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Enclosed please find change pages for the subject document. Please replace the pages as follows:

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420-TP-016-003

# Backus-Naur Format (BNF) Representation of the B.0 Earth Science Data Model for the ECS Project

Technical Paper

January 1999

**Technical paper - Not intended for formal review  
or Government approval.**

Prepared Under Contract NAS5-60000

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# Abstract

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This technical paper describes the convention and the Backus-Naur Format (BNF) representation of the Release B.0 Implementation Earth Science Data Model that was first published in May 1997 (Reference 420-TP-016-001, 420-TP-015-002, 420-TP-015-001).

This technical paper supersedes the B.0 BNF representation (420-TP-016-002), published in December 1997.

**Keywords:** Attribute, BNF, Class, Data, Database, Design, Dictionary, Metadata, Model, Specifications

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# 1. Introduction

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## 1.1 Introduction

This paper presents four views of the ECS B.0 Earth Science Data Model (420-TP-016-001) through Addendum 3 (12/98) using Backus-Naur Format. This technical paper supersedes the B.0 BNF (420-TP-016-002) published in December 1997. The purpose of these views is to depict the optionality of the various classes and attributes in the data model from the viewpoint of the data and metadata providers. Three of these views are based on the science product categories defined by the Data Model Working Group (DMWG) meeting in the summer of 1995. This is done in recognition of the fact that to demand a full set of attributes for all data collections in ECS is unnecessary and possibly very costly for migrated data sets. The fourth, minimal view is added to represent the metadata requirements for non-science or system collections. This view is the “lowest common denominator” of metadata required by the system to insert a granule and is the only level enforced by the system. The minimal view also represents the minimum metadata attributes that are mandatory. Equally to make all or most attributes optional would allow the possibility of having valuable data sets not fully described and therefore inadequately documented and serviced. The categories of data products in relation to the amount of level of metadata support required are defined as follows:

**Minimal** level of metadata is the minimum number of attributes needed by the system to insert a granule. This level is required for non-science or system collections, which will not be distributed as products. This level of service is enforced by SDSRV (Metadata Database Schema).

**Limited** level of metadata includes those **Minimal** attributes required by the system and additionally those **Limited** attributes needed to identify the science content of the collection to the Global Change Master Directory (GCMD). Data providers may provide metadata above and beyond this level as desired. Compliance with this level is not enforced and is the responsibility of the metadata provider.

**Intermediate** level of metadata is required for products generated outside of EOSDIS but used within EOSDIS (ancillary, level 0, campaign, LandSat 7, TRMM). It could also be applied to V0 data sets migrated to ECS (especially those reformatted to HDF-EOS) as well as special products. Compliance with this level is not enforced and is the responsibility of the metadata provider.

**Full** level of metadata is required for products generated within EOSDIS. Compliance with this level is not enforced and is the responsibility of the metadata provider. The more comprehensive the metadata supplied, the more comprehensive the services supported. The major service is the sophistication of the search and the amount of supporting metadata, which can be retrieved.

## 1.2 Organization

This paper is organized in accordance with ESDIS standard format. A description of the document content follows:

- Section 2 contains the B.0 Earth Science object model, class descriptions, and attribute specifications.

Questions regarding technical information contained within this Paper should be addressed to the following ECS contacts:

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## 2. Interpretation of Information

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### 2.1 Introduction

The notation used in the body of this paper is Backus Naur Form (BNF). The production rules are described in Section 2.2

### 2.2 BNF Production Rules

A production rule specifies the relationship between a compound element, and data elements and other (lower-level) compound elements. Each production rule has a left side (identifier) and a right side (expression) connected by the symbol "=", meaning that the term on the left side is replaced by or produces the term on the right side. Terms on the right side are either other compound elements or individual data elements. By making substitutions using matching terms in the production rules, one can explain higher-level concepts using data elements. The symbols used in the production rules have the following meaning:

| <u>Symbol</u> | <u>Meaning</u>   |
|---------------|--|
| =             | Is replaced by, produces, consists of  |
| +             | and  |
| [   ]         | exclusive OR , select exactly one term from the list of enclosed terms . Terms are separated by " ".                 |
| m{ }n         | iteration - the term(s) enclosed is(are) repeated from "m" to "n" times. If m = 0 then the entire group is optional. |
| ()            | Optional - the attribute(s) enclosed is (are) optional   |

Examples:

|         |  |
|---------|--|
| a=b+c   | "a consists of b and c"                                |
| a=[b c] | "a consists of one of b or c"                          |
| a=4{b}6 | "a consists of four to six occurrences of b"           |
| a=b+(c) | "a consists of b and optionally c"                     |
| a=0{b}1 | " a consists of zero or one occurrence of b"           |
| a=1{b}n | " a consists of at least one or more occurrences of b" |

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## 3. Metadata Specification

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The following defines the production rules for the population of the ECS collection and granule metadata for minimal (system), limited, intermediate and full metadata content.

### 3.1 Metadata Requirement for Minimal Collections and Granules

The intent is to provide minimum metadata for non-science collections. These attributes are the minimal amount needed to insert a granule into the ECS. Attribute groups with a minimal value of zero (e.g. 0{b}n) are optional and may be supplied at the data providers discretion.

**Table 1. Minimum Metadata**

| <b>ECS Minimal Collection =</b>  | <b>ECS MinimalGranule =</b>          |
|----------------------------------|--------------------------------------|
| 1{CollectionDescriptionClass}1 + | 1{CollectionDescriptionClass}1 +     |
| 1{ECSCollection}1 +              | 0{ECSDataGranule}1 +                 |
| 0{SingleTypeCollection}1 +       | 0{[RangeDateTime SingleDateTime]}1 + |
| 0{CollectionAssociation}n +      | 0{SpatialDomainContainer}1 +         |
| 0{AdditionalAttributes}n +       | 0{OrbitCalculatedSpatialDomain}n +   |
| 0{ ECSDiscipline} n+             | 0{MeasuredParameter}n +              |
| 0{ECSTopic}n+                    | 0{ProcessingQA}n +                   |
| 0{ECSTerm}n+                     | 0{StorageMediumClass}n +             |
| 0{ECSVariable}n+                 | 0{SensorCharacteristic}n +           |
| 0{ECSParameter}n+                | 0{Platform}n +                       |
| 0{ProcessingLevel} 1+            | 0{AnalysisSource}n +                 |
| 0{Review} n +                    | 0{Campaign}n +                       |
| 0{SpatialKeywordClass}n +        | 0{AdditionalAttributes}n +           |
| 0{TemporalKeywordClass}n +       | 0{InputGranule}n +                   |
| 0{Locality}n +                   | 0{AncillaryInputGranule}n +          |
| 0{Platform}n +                   | 0{OrbitParametersGranule}n +         |
| 0{AnalysisSource}n +             | 0{Browse}n+                          |
| 0{Campaign}n +                   | 0{QAGranule}n +                      |
| 0{Contact}n +                    | 0{UserCommentDocument}n +            |
| 0{Spatial}1 +                    | 0{ProductionHistory}1                |
| 0{Temporal}1+                    |                                      |
| 0{CSDTDescription}1 +            |                                      |
| 0{StorageMediumClass}n +         |                                      |
| 0{AlgorithmPackage}1 +           |                                      |
| 0{UserCommentDocument}1 +        |                                      |
| 0{ValidationDocument}1 +         |                                      |
| 0{QualityTextComment}1 +         |                                      |
| 0{ProcessingLevel}1 +            |                                      |
| 0{Document}n                     |                                      |

### 3.2 Metadata Requirement for Limited Science Collections and Granules

The intent is to provide minimum metadata for science related collections.

**Table 2. Limited Metadata**

| <b>ECS Limited Science Collection =</b> | <b>ECS Limited Science Data Granule =</b> |
|---|---|
| 1{CollectionDescriptionClass}1 +        | 1{CollectionDescriptionClass}1 +          |
| 1{ECSCollection}1 +                     | 0{ECSDataGranule}1 +                      |
| 0{SingleTypeCollection}1 +              | 0{[RangeDateTime SingleDateTime]}1 +      |
| 0{CollectionAssociation}n +             | 0{SpatialDomainContainer}1 +              |
| 0{AdditionalAttributes}n +              | 0{OrbitCalculatedSpatialDomain}n+         |
| 1{ ECSDiscipline} n+                    | 0{MeasuredParameter}n+                    |
| 1{ECSTopic}n+                           | 0{ProcessingQA}n+                         |
| 1{ECSTerm}n+                            | 0{StorageMediumClass}n +                  |
| 0{ECSVariable}n+                        | 0{SensorCharacteristic}n +                |
| 0{ECSParameter}n+                       | 0{Platform}n +                            |
| 0{ProcessingLevel}1 +                   | 0{AnalysisSource}n +                      |
|   | 0{Campaign}n +                            |
| 0{Review}n +                            | 0{AdditionalAttributes}n +                |
| 0{SpatialKeywordClass}n +               | 0{InputGranule}n +                        |
| 0{TemporalKeywordClass}n +              | 0{AncillaryInputGranule}n +               |
| 0{Locality}n +                          | 0{OrbitParametersGranule}n +              |
| 0{Platform}n +                          | 0{Browse}n+                               |
| 0{AnalysisSource}n +                    | 0{QAGranule}n +                           |
| 0{Campaign}n +                          | 0{UserCommentDocument}n                   |
| 1{Contact}n +                           | 0{ProductionHistory}1                     |
| 0{Spatial}1 +                           |   |
| 0{Temporal}1+                           |   |
| 0{CSDTDescription}1 +                   |   |
| 0{StorageMediumClass}n +                |   |
| 0{AlgorithmPackage}1 +                  |   |
| 0{UserCommentDocument}1 +               |   |
| 0{ValidationDocument}1 +                |   |
| 0{QualityTextComment}1 +                |   |
| 0{Document}n                            |   |

### 3.3 Metadata Requirement for Intermediate Science Collections and Granules

**Table 3. Intermediate Metadata**

| ECS Intermediate Science Collection = | ECS Intermediate Science Data Granule = |
|---------------------------------------|---|
| 1{CollectionDescriptionClass}1 +      | 1{CollectionDescriptionClass}1 +        |
| 1{ECSCollection}1 +                   | 1{ECSDataGranule}1 +                    |
| 1{SingleTypeCollection}1 +            | 0{[RangeDateTime SingleDateTime]}1 +    |
| 0{CollectionAssociation}n +           | 0{SpatialDomainContainer}1 +            |
| 0{AdditionalAttributes}n +            |   |
| 1{ECSDiscipline}n+                    | 0{OrbitCalculatedSpatialDomain}n +      |
| 1{ECSTopic}n+                         | 0{MeasuredParameter}n +                 |
| 1{ECSTerm}n+                          | 0{ProcessingQA}n +                      |
| 1{ECSVariable}n+                      | 0{StorageMediumClass}n +                |
| 0{ECSParameter}n+                     | 0{SensorCharacteristic}n +              |
| 0{ProcessingLevel}1 +                 | 0{Platform}n +                          |
| 0{Review}n +                          | 0{AnalysisSource}n +                    |
| 0{SpatialKeywordClass}n +             | 0{Campaign}n +                          |
| 0{TemporalKeywordClass}n +            | 0{AdditionalAttributes}n +              |
| 0{Locality}n +                        | 0{InputGranule}n +                      |
| 0{Platform}n +                        | 0{AncillaryInputGranule}n +             |
| 0{AnalysisSource}n +                  | 0{OrbitParametersGranule}n +            |
| 0{Campaign}n +                        | 0{Browse}n+                             |
| 1{Contact}n +                         | 0{QAGranule}n +                         |
| 1{Spatial}1                           | 0{UserCommentDocument}n                 |
| 1{Temporal}1+                         | 0{ProductionHistory}1                   |
| 0{CSDTDescription}1 +                 |   |
| 0{StorageMediumClass}n +              |   |
| 0{AlgorithmPackage}1 +                |   |
| 0{UserCommentDocument}1 +             |   |
| 0{ValidationDocument}1 +              |   |
| 0{QualityTextComment}1 +              |   |
| 1{Document}n                          |   |



### 3.4 Metadata Requirement for Full Science Collections and Granules

**Table 4. Full Metadata**

| ECS Full Science Collection =    | ECS Full Science Data Granule =      |
|----------------------------------|--------------------------------------|
| 1{CollectionDescriptionClass}1 + | 1{CollectionDescriptionClass}1 +     |
| 1{ECSCollection}1 +              | 1{ECSDataGranule}1 +                 |
| 1{SingleTypeCollection}1 +       | 0{[RangeDateTime SingleDateTime]}1 + |
| 0{CollectionAssociation}n +      | 0{SpatialDomainContainer}1 +         |
| 0{AdditionalAttributes}n +       | 0{OrbitCalculatedSpatialDomain}n +   |
| 1{ECSDiscipline}n+               | 0{MeasuredParameter}n +              |
| 1{ECSTopic}n+                    | 0{ProcessingQA}n +                   |
| 1{ECSTerm}n+                     | 0{StorageMediumClass}n +             |
| 1{ECSVariable}n+                 | 0{SensorCharacteristic}n +           |
| 0{ECSParameter}n+                | 0{Platform}n +                       |
| 1{ProcessingLevel}1 +            | 0{AnalysisSource}n +                 |
| 0{Review}n +                     | 0{Campaign}n +                       |
| 0{SpatialKeywordClass}n +        | 0{AdditionalAttributes}n +           |
| 0{TemporalKeywordClass}n +       | 0{InputGranule}n +                   |
| 0{Locality}n +                   | 0{AncillaryInputGranule}n +          |
| 0{Platform}n +                   | 0{OrbitParametersGranule}n +         |
| 0{AnalysisSource}n +             | 0{Browse} n+                         |
| 0{Campaign}n +                   | 0{QAGranule}n +                      |
| 1{Contact}n +                    | 0{UserCommentDocument}n +            |
| 1{Spatial}1                      | 1{ProductionHistory}1                |
| 1{Temporal}1+                    |                                      |
| 0{CSDTDescription}1 +            |                                      |
| 0{StorageMediumClass}n +         |                                      |
| 1{AlgorithmPackage}1 +           |                                      |
| 0{UserCommentDocument}1 +        |                                      |
| 0{ValidationDocument}1 +         |                                      |
| 0{QualityTextComment}1 +         |                                      |
| 1{Document}n                     |                                      |

## 3.5 Compound Definitions

**Table 5. Compound Definitions**

| <u>Collection Level Compound Definitions</u>  | <u>Granule Level Compound Definitions</u>  |
|---|--|
| <b>CollectionDescriptionClass =</b><br>ShortName +<br>LongName +<br>CollectionDescription +<br>VersionID  | <b>CollectionDescriptionClass =</b><br>ShortName +<br>VersionID  |
| <b>ECSCollection =</b><br>ArchiveCenter +<br>(ProcessingCenter) +<br>RevisionDate +<br>(SuggestedUsage) +<br>VersionDescription   | <b>ECSDataGranule =</b><br>SizeMBECSDataGranule +<br>(ReprocessingActual) +<br>(ReprocessingPlanned) +<br>(DayNightFlag) +<br>GranulePointer +<br>(LocalGranuleID) +<br>(LocalVersionID) +<br>ProductionDateTime +<br>(PGEVersion) |
| <b>SingleTypeCollection =</b><br>(AccessConstraints) +<br>(CitationforExternalPublication) +<br>CollectionState +<br>MaintenanceandUpdateFrequency  | <b>RangeDateTime =</b><br>RangeBeginningDate +<br>RangeBeginningTime +<br>RangeEndingDate +<br>RangeEndingTime   |
| <b>CollectionAssociation =</b><br>CollectionType +<br>CollectionUse +<br>VersionID +<br>Shortname   | <b>SingleDateTime =</b><br>CalendarDate +<br>Timeofday   |
| <b>AdditionalAttributes =</b><br>AdditionalAttributeDatatype +<br>AdditionalAttributeDescription +<br>AdditionalAttributeName +<br>0{PhysicalParameterDetails}1 +<br>0{InformationContent}1 | <b>SpatialDomainContainer =</b><br>0{GranuleLocality}n+<br>1{HorizontalSpatialDomainContainer}1 +<br>0{VerticalSpatialDomain}n   |

**Table 5. Compound Definitions (cont.)**

| <u>Collection Level Compound Definitions</u>   | <u>Granule Level Compound Definitions</u>  |
|--|--|
| <p><b>PhysicalParameterDetails =</b><br/>           (ParameterMeasurementResolution) +<br/>           (ParameterRangeBegin) +<br/>           (ParameterRangeEnd) +<br/>           (ParameterUnitsOfMeasurement) +<br/>           (ParameterValueAccuracy) +<br/>           (ParameterValueAccuracyExplanation)</p> | <p><b>HorizontalSpatialDomainContainer =</b><br/>           0{ZoneIdentifierClass}1 +<br/>           [Point  <br/>           Circle <br/>           BoundingBox  <br/>           GPolygon]</p> |
| <p><b>InformationContent =</b><br/>           ParameterValue</p>   | <p><b>GranuleLocality =</b><br/>           LocalityValue</p>   |
| <p><b>ECSDiscipline =</b><br/>           ECSDisciplineKeyword</p>  |  |
| <p><b>ECSTopic=</b><br/>           ECSTopicKeyword</p>   | <p><b>ZoneIdentifierClass =</b><br/>           ZoneIdentifier</p>  |
| <p><b>ECSTerm=</b><br/>           ECSTopicKeyword</p>  | <p><b>GPolygon =</b><br/>           1{GPolygonContainer}n</p>  |
| <p><b>ECSVariable =</b><br/>           ECSVariableKeyword</p>  | <p><b>GPolygonContainer =</b><br/>           GRing +<br/>           3{GRingPoint}n</p>   |
| <p><b>ECSParameter =</b><br/>           ECSParameterKeyword</p>  | <p><b>GRing=</b><br/>           ExclusionGRingFlag</p>   |
| <p><b>ProcessingLevel =</b><br/>           ProcessingLevelDescription +<br/>           ProcessingLevelID</p>   | <p><b>GRingPoint =</b><br/>           GRingPointLatitude +<br/>           GRingPointLongitude +<br/>           GRingPointSequenceNo</p>  |
| <p><b>Review =</b><br/>           FutureReviewDate +<br/>           ScienceReviewDate +<br/>           ScienceReviewStatus</p>   | <p><b>BoundingBox =</b><br/>           EastBoundingCoordinate+<br/>           NorthBoundingCoordinate +</p>  |

**Table 5. Compound Definitions (cont.)**

| <u>Collection Level Compound Definitions</u>   | <u>Granule Level Compound Definitions</u>   |
|--|---|
| <p><b>SpatialKeywordClass =</b><br/>SpatialKeyword</p>   | <p>SouthBoundingCoordinate +<br/>WestBoundingCoordinate</p>   |
| <p><b>TemporalKeywordClass =</b><br/>TemporalKeyword</p>   | <p><b>Point =</b><br/>PointLatitude +<br/>PointLongitude</p>  |
| <p><b>Locality =</b><br/>LocalityType +<br/>(LocalityDescription)</p>  | <p><b>Circle =</b><br/>CenterLatitude +<br/>CenterLongitude +<br/>RadiusUnits +<br/>RadiusValue</p>   |
| <p><b>Platform =</b><br/>PlatformShortName +<br/>PlatformType +<br/><br/>PlatformLongName +<br/>0{PlatformCharacteristic}n +<br/>0{Instrument}n</p>  | <p><b>VerticalSpatialDomain =</b><br/>VerticalSpatialDomainType +<br/>VerticalSpatialDomainValue</p>  |
| <p><b>PlatformCharacteristic =</b><br/>PlatformCharacteristicName +<br/>(PlatformCharacteristicUnit) +<br/>PlatformCharacteristicDataType +<br/>PlatformCharacteristicDescription +<br/>1{PlatformCharacteristicValueClass}1</p> | <p><b>OrbitCalculatedSpatialDomain =</b><br/>EquatorCrossingDate +<br/>EquatorCrossingLongitude +<br/>EquatorCrossingTime +<br/>(OrbitalModelName) +<br/>[OrbitNumber   +<br/>[StartOrbitNumber +<br/>StopOrbitNumber]]</p> |
| <p><b>PlatformCharacteristicValueClass =</b><br/>PlatformCharacteristicValue</p>   | <p><b>MeasuredParameter =</b><br/>ParameterName +<br/>1{QAFlags}1 +<br/>0{QAStats}1</p>   |
| <p><b>Instrument =</b><br/>InstrumentShortName +<br/>(InstrumentLongName) +<br/>(NumberOfSensors) +<br/>(InstrumentTechnique) +<br/>0{OperationModeClass}n +<br/>0{InstrumentCharacteristic}n +<br/>0{Sensor}n</p>               |   |

**Table 5. Compound Definitions (cont.)**

| <u>Collection Level Compound Definitions</u>   | <u>Granule Level Compound Definitions</u>  |
|--|--|
| <p><b>OperationModeClass =</b><br/>OperationMode</p> <p><b>InstrumentCharacteristic =</b><br/>(InstrumentCharacteristicUnit) +<br/>InstrumentCharacteristicDataType +<br/>InstrumentCharacteristicDescription +<br/>InstrumentCharacteristicName +<br/><u>1{InstrumentCharacteristicValueClass} n</u><br/>InstrumentCharacteristicDescription +<br/>InstrumentCharacteristicName</p> | <p><b>QAFlags =</b><br/>AutomaticQualityFlag +<br/>AutomaticQualityFlagExplanation +<br/>(OperationalQualityFlag) +<br/>(OperationalQualityFlagExplanation) +<br/>(ScienceQualityFlag) +<br/>(ScienceQualityFlagExplanation)</p> |
| <p><b>InstrumentCharacteristicValueClass =</b><br/>InstrumentCharacteristicValue</p>   | <p><b>QAStats =</b><br/>(QAPercentInterpolatedDate) +<br/>QAPercentMissingData +<br/>(QAPercentOutOfBoundsData) +<br/>(QAPercentCloudCover)</p>  |
| <p><b>Sensor =</b><br/>SensorShortName +<br/>(SensorLongName) +<br/>(SensorTechnique) +<br/>0{SensorCharacteristic}n</p>   | <p><b>ProcessingQA =</b><br/>ProcessingQADescription +<br/>ProcessingQAAttribute</p>   |
| <p><b>SensorCharacteristic =</b><br/>(SensorCharacteristicUnit) +<br/>SensorCharacteristicDataType +<br/>SensorCharacteristicDescription +<br/>SensorCharacteristicName +<br/>SensorCharacteristicValueClass</p>   | <p><b>StorageMediumClass =</b><br/>StorageMedium</p> <p><b>SensorCharacteristic =</b><br/>SensorCharacteristicName +<br/>{SensorCharacteristicValue}</p>   |

**Table 5. Compound Definitions (cont.)**

| <u>Collection Level Compound Definitions</u>  | <u>Granule Level Compound Definitions</u>   |
|---|---|
| <p><b>SensorCharacteristicValueClass =</b><br/>SensorCharacteristicValue</p>  | <p><b>Platform =</b><br/>PlatformShortName +<br/>(Instrument) 1 +<br/>0{Sensor} n</p>         |
| <p><b>AnalysisSource=</b><br/>AnalysisType +<br/>(AnalysisLongName) +<br/>AnalysisShortName +<br/>(AnalysisTechnique)</p>   | <p><b>Instrument =</b><br/>InstrumentShortName +<br/>0{OperationModeClass} 1</p>              |
| <p><b>Campaign =</b><br/>CampaignShortName +<br/>(CampaignLongName) +<br/>(CampaignStartDate) +<br/>(CampaignEndDate)</p>   | <p><b>OperationModeClass=</b><br/>OperationMode</p>   |
| <p><b>Contact =</b><br/>Role +<br/>(HoursofService) +<br/>(ContactInstructions) +<br/>[ContactPerson   +<br/>ContactOrganization] +<br/>0{Email} 1+<br/>0{Telephone} n+<br/>0{ContactAddress} n</p> | <p><b>Sensor =</b><br/>SensorShortName</p>  |
| <p><b>ContactPerson =</b><br/>ContactFirstName +<br/>(ContactMiddleName) +<br/>ContactLastName +<br/>(ContactJobPosition)</p>   | <p><b>AnalysisSource =</b><br/>AnalysisShortName</p>  |
|   | <p><b>Campaign=</b><br/>CampaignShortName</p>   |
|   | <p><b>AdditionalAttributes =</b><br/>AdditionalAttributeName +<br/>1{InformationContent}1</p> |
|   | <p><b>InformationContent =</b><br/>ParameterValue</p>   |
|   | <p><b>InputGranule =</b><br/>InputPointer</p>   |

**Table 5. Compound Definitions (cont.)**

| <u>Collection Level Compound Definitions</u>  | <u>Granule Level Compound Definitions</u>  |
|---|--|
| <p><b>ContactOrganization =</b><br/>ContactOrganizationName</p>   | <p><b>AncillaryInputGranule =</b><br/>AncillaryInputType +<br/>AncillaryInputPointer</p> |
| <p><b>Email =</b><br/>ElectronicMailAddