /HorizontalSpatialDomain /Geometry/ GPolygon/Boundary/Points /Longitude	Number	-180 to 180	Yes, if applicable	4..*	Number in degrees. A minimum of 4 GPolygon bounding points must be provided.
UMM-C	SpatialExtent /HorizontalSpatialDomain /Geometry/ GPolygon/Boundary/Points /Latitude	Number	-90 to 90	Yes, if applicable	4..*	Number in degrees. A minimum of 4 GPolygon bounding points must be provided.
UMM-C	SpatialExtent /HorizontalSpatialDomain /Geometry/ GPolygon/ExclusiveZone /Boundaries/Points/Longitude	Number	-180 to 180	No	0..*	Number in degrees. A minimum of 4 GPolygon exclusion zone bounding points must be provided, if applicable (providing an exclusion zone is optional).
UMM-C	SpatialExtent /HorizontalSpatialDomain /Geometry/ GPolygon/ExclusiveZone /Boundaries/Points/Latitude	Number	-90 to 90	No	0..*	Number in degrees. A minimum of 4 GPolygon exclusion zone bounding points must be provided, if applicable (providing an exclusion zone is optional).

(4) Line

If Line is selected, the cardinality is 1..*

Model	Element	Type	Constraints	Required?	Cardinality	Notes
UMM-C	SpatialExtent /HorizontalSpatialDomain/ Geometry/Lines/Points /Longitude	Number	-180 to 180	Yes, if applicable	2..*	Number in degrees. A minimum of 2 points must be provided to create a line.
UMM-C	SpatialExtent /HorizontalSpatialDomain/ Geometry/Lines/Points/Latitude	Number	-90 to 90	Yes, if applicable	2..*	Number in degrees. A minimum of 2 points must be provided to create a line.

ResolutionAndCoordinateSystem

Model	Element	Type	Usable Valid Values	Constraints	Required?	Cardinality	Notes
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UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/Description	String	n/a	1-2048 characters	No	0..1	
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/GeodeticModel/ HorizontalDatumName	String	n/a	1 - 80 characters	No	0..1	Recommend providing EPSG geodetic datum names
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/GeodeticModel/ EllipsoidName	String	n/a	1 - 255 characters	No	0..1	Recommend providing EPSG ellipsoid names
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/GeodeticModel/ SemiMajorAxis	Number	n/a	n/a	No	0..1	
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/GeodeticModel/ DenominatorOfFlatteningRatio	Number	n/a	n/a	No	0..1	
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/HorizontalDataResolution/ VariesResolution	Enumeration	Varies	n/a	No	0..1	
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/HorizontalDataResolution/ PointResolution	Enumeration	Point	n/a	No	0..1	
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/HorizontalDataResolution/ NonGriddedResolutions GriddedResolutions GenericResolutions	Object	n/a	n/a	No	0..1	
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/HorizontalDataResolution/ NonGriddedRangeResolutions GriddedRangeResolutions	Object	n/a	n/a	No	0..1	
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/HorizontalDataResolution/ NonGriddedResolutions GriddedResolutions GenericResolutions /XDimension	Number	n/a	n/a	one of XDimension or YDimension is required	0..1	This is used for Non Gridded, Gridded, or Generic Resolutions.

UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/HorizontalDataResolution/ NonGriddedRangeResolutions GriddedRangeResolutions/ MinimumXDimension	Number	n/a	n/a	one of MinimumXDimension and MaximumXDimension or MinimumYDimension and MaximumYDimension is required	0..1	This is used for Non Gridded Range, or Gridded Range.
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/HorizontalDataResolution/ NonGriddedRangeResolutions GriddedRangeResolutions/ MaximumXDimension	Number	n/a	n/a	one of MinimumXDimension and MaximumXDimension or MinimumYDimension and MaximumYDimension is required	0..1	This is used for Non Gridded Range, or Gridded Range.
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/HorizontalDataResolution/ NonGriddedResolutions GriddedResolutions GenericResolutions/YDimension	Number	n/a	n/a	one of XDimension or YDimension is required	0..1	This is used for Non Gridded, Gridded, or Generic Resolutions.
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/HorizontalDataResolution/ NonGriddedRangeResolutions GriddedRangeResolutions/ MinimumYDimension	Number	n/a	n/a	one of MinimumXDimension and MaximumXDimension or MinimumYDimension and MaximumYDimension is required	0..1	This is used for Non Gridded Range, or Gridded Range.
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/HorizontalDataResolution/ NonGriddedRangeResolutions GriddedRangeResolutions/ MaximumYDimension	Number	n/a	n/a	one of MinimumXDimension and MaximumXDimension or MinimumYDimension and MaximumYDimension is required	0..1	This is used for Non Gridded Range, or Gridded Range.
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/HorizontalDataResolution/ NonGriddedResolutions GriddedResolutions GenericResolutions NonGriddedRangeResolutions GriddedRangeResolutions/ Unit	Enumeration	Decimal Degrees Kilometers Meters Statute Miles Nautical Miles Not provided	n/a	Yes	1	This is used for Non Gridded, Non Gridded Range, Gridded, Gridded Range, or Generic Resolutions
UMM-C	SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/HorizontalDataResolution/ NonGriddedResolutions NonGriddedRangeResolutions/ViewingAngleType	Enumeration	At Nadir Scan Extremes	n/a	No	0..1	This is used for Non Gridded, or Non Gridded Range.

UMM-C	SpatialExtent/ HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/ HorizontalDataResolution/ NonGriddedResolutions NonGriddedRangeResolutions/ ScanDirection	Enumeration	Along Track Cross Track	n/a	No	0..1	This is used for Non Gridded, or Non Gridded Range.
UMM-C	SpatialExtent/ HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/ LocalCoordinateSystem/ GeoReferenceInformation	String	n/a	1 - 2048 characters	No	0..1	
UMM-C	SpatialExtent/ HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/ LocalCoordinateSystem/ Description	String	n/a	1 - 2048 characters	No	0..1	

Vertical Spatial Domain:

Providing a Vertical Spatial Domain is optional (Cardinality 0..*)

Model	Element	Type	Usable Valid Values	Constraints	Required?	Cardinality	Notes
UMM-C	SpatialExtent/ VerticalSpatialDomain/Type	Enumeration	Atmosphere Layer Maximum Altitude Maximum Depth Minimum Altitude Minimum Depth	n/a	Yes, if applicable	1	Provide multiple iterations of the vertical spatial domain elements to define an upper and a lower vertical boundary (e.g. a minimum altitude and a maximum altitude).
UMM-C	SpatialExtent/ VerticalSpatialDomain/Value	String	n/a	1 - 80 characters	Yes, if applicable	1	Both Type and Value are required. Use the Value field to describe the number and unit of the Type provided in the previous field (e.g. 50 KM, 208 meters)

Orbit Parameters:

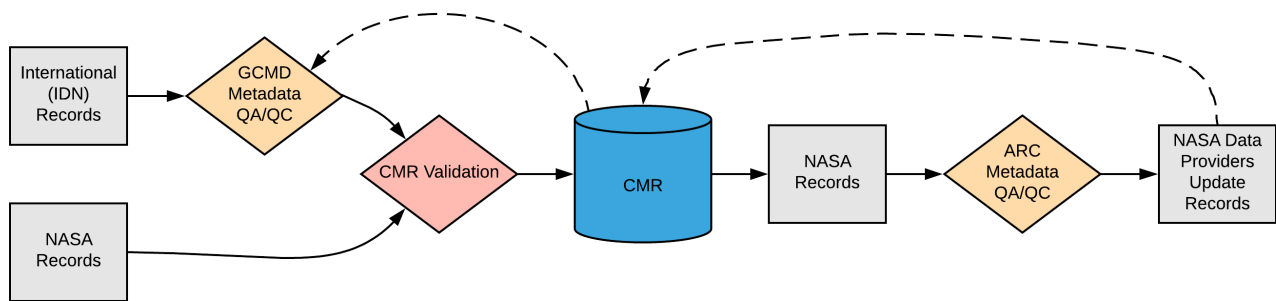
Providing Orbit Parameters is optional (Cardinality 0..*)

Model	Element	Type	Usable Valid Values	Constraints	Required?	Cardinality	Notes
UMM-C	SpatialExtent/OrbitParameters/ SwathWidth	Number	n/a	n/a	One of either SwathWidth or Footprints is required if OrbitParameters is used.	1	
UMM-C	SpatialExtent/OrbitParameters/ SwathWidthUnit	Enumeration	Kilometer Meter	n/a	Yes, if applicable	1	
UMM-C	SpatialExtent/OrbitParameters/ Footprints	Array	n/a	n/a	One of either SwathWidth or Footprints is required if OrbitParameters is used.	0..*	
UMM-C	SpatialExtent/OrbitParameters/ Footprints/Footprint	Number	n/a	n/a	Yes, if applicable	1	
UMM-C	SpatialExtent/OrbitParameters/ Footprints/FootprintUnit	Enumeration	Kilometer Meter		Yes, if applicable	1	
UMM-C	SpatialExtent/OrbitParameters/ Footprints/Description	String	n/a	n/a	No	0..1	
UMM-C	SpatialExtent/OrbitParameters/ OrbitPeriod	Number	n/a	n/a	Yes, if applicable	1	In decimal minutes.
UMM-C	SpatialExtent/OrbitParameters/ OrbitPeriodUnit	Enumeration	Decimal Minute	n/a	Yes, if applicable	1	

UMM-C	SpatialExtent/OrbitParameters /InclinationAngle	Number	n/a	-90 to 90	Yes, if applicable	1	In degrees.
UMM-C	SpatialExtent/OrbitParameters /InclinationAngleUnit	Enumeration	Degree	n/a	Yes, if applicable	1	
UMM-C	SpatialExtent/OrbitParameters /NumberOfOrbits	Number	n/a	n/a	Yes, if applicable	1	
UMM-C	SpatialExtent/OrbitParameters /StartCircularLatitude	Number	n/a	-90 to 90	No	0..1	In degrees.
UMM-C	SpatialExtent/OrbitParameters /StartCircularLatitudeUnit	Enumeration	Degree	n/a	Yes, if StartCircularLatitude is used	0..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
 - Identify errors, discrepancies or omissions.
- Automated Review
 - Check that the field has been populated.
 - Check that the field value is valid.
 - Check that the field values matches the enumeration values.
 - Check that the spatial coverage ranges are correct.
 - Check that the field length is not greater than 255 characters (Ellipsoid_Name).
 - Check that the field length is not greater than 80 characters (Horizontal_Datum_Name).
 - Check that the field length is not greater than 80 characters (Geographic_Coordinate_Units).
 - Check that the field length is not greater than 2,048 characters (Local_Coordinate_System/Description).
 - Check that the field length is not greater than 2,048 characters (Local_Coordinate_System/GeoReference_Information).
 - Check that the field length is not greater than 255 characters (Horizontal_Coordinate_System/Planar_Coordinate_System /Grid_Coordinate_System_Name).
 - Check that the field length is not greater than 2,048 characters (Horizontal_Coordinate_System/Planar_Coordinate_System /Local_Planar_Coordinate_System/GeoReference_Information).
 - Check that the field length is not greater than 2,048 characters (Horizontal_Coordinate_System/Planar_Coordinate_System /LocalPlanar_Coordinate_System/Description).
 - Check that the field length is not greater than 80 characters (Horizontal_Coordinate_System/Planar_Coordinate_System /Map_Projection/Map_Projection_Name).
 - Check that the field length is not greater than 255 characters (Horizontal_Coordinate_System/Planar_Coordinate_System /Map_Projection/Map_Projection_Pointer).
 - Check that the field length is not greater than 80 characters (Horizontal_Coordinate_System/Planar_Coordinate_System /Planar_Coordinate_Information).
 - Check that the field length is not greater than 20 characters (Planar_Coordinate_System/Planar_Coordinate_Information /Distance_And_Bearing_Representation/Bearing_Reference_Direction).
 - Check that the field length is not greater than 2,048 characters (Planar_Coordinate_System/Planar_Coordinate_Information /Distance_And_Bearing_Representation/Bearing_Reference_Meridian).
 - Check that the field length is not greater than 255 characters (Planar_Coordinate_System/Planar_Coordinate_Information /Distance_And_Bearing_Representation/Bearing_Units).
 - Check that the field length is not greater than 80 characters (Planar_Coordinate_System/Planar_Coordinate_Information /Encoding_Method).
 - Check that the field length is not greater than 80 characters (Horizontal_Coordinate_System/Planar_Coordinate_System /Planar_Coordinate_System_Id).
 - Check that the field length is not greater than 80 characters (TwoD_Coordinate_System/TwoDCoordinateSystem /TwoD_Coordinate_System_Name).

- Check that the field length is not greater than 80 characters (Vertical_Coordinate_System/Altitude_System_Definition/Datum_Name).
 - Check that the field length is not greater than 80 characters (Vertical_Coordinate_System/Altitude_System_Definition/Distance_Units).
 - Check that the field length is not greater than 2,048 characters (Vertical_Coordinate_System/Altitude_System_Definition/Encoding_Method).
 - Check that the field length is not greater than 80 characters (Vertical_Coordinate_System/Altitude_System_Definition/Resolutions).
 - Check that the field length is not greater than 80 characters (Vertical_Coordinate_System/Depth_System_Definition).
 - Check that the field length is not greater than 80 characters (Vertical_Coordinate_System/Depth_System_Definition/Datum_Name).
 - Check that the field length is not greater than 80 characters (Vertical_Coordinate_System/Depth_System_Definition/Distance_Units).
 - Check that the field length is not greater than 2,048 characters (Vertical_Coordinate_System/Depth_System_Definition/Encoding_Method).
 - Check that the field length is not greater than 80 characters (Vertical_Coordinate_System/DepthSystemDefinition/Resolution).
 - Check that the field length is not greater than 80 characters (Vertical_Spatial_Info/VerticalSpatialInfo/Type).
 - Check that the field length is not greater than 80 characters (Vertical_Spatial_Info/VerticalSpatialInfo/Value).
 - Check that the field length is not greater than 80 characters (Zone_Identifier).
 - This element is required and must exist.
 - General validation rules for cartesian coordinates
 - Any single spatial area may not cross the International Date Line or Poles.
 - Two vertices will be connected with a straight line.
 - General validation rules for geodetic coordinates
 - The implemented Geodetic model uses the great circle distance to connect two vertices for constructing a polygon area or line. If there is not enough density (that is, the number of points) for a set of vertices, then the line or the polygon area might be misinterpreted or the metadata might be considered invalid.
 - Any single spatial area may cross the International Date Line and/or Poles
 - Any single spatial area may not cover more than one half of the earth.
 - General collection level rules
 - Each collection may specify only one coordinate system for its spatial coverage.
 - Each collection's coordinate system is independent of all other collections.
 - Each collection's coordinate system is independent of its granule spatial representation — i.e., a collection's spatial extent may be expressed in the Cartesian geometry, but have all of its granules specify their spatial extents in the Geodetic geometry.
 - A collection specifies its granules' spatial representation, which cannot be overridden by a granule. This element is called GranuleSpatialRepresentation.
 - A collection with an orbital granule spatial representation must specify exact orbit parameters in order to facilitate granule discovery via spatial constraints.
 - Ingest for a metadata record will fail if any spatial metadata input is invalid with respect to the associate rules of the utilized coordinate system.
 - For any granules that are ingested for the collection, the granules spatial extent must exist within the collection's spatial extent.
 - The sub element GranuleSpatialRepresentation is required and so it must exist and must be filled in with one of the following enumerations: CARTESIAN, GEODETIC, ORBIT, or NO_SPATIAL. If the collection has granules associated with it the GranuleSpatialRepresentation cannot be changed. If SpatialCoverageType exists, it must be populated with one of the following enumerations: HORIZONTAL, VERTICAL, ORBITAL, HORIZONTAL_VERTICAL, ORBITAL_VERTICAL
 - Under HorizontalSpatialDomain
 - the geometry sub element must exist
 - if populated, the zone identifier must have at least 1 character and no more than 80 characters in length
 - In geometry
 - The coordinate system sub element must exist and be populated with one of the following enumerations: CARTESIAN or GEODETIC.
 - At least one of the geometry types (points, bounding rectangles, gpolygons, or lines) must exist.
 - For Point and Bounding Rectangle types all sub elements are required.
 - For GPolygon types
 - The Boundary sub element must exist and at least 4 points must be present in the boundary
 - A polygon's vertices must be stored in order of vertex connection.
 - Provide the vertices in clockwise order. (If using ISO 19115-2 MENDS, the expected order is counter-clockwise and the CMR will convert the order to clockwise as it translates the record to UMM).
 - No consecutive vertices may have the same latitude and longitude, that is, no repeating points.
 - Polygonal lines may not cross each other within the polygon.
 - The first point and last point must be the same.
 - No polygon should cover more than half the Earth in the Geodetic coordinate system.
 - If the ExclusiveZone is used the Boundary sub element must exist.
 - For Lines
 - At least 2 Points must exist
 - A line may not have consecutive vertices with the same latitude and longitude (duplicate points).
 - A line must be less than one half the circumference of the Earth in the Geodetic coordinate system.
- Under VerticalSpatialDomain
 - All sub elements must exist
 - The type sub element must be populated with the following enumeration values: Atmosphere Layer, Maximum Altitude, Maximum Depth, Minimum Altitude, Minimum Depth.
- If the OrbitParameters sub element exists all of its sub elements except for the StartCircularLatitude sub element must exist.

ARC Priority Matrix

Priority Categorization	Justification
Red = High Priority Finding	This element is categorized as highest priority when: • No Spatial Extent is provided.

	- The Spatial Extent of the granule metadata falls over 1.0 decimal degree outside of the Spatial Extent specified in the collection level metadata. - The Spatial Extent appears to be inaccurate compared to the described data. - The Spatial Data Resolution or Datum information provided appears to be inaccurate compared to the described data.
Yellow = Medium Priority Finding	This element is categorized as medium priority when: - No Horizontal Data Resolution information is provided. - The Spatial Extent of the granule metadata falls outside of the Spatial Extent specified in the collection level metadata, but the difference is less than 1.0 decimal degree. - A recommendation is made to update the Spatial Extent to a form that more accurately reflects the data (e.g. providing 'Point' coordinates rather than a 'Bounding Rectangle' for point location data).
Blue = Low Priority Finding	This element is categorized as low priority when: No Horizontal Datum Name is provided, if appropriate for the data.
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 10

UMM-C Element	DIF 10 Path	Type	Usable Valid Values	Constraints	Required in DIF 10?	Cardinality
SpatialExtent/ SpatialCoverageType	Spatial_Coverage/Spatial_Coverage_Type	Enumeration	HORIZONTAL VERTICAL ORBITAL HORIZONTAL_VERTICAL ORBITAL_VERTICAL	n/a	No	0..1
SpatialExtent/ GranuleSpatialRepresentation	Spatial_Coverage/Granule_Spatial_Representation	Enumeration	CARTESIAN GEODETTIC ORBIT NO_SPATIAL	n/a	Yes	1
SpatialExtent/ HorizontalSpatialDomain/ ZoneIdentifier	Spatial_Coverage/Zone_Identifier	String	n/a	1 - 80 characters	No	0..1
SpatialExtent/ HorizontalSpatialDomain/ Geometry/CoordinateSystem	Spatial_Coverage/Geometry/Coordinate_System	Enumeration	CARTESIAN GEODETTIC	n/a	Yes	1

Choice of one of the following for Spatial_Coverage/ Geometry:

(1) Bounding Rectangle

If Bounding_Rectangle is selected, the cardinality is 1..*

UMM-C Element	DIF 10 Path	Type	Constraints	Required in DIF 10?	Cardinality	Notes
	Spatial_Coverage/Geometry/ Bounding_Rectangle/ Center_Point/Point/Point_Longitude	Number	-180 to 180	No	1	Number in degrees Does not map to UMM-C
	Spatial_Coverage/Geometry/ Bounding_Rectangle/	Number	-90 to 90	No	1	Number in degrees

	Center_Point/Point/Point_Latitude					Does not map to UMM-C
SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ SouthBoundingCoordinate	Spatial_Coverage/Geometry /Bounding_Rectangle/ Southernmost_Latitude	Number	-180 to 180	Yes, if applicable	1	Number in degrees
SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ NorthBoundingCoordinate	Spatial_Coverage/Geometry /Bounding_Rectangle/ Northernmost_Latitude	Number	-90 to 90	Yes, if applicable	1	Number in degrees
SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ WestBoundingCoordinate	Spatial_Coverage/Geometry /Bounding_Rectangle/ Westernmost_Longitude	Number	-180 to 180	Yes, if applicable	1	Number in degrees
SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ EastBoundingCoordinate	Spatial_Coverage/Geometry /Bounding_Rectangle/ Easternmost_Longitude	Number	-180 to 180	Yes, if applicable	1	Number in degrees
	Spatial_Coverage/Geometry /Bounding_Rectangle/ Minimum_Altitude	Number		No		
	Spatial_Coverage/Geometry /Bounding_Rectangle/ Maximum_Altitude	Number		No		
	Spatial_Coverage/Geometry /Bounding_Rectangle/ Altitude_Unit	String		No		
	Spatial_Coverage/Geometry /Bounding_Rectangle/ Minimum_Depth	Number		No		
	Spatial_Coverage/Geometry /Bounding_Rectangle/ Maximum_Depth	Number		No		
	Spatial_Coverage/Geometry /Bounding_Rectangle/ Depth_Unit	String		No		

(2) Point

If Point is selected, the cardinality is 1..*

UMM-C Element	DIF 10 Path	Type	Constraints	Required in DIF 10?	Cardinality	Notes
SpatialExtent /HorizontalSpatialDomain/ Geometry/Point/Longitude	Spatial_Coverage/Geometry/Point/Point_Longitude	Number	-180 to 180	Yes, if applicable	1	Number in degrees
SpatialExtent /HorizontalSpatialDomain/ Geometry/Point/Latitude	Spatial_Coverage/Geometry/Point/Point_Latitude	Number	-90 to 90	Yes, if applicable	1	Number in degrees

(3) Line

If Line is selected, the cardinality is 1..*

UMM-C Element	DIF 10 Path	Type	Constraints	Required in DIF 10?	Cardinality	Notes

SpatialExtent /HorizontalSpatialDomain/ Geometry/Lines/Points /Longitude	Spatial_Coverage /Geometry/Line/ Point/Point_Longitude	Number	-180 to 180	Yes, if applicable	2..*	Number in degrees. A minimum of 2 points must be provided to create a line.
SpatialExtent /HorizontalSpatialDomain/ Geometry/Lines/Points /Latitude	Spatial_Coverage /Geometry/Line/ Point/Point_Latitude	Number	-90 to 90	Yes, if applicable	2..*	Number in degrees. A minimum of 2 points must be provided to create a line.
	Spatial_Coverage /Geometry/Line/ Center_Point /Point_Latitude	Number	-90 to 90	No	1	Number in degrees Does not map to UMM-C
	Spatial_Coverage /Geometry/Line/ Center_Point /Point_Longitude	Number	-180 to 180	No	1	Number in degrees Does not map to UMM-C

(4) Polygon

If Polygon is selected, the cardinality is 1..*

UMM-C Element	DIF 10 Path	Type	Constraints	Required in DIF 10?	Cardinality	Notes
SpatialExtent /HorizontalSpatialDomain/ Geometry/GPolygon /Boundary/Points/ Longitude	Spatial_Coverage/Geometry /Polygon/ Boundary/Point/Point_Longitude	Number	-180 to 180	Yes, if applicable	2..*	Number in degrees. A minimum of 2 points must be provided to create a line.
SpatialExtent /HorizontalSpatialDomain/ Geometry/GPolygon /Boundary/Points/ Latitude	Spatial_Coverage/Geometry /Polygon/ Boundary/Point/Point_Latitude	Number	-90 to 90	Yes, if applicable	2..*	Number in degrees. A minimum of 2 points must be provided to create a line.
SpatialExtent /HorizontalSpatialDomain/ Geometry/GPolygon /ExclusiveZone/ Boundaries/Points /Longitude	Spatial_Coverage/Geometry /Polygon/ Exclusion_Zone/Boundary/Point /Point_Longitude	Number	-180 to 180	No	1	Number in degrees
SpatialExtent /HorizontalSpatialDomain/ Geometry/GPolygon /ExclusiveZone/ Boundaries/Points /Latitude	Spatial_Coverage/Geometry /Polygon/ /Exclusion_Zone/Boundary/Point /Point_Latitude	Number	-90 to 90	No	1	Number in degrees
	Spatial_Coverage/Geometry /Polygon/ Center_Point/Point /Point_Longitude	Number	-180 to 180	No	1	Number in degrees Does not map to UMM-C
	Spatial_Coverage/Geometry /Polygon/ Center_Point/Point /Point_Latitude	Number	-90 to 90	No	1	Number in degrees Does not map to UMM-C

Resolution And Coordinate System:

UMM-C Element	DIF 10 Path	Type	Constraints	Required in DIF 10?	Cardinality	Notes
n/a	Spatial_Coverage/Spatial_Info	Enumerati	Horizontal	Yes, if	1	This element should

