Spatial Information

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Element Description

The Spatial Information element stores information about the reference frame from which horizontal and vertical spatial domains are measured. The horizontal reference frame includes fields for Geodetic Model, Geographic Coordinates, and Local Coordinates. The Vertical reference frame includes fields for altitudes (elevations) and depths.

Best Practices

Providing Spatial Information is optional, but encouraged. This element can be used to provide horizontal and/or vertical coordinate system information.

The Spatial Coverage Type field is required for Spatial Information.

Spatial Coverage Type: Denotes the type of spatial coverage of the collection. While this field is not currently controlled, recommend providing one of the spatial coverage type enumeration values: EARTH/GLOBAL, HORIZONTAL, VERTICAL, ORBITAL, HORIZONTAL_VERTICAL, ORBITAL_VERTICAL, HORIZONTAL_ORBITAL, HORIZONTAL_VERTICAL_ORBITAL, LUNAR

Vertical Spatial Information

The following sub-elements can be used to describe Vertical Coordinate Systems.

There are 2 categories for Vertical Coordinate Systems including:

(1) Altitude System Definition

Altitude System Definition should be used to describe data with a vertical component that is above-ground. Sub-elements under Altitude System Definition are summarized below:

- Datum Name: The name of the vertical datum the data is encoded in. Vertical datums define a level reference surface from which vertical measurements are compared. There are many standard vertical datums. If a standard vertical datum is used, it is recommended that the EPSG vertical datum name be provided.
- Distance Units: The units in which altitude measurements are recorded. This field is controlled and must be selected from one of the following values: HectoPascals, Kilometers, Millibars
- Resolutions: The minimum distance possible between two adjacent values, expressed in distance units of measure for the collection.

(2) Depth System Definition

Depth System Definition should be used to describe data with a vertical component that is below-ground. Sub-elements under Depth System Definition are summarized below:

- Datum Name: The name of the vertical datum the data is encoded in. Vertical datums define a level reference surface from which vertical measurements are compared. There are many standard vertical datums. If a standard vertical datum is used, it is recommended that the EPSG vertical datum name be provided.
- Distance Units: The units in which depth measurements are recorded. This field is controlled and must be selected from one of the following values: Fathoms, Feet, HectoPascals, Meters, Millibars
- Resolutions: The minimum distance possible between two adjacent values, expressed in distance units of measure for the collection

Element Specification

Providing Spatial Information is optional (Cardinality: 0..1)

Model	Element	Туре	Usable Valid Values	Constraints	Required?	Cardinality	Notes

UMM-C	SpatialInformation /SpatialCoverageType	String	EARTH/GLOBAL, HORIZONTAL, VERTICAL, ORBITAL, HORIZONTAL_VERTICAL, ORBITAL_VERTICAL, HORIZONTAL_ORBITAL, HORIZONTAL_VERTICAL_ORBITAL, LUNAR	1 - 80 characters	Yes, if applicable	1	
UMM-C	SpatialInformation/VerticalCoor dinateSystem /AltitudeSystemDefinition /DatumName	String	n/a	1 - 80 characters	No	01	Recomm end providing EPSG vertical datum names
UMM-C	SpatialInformation/VerticalCoor dinateSystem /AltitudeSystemDefinition /DistanceUnits	Enumer ation	HectoPascals Kilometers Millibars	n/a	No	01	
UMM-C	SpatialInformation/VerticalCoor dinateSystem /AltitudeSystemDefinition /Resolutions	Number	n/a	n/a	No	0*	
UMM-C	SpatialInformation/VerticalCoor dinateSystem /DepthSystemDefinition /DatumName	String	n/a	1 - 80 characters	No	01	Recomm end providing EPSG vertical datum names
UMM-C	SpatialInformation/VerticalCoor dinateSystem /DepthSystemDefinition /DistanceUnits	Enumer ation	Fathoms Feet HectoPascals Meters Millibars	n/a	No	01	
UMM-C	SpatialInformation /VerticalCoordinateSystem /DepthSystemDefinition /Resolutions	Number	n/a	n/a	No	0*	

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.
 Proof all content for conciseness and readability.

```
None
ARC Priority Matrix
```

Priority Categorization Justification

Red = High Priority Finding	This element is categorized as highest priority when:
	 Spatial Information is provided but the required 'Spatial Information Type' field is not included. An invalid value is provided for 'Distance Units' ('DistanceUnits' must be selected from an enumeration list). An invalid value is provided for 'GeographicCoordinateUnits' ('GeographicCoordinateUnits' must be selected from an enumeration list). An enumeration list). The information provided is incorrect for the dataset.
Yellow = Medium Priority Finding	Not Applicable
Blue = Low Priority Finding	This element is categorized as low priority when:
	 A recommendation is made to provide any additional information to existing Spatial Information provided in the metadata.
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

Providing Spatial_Info is optional in DIF 10 (Cardinality: 0..1).

Note: There are no Vertical Coordinate System fields in DIF 10 - vertical information can be provided in the Vertical_Spatial_Info element. For details on Vertical_Spatial_Info please see the Spatial Extent wiki page.

DIF 10 also supports an element called Data_Resolution which does not currently map to the UMM, however, there are plans to support it in the future.

UMM-C Element	DIF 10 Path	Туре	Constraints Required Cardinality in DIF 10?		Notes	
SpatialInformati on /SpatialCovera geType	Spatial_Coverage /Spatial_Info /Spatial_Coverage_T ype	Enumer ation	Earth/Global, Horizontal, Vertical, Orbit, HorizontalVertical, Orbital_Vertical, Horizontal_Orbital, Horizontal_Vertical_Orbital, Lunar	Yes, if applicable	1	Horizon‖ has been deprecated, use HorizontalVertical instead
n/a	Data_Resolution /Vertical_Resolution	String		No	01	
n/a	Data_Resolution/ Vert ical_Resolution_Unit	String		No	01	
n/a	Data_Resolution /Vertical_Resolution_ Range	String	KMS controlled	No	01	Recommend selecting a value from the GCMD Vertical Data Resolution keywords to populate this field
n/a	Data_Resolution/Tem poral_Resolution	String		No	01	Note: this field does not map to any other metadata elements and is unique to DIF 10.
n/a	Data_Resolution/Tem poral_Resolution_Ra nge	String	KMS controlled	No	01	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

Enumeration Mapping

DIF 10	Translation Direction	UMM
Earth/Global		EARTH/GLOBAL

Horizontal	HORIZONTAL
HorizontalVertical	HORIZONTAL_VERTICAL
Orbit	ORBITAL
Vertical	VERTICAL
Horizon‖	HORIZONTAL_VERTICAL
Orbital_Vertical	ORBITAL_VERTICAL
Horizontal_Orbital	HORIZONTAL_ORBITAL
Horizontal_Vertical_Orbital	HORIZONTAL_VERTICAL_ORBITAL
Lunar	LUNAR

Example Mapping

DIF 10

UMM

```
"SpatialInformation": [
{
"SpatialCoverageType": "HORIZONTAL",
}
]
```

ECHO 10

Providing the Spatial Info element is optional in ECHO 10 (Cardinality: 0..1)

UMM-C Element	ECHO 10 Path	Туре	Constraints	Required in ECHO10?	Cardinality	Note
SpatialInformation/ SpatialCoverageTy pe	SpatialInfo /SpatialCoverageT ype	String	1 - 80 characters	Yes, if applicable	1	This attribute denotes whether the collection's spatial coverage requires horizontal, vertical, or both in the spatial domain and coordinate system definitions. This field is not controlled in ECHO 10, however, it is recommended that one of the UMM SpatialCoverageType enumeration values be provided in order to reduce translation errors (HORIZONTAL, VERTICAL, ORBITAL, HORIZONTAL_VERTICAL, ORBITAL_VERTICAL)
SpatialInformation/ VerticalCoordinate System /AltitudeSystemDef inition/DatumName	SpatialInfo /VerticalCoordinate System /AltitudeSystemDef inition/DatumName	String	1 - 80 characters	No	01	Recommend providing EPSG vertical datum names
SpatialInformation/ VerticalCoordinate System /AltitudeSystemDef inition /DistanceUnits	SpatialInfo /VerticalCoordinate System /AltitudeSystemDef inition /DistanceUnits	String	1 - 80 characters	No	01	

SpatialInformation/ VerticalCoordinate System /AltitudeSystemDef inition /EncodingMethod	SpatialInfo /VerticalCoordinate System /AltitudeSystemDef inition /EncodingMethod	String	1 - 2048 characters	No	01	The means used to encode measurements.
SpatialInformation/ VerticalCoordinate System /AltitudeSystemDef inition/Resolutions	SpatialInfo /VerticalCoordinate System /AltitudeSystemDef inition/Resolutions /Resolution	Decimal	n/a	No	0*	This entity stores the minimum distance possible between two adjacent values, expressed in the distance units of measure for collection. A list of vertical resolutions may be provided here.
SpatialInformation/ VerticalCoordinate System /DepthSystemDefin ition/DatumName	SpatialInfo /VerticalCoordinate System /DepthSystemDefi nition/DatumName	String	1 - 80 characters	No	01	Recommend providing EPSG vertical datum names
SpatialInformation/ VerticalCoordinate System /DepthSystemDefin ition/DistanceUnits	SpatialInfo /VerticalCoordinate System /DepthSystemDefi nition /DistanceUnits	String	1 - 80 characters	No	01	
SpatialInformation/ VerticalCoordinate System /DepthSystemDefin ition /EncodingMethod	SpatialInfo /VerticalCoordinate System /DepthSystemDefi nition /EncodingMethod	String	1 - 2048 characters	No	01	The means used to encode measurements.
SpatialInformation/ VerticalCoordinate System /DepthSystemDefin ition/Resolutions	SpatialInfo /VerticalCoordinate System /DepthSystemDefi nition/Resolutions /Resolution	Decimal	n/a	No	0*	This entity stores the minimum distance possible between two adjacent values, expressed in the distance units of measure for collection. A list of vertical resolutions may be provided here.

Example Mapping

ECHO 10

```
<SpatialInfo>

<SpatialCoverageType>HORIZONTAL_VERTICAL<//SpatialCoverageType>

<VerticalCoordinateSystem>

<AltitudeSystemDefinition>

<DatumName>North American Vertical Datum 1988<
/DatumName>

<DistanceUnits>Kilometers</DistanceUnits>

<Resolutions>

<Resolution>10</Resolution>

</Resolutions>

</AltitudeSystemDefinition>

</VerticalCoordinateSystem>

</SpatialInfo>
```

UMM

UMM Migration

N/A

History

UMM Versioning

Version	Date	What Changed
1.18.0	2024- 03-18	Updated Spatial Coverage Type enumeration list for 1.18.0
1.15.5	2020- 12-03	No changes were made for Spatial Information during the transition from version 1.15.4 to 1.15.5
1.15.4	2020- 09-18	No changes were made for Spatial Information during the transition from version 1.15.3 to 1.15.4
1.15.3	2020- 07-01	No changes were made for Spatial Information during the transition from version 1.15.2 to 1.15.3
1.15.2	2020- 05-20	No changes were made for Spatial Information during the transition from version 1.15.1 to 1.15.2
1.15.1	2020- 03-25	No changes were made for Spatial Information during the transition from version 1.15.0 to 1.15.1
1.15.0	2020- 02-26	No changes were made for Spatial Information during the transition from version 1.14.0 to 1.15.0
1.14.0	2019- 10-21	The Horizontal Coordinate System element and all supporting elements were either removed or renamed and moved to the SpatialExtent element.
1.13.0	2019- 04-11	No changes were made for Spatial Information during the transition from version 1.12.0 to 1.13.0
1.12.0	2019- 01-22	No changes were made for Spatial Information during the transition from version 1.11.0 to 1.12.0.
1.11.0	2018- 11-28	No changes were made for Spatial Information during the transition from version 1.10.0 to 1.11.0.
1.10.0	2018- 05-02	 During the transition from version 1.9.0 to 1.10.0: The sub element 'GeographicCoordinateUnits' was added and enumerated The sub element 'EncodingMethod' was removed from both 'AltitudeSystemDefinitionType' and 'DepthSystemDefinitionType' 'VerticalSystemDefinitionType' was replaced with both 'AltitudeSystemDefinitionType' and 'DepthSystemDefinitionType' and 'DepthSystemDefinitionType' was replaced with both 'AltitudeSystemDefinitionType' and 'DepthSystemDefinitionType' and 'DepthSystemDefinitionType'. Free text strings were changed to enumeration for the following sub elements within 'AltitudeSystemDefinitionType' and 'DepthSystemDefinitionType': 'AltitudeDistanceUnitsEnum' and 'DepthSystemDefinitionType.'

ARC Documentation

Version	Date	What Changed	Author
1.0	2019-02-15	Recommendations/priority matrix transferred from internal ARC documentation to wiki space	Jeanne' le Roux
			Ingrid Garcia-Solera