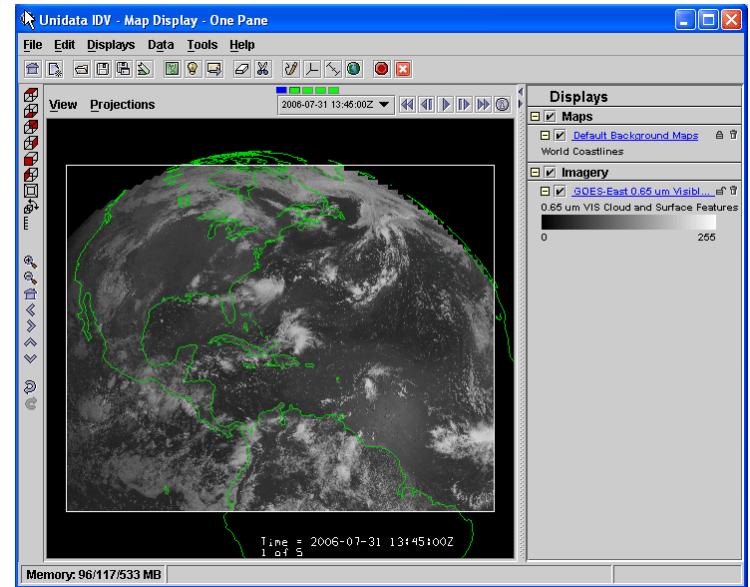
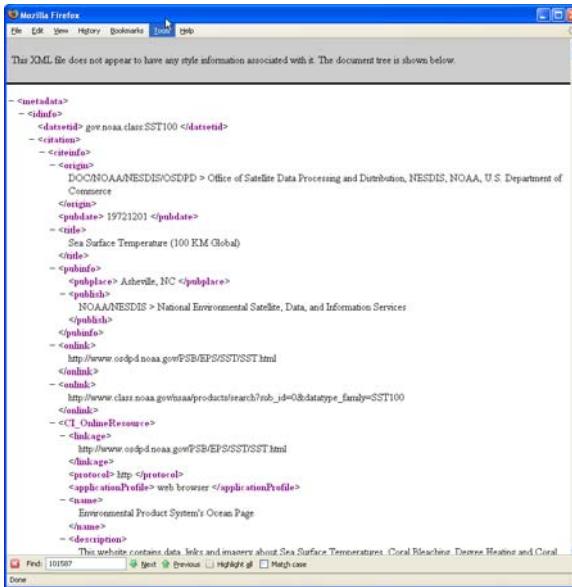


# Standard Metadata in Scientific Data Formats

Ted.Habermann@noaa.gov

## GEOSS Harmonization - 2009



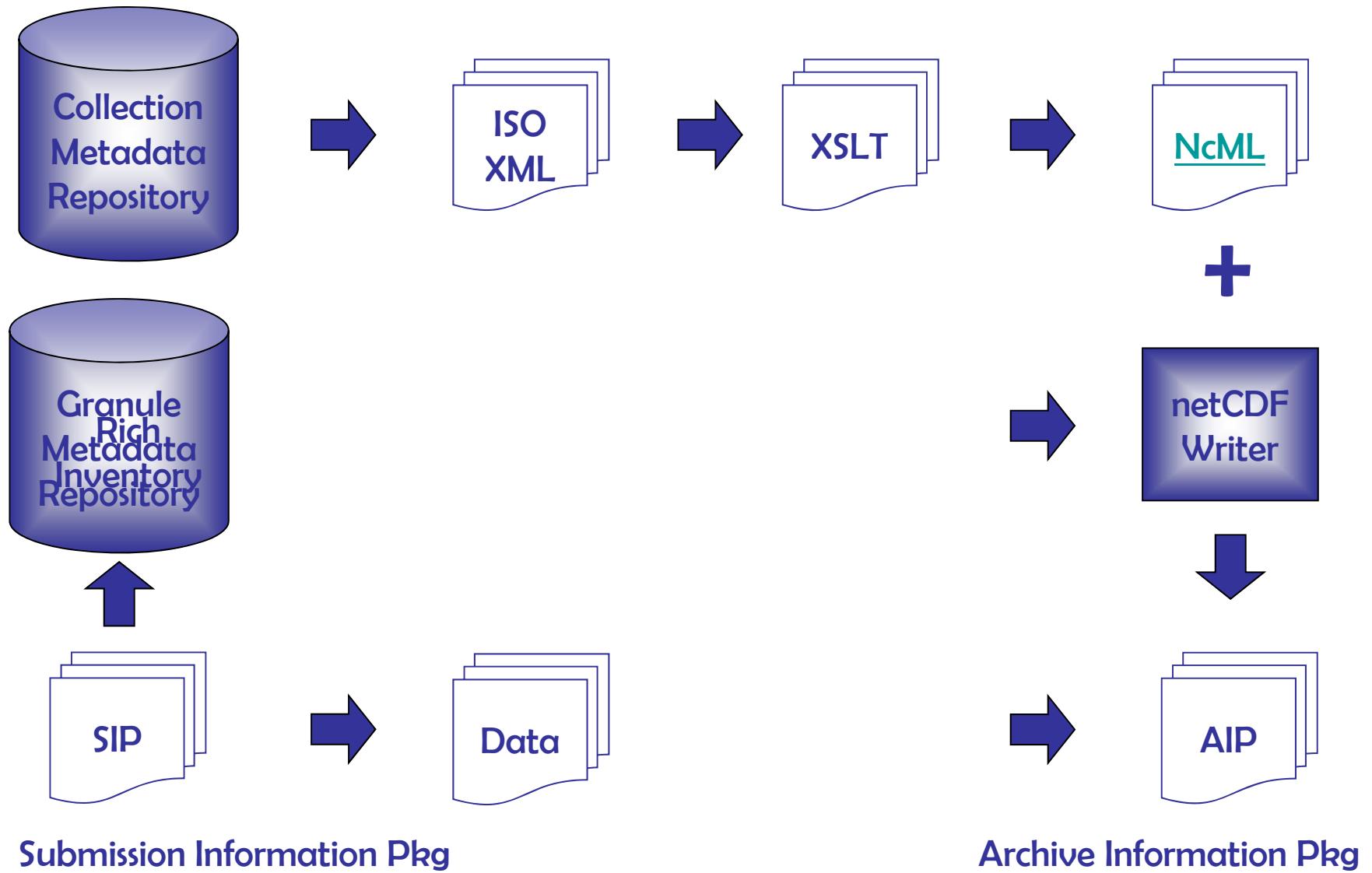
# Observations of Metadata in netCDF Files

The obvious difference in the quantity and quality of metadata available in these two netCDF files prompted me to begin thinking about how we can take advantage of improving the content in metadata repositories as we write open-source scientific data formats.

Whether you're a professional or a hobbyist, our software offers a wide range of features to help you get the most out of your images.

## Metadata Provided with a Level 3 SST Product From SWOTSSC

# Metadata in this Process



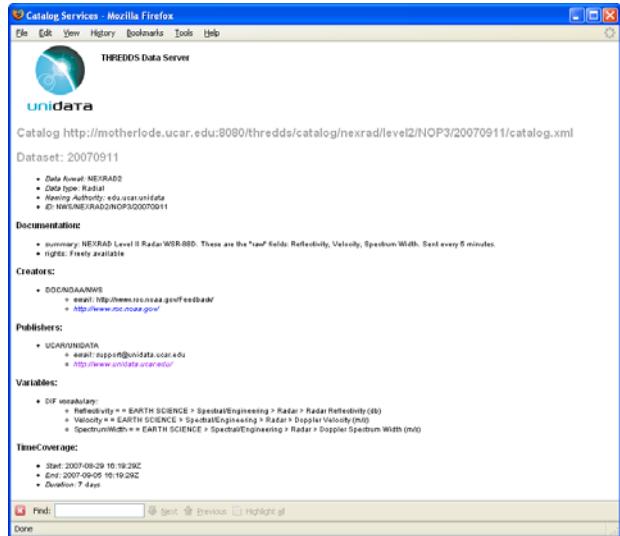
# Archive Information Package Content

```
<attribute name="Conventions" type="String" value=""CF-1.0""/>
<attribute name="Metadata_Conventions" type="String" value="ISO, DublinCore"/>
<attribute name="ISO_Link" type="String" value="URL"/>
<attribute name="institution" type="String" value="NOAA / NGDC"/>
<attribute name="iso_publisher_name" type="String" value="NOAA / NGDC"/>
<attribute name="dc_publisher" type="String" value="NOAA / NGDC"/>
<variable name="Analysis Temperature">
  <attribute type="string" name="iso_long_name" value="Analysis Temperature"/>
  <attribute type="float" name="iso_valid_min" value="-850"/>
  <attribute type="float" name="iso_valid_max" value="610"/>
  <attribute type="string" name="iso_units" value="degrees Celsius * 10"/>
  <attribute type="float" name="min" value="150"/>
  <attribute type="float" name="max" value="220"/>
  <attribute type="string" name="units" value="Celsius"/>
  <attribute type="float" name="scale_factor" value="0.1"/>
</variable>
```

*Contentida Metadata*

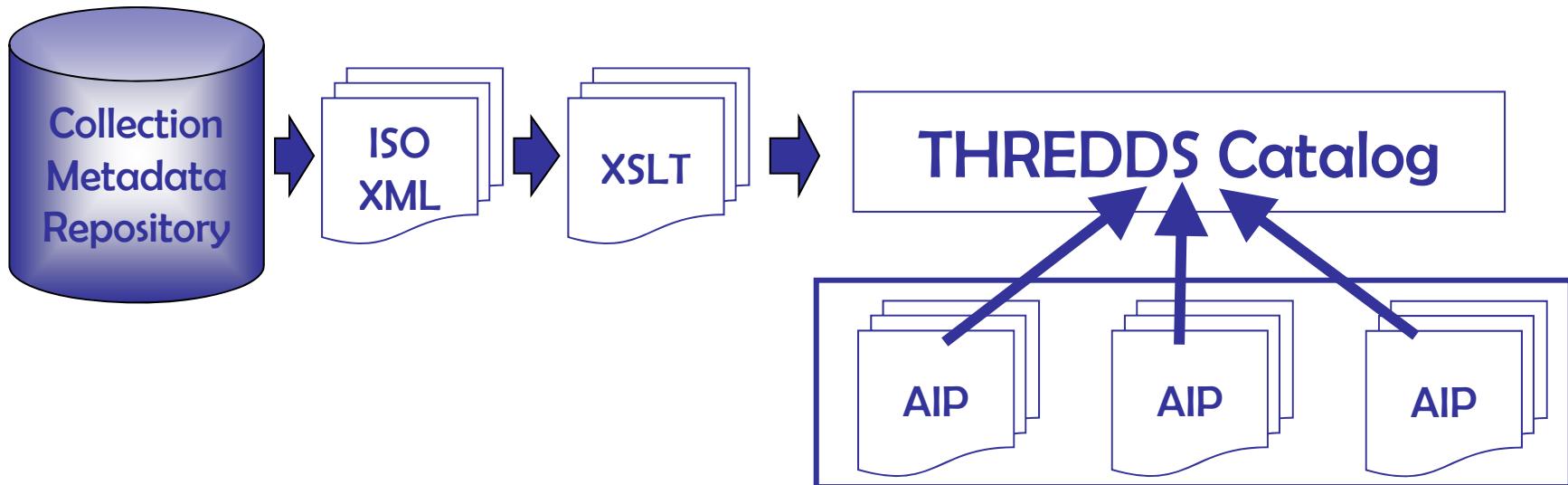


# THREDDS Metadata

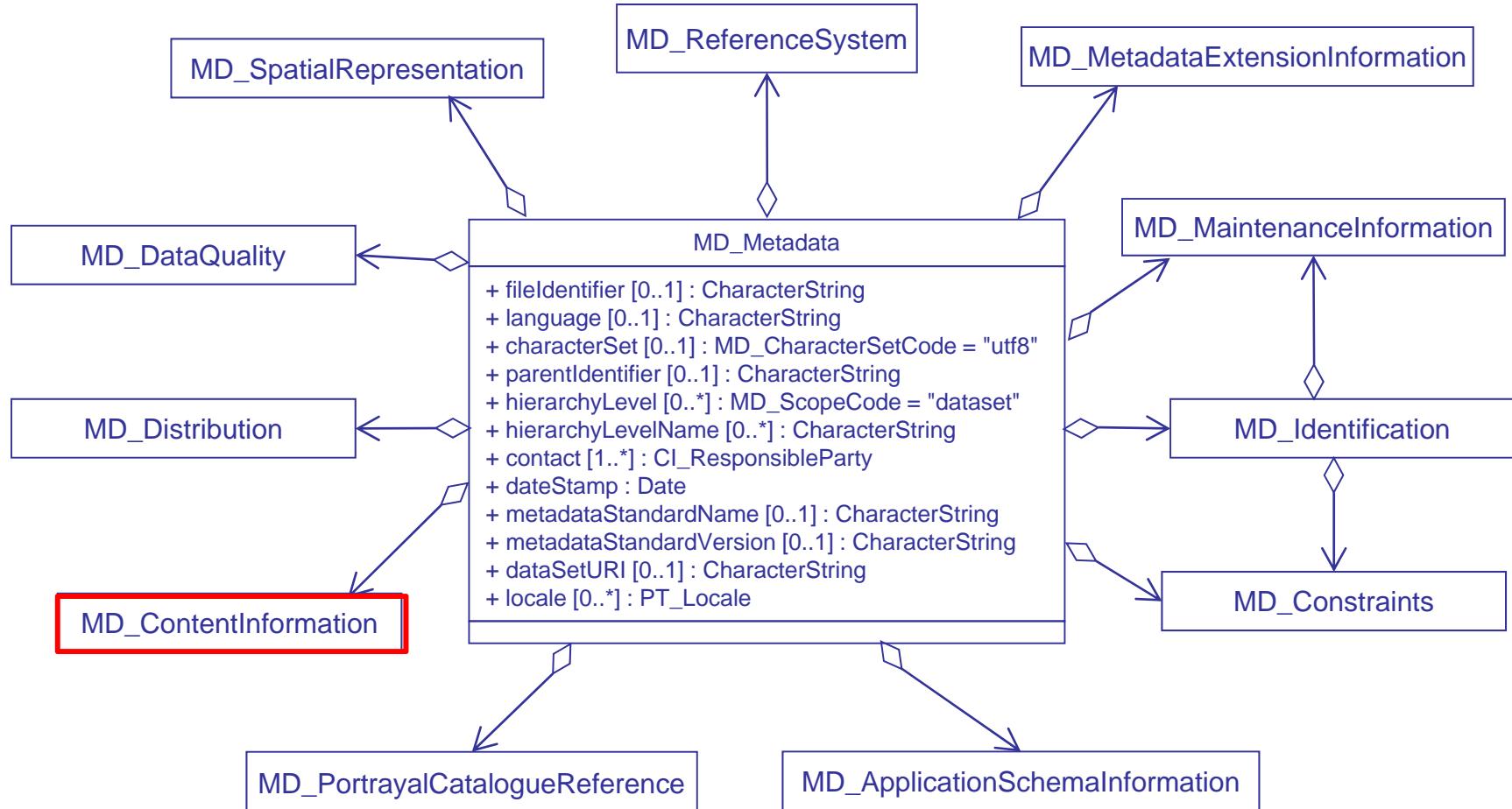


1) The THREDDS Catalog Generator can extract selected collection or granule metadata from the files and include it in the catalog.

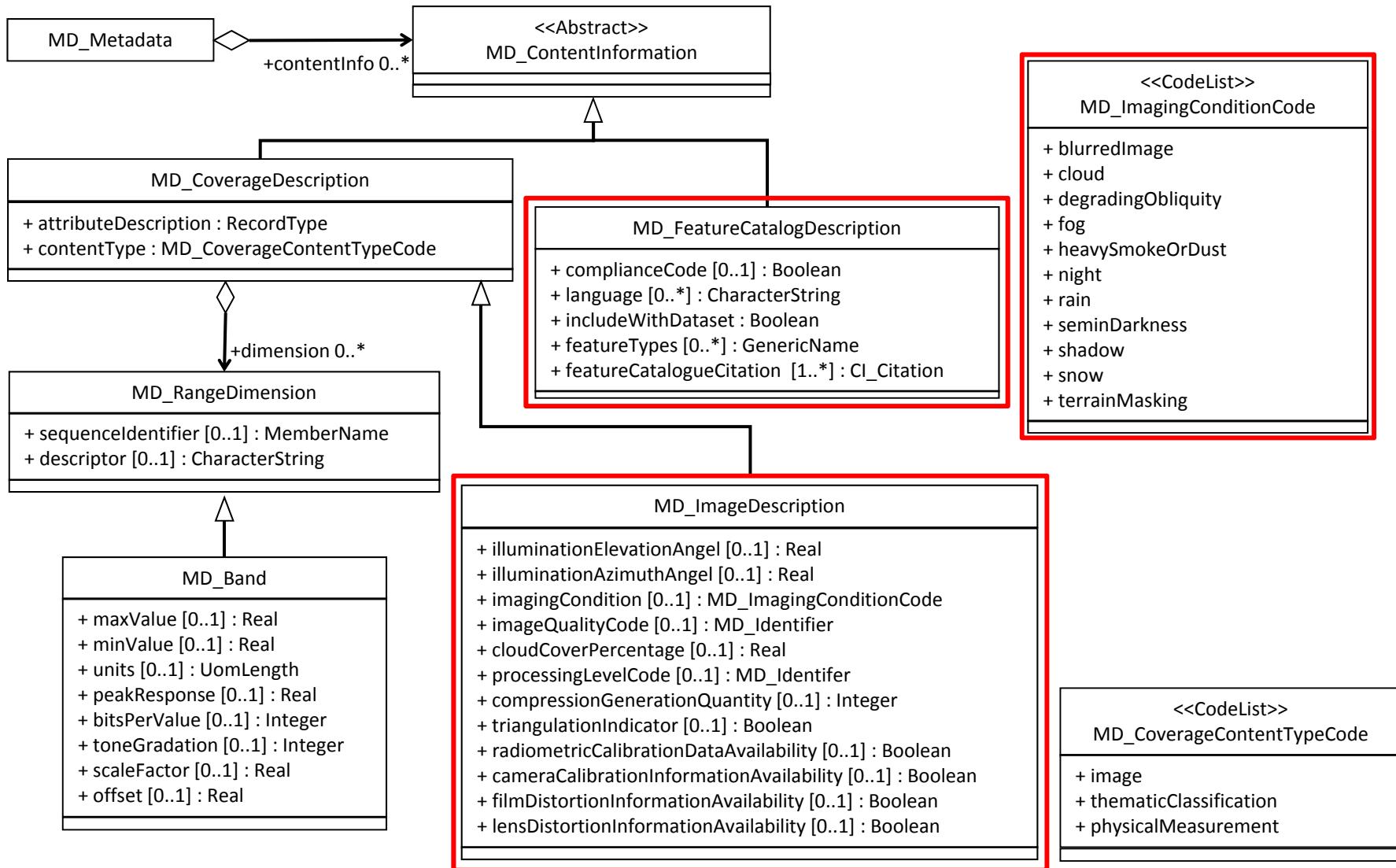
2) The Metadata\_Link attributes could be extracted to support a THREDDS Metadata Service.

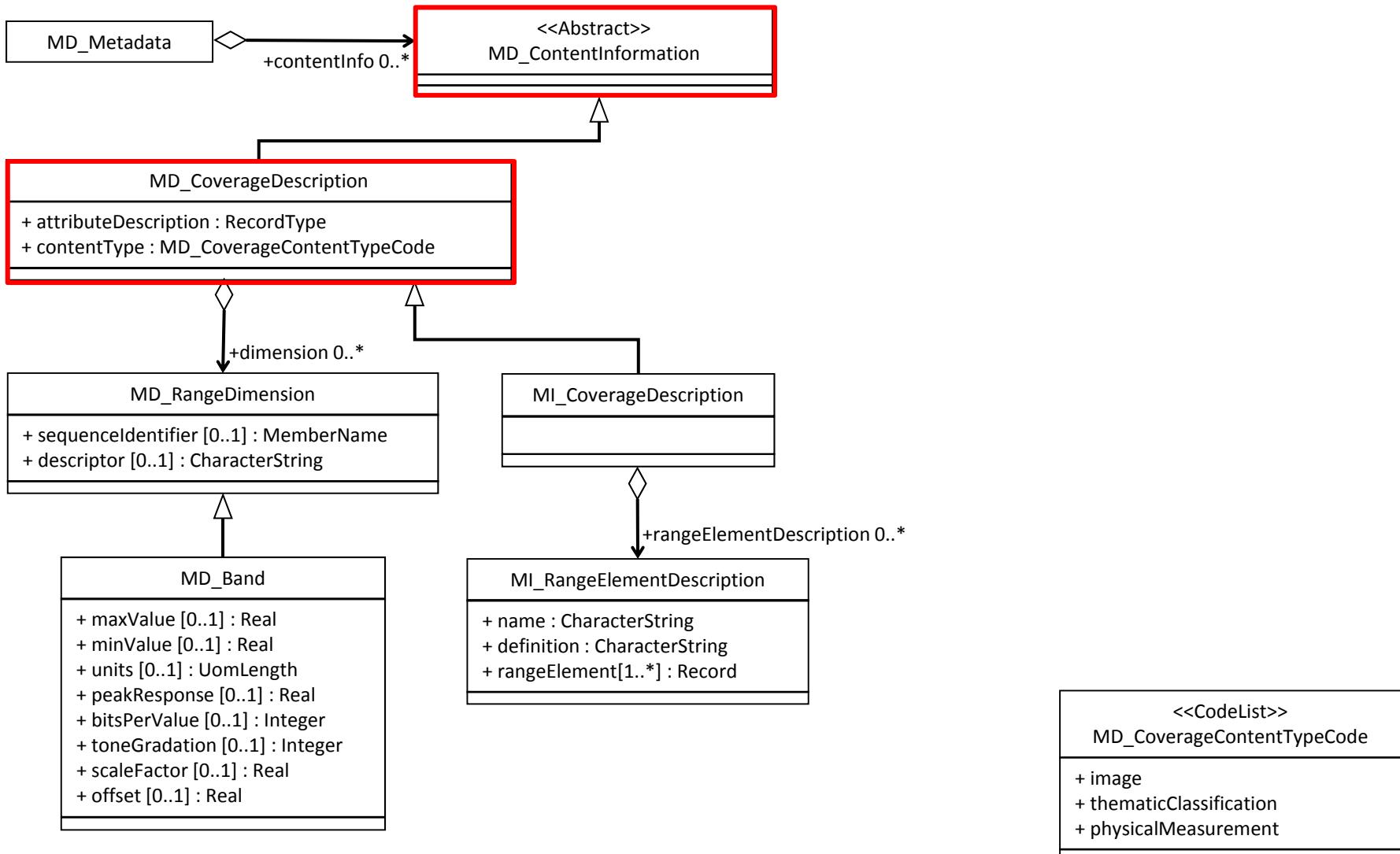


# MD\_ContentInformation



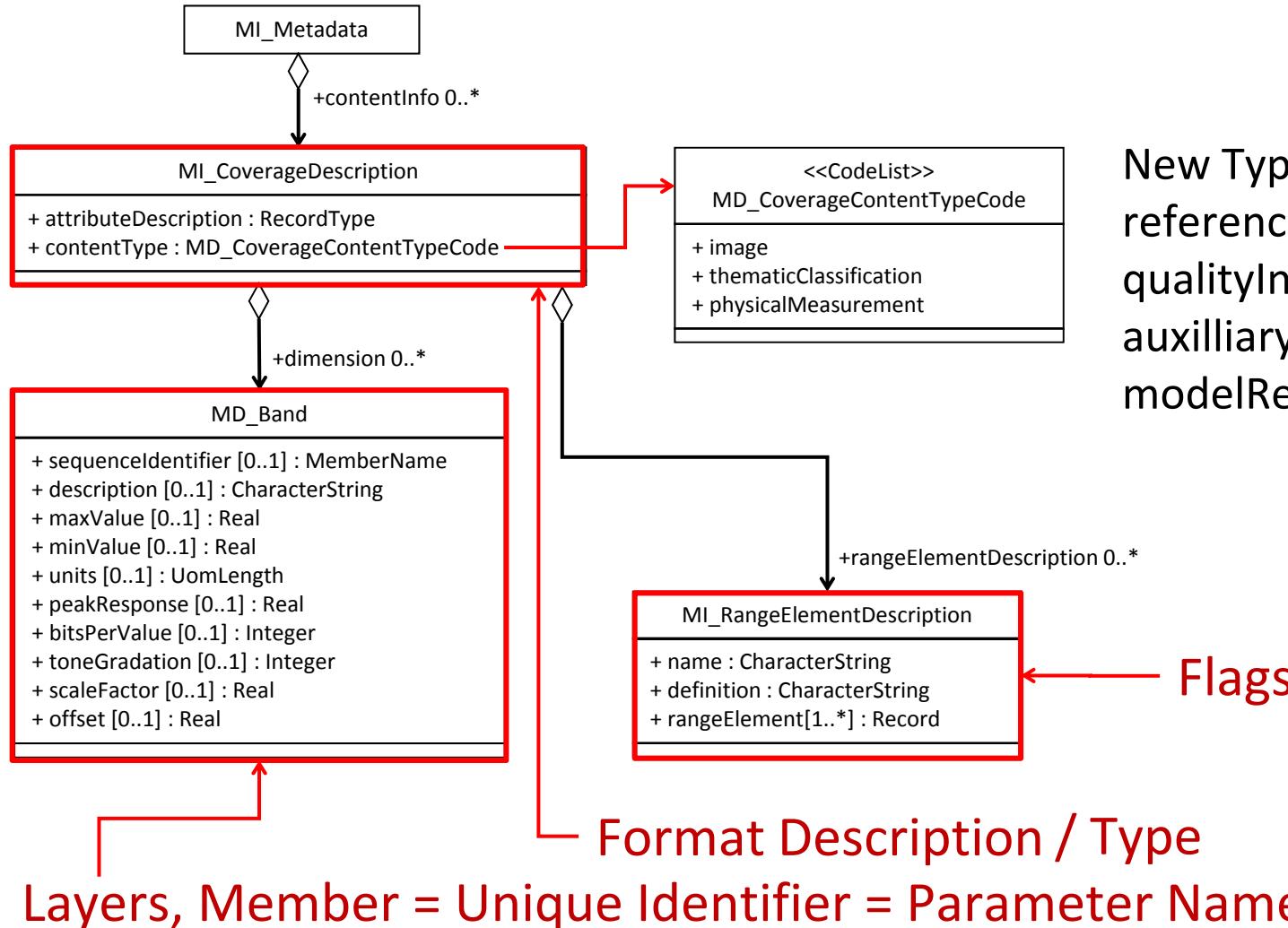
# MD\_ContentInformation



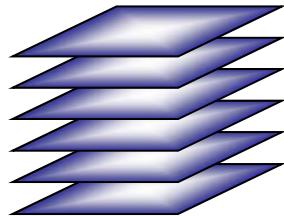


## MI\_ContentInformation 19115-2 (Grid Coverages)

# MI\_CoverageDescriptions

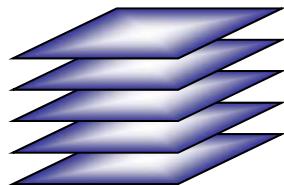


# Simple multi-layered dataset (SST50)



## Physical Measurements:

Analysis Temperature (sea\_surface\_temperature) contentInfo 1  
Gradient X+, X-, Y+, Y-, Average  
Ice Field

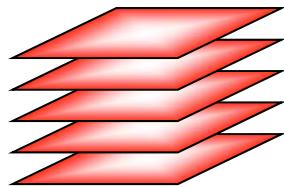


## Auxilliary Data:

Physiographic Desc. (land\_binary\_mask) contentInfo 2  
Spatial Covariance X+, X-, Y+, Y- contentInfo3

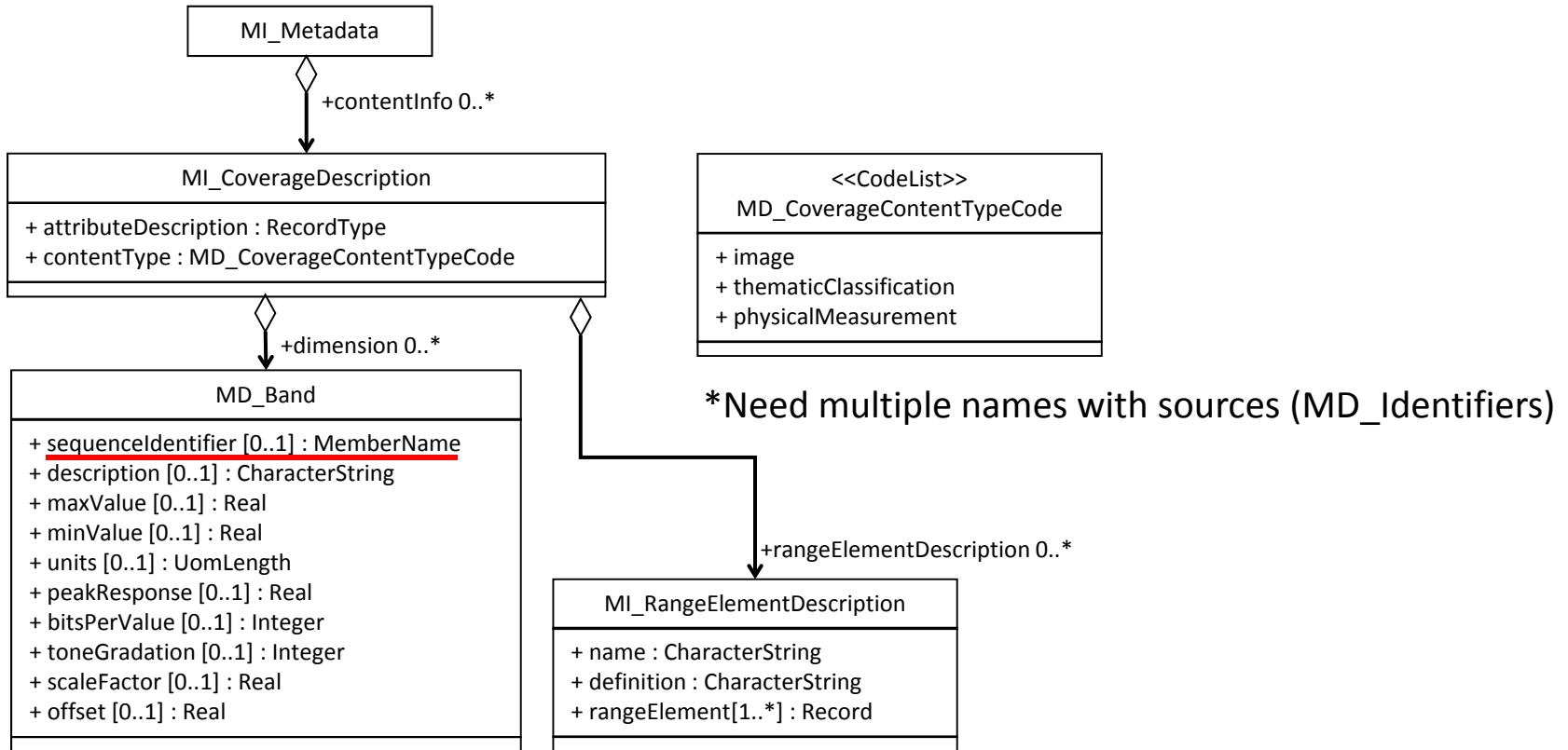
## Quality Reports:

Lineage / Processing dataQuality 1  
Processing Parameters 1 dataQuality 2  
Processing Parameters 2 dataQuality 3  
Mission History dataQuality 4



## Quality Information:

Age Of Most Recent Observation dataQuality 5  
Number of Observations dataQuality 6  
Class 1 Coverage dataQuality 7  
Reliability dataQuality 8



```

<variable type="float" shape="lat lon" name="Optical Thickness">
    <attribute type="string" name="standard name" value="atmosphere optical thickness due to aerosol"/>
    <attribute type="string" name="long name" value="Optical Thickness"/>
    <attribute type="float" name="valid_min" value="0"/>
    <attribute type="float" name="valid_max" value="2440"/>
    <attribute type="string" name="units" value="Optical Thickness Unit X 1000"/>
</variable>

```

## MI\_CoverageDescription (Grid Coverages)

<<DataType>> CI_Citation	
+ title : <u>CharacterString</u> + alternateTitle [0..*] : CharacterString + date [1..*] : CI_Date + edition [0..1] : CharacterString + editionDate [0..1] : Date + identifier [0..*] : MD_Identifier + citedResponsibleParty [0..*] : CI_ResponsibleParty + presentationForm [0..*] : CI_PresentationFormCode + series [0..1] : CI_Series + otherCitationDetails [0..1] : CharacterString + collectiveTitle [0..1] : CharacterString + ISBN [0..1] : CharacterString + ISSN [0..1] : CharacterString	

<<CodeList>> CI_PresentationFormCode	
+ documentDigital + documentHardcopy + imageDigital + imageHardcopy + mapDigital + mapHardcopy + modelDigital	+ modelHardcopy + profileDigital + profileHardcopy + tableDigital + tableHardcopy + videoDigital + videoHardcopy

<<DataType>> CI_Date	
+ date : Date + dateType : CI_DateTypeCode	

<<CodeList>> CI_DateTypeCode	
+ creation + publication + revision	

<<DataType>> CI_Series	
+ name [0..1] : CharacterString + issueIdentification [0..1] : CharacterString + page [0..1] : CharacterString	

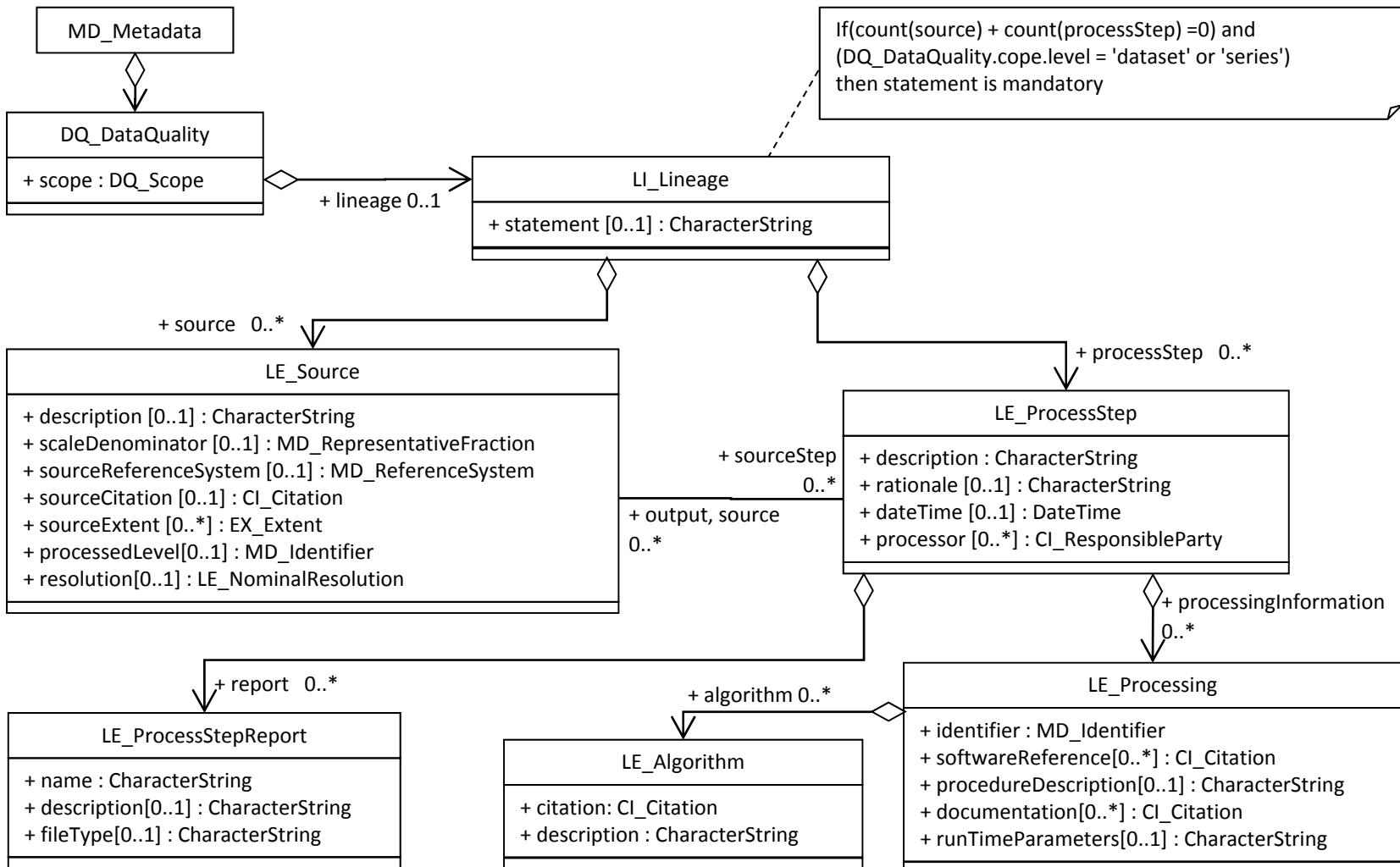
<<DataType>> CI_ResponsibleParty	
+ individualName [0..1] : CharacterString + organisationName [0..1] : CharacterString + positionName [0..1] : CharacterString + role : CI_RoleCode	

<<DataType>> CI_Contact	
+ hoursOfService [0..1] : CharacterString + contactInstructions [0..1] : CharacterString + onlineResource [0..1] : CI_OnlineResource	

<attribute type="string" name="title"  
value="Aerosol Optical Thickness (100 KM)"/>

<attribute type="string" name="institution"  
value="DOC/NOAA/NESDIS/OSDPD >Office of Satellite Data  
Processing and Distribution, NESDIS, NOAA, U.S. Department  
of Commerce"/>

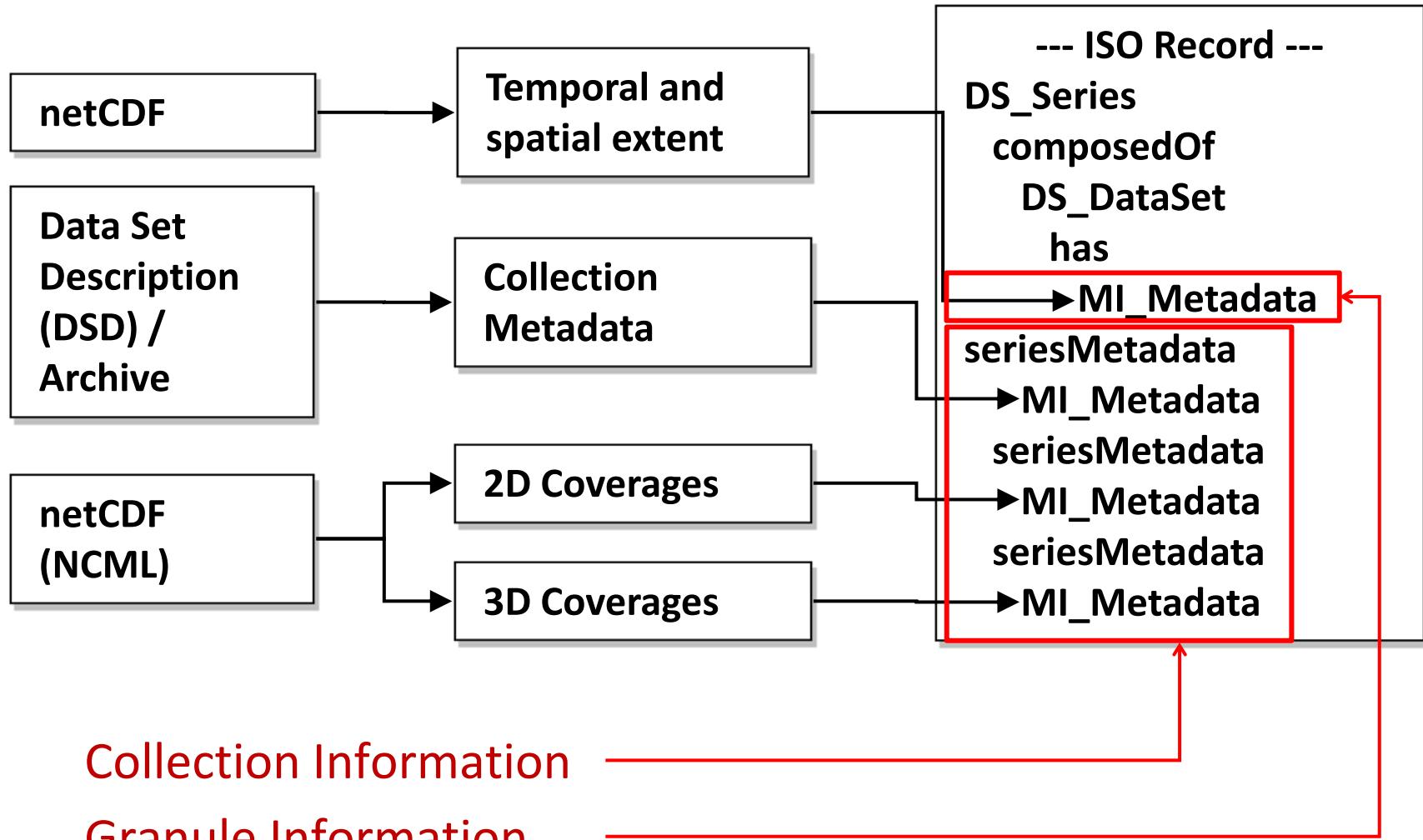
## CI\_CitationInformation



<attribute type="string" name="history" value=" Process Step: Orbital processing: Input level 1 data, calibration, cloud screening, sst and optical thicknesses computations. Gridded products of aerosol observations are produced weekly from the afternoon satellite data."/>

## DQ\_Lineage (19115-2)

# Combining Collection and Granule Information



# Conclusion

Most metadata content is independent of the standards used to represent it because it is designed to answer common questions about scientific data.

We can learn quite a bit by understanding how to represent the same answers in several ways.

Questions or suggestions: [ted.habermann@noaa.gov](mailto:ted.habermann@noaa.gov)