	/Spatial_Coverage_Type	on	Horizontal/Vertical Orbit Vertical Horizon&Vert	applicable		be the same as Spatial_Coverage /Spatial_Coverage_Type and therefore is redundant. It is no longer translated.
SpatialExtent /HorizontalSpatialDomain/ ResolutionAndCoordinateSystem/Description	n/a					
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ /GeodeticModel /HorizontalDatumName	Spatial_Coverage/Spatial_Info /Horizontal_Coordinate_System /Geodetic_Model /Horizontal_DatumName	String		No	0..1	Recommend providing EPSG geodetic datum names
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ /GeodeticModel /EllipsoidName	Spatial_Coverage/Spatial_Info /Horizontal_Coordinate_System /Geodetic_Model/Ellipsoid_Name	String		No	0..1	Recommend providing EPSG ellipsoid names
SpatialExtent /HorizontalSpatialDomain/ /ResolutionAndCoordinateSystem/ /GeodeticModel /SemiMajorAxis	Spatial_Coverage/Spatial_Info /Horizontal_Coordinate_System /Geodetic_Model/Semi_Major_Axis	Decimal		No	0..1	
SpatialExtent /HorizontalSpatialDomain/ /ResolutionAndCoordinateSystem/ /GeodeticModel /DenominatorOfFlatteningRatio	Spatial_Coverage/Spatial_Info /Horizontal_Coordinate_System /Geodetic_Model /Denominator_Of_Flattening_Ratio	Decimal		No	0..1	
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ /HorizontalDataResolution /GenericResolutions	n/a					
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ /HorizontalDataResolution /GenericResolution /XDimension	Spatial_Coverage/Spatial_Info /Horizontal_Coordinate_System /Geographic_Coordinate_System /LongitudeResolution	Decimal		No	0..1	If this exists then translate this element otherwise use Data_Resolution /Longitude_Resolution located in the next cell below.
	Data_Resolution /Longitude_Resolution	String		No	0..1	If Geographic_Coordinate_System /LongitudeResolution doesn't exist then translate this element.
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ /HorizontalDataResolution /GenericResolution /YDimension	Spatial_Coverage/Spatial_Info /Horizontal_Coordinate_System /Geographic_Coordinate_System /LatitudeResolution	Decimal		No	0..1	If this exists then translate this element otherwise use Data_Resolution /Latitude_Resolution located in the next cell below.
	Data_Resolution/Latitude_Resolution	String		No	0..1	If Geographic_Coordinate_System /LatitudeResolution doesn't exist then translate this element.
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ /HorizontalDataResolution /GenericResolution/Unit	Spatial_Coverage/Spatial_Info /Horizontal_Coordinate_System /Geographic_Coordinate_System /GeographicCoordinateUnits	String		No	0..1	

SpatialExtent /HorizontalSpatialDomain /ResolutionAndCoordinateSystem/ LocalCoordinateSystem /GeoReferenceInformation	Spatial_Coverage/Spatial_Info /Horizontal_Coordinate_System /Local_Coordinate_System /GeoReference_Information	String		No	0..1	
SpatialExtent /HorizontalSpatialDomain /ResolutionAndCoordinateSystem/ LocalCoordinateSystem /Description	Spatial_Coverage/Spatial_Info /Horizontal_Coordinate_System /Local_Coordinate_System /Description	String		No	0..1	
n/a	Data_Resolution /Horizontal_Resolution_Range	String	KMS controlled	No	0..1	Recommend selecting a value from the GCMD Horizontal Data Resolution keywords to populate this field. The CMR will use its own values to categorically create facet ranges. The GCMD values will be updated afterward. Therefore this field cannot be used by the CMR and will not be translated.
n/a	Data_Resolution/Vertical_Resolution	String		No	0..1	
n/a	Data_Resolution/ Vertical_Resolution_Unit	String		No	0..1	
n/a	Data_Resolution /Vertical_Resolution_Range	String	KMS controlled	No	0..1	Recommend selecting a value from the GCMD Vertical Data Resolution keywords to populate this field
n/a	Data_Resolution/Temporal_Resolution	String		No	0..1	Note: this field does not map to any other metadata elements and is unique to DIF 10.
n/a	Data_Resolution/Temporal_Resolution_Range	String	KMS controlled	No	0..1	Recommend selecting a value from the GCMD Vertical Data Resolution keywords to populate this field Note: this field does not map to any other metadata elements and is unique to DIF 10.

Orbit Parameters:

Providing Orbit_Parameters is optional (Cardinality 0..*)

UMM-C Element	DIF 10 Path	Type	Constraints	Required in DIF 10?	Cardinality	Notes
SpatialExtent/OrbitParameters /SwathWidth	Spatial_Coverage/Orbit_Parameters /Swath_Width	Number	n/a	Yes, if applicable	1	In kilometers.
SpatialExtent/OrbitParameters/Period	Spatial_Coverage/Orbit_Parameters/Period	Number	n/a	Yes, if applicable	1	In decimal minutes.
SpatialExtent/OrbitParameters /InclinationAngle	Spatial_Coverage/Orbit_Parameters /Inclination_Angle	Number	-90 to 90	No	1	In degrees.
SpatialExtent/OrbitParameters /NumberOfOrbits	Spatial_Coverage/Orbit_Parameters /Number_of_Orbits	Number	n/a	No	1	

SpatialExtent/OrbitParameters /StartCircularLatitude	Spatial_Coverage/Orbit_Parameters /Start_Circular_Latitude	Number	-90 to 90	No	0..1	In degrees.
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Vertical Spatial Info:

Providing a Vertical_Spatial_Info is optional (Cardinality 0..*)

UMM-C Element	DIF 10 Path	Type	Usable Valid Values	Constraints	Required in DIF 10?	Cardinality	Notes
SpatialExtent/ VerticalSpatial Domain/Type	Spatial_Cover age/ Vertical_Spati al_Info/Type	Enumer ation	Atmosphere Layer Maximum Altitude Maximum Depth Minimum Altitude Minimum Depth	n/a	Yes, if applicable	1	Provide multiple iterations of the vertical spatial domain elements to define an upper and a lower vertical boundary (e.g. a minimum altitude and a maximum altitude).
SpatialExtent/ VerticalSpatial Domain/Value	Spatial_Cover age/ Vertical_Spati al_Info/Value	String	n/a	1 - 80 characters	Yes, if applicable	1	

Example Mapping

DIF 10

```

<Spatial_Coverage>
  <Spatial_Coverage_Type>Horizontal<
/Spatial_Coverage_Type>
  <Granule_Spatial_Representation>CARTESIAN<
/Granule_Spatial_Representation>
  <Zone_Identifier>1</Zone_Identifier>
  <Geometry>
    <Coordinate_System>CARTESIAN</Coordinate_System>
    <Polygon>
      <Boundary>
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        </Point>
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        <Point>
          <Point_Longitude>-10</Point_Longitude>
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        </Point>
      </Boundary>
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          <Point_Longitude>-1</Point_Longitude>

```

```

        <Point_Latitude>-5</Point_Latitude>
    </Point>
    <Point>
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</Polygon>
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    <Northernmost_Latitude>90.0<
/Northernmost_Latitude>
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/Westernmost_Longitude>
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/Easternmost_Longitude>
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    <Point_Latitude>-70</Point_Latitude>
</Point>
<Point>
    <Point_Longitude>-65</Point_Longitude>
    <Point_Latitude>-65</Point_Latitude>
</Point>
</Geometry>
<Orbit_Parameters>
    <Swath_Width>22</Swath_Width>
    <Period>1</Period>
    <Inclination_Angle>4</Inclination_Angle>
    <Number_Of_Orbits>1</Number_Of_Orbits>

```

```

    <Start_Circular_Latitude>1<
/Start_Circular_Latitude>
</Orbit_Parameters>
<Vertical_Spatial_Info>
  <Type>Maximum_Altitude</Type>
  <Value>100</Value>
</Vertical_Spatial_Info>
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  <Type>Minimum_Altitude</Type>
  <Value>1</Value>
</Vertical_Spatial_Info>
...
<Spatial_Info>
  <Spatial_Coverage_Type>Horizontal<
/Spatial_Coverage_Type>
  <Horizontal_Coordinate_System>
    <Geodetic_Model>
      <Horizontal_DatumName>North American
Datum 1983</Horizontal_DatumName>
      <Ellipsoid_Name>GRS 1980</Ellipsoid_Name>
      <Semi_Major_Axis>6378137</Semi_Major_Axis>
      <Denominator_Of_Flattening_Ratio>298.
257222101</Denominator_Of_Flattening_Ratio>
    </Geodetic_Model>
    <Geographic_Coordinate_System>
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Degrees</GeographicCoordinateUnits>
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/LatitudeResolution>
      <LongitudeResolution>0.5<
/LongitudeResolution>
    </Geographic_Coordinate_System>
  </Horizontal_Coordinate_System>
</Spatial_Info>
</Spatial_Coverage>
-----
-----
-----
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  <Longitude_Resolution>50 km</Longitude_Resolution>
  <Horizontal_Resolution_Range>50 km - < 100 km or
approximately .5 degree - < 1 degree<
/Horizontal_Resolution_Range>
  <Temporal_Resolution>Hourly - < Daily<
/Temporal_Resolution>
</Data_Resolution>

```

```

"SpatialExtent": {
  "SpatialCoverageType": "HORIZONTAL",
  "HorizontalSpatialDomain": {
    "ZoneIdentifier" : "1",
    "Geometry": {
      "CoordinateSystem": "CARTESIAN",
      "Points": [{
        "Longitude": -70,
        "Latitude": -70
      }, {
        "Longitude": -65,
        "Latitude": -65
      }],
      "BoundingRectangles": [{
        "WestBoundingCoordinate": -180.0,
        "NorthBoundingCoordinate": 90.0,
        "EastBoundingCoordinate": -170.3,
        "SouthBoundingCoordinate": 80.1
      }],
      "GPolygons": [{
        "Boundary" : {

```

```

    "Points": [{
      "Longitude": -10,
      "Latitude": -10
    }, {
      "Longitude": 10,
      "Latitude": -10
    }, {
      "Longitude": 10,
      "Latitude": 10
    }, {
      "Longitude": -10,
      "Latitude": 10
    }, {
      "Longitude": -10,
      "Latitude": -10
    }
  ]
}, {
  "ExclusiveZone": {
    "Boundaries": [{
      "Points": [{
        "Longitude": -5,
        "Latitude": -5
      }, {
        "Longitude": -1,
        "Latitude": -5
      }, {
        "Longitude": -1,
        "Latitude": -1
      }, {
        "Longitude": -5,
        "Latitude": -1
      }, {
        "Longitude": -5,
        "Latitude": -5
      }
    ]
  }, {
    "Points": [{
      "Longitude": 0,
      "Latitude": 0
    }, {
      "Longitude": 5,
      "Latitude": 0
    }, {
      "Longitude": 5,
      "Latitude": 5
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      "Longitude": 0,
      "Latitude": 5
    }, {
      "Longitude": 0,
      "Latitude": 0
    }
  ]
}
}],
"Lines": [{
  "Points": [{
    "Longitude": -50,
    "Latitude": -50
  }, {
    "Longitude": -40,
    "Latitude": -40
  }
]
}, {
  "Points": [{
    "Longitude": 50,
    "Latitude": 50
  }, {
    "Longitude": 40,
    "Latitude": 40
  }
]
}
}

```

```

    }]
  },
  "ResolutionAndCoordinateSystem": {
    "Description": "A description of the
horizontal spatial resolution for end user
consumption."
    "GeodeticDatum": {
      "HorizontalDatumName": "North American
Datum 1983",
      "EllipsoidName": "GRS 1980",
      "SemiMajorAxis": "6378137",
      "DenominatorOfFlatteningRatio":
"298.257222101"
    },
    "HorizontalDataResolution": {
      "GenericResolutions": [{
        "XDimension": 0.5,
        "YDimension": 0.5,
        "Unit": "Decimal Degrees"
      }]
    }
  },
  "VerticalSpatialDomains": [{
    "Type": "Maximum Altitude",
    "Value": "100"
  }, {
    "Type": "Minimum Altitude",
    "Value": "1"
  }
],
"OrbitParameters": {
  "SwathWidth": 22,
  "Period": 1,
  "InclinationAngle": 4,
  "NumberOfOrbits": 1,
  "StartCircularLatitude": 1,
  "GranuleSpatialRepresentation": "CARTESIAN"
},
"GranuleSpatialRepresentation": "CARTESIAN"
},

```

ECHO 10

UMM-C Element	ECHO 10 Path	Type	Usable Valid Values	Constraints	Required in ECHO10?	Cardinality
SpatialExtent/ SpatialCoverageType	Spatial/SpatialCoverageType	Enumeration	HORIZONTAL VERTICAL ORBITAL HORIZONTAL_VERTICAL ORBITAL_VERTICAL	n/a	No	0..1
SpatialExtent/ HorizontalSpatialDomain/ ZoneIdentifier	Spatial/HorizontalSpatialDomain/ ZoneIdentifier	String	n/a	1 - 80 characters	No	0..1
SpatialExtent /HorizontalSpatialDomain/ Geometry/CoordinateSystem	Spatial/HorizontalSpatialDomain /Geometry/ CoordinateSystem	Enumeration	CARTESIAN GEODETTIC	n/a	Yes	1
SpatialExtent/ GranuleSpatialRepresentation	Spatial/GranuleSpatialRepresentation	Enumeration	CARTESIAN GEODETTIC ORBIT NO_SPATIAL	n/a	Yes	1

Choice of one of the following for Horizontal Spatial Domain/ Geometry:

(1) Point

If Point is selected, the cardinality is 1..*

UMM-C Element	ECHO 10 Path	Type	Constraints	Required in ECHO10?	Cardinality	Notes
SpatialExtent /HorizontalSpatialDomain/ Geometry/Point/Longitude	SpatialExtent/HorizontalSpatialDomain/Geometry /Point/Longitude	Number	-180 to 180	Yes, if applicable	1	Number in degrees
SpatialExtent /HorizontalSpatialDomain/ Geometry/Point/Latitude	SpatialExtent/HorizontalSpatialDomain/Geometry /Point/Latitude	Number	-90 to 90	Yes, if applicable	1	Number in degrees

(2) Bounding Rectangle

If BoundingRectangle is selected, the cardinality is 1..*

UMM-C Element	ECHO 10 Path	Type	Constraints	Required in ECHO10?	Cardinality	Notes
SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ WestBoundingCoordinate	SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ WestBoundingCoordinate	Number	-180 to 180	Yes, if applicable	1	Number in degrees
SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ NorthBoundingCoordinate	SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ NorthBoundingCoordinate	Number	-90 to 90	Yes, if applicable	1	Number in degrees
SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ EastBoundingCoordinate	SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ EastBoundingCoordinate	Number	-180 to 180	Yes, if applicable	1	Number in degrees
SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ SouthBoundingCoordinate	SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ SouthBoundingCoordinate	Number	-90 to 90	Yes, if applicable	1	Number in degrees
	SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ CenterPoint/PointLongitude	Number	-180 to 180	Yes, if applicable	CenterPoint 0..1	Number in degrees Does not map to UMM-C
	SpatialExtent /HorizontalSpatialDomain/ Geometry/BoundingRectangles/ CenterPoint/PointLatitude	Number	-90 to 90	Yes, if applicable	CenterPoint 0..1	Number in degrees Does not map to UMM-C

(3) Line

If Line is selected, the cardinality is 2..* since at least 2 points must be provided to create a Line.

UMM-C Element	ECHO 10 Path	Type	Constraints	Required in ECHO10?	Cardinality	Notes
SpatialExtent /HorizontalSpatialDomain/ Geometry/Lines/Points/Longitude	SpatialExtent /HorizontalSpatialDomain/ Geometry/Line/Point/PointLongitude	Number	-180 to 180	Yes, if applicable	1	Number in degrees
		Number	-90 to 90	Yes, if applicable	1	Number in

SpatialExtent /HorizontalSpatialDomain/ Geometry/Lines/Points/Latitude	SpatialExtent /HorizontalSpatialDomain/ Geometry/Line/Point/PointLatitude					degrees
	SpatialExtent /HorizontalSpatialDomain/ Geometry/Line/CenterPoint/PointLongitude	Number	-180 to 180	Yes, if applicable	CenterPoint 0..1	Number in degrees Does not map to UMM-C
	SpatialExtent /HorizontalSpatialDomain/ Geometry/Line/CenterPoint/PointLatitude	Number	-90 to 90	Yes, if applicable	CenterPoint 0..1	Number in degrees Does not map to UMM-C

(4) GPolygon

If GPolygon is selected, the cardinality is 1..*

UMM-C Element	ECHO 10 Path	Type	Constraints	Required in ECHO10?	Cardinality	Notes
SpatialExtent /HorizontalSpatialDomain/ Geometry/GPolygon/ Boundary/Points/ Longitude	Spatial/ Horizontal Spatial Domain/ Geometry/ GPolygon/ Boundary/Point/ Point Longitude	Number	-180 to 180	Yes, if applicable	4..*	Number in degrees. A minimum of 4 GPolygon bounding points must be provided to create a polygon.
SpatialExtent /HorizontalSpatialDomain/ Geometry/GPolygon/ Boundary/Points/ Latitude	Spatial/ Horizontal Spatial Domain/ Geometry/ GPolygon/ Boundary/ Point/ Point Latitude	Number	-90 to 90	Yes, if applicable	4..*	Number in degrees. A minimum of 4 GPolygon bounding points must be provided to create a polygon.
SpatialExtent /HorizontalSpatialDomain/ Geometry/ GPolygon/ ExclusiveZone/ Boundaries/Points/ Longitude	Spatial/ Horizontal Spatial Domain/ Geometry/GPolygon/Exclusive Zone/ Boundary/Point/Point Latitude	Number	-180 to 180	No	0..*	Number in degrees. A minimum of 4 GPolygon exclusion zone bounding points must be provided, if applicable (providing an exclusion zone is optional), to create a polygon.
SpatialExtent /HorizontalSpatialDomain/ Geometry/ GPolygon/ ExclusiveZone/ Boundaries/Points/ Latitude	Spatial/ Horizontal Spatial Domain/ Geometry/ GPolygon/ Exclusive Zone/ Boundary/ Point/ Point Latitude	Number	-90 to 90	No	0..*	Number in degrees. A minimum of 4 GPolygon exclusion zone bounding points must be provided, if applicable (providing an exclusion zone is optional), to create a polygon.
	Spatial/ Horizontal Spatial Domain/ Geometry/ Center Point/ Point/ Point Longitude	Number	-180 to 180	Yes, if applicable	CenterPoint 0..1	Number in degrees Does not map to UMM-C
	Spatial/ Horizontal Spatial Domain/ Geometry/ GPolygon/ Center Point/ Point/ Point Latitude	Number	-90 to 90	Yes, if applicable	CenterPoint 0..1	Number in degrees Does not map to UMM-C

Resolution And Coordinate System:

UMM-C Element	ECHO 10 Path	Type	Constraints	Required in ECHO10?	Cardinality	Note
n/a	SpatialInfo/SpatialCoverageType	String	1 - 80 characters	Yes, if applicable	1	This attribute should be the same as Spatial/SpatialCoverageType and is therefore redundant. It is no longer translated.
SpatialExtent /HorizontalSpatialDomain/ Description	n/a					

SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ /GeodeticModel /HorizontalDatumName	SpatialInfo/HorizontalCoordinateSystem /GeodeticModel/HorizontalDatumName	String	1 - 80 characters	No	0..1	Recommend providing EPSG geodetic datum names
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ GeodeticModel /EllipsoidName	SpatialInfo/HorizontalCoordinateSystem /GeodeticModel/EllipsoidName	String	1 - 255 characters	No	0..1	Recommend providing EPSG ellipsoid names
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ /GeodeticModel /SemiMajorAxis	SpatialInfo/HorizontalCoordinateSystem /GeodeticModel/SemiMajorAxis	Decimal	n/a	No	0..1	
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ GeodeticModel /DenominatorOfFlatteningRatio	SpatialInfo/HorizontalCoordinateSystem /GeodeticModel/DenominatorOfFlatteningRatio	Decimal	n/a	No	0..1	
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution /GenericResolution						
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution /GenericResolution /XDimension	SpatialInfo/HorizontalCoordinateSystem /GeographicCoordinateSystem /LongitudeResolution	Decimal	n/a	No	0..1	For lon, a 3 digit decimal number from 0-180 + or absence of - for values west of prime meridian; - for all others.
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution /GenericResolution /YDimension	SpatialInfo/HorizontalCoordinateSystem /GeographicCoordinateSystem /LatitudeResolution	Decimal	n/a	No	0..1	For lat, a 2 digit decimal number from 0-90 + or absence of - for values north of equator; - for all others.
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution /GenericResolution/Unit	SpatialInfo/HorizontalCoordinateSystem /GeographicCoordinateSystem /GeographicCoordinateUnits	String	1 - 80 characters	No	0..1	Units of measure used for the geodetic latitude and longitude resolution values. E.g. Decimal Degrees or Degrees Minutes Seconds.
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ LocalCoordinateSystem /Description	SpatialInfo/HorizontalCoordinateSystem /LocalCoordinateSystem/Description	String	1 - 2048 characters	No	0..1	
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ LocalCoordinateSystem /GeoReferenceInformation	SpatialInfo/HorizontalCoordinateSystem /LocalCoordinateSystem /GeoReferenceInformation	String	1 - 2048 characters	No	0..1	

Vertical Spatial Domain:

Providing a Vertical Spatial Domain is optional (Cardinality 0..*)

UMM-C Element	ECHO 10 Path	Type	Usable Valid Values	Constraints	Required in ECHO10?	Cardinality	Notes
SpatialExtent/	Spatial/VerticalSpatialDomain/Type	Enumeration	Atmosphere Layer	n/a	Yes, if applicable	1	Provide multiple iterations of the vertical spatial domain elements to define an upper and a lower vertical boundary (e.g. a minimum

VerticalSpatial Domain/Type			Maximum Altitude Maximum Depth Minimum Altitude Minimum Depth				altitude and a maximum altitude).
SpatialExtent/ VerticalSpatial Domain/Value	Spatial/VerticalSpatialDomain/Value	String	n/a	1 - 80 characters	Yes, if applicable	1	Both Type and Value are required. Use the Value field to describe the number and unit of the Type provided in the previous field (e.g. 50 KM, 208 meters)

Orbit Parameters:

Providing Orbit Parameters is optional (Cardinality 0..*)

UMM-C Element	ECHO 10 Path	Type	Constraints	Required in ECHO10?	Cardinality	Notes
SpatialExtent/OrbitParameters/SwathWidth	Spatial/OrbitParameters/SwathWidth	Number	n/a	Yes, if applicable	1	In kilometers
SpatialExtent/OrbitParameters/Period	Spatial/OrbitParameters/Period	Number	n/a	Yes, if applicable	1	In decimal minutes
SpatialExtent/OrbitParameters /InclinationAngle	Spatial/OrbitParameters/InclinationAngle	Number	-90 to 90	Yes, if applicable	1	In degrees
SpatialExtent/OrbitParameters /NumberOfOrbits	Spatial/OrbitParameters/NumberOfOrbits	Number	n/a	Yes, if applicable	1	
SpatialExtent/OrbitParameters /StartCircularLatitude	Spatial/OrbitParameters/StartCircularLatitude	Number	-90 to 90	No	0..1	In degrees

Example Mapping

ECHO 10

```

<SpatialInfo>
  <SpatialCoverageType>HORIZONTAL_VERTICAL<
/SpatialCoverageType>
  <HorizontalCoordinateSystem>
    <GeodeticModel>
      <HorizontalDatumName>North American Datum 1983<
/HorizontalDatumName>
      <EllipsoidName>GRS 1980</EllipsoidName>
      <SemiMajorAxis>6378137</SemiMajorAxis>
      <DenominatorOfFlatteningRatio>298.257222101<
/DenominatorOfFlatteningRatio>
    </GeodeticModel>
    <GeographicCoordinateSystem>
      <GeographicCoordinateUnits>Decimal Degrees<
/GeographicCoordinateUnits>
      <LatitudeResolution>0.5</LatitudeResolution>
      <LongitudeResolution>0.5</LongitudeResolution>
    </GeographicCoordinateSystem>
  </HorizontalCoordinateSystem>
</Spatial>
  <SpatialCoverageType>HORIZONTAL<
/SpatialCoverageType>
  <HorizontalSpatialDomain>
    <ZoneIdentifier>1</ZoneIdentifier>
    <Geometry>
      <CoordinateSystem>CARTESIAN</CoordinateSystem>
      <Point>
        <PointLongitude>-70</PointLongitude>
        <PointLatitude>-70</PointLatitude>
      </Point>
      <Point>
        <PointLongitude>-65</PointLongitude>

```

```

        <PointLatitude>-65</PointLatitude>
    </Point>
    <BoundingRectangle>
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/WestBoundingCoordinate>
        <NorthBoundingCoordinate>90.0<
/NorthBoundingCoordinate>
        <EastBoundingCoordinate>-170.3<
/EastBoundingCoordinate>
        <SouthBoundingCoordinate>80.1<
/SouthBoundingCoordinate>
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                <PointLatitude>10</PointLatitude>
            </Point>
            <Point>
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            </Point>
        </Boundary>
        <ExclusiveZone>
            <Boundary>
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                    <PointLatitude>-1</PointLatitude>
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                    <PointLatitude>-5</PointLatitude>
                </Point>
            </Boundary>
            <Boundary>
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                    <PointLatitude>5</PointLatitude>
                </Point>
                <Point>
                    <PointLongitude>5</PointLongitude>
                    <PointLatitude>5</PointLatitude>
                </Point>
                <Point>
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                    <PointLatitude>0</PointLatitude>
                </Point>
            </Boundary>
        </ExclusiveZone>
    </GPolygon>
</Line>

```

```

    <Point>
      <PointLongitude>-50</PointLongitude>
      <PointLatitude>-50</PointLatitude>
    </Point>
    <Point>
      <PointLongitude>-40</PointLongitude>
      <PointLatitude>-40</PointLatitude>
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  </Line>
</Line>
<Line>
  <Point>
    <PointLongitude>50</PointLongitude>
    <PointLatitude>50</PointLatitude>
  </Point>
  <Point>
    <PointLongitude>40</PointLongitude>
    <PointLatitude>40</PointLatitude>
  </Point>
</Line>
</Geometry>
</HorizontalSpatialDomain>
<VerticalSpatialDomain>
  <Type>Maximum Altitude</Type>
  <Value>100</Value>
</VerticalSpatialDomain>
<VerticalSpatialDomain>
  <Type>Minimum Altitude</Type>
  <Value>1</Value>
</VerticalSpatialDomain>
<OrbitParameters>
  <SwathWidth>22</SwathWidth>
  <Period>1</Period>
  <InclinationAngle>4</InclinationAngle>
  <NumberOfOrbits>1</NumberOfOrbits>
  <StartCircularLatitude>1</StartCircularLatitude>
</OrbitParameters>
  <GranuleSpatialRepresentation>CARTESIAN<
/GranuleSpatialRepresentation>
</Spatial>

```

UMM

```

"SpatialExtent": {
  "SpatialCoverageType": "HORIZONTAL",
  "HorizontalSpatialDomain": {
    "ZoneIdentifier" : "1",
    "Geometry": {
      "CoordinateSystem": "CARTESIAN",
      "Points": [{
        "Longitude": -70,
        "Latitude": -70
      }, {
        "Longitude": -65,
        "Latitude": -65
      }],
      "BoundingRectangles": [{
        "WestBoundingCoordinate": -180.0,
        "NorthBoundingCoordinate": 90.0,
        "EastBoundingCoordinate": -170.3,
        "SouthBoundingCoordinate": 80.1
      }],
      "GPolygons": [{
        "Boundary" : {
          "Points": [{
            "Longitude": -10,
            "Latitude": -10
          }, {
            "Longitude": 10,
            "Latitude": -10
          }, {

```

```

        "Longitude":10,
        "Latitude":10
    }, {
        "Longitude":-10,
        "Latitude":10
    }, {
        "Longitude":-10,
        "Latitude":-10
    }
    ]
}, {
    "ExclusiveZone": {
        "Boundaries": [{
            "Points": [{
                "Longitude":-5,
                "Latitude":-5
            }, {
                "Longitude":-1,
                "Latitude":-5
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                "Latitude":-1
            }, {
                "Longitude":-5,
                "Latitude":-1
            }, {
                "Longitude":-5,
                "Latitude":-5
            }
        ]
    }, {
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        }, {
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            "Latitude":5
        }, {
            "Longitude":0,
            "Latitude":5
        }, {
            "Longitude":0,
            "Latitude":0
        }
    ]
    }
}],
"Lines": [{
    "Points": [{
        "Longitude":-50,
        "Latitude":-50
    }, {
        "Longitude":-40,
        "Latitude":-40
    }
    ]
}, {
    "Points": [{
        "Longitude":50,
        "Latitude":50
    }, {
        "Longitude":40,
        "Latitude":40
    }
    ]
}],
"ResolutionAndCoordinateSystem": {
    "GeodeticDatum": {
        "HorizontalDatumName": "North American
Datum 1983",
        "EllipsoidName": "GRS 1980",

```

```

        "SemiMajorAxis": "6378137",
        "DenominatorOfFlatteningRatio":
"298.257222101"
    },
    "HorizontalDataResolution": {
        "GenericResolution": [{
            "XDimension": 0.5,
            "YDimension": 0.5,
            "Unit": "Decimal Degrees"
        }]
    }
},
"VerticalSpatialDomains": [{
    "Type": "Maximum Altitude",
    "Value": "100"
}, {
    "Type": "Minimum Altitude",
    "Value": "1"
}
],
"OrbitParameters": {
    "SwathWidth": 22,
    "Period": 1,
    "InclinationAngle": 4,
    "NumberOfOrbits": 1,
    "StartCircularLatitude": 1,
    "GranuleSpatialRepresentation": "CARTESIAN"
},
"GranuleSpatialRepresentation": "CARTESIAN"
},

```

ISO 19115-2 MENDS

UMM-C element	ISO 19115-2 MENDS Path	Type
SpatialExtent /SpatialCoverageType	Make sure the gmd:extent is a different extent then TilingInformationSystem /gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:description/gco:CharacterString SpatialCoverageType=	String
SpatialExtent/ HorizontalSpatialDomain /ZoneIdentifier	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicDescription id="ZoneIdentifier"/gmd:geographicIdentifier/gmd:MD_Identifier /gmd:code/gco:CharacterString	String
	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicDescription id="ZoneIdentifier"/gmd:geographicIdentifier/gmd:MD_Identifier /gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm.zoneidentifier	String
	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicDescription id="ZoneIdentifier"/gmd:geographicIdentifier/gmd:MD_Identifier /gmd:description/gco:CharacterString = ZoneIdentifier	String
SpatialExtent /HorizontalSpatialDomain/ Geometry /CoordinateSystem	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent" /gmd:description/gco:CharacterString CoordinateSystem=	String
SpatialExtent/ GranuleSpatialRepresentation	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:description/gco:CharacterString SpatialGranuleSpatialRepresentation= (CMR read only) If the above path does not exist then look here: /gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent" /gmd:geographicElement/gmd:EX_GeographicDescription id="GranuleSpatialRepresentation"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:code/gco:CharacterString	String

Choice of one of the following for Horizontal Spatial Domain/ Geometry:

(1) Point

If Point is selected, the cardinality is 1..*

UMM-C Element	ISO 19115-2 MENDS Path	Type	Notes
SpatialExtent /HorizontalSpatial Domain/ Geometry/Point /Longitude SpatialExtent /HorizontalSpatial Domain/ Geometry/Point /Latitude	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_BoundingPolygon/gmd:polygon/gml:Point/ gml:pos srsName="http://www.opengis.net/def/crs/EPSSG/4326" srsDimension="2">Latitude + " " + Longitude	Decimals as strings	Latitude first then longitude for every point. No commas just spaces. ex: -10 -10

(2) Bounding Rectangle

If BoundingRectangle is selected, the cardinality is 1..*

UMM-C Element	ISO 19115-2 MENDS Path	Type
SpatialExtent /HorizontalSpatialDomain/ Geometry /BoundingRectangles/ WestBoundingCoordinate	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicBoundingBox/gmd:westBoundLongitude/gco:Decimal	Decimal
SpatialExtent /HorizontalSpatialDomain/ Geometry /BoundingRectangles/ NorthBoundingCoordinate	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicBoundingBox/gmd:northBoundLongitude/gco:Decimal	Decimal
SpatialExtent /HorizontalSpatialDomain/ Geometry /BoundingRectangles/ EastBoundingCoordinate	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicBoundingBox/gmd:eastBoundLongitude/gco:Decimal	Decimal
SpatialExtent /HorizontalSpatialDomain/ Geometry /BoundingRectangles/ SouthBoundingCoordinate	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicBoundingBox/gmd:southBoundLongitude/gco:Decimal	Decimal

(3) Line

If Line is selected, the cardinality is 2..* since at least 2 points must be provided to create a Line.

--	--	--	--

UMM-C Element	ISO 19115-2 MENDS Path	Type	Notes
SpatialExtent /HorizontalSpatialDomain/ Geometry/Lines /Points/Longitude	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/ gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_BoundingPolygon/ gmd:polygon/gml:LineString/gml:posList srsName=" http://www.opengis.net/def/crs/EPSSG/4326 " srsDimension="2">	Decimals as strings	Latitude first then longitude for every point. No commas just spaces. The following example has 2 lines: -10 -10 -10 10 10 10 10 -10
SpatialExtent /HorizontalSpatialDomain/ Geometry/Lines /Points/Latitude			

(4) GPolygon

If GPolygon is selected, the cardinality is 1..*

UMM-C Element	ISO 19115-2 MENDS Path	Type	Notes
SpatialExtent /HorizontalSpatialDomain/ Geometry/GPolygon /Boundary/ Points/Longitude	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/ gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_BoundingPolygon /gmd:polygon/gml:Polygon srsName=" http://www.opengis.net/def/crs/EPSSG/9825 "	Decimals as Strings	Latitude first then longitude for every point. No commas just spaces. ex: -10 -10 -10 10 10 10 10 -10 -10 -10
SpatialExtent /HorizontalSpatialDomain/ Geometry/GPolygon /Boundary /Points/Latitude			
SpatialExtent /HorizontalSpatialDomain /Geometry/ GPolygon/ExclusiveZone /Boundaries/ Points/Longitude	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/ gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_BoundingPolygon/ gmd:polygon/gml:Polygon srsName=" http://www.opengis.net/def/crs/EPSSG/9.9.1/2982 "/ gml:interior/gml:LinearRing/gml:posList	Decimals as Strings	Latitude first then longitude for every point. No commas just spaces. ex: -5 -5 -5 5 5 5 5 -5 -5 -5 EPSG codes can be found here: http://www.opengis.net/def/crs/EPSSG
SpatialExtent /HorizontalSpatialDomain /Geometry /GPolygon/ExclusiveZone /Boundaries/ Points/Latitude			

Resolution And Coordinate System:

UMM-C Element	ISO 19115-2 MENDS Path	Type
SpatialExtent /HorizontalSpatialDomain/Description	[=> /gmd:geographicElement/gmd:EX_GeographicDescription id="horizontalresolutionandcoordinatesystem_description"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = Description: description with [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm.horizontalresolutionandcoordinatesystem_description and [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:description/gco:CharacterString = HorizontalResolutionAndCoordinateSystem_Description	String
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ /GeodeticModel /HorizontalDatumName	[=> /gmd:geographicElement/gmd:EX_GeographicDescription id="horizontalresolutionandcoordinatesystem_geodeticmodel"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = HorizontalDatumName: datum name Ellipsoidname: ellipsoid name SemiMajorAxis: number DenominatorOfFlatteningRatio: number with [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm.horizontalresolutionandcoordinatesystem_geodeticmodel and	String

SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ GeodeticModel /EllipsoidName	[=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:description/gco:CharacterString = HorizontalResolutionAndCoordinateSystem_GeodeticModel	
SpatialExtent /HorizontalSpatialDo main /ResolutionAndCoord inateSystem /GeodeticModel /SemiMajorAxis		
SpatialExtent /HorizontalSpatialDo main /ResolutionAndCoord inateSystem/ GeodeticModel /DenominatorOfFlatte ningRatio		
SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ HorizontalDataResol ution/VariesResolution	[=> /gmd:geographicElement/gmd:EX_GeographicDescription id="horizontalresolutionandcoordinatesystem_horizontaldataresolutionsN"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:code/gco:CharacterString = Varies where N is a number 0,1,2...N with [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm.horizontalresolutionandcoordinatesystem_variesresolution and [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:description/gco:CharacterString = HorizontalResolutionAndCoordinateSystem_VariesResolution	String
SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ HorizontalDataResol ution/PointResolution	[=> /gmd:geographicElement/gmd:EX_GeographicDescription id="horizontalresolutionandcoordinatesystem_horizontaldataresolutionsN"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:code/gco:CharacterString = Point where N is a number 0,1,2...N with [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm.horizontalresolutionandcoordinatesystem_pointresolution and [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:description/gco:CharacterString = HorizontalResolutionAndCoordinateSystem_PointResolution	String
SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ HorizontalDataResol ution /NonGriddedResoluti ons	[=> /gmd:geographicElement/gmd:EX_GeographicDescription id="horizontalresolutionandcoordinatesystem_horizontaldataresolutionsN"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:code/gco:CharacterString = XDimension: number YDimension: number Unit: value ViewingAngleType: value ScanDirection: value where N is a number 0,1,2...N with [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm.horizontalresolutionandcoordinatesystem_nongriddedresolutions and	String
SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ HorizontalDataResol ution /NonGriddedResoluti ons/XDimension	[=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:description/gco:CharacterString = HorizontalResolutionAndCoordinateSystem_NonGriddedResolutions	
SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ HorizontalDataResol ution /NonGriddedResoluti ons/YDimension		

SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ HorizontalDataResol ution /NonGriddedResoluti ons/Unit		
SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ HorizontalDataResol ution /NonGriddedResoluti ons /ViewingAngleType		
SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ HorizontalDataResol ution /NonGriddedResoluti ons/ScanDirection		
SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ HorizontalDataResol ution /NonGriddedRangeR esolutions SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ HorizontalDataResol ution /NonGriddedRangeR esolutions /MinimumXDimension SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ HorizontalDataResol ution /NonGriddedRangeR esolutions /MinimumYDimension SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/ HorizontalDataResol ution /NonGriddedRangeR esolutions /MaximumXDimension SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/	[=> /gmd:geographicElement/gmd:EX_GeographicDescription id="horizontalresolutionandcoordinatesystem_horizontaldataresolutionsN"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:code/gco:CharacterString = MinimumXDimension: number MinimumYDimension: number MaximumXDimension: number MaximumYDimension: number Unit: value ViewingAngleType: value ScanDirection: value where N is a number 0,1,2...N with [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm. horizontalresolutionandcoordinatesystem_nongriddedrangeresolutions and [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:description/gco:CharacterString = HorizontalResolutionAndCoordinateSystem_NonGriddedRangeResolutions	String

HorizontalDataResolution /NonGriddedRangeResolutions /MaximumYDimension		
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution /NonGriddedRangeResolutions/Unit		
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution /NonGriddedRangeResolutions/ViewingAngleType		
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution /NonGriddedRangeResolutions/ScanDirection		
SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution /GriddedResolutions SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution /GriddedResolutions/XDimension SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution /GriddedResolutions/YDimension SpatialExtent /HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution /GriddedResolutions/Unit	[=> /gmd:geographicElement/gmd:EX_GeographicDescription id="horizontalresolutionandcoordinatesystem_horizontaldataresolutionsN"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:code/gco:CharacterString = XDimension: number YDimension: number Unit: value where N is a number 0,1,2...N with [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm.horizontalresolutionandcoordinatesystem_griddedresolutions and [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:description/gco:CharacterString = HorizontalResolutionAndCoordinateSystem_GriddedResolutions	String
SpatialExtent /HorizontalSpatialDomain	[=> /gmd:geographicElement/gmd:EX_GeographicDescription id="horizontalresolutionandcoordinatesystem_horizontaldataresolutionsN"/gmd:geographicIdentifier/gmd:	

main/ResolutionAndCoordinateSystem/ HorizontalDataResolution/GriddedRangeResolutions	MD_Identifier/gmd:code/gco:CharacterString = MinimumXDimension: number MinimumYDimension: number MaximumXDimension: number MaximumYDimension: number Unit: value where N is a number 0,1,2...N with [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm. horizontalresolutionandcoordinatesystem_griddedrangeresolutions and [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:description/gco:CharacterString = HorizontalResolutionAndCoordinateSystem_GriddedRangeResolutions	String
SpatialExtent/HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution/GriddedRangeResolutions/MinimumXDimension		
SpatialExtent/HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution/GriddedRangeResolutions/MinimumYDimension		
SpatialExtent/HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution/GriddedRangeResolutions/MaximumXDimension		
SpatialExtent/HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution/GriddedRangeResolutions/MaximumYDimension		
SpatialExtent/HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution/GriddedRangeResolutions/Unit		
SpatialExtent/HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution/GenericResolutions	[=> /gmd:geographicElement/gmd:EX_GeographicDescription id="horizontalresolutionandcoordinatesystem_horizontaldataresolutionsN"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:code/gco:CharacterString = XDimension: number YDimension: number Unit: Not provided where N is a number 0,1,2...N with [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm. horizontalresolutionandcoordinatesystem_genericresolutions and [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:description/gco:CharacterString = HorizontalResolutionAndCoordinateSystem_GenericResolutions	String
SpatialExtent/HorizontalSpatialDomain/ResolutionAndCoordinateSystem/ HorizontalDataResolution/GenericResolutions/XDimension		

SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/		
HorizontalDataResol ution /GenericResolutions /YDimension		
SpatialExtent /HorizontalSpatialDo main/ResolutionAndC oordinateSystem/		
HorizontalDataResol ution /GenericResolutions /Unit		
SpatialExtent /HorizontalSpatialDo main /ResolutionAndCoord inateSystem/	[=> /gmd:geographicElement/gmd:EX_GeographicDescription id="horizontalresolutionandcoordinatesystem_localcoordinatesystem"/gmd:geographicIdentifier/gmd:MD_Identifier /gmd:code/gco:CharacterString = GeoReferenceInformation: value Description: value with [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm.horizontalresolutionandcoordinatesystem_localcoordinatesystem and [=>/gmd:geographicElement/gmd:EX_GeographicDescription/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:description/gco:CharacterString = HorizontalResolutionAndCoordinateSystem_LocalCoordinateSystem	String
LocalCoordinateSyst em/Description		
SpatialExtent /HorizontalSpatialDo main /ResolutionAndCoord inateSystem/		
LocalCoordinateSyst em /GeoReferenceInform ation		

Vertical Spatial Domain:

Providing a Vertical Spatial Domain is optional (Cardinality 0..*)

UMM-C Element	ISO 19115-2 MENDS Path	Type
SpatialExt ent/	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicDescription id="VerticalSpatialDomainN"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:code/gco:CharacterString = Type: {Type} Value: {Value} Unit: {Unit}	String
VerticalSp atialDomai n/Type	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicDescription id="VerticalSpatialDomainN"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm.verticalspatialdomain	
SpatialExt ent/	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicDescription id="VerticalSpatialDomainN" /gmd:geographicIdentifier/gmd:MD_Identifier/gmd:description/gco:CharacterString = VerticalSpatialDomain	
VerticalSp atialDomai n/Value	Where VerticalSpatialDomainN = VerticalSpatialDomain0, VerticalSpatialDomain1, ... VerticalSpatailDomainN.	

Orbit Parameters:

Providing Orbit Parameters is optional (Cardinality 0..*)

UMM-C Element	ISO 19115-2 MENDS Path	Type
SpatialExte nt /OrbitParam eters /SwathWidth	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicDescription id="OrbitParameters"/gmd:geographicIdentifier/gmd:MD_Identifier /gmd:description/gco:CharacterString = OrbitParameters	String

SpatialExtent /OrbitParameters /SwathWidthUnit	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicDescription id="OrbitParameters"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm.orbitparameters
SpatialExtent /OrbitParameters /OrbitPeriod	/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicDescription id="OrbitParameters"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:code/gco:CharacterString = SwathWidth: {value} SwathWidthUnit: {value} OrbitPeriod: {value} OrbitPeriodUnit: {value} InclinationAngle: {value} InclinationAngleUnit: {value} NumberOfOrbits: {value} StartCircularLatitude: {value} StartCircularLatitudeUnit: {value}
SpatialExtent /OrbitParameters /OrbitPeriodUnit	
SpatialExtent /OrbitParameters /InclinationAngle	
SpatialExtent /OrbitParameters /InclinationAngleUnit	
SpatialExtent /OrbitParameters /NumberOfOrbits	
SpatialExtent /OrbitParameters /StartCircularLatitude	
SpatialExtent /OrbitParameters /StartCircularLatitudeUnit	

Example Mapping

```

<gmi:MI_Metadata
  ...
  <gmd:spatialRepresentationInfo>
    <gmd:MD_GridSpatialRepresentation>
      <gmd:numberOfDimensions>
        <gco:Integer>2</gco:Integer>
      </gmd:numberOfDimensions>
      <gmd:axisDimensionProperties xlink:href="
#horizontalresolutionandcoordinatesystem_geographicco
ordinatesystems0">
        <gmd:MD_Dimension>
          <gmd:dimensionName>
            <gmd:
MD_DimensionNameTypeCode codeList="https://cdn.
earthdata.nasa.gov/iso/resources/Codelist
/gmx/Codelists.xml#MD_DimensionNameTypeCode"
codeListValue="column">column</gmd:
MD_DimensionNameTypeCode>
          </gmd:dimensionName>
          <gmd:dimensionSize/>

```

[illegible]

[illegible]

```

Boolean>
    </gmd:extentTypeCode>
    <gmd:polygon>
        <gml:LineString gml:
id="geo-a36c37b3-1121-4aa3-9afb-f5169e9a20bc">
            <gml:posList>-50
-50 -40 -40</gml:posList>
            </gml:LineString>
        </gmd:polygon>
    </gmd:EX_BoundingPolygon>
</gmd:geographicElement>
<gmd:geographicElement>
    <gmd:EX_BoundingPolygon>
        <gmd:extentTypeCode>
            <gco:Boolean>1</gco:
Boolean>
            </gmd:extentTypeCode>
            <gmd:polygon>
                <gml:LineString gml:
id="geo-057bee05-65d1-41b2-97f7-e5ed0269a64c">
                    <gml:posList>50
50 40 40</gml:posList>
                </gml:LineString>
            </gmd:polygon>
        </gmd:EX_BoundingPolygon>
    </gmd:geographicElement>
</gmd:geographicElement>
    <gmd:
EX_GeographicBoundingBox id="geo-2ea5a89d-bf99-4273-
b976-1a616f6a13c2">
        <gmd:extentTypeCode>
            <gco:Boolean>1</gco:
Boolean>
            </gmd:extentTypeCode>
            <gmd:westBoundLongitude>
                <gco:Decimal>-180.0<
/gco:Decimal>
            </gmd:westBoundLongitude>
            <gmd:eastBoundLongitude>
                <gco:Decimal>-170.3<
/gco:Decimal>
            </gmd:eastBoundLongitude>
            <gmd:southBoundLatitude>
                <gco:Decimal>80.1<
/gco:Decimal>
            </gmd:southBoundLatitude>
            <gmd:northBoundLatitude>
                <gco:Decimal>90.0<
/gco:Decimal>
            </gmd:northBoundLatitude>
        </gmd:
EX_GeographicBoundingBox>
    </gmd:geographicElement>
    <gmd:geographicElement>
        <gmd:
EX_GeographicDescription id="
horizontalresolutionandcoordinatesystem">
            <gmd:
geographicIdentifier>
                <gmd:MD_Identifier>
                    <gmd:code>
                        <gco:
CharacterString>Description: 3 of the 10 pixels are
averaged at 64 samples per second this gives a
horizontal resolution of 1.5 km at the tangent point
location.</gco:CharacterString>
                    </gmd:code>
                <gmd:codeSpace>
                    <gco:
CharacterString>gov.nasa.esdis.umm.
horizontalresolutionandcoordinatesystem_description<

```

[illegible]

```

description>
                                </gmd:MD_Identifier>
                                </gmd:
geographicIdentifier>
                                </gmd:
EX_GeographicDescription>
                                </gmd:geographicElement>
                                <gmd:geographicElement>
                                <gmd:
EX_GeographicDescription id="VerticalSpatialDomain0">
                                <gmd:
geographicIdentifier>
                                <gmd:MD_Identifier>
                                <gmd:code>
                                <gco:
CharacterString>Type: Maximum Altitude Value: 100<
/gco:CharacterString>
                                </gmd:code>
                                <gmd:codeSpace>
                                <gco:
CharacterString>gov.nasa.esdis.umm.
verticalspatialdomain</gco:CharacterString>
                                </gmd:codeSpace>
                                <gmd:description>
                                <gco:
CharacterString>VerticalSpatialDomain</gco:
CharacterString>
                                </gmd:
description>
                                </gmd:MD_Identifier>
                                </gmd:
geographicIdentifier>
                                </gmd:
EX_GeographicDescription>
                                </gmd:geographicElement>
                                <gmd:geographicElement>
                                <gmd:
EX_GeographicDescription id="VerticalSpatialDomain1">
                                <gmd:
geographicIdentifier>
                                <gmd:MD_Identifier>
                                <gmd:code>
                                <gco:
CharacterString>Type: Minimum Altitude Value: 1</gco:
CharacterString>
                                </gmd:code>
                                <gmd:codeSpace>
                                <gco:
CharacterString>gov.nasa.esdis.umm.
verticalspatialdomain</gco:CharacterString>
                                </gmd:codeSpace>
                                <gmd:description>
                                <gco:
CharacterString>VerticalSpatialDomain</gco:
CharacterString>
                                </gmd:
description>
                                </gmd:MD_Identifier>
                                </gmd:
geographicIdentifier>
                                </gmd:
EX_GeographicDescription>
                                </gmd:geographicElement>
                                <gmd:geographicElement>
                                <gmd:
EX_GeographicDescription id="OrbitParameters">
                                <gmd:
geographicIdentifier>
                                <gmd:MD_Identifier>
                                <gmd:code>
                                <gco:

```

```

CharacterString>SwathWidth: 22 SwathWidthUnit:
Kilometer OrbitPeriod: 1 OrbitPeriodUnit: Degree
Minute, InclinationAngle: 4 InclinationAngleUnit:
Degree NumberOfOrbits: 1 StartCircularLatitude: 1
StartCircularLatitudeUnit: Degree</gco:
CharacterString>
</gmd:code>
<gmd:codeSpace>
<gco:
CharacterString>gov.nasa.esdis.umm.orbitparameters<
/gco:CharacterString>
</gmd:codeSpace>
<gmd:description>
<gco:
CharacterString>OrbitParameters</gco:CharacterString>
</gmd:
description>
</gmd:MD_Identifier>
</gmd:
geographicIdentifier>
</gmd:
EX_GeographicDescription>
</gmd:geographicElement>
<gmd:geographicElement>
<gmd:EX_GeographicDescription
id="OrbitParameters_Footprint_1">
<gmd:geographicIdentifier>
<gmd:MD_Identifier>
<gmd:code>
<gco:
CharacterString>Footprint: 100 FootprintUnit:
Kilometer Description: The leading footprint</gco:
CharacterString>
</gmd:code>
<gmd:codeSpace>
<gco:CharacterString>gov.
nasa.esdis.umm.orbitparameters_footprint</gco:
CharacterString>
</gmd:codeSpace>
<gmd:description>
<gco:
CharacterString>OrbitParameters_Footprint</gco:
CharacterString>
</gmd:description>
</gmd:MD_Identifier>
</gmd:geographicIdentifier>
</gmd:
EX_GeographicDescription>
</gmd:geographicElement>
<gmd:geographicElement>
<gmd:EX_GeographicDescription
id="OrbitParameters_Footprint_2">
<gmd:geographicIdentifier>
<gmd:MD_Identifier>
<gmd:code>
<gco:
CharacterString>Footprint: 150 FootprintUnit:
Kilometer Description: The trailing footprint</gco:
CharacterString>
</gmd:code>
<gmd:codeSpace>
<gco:CharacterString>gov.
nasa.esdis.umm.orbitparameters_footprint</gco:
CharacterString>
</gmd:codeSpace>
<gmd:description>
<gco:
CharacterString>OrbitParameters_Footprint</gco:
CharacterString>
</gmd:description>
</gmd:MD_Identifier>

```

```

        </gmd:geographicIdentifier>
    </gmd:
EX_GeographicDescription>
        </gmd:geographicElement>
        <gmd:temporalElement>
            <gmd:EX_TemporalExtent>
                <gmd:extent>
                    <gml:TimePeriod gml:
id="dbc598363-e316-4c08-ad5b-d8f4f42b7825">
                        <gml:
beginPosition>2001-01-01T00:00:00.000Z</gml:
beginPosition>
                            <gml:
endPosition>2001-06-01T00:00:00.000Z</gml:
endPosition>
                                </gml:TimePeriod>
                            </gmd:extent>
                        </gmd:EX_TemporalExtent>
                    </gmd:temporalElement>
                </gmd:EX_Extent>
            </gmd:extent>
        ...

```

UMM

```

"SpatialExtent": {
  "SpatialCoverageType": "HORIZONTAL",
  "HorizontalSpatialDomain": {
    "ZoneIdentifier": "1",
    "Geometry": {
      "CoordinateSystem": "CARTESIAN",
      "Points": [{
        "Longitude": -70,
        "Latitude": -70
      }, {
        "Longitude": -65,
        "Latitude": -65
      }],
      "BoundingRectangles": [{
        "WestBoundingCoordinate": -180.0,
        "NorthBoundingCoordinate": 90.0,
        "EastBoundingCoordinate": -170.3,
        "SouthBoundingCoordinate": 80.1
      }],
      "GPolygons": [{
        "Boundary": {
          "Points": [{
            "Longitude": -10,
            "Latitude": -10
          }, {
            "Longitude": 10,
            "Latitude": -10
          }, {
            "Longitude": 10,
            "Latitude": 10
          }, {
            "Longitude": -10,
            "Latitude": 10
          }, {
            "Longitude": -10,
            "Latitude": -10
          }
        ]
      }],
      "ExclusiveZone": {
        "Boundaries": [{
          "Points": [{
            "Longitude": -5,
            "Latitude": -5
          }, {
            "Longitude": -1,

```

```

        "Latitude":-5
    }, {
        "Longitude":-1,
        "Latitude":-1
    }, {
        "Longitude":-5,
        "Latitude":-1
    }, {
        "Longitude":-5,
        "Latitude":-5
    }
    ]
}, {
    "Points": [{
        "Longitude":0,
        "Latitude":0
    }, {
        "Longitude":5,
        "Latitude":0
    }, {
        "Longitude":5,
        "Latitude":5
    }, {
        "Longitude":0,
        "Latitude":5
    }, {
        "Longitude":0,
        "Latitude":0
    }
    ]
}
}],
"Lines": [{
    "Points": [{
        "Longitude":-50,
        "Latitude":-50
    }, {
        "Longitude":-40,
        "Latitude":-40
    }
    ],
    {
        "Points": [{
            "Longitude":50,
            "Latitude":50
        }, {
            "Longitude":40,
            "Latitude":40
        }
    ]
}
}],
"ResolutionAndCoordinateSystem": {
    "Description": "3 of the 10 pixels are
averaged at 64 samples per second this gives a
horizontal resolution of 1.5 km at the tangent point
location."
    "GeodeticDatum": {
        "HorizontalDatumName": "North American Datum
1983",
        "EllipsoidName": "GRS 1980",
        "SemiMajorAxis": "6378137",
        "DenominatorOfFlatteningRatio":
"298.257222101"
    }
    "HorizontalDataResolution":
    "NonGriddedResolutions": [{
        "XDimension": 0.5,
        "YDimension": 0.5,
        "Unit": "Decimal Degrees"
    }
    ]
}
}
},

```

```

"VerticalSpatialDomains": [{
  "Type": "Maximum Altitude",
  "Value": "100"
}, {
  "Type": "Minimum Altitude",
  "Value": "1"
}],
"OrbitParameters": {
  "SwathWidth": 22,
  "SwathWidthUnit": "Kilometer",
  "Footprints": [{
    "Footprint": 100,
    "FootprintUnit": "Kilometer",
    "Description": "The leading footprint"
  }, {
    "Footprint": 150,
    "FootprintUnit": "Kilometer",
    "Description": "The trailing footprint"
  }],
  "OrbitPeriod": 1,
  "OrbitPeriodUnit": "Decimal Minute",
  "InclinationAngle": 4,
  "InclinationAngleUnit": "Degree",
  "NumberOfOrbits": 1,
  "StartCircularLatitude": 1,
  "StartCircularLatitudeUnit": "Degree"
},
"GranuleSpatialRepresentation": "CARTESIAN"
},

```

ISO 19115-2 SMAP

UMM-C element	ISO 19115-2 MENDS Path	Type
SpatialExtent /SpatialCoverageType	Make sure the gmd:extent is a different extent then TilingInformationSystem /gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:description/gco:CharacterString SpatialCoverageType=	String
SpatialExtent/ HorizontalSpatialDomain /ZoneIdentifier	/gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicDescription id="ZoneIdentifier"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:code/gco:CharacterString	String
SpatialExtent /HorizontalSpatialDomain/ Geometry /CoordinateSystem	/gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent" /gmd:description/gco:CharacterString CoordinateSystem=	String
SpatialExtent/ GranuleSpatialRepresentation	/gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:description/gco:CharacterString SpatialGranuleSpatialRepresentation=	String

Choice of one of the following for Horizontal Spatial Domain/ Geometry:

(1) Point

If Point is selected, the cardinality is 1..*

UMM-C Element	ISO 19115-2 MENDS Path	Type	Notes
SpatialExtent /HorizontalSpatialDomain/ Geometry/Point /Longitude	/gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/ gmd:geographicElement/gmd:EX_BoundingPolygon/	Decimals as strings	Latitude first then longitude for every point. No commas just spaces. ex: -10 -10 EPSG codes can be found here: http://www.opengis.net/def/crs/EPSC

SpatialExtent /HorizontalSpatialDomain/ Geometry/Point /Latitude	gmd:polygon/gml:Point/ gml:pos srsName=" http://www.opengis.net/def/crs/EPSG/9.9.1/2982 " srsDimension="2">Latitude + " " + Longitude		
---	--	--	--

(2) Bounding Rectangle

If BoundingRectangle is selected, the cardinality is 1..*

UMM-C Element	ISO 19115-2 MENDS Path	Type
SpatialExtent /HorizontalSpatialDomain/ Geometry /BoundingRectangles/ WestBoundingCoordinate	/gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement /gmd:EX_GeographicBoundingBox/ gmd:westBoundLongitude/gco:Decimal	Decimal
SpatialExtent /HorizontalSpatialDomain/ Geometry /BoundingRectangles/ NorthBoundingCoordinate	/gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement /gmd:EX_GeographicBoundingBox/ gmd:northBoundLongitude/gco:Decimal	Decimal
SpatialExtent /HorizontalSpatialDomain/ Geometry /BoundingRectangles/ EastBoundingCoordinate	/gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement /gmd:EX_GeographicBoundingBox/ gmd:eastBoundLongitude/gco:Decimal	Decimal
SpatialExtent /HorizontalSpatialDomain/ Geometry /BoundingRectangles/ SouthBoundingCoordinate	/gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement /gmd:EX_GeographicBoundingBox/ gmd:southBoundLongitude/gco:Decimal	Decimal

(3) Line

If Line is selected, the cardinality is 2..* since at least 2 points must be provided to create a Line.

UMM-C Element	ISO 19115-2 MENDS Path	Type	Notes
SpatialExtent /HorizontalSpatialDomain/ Geometry/Lines /Points/Longitude	/gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_BoundingPolygon/	Decimals as strings	Latitude first then longitude for every point. No commas just spaces. The following example has 2 lines: -10 -10 -10 10 10 10 -10
SpatialExtent /HorizontalSpatialDomain/ Geometry/Lines /Points/Latitude	gmd:polygon/gml:LineString/gml:posList srsName=" http://www.opengis.net/def/crs/EPSG/9.9.1/2982 " srsDimension="2">		EPSG codes can be found here: http://www.opengis.net/def/crs/EPSG

(4) GPolygon

If GPolygon is selected, the cardinality is 1..*

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

SpatialExtent /HorizontalSpatialDomain/	/gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/	Decimal as Strings	Latitude first then longitude for every point. No commas just spaces. ex: -10 -10 -10 10 10 10 -10 -10 -10
Geometry/GPolygon /Boundary/Points /Longitude	gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_BoundingPolygon/		EPSG codes can be found here: http://www.opengis.net/def/crs/EPSSG
SpatialExtent /HorizontalSpatialDomain/	gmd:polygon/gml:Polygon srsName="http://www.opengis.net/def/crs/EPSSG/9.9.1/2982"/gml:exterior/gml:LinearRing/gml:posList		
Geometry/GPolygon /Boundary/Points /Latitude			
SpatialExtent /HorizontalSpatialDomain/	/gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/	Decimal as Strings	Latitude first then longitude for every point. No commas just spaces. ex: -5 -5 -5 5 5 5 -5 -5 -5
Geometry/GPolygon /ExclusiveZone/	gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_BoundingPolygon/		EPSG codes can be found here: http://www.opengis.net/def/crs/EPSSG
Boundaries/Points /Longitude	gmd:polygon/gml:Polygon srsName="http://www.opengis.net/def/crs/EPSSG/9.9.1/2982"/gml:interior/gml:LinearRing/gml:posList		
SpatialExtent /HorizontalSpatialDomain/			
Geometry/GPolygon /ExclusiveZone/			
Boundaries/Points /Latitude			

Resolution And Coordinate System: SMAP metadata records do not contain resolution and coordinate system information. At this time the CMR does not translate SMAP resolution and coordinate system information.

Vertical Spatial Domain:

Providing a Vertical Spatial Domain is optional (Cardinality 0..*)

UMM-C Element	ISO 19115-2 MENDS Path	Type
SpatialExtent/ VerticalSpatialDomain/Type	/gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/ gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/gmd:EX_GeographicDescription id="VerticalSpatialDomainN"/gmd:geographicIdentifier/gmd:MD_Identifier/gmd:code/	String
SpatialExtent/ VerticalSpatialDomain/Value	gco:CharacterString = Type: {Type} Value: {Value} Unit: {Unit} /gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/ gmd:EX_GeographicDescription id="VerticalSpatialDomainN"/gmd:geographicIdentifier/gmd:MD_Identifier/ gmd:codeSpace/gco:CharacterString = gov.nasa.esdis.umm.verticalspatialdomain /gmd:DS_Series/gmd:seriesMetadata/gmi:MI_Metadata/gmd:identificationInfo/ gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent id="boundingExtent"/gmd:geographicElement/ gmd:EX_GeographicDescription id="VerticalSpatialDomainN" /gmd:geographicIdentifier/gmd:MD_Identifier/ gmd:description/gco:CharacterString = VerticalSpatialDomain Where VerticalSpatialDomainN = VerticalSpatialDomain0, VerticalSpatialDomain1, ... VerticalSpatialDomainN.	

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="boundingExtent">
          <gmd:description>
            <gco:
CharacterString>SpatialCoverageType=HORIZONTAL,
SpatialGranuleSpatialRepresentation=CARTESIAN,
CoordinateSystem=CARTESIAN</gco:CharacterString>
          </gmd:description>
          <gmd:geographicElement>
            <gmd:
EX_GeographicDescription id="ZoneIdentifier">
              <gmd:
geographicIdentifier>
                <gmd:MD_Identifier>
                  <gmd:code>
                    <gco:
CharacterString>1</gco:CharacterString>
                  </gmd:code>
                  <gmd:codeSpace>
                    <gco:
CharacterString>gov.nasa.esdis.umm.zoneidentifier<
/gco:CharacterString>
                  </gmd:codeSpace>
                  <gmd:description>
                    <gco:
CharacterString>ZoneIdentifier</gco:CharacterString>
                  </gmd:
description>
                </gmd:MD_Identifier>
              </gmd:
geographicIdentifier>
            </gmd:
EX_GeographicDescription>
          </gmd:geographicElement>
          <gmd:geographicElement>
            <gmd:EX_BoundingPolygon>
              <gmd:extentTypeCode>
                <gco:Boolean>1</gco:
Boolean>
              </gmd:extentTypeCode>
              <gmd:polygon>
                <gml:Point gml:id="
geo-bb789a47-86c3-492a-bf2e-9aa3d2072853">
                  <gml:pos>-70 -70<
/gml:pos>
                </gml:Point>
              </gmd:polygon>
            </gmd:EX_BoundingPolygon>
          </gmd:geographicElement>
          <gmd:geographicElement>
            <gmd:EX_BoundingPolygon>
              <gmd:extentTypeCode>
                <gco:Boolean>1</gco:
Boolean>
              </gmd:extentTypeCode>
              <gmd:polygon>
                <gml:Point gml:id="
geo-ccaafa180-5116-4e0b-b804-93e036ab6c8c">
                  <gml:pos>-65 -65<
/gml:pos>
                </gml:Point>
              </gmd:polygon>
            </gmd:EX_BoundingPolygon>
          </gmd:geographicElement>
          <gmd:geographicElement>

```

```

                <gmd:EX_BoundingPolygon>
                    <gmd:extentTypeCode>
                        <gco:Boolean>1</gco:
Boolean>

                    </gmd:extentTypeCode>
                    <gmd:polygon>
                        <gml:Polygon
                            gml:id="geo-
d46a38a1-f543-4470-83f3-509df33d5acc" srsName="
http://www.opengis.net/def/crs/EPSSG/0/9825">
                            <gml:exterior>
                                <gml:
LinearRing>
                                    <gml:
posList>-10 -10 -10 10 10 10 10 -10 -10 -10</gml:
posList>

                                    </gml:
LinearRing>

                                    </gml:exterior>
                                    <gml:interior>
                                        <gml:
LinearRing>
                                            <gml:
posList>-5 -5 -5 -1 -1 -1 -1 -5 -5 -5</gml:posList>
                                            </gml:
LinearRing>

                                            </gml:interior>
                                            <gml:interior>
                                                <gml:
LinearRing>
                                                    <gml:
posList>0 0 0 5 5 5 5 0 0 0</gml:posList>
                                                    </gml:
LinearRing>

                                                    </gml:interior>
                                                    </gml:Polygon>
                                                </gmd:polygon>
                                            </gmd:EX_BoundingPolygon>
                                        </gmd:geographicElement>
                                    <gmd:geographicElement>
                                        <gmd:EX_BoundingPolygon>
                                            <gmd:extentTypeCode>
                                                <gco:Boolean>1</gco:
Boolean>

                                            </gmd:extentTypeCode>
                                            <gmd:polygon>
                                                <gml:LineString gml:
id="geo-a36c37b3-1121-4aa3-9afb-f5169e9a20bc">
                                                    <gml:posList>-50
-50 -40 -40</gml:posList>

                                                    </gml:LineString>
                                                </gmd:polygon>
                                            </gmd:EX_BoundingPolygon>
                                        </gmd:geographicElement>
                                    <gmd:geographicElement>
                                        <gmd:EX_BoundingPolygon>
                                            <gmd:extentTypeCode>
                                                <gco:Boolean>1</gco:
Boolean>

                                            </gmd:extentTypeCode>
                                            <gmd:polygon>
                                                <gml:LineString gml:
id="geo-057bee05-65d1-41b2-97f7-e5ed0269a64c">
                                                    <gml:posList>50
50 40 40</gml:posList>

                                                    </gml:LineString>
                                                </gmd:polygon>
                                            </gmd:EX_BoundingPolygon>
                                        </gmd:geographicElement>
                                    <gmd:geographicElement>
                                        <gmd:

```

```

EX_GeographicBoundingBox id="geo-2ea5a89d-bf99-4273-
b976-1a616f6a13c2">
    <gmd:extentTypeCode>
        <gco:Boolean>1</gco:
Boolean>
    </gmd:extentTypeCode>
    <gmd:westBoundLongitude>
        <gco:Decimal>-180.0<
/gco:Decimal>
    </gmd:westBoundLongitude>
    <gmd:eastBoundLongitude>
        <gco:Decimal>-170.3<
/gco:Decimal>
    </gmd:eastBoundLongitude>
    <gmd:southBoundLatitude>
        <gco:Decimal>80.1<
/gco:Decimal>
    </gmd:southBoundLatitude>
    <gmd:northBoundLatitude>
        <gco:Decimal>90.0<
/gco:Decimal>
    </gmd:northBoundLatitude>
</gmd:
EX_GeographicBoundingBox>
</gmd:geographicElement>
<gmd:geographicElement>
    <gmd:
EX_GeographicDescription id="VerticalSpatialDomain0">
    <gmd:
geographicIdentifier>
        <gmd:MD_Identifier>
            <gmd:code>
                <gco:
CharacterString>Type: Maximum Altitude Value: 100<
/gco:CharacterString>
            </gmd:code>
            <gmd:codeSpace>
                <gco:
CharacterString>gov.nasa.esdis.umm.
verticalspatialdomain</gco:CharacterString>
            </gmd:codeSpace>
            <gmd:description>
                <gco:
CharacterString>VerticalSpatialDomain</gco:
CharacterString>
            </gmd:
description>
                </gmd:MD_Identifier>
            </gmd:
geographicIdentifier>
        </gmd:
EX_GeographicDescription>
    </gmd:geographicElement>
    <gmd:geographicElement>
        <gmd:
EX_GeographicDescription id="VerticalSpatialDomain1">
        <gmd:
geographicIdentifier>
            <gmd:MD_Identifier>
                <gmd:code>
                    <gco:
CharacterString>Type: Minimum Altitude Value: 1</gco:
CharacterString>
                </gmd:code>
                <gmd:codeSpace>
                    <gco:
CharacterString>gov.nasa.esdis.umm.
verticalspatialdomain</gco:CharacterString>
                </gmd:codeSpace>
                <gmd:description>
                    <gco:

```

```

CharacterString>VerticalSpatialDomain</gco:
CharacterString>
                                </gmd:
description>
                                </gmd:MD_Identifier>
                                </gmd:
geographicIdentifier>
                                </gmd:
EX_GeographicDescription>
                                </gmd:geographicElement>
                                <gmd:temporalElement>
                                    <gmd:EX_TemporalExtent>
                                        <gmd:extent>
                                            <gml:TimePeriod gml:
id="dbc598363-e316-4c08-ad5b-d8f4f42b7825">
                                                <gml:
beginPosition>2001-01-01T00:00:00.000Z</gml:
beginPosition>
                                                <gml:
endPosition>2001-06-01T00:00:00.000Z</gml:
endPosition>
                                                    </gml:TimePeriod>
                                                </gmd:extent>
                                            </gmd:EX_TemporalExtent>
                                        </gmd:temporalElement>
                                    </gmd:EX_Extent>
                                </gmd:extent>
...

```

UMM

```

"SpatialExtent": {
  "SpatialCoverageType": "HORIZONTAL",
  "HorizontalSpatialDomain": {
    "ZoneIdentifier" : "1",
    "Geometry": {
      "CoordinateSystem": "CARTESIAN",
      "Points": [{
        "Longitude": -70,
        "Latitude": -70
      }, {
        "Longitude": -65,
        "Latitude": -65
      }],
      "BoundingRectangles": [{
        "WestBoundingCoordinate": -180.0,
        "NorthBoundingCoordinate": 90.0,
        "EastBoundingCoordinate": -170.3,
        "SouthBoundingCoordinate": 80.1
      }],
      "GPolygons": [{
        "Boundary" : {
          "Points": [{
            "Longitude": -10,
            "Latitude": -10
          }, {
            "Longitude": 10,
            "Latitude": -10
          }, {
            "Longitude": 10,
            "Latitude": 10
          }, {
            "Longitude": -10,
            "Latitude": 10
          }, {
            "Longitude": -10,
            "Latitude": -10
          }
        ]
      }],
    }
  },

```

```

    "ExclusiveZone": {
      "Boundaries": [{
        "Points": [{
          "Longitude": -5,
          "Latitude": -5
        }, {
          "Longitude": -1,
          "Latitude": -5
        }, {
          "Longitude": -1,
          "Latitude": -1
        }, {
          "Longitude": -5,
          "Latitude": -1
        }, {
          "Longitude": -5,
          "Latitude": -5
        }]
      }, {
        "Points": [{
          "Longitude": 0,
          "Latitude": 0
        }, {
          "Longitude": 5,
          "Latitude": 0
        }, {
          "Longitude": 5,
          "Latitude": 5
        }, {
          "Longitude": 0,
          "Latitude": 5
        }, {
          "Longitude": 0,
          "Latitude": 0
        }]
      }]
    },
    "Lines": [{
      "Points": [{
        "Longitude": -50,
        "Latitude": -50
      }, {
        "Longitude": -40,
        "Latitude": -40
      }]
    }, {
      "Points": [{
        "Longitude": 50,
        "Latitude": 50
      }, {
        "Longitude": 40,
        "Latitude": 40
      }]
    }]
  },
  "VerticalSpatialDomains": [{
    "Type": "Maximum Altitude",
    "Value": "100"
  }, {
    "Type": "Minimum Altitude",
    "Value": "1"
  }
],
"GranuleSpatialRepresentation": "CARTESIAN"
},

```

UMM Migration

The translation between the operational version of UMM-C 1.13 and the UMM-C 1.14 is almost a one to one mapping. Since the old model doesn't have the descriptions, they can't be translated back or forth. The Horizontal Resolution and Coordinate System information has been moved to be co-located with the horizontal spatial extent information. Translating from the proposed UMM-C back to UMM-C version 1.13 the lower resolution will be used. The value of HorizontalResolutionProcessingLevelEnum is "Not provided". The LongitudeResolution translated to the XDimension element and the LatitudeResolution is translated to the YDimension element.

History

UMM Versioning

Version	Date	What Changed
1.17.0	5/1 /2022	Added OrbitParameter sub element Units and Footprints from version 1.16.7 to 1.17.0
1.15.5	12/3 /2020	No changes were made for Spatial Extent during the transition from version 1.15.4 to 1.15.5
1.15.4	9/18 /2020	No changes were made for Spatial Extent during the transition from version 1.15.3 to 1.15.4
1.15.3	7/1 /2020	No changes were made for Spatial Extent during the transition from version 1.15.2 to 1.15.3
1.15.2	5/20 /2020	Added Statute Miles, Nautical Miles, and Not provided as valid values to the HorizontalDataResolutionUnitEnum element. Also Simplified VariesResolution and PointResolution by removing the non needed HorizontalResolutionProcessingLevelEnum sub element from version 1.15.1 to 1.15.2
1.15.1	3/25 /2020	No changes were made for Spatial Extent during the transition from version 1.15.0 to 1.15.1
1.15.0	2/26 /2020	- Changed the HorizontalDataResolutions element to HorizontalDataResolution and added sub element objects to aid in more clearer error messages when users make schema mistakes. Before the JSON schema validator spewed a lot of misleading error messages making it hard to figure out what the user did wrong. - Added a description for AdditionalAttributes/Name so that the help text shows up in MMT.
1.14.0	10/21 /2019	- Removed the HorizontalCoordinateSystem element from SpatialInformationType class - Added the ResolutionAndCoordinateSystem element with the ResolutionAndCoordinateSystemType definition to the HorizontalSpatialDomainType class. - Renamed HorizontalCoordinateSystemType class to ResolutionAndCoordinateSystemType. - Added the description element to the ResolutionAndCoordinateSystemType class - Removed the GeographicCoordinateSystem element and its class (GeographicCoordinateSystemType) - Added HorizontalDataResolutions element with the HorizontalDataResolutionType definition to the ResolutionAndCoordinateSystemType class and allowing multiple instances of this class. - The new HorizontalDataResolutionType class contains 7 choices with up to 8 new elements.
1.13.0	04/11 /2019	No changes were made for Spatial Extent during the transition from version 1.12.0 to 1.13.0
1.12.0	01/22 /2019	No changes were made for Spatial Extent during the transition from version 1.11.0 to 1.12.0.
1.11.0	11/28 /2018	No changes were made for Spatial Extent 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, the sub element 'VerticalSpatialDomainType' was enumerated.

ARC Documentation

Version	Date	What Changed	Author
1.0	02/19/2018	Recommendations/priority matrix transferred from internal ARC documentation to wiki space	Kaylin Bugbee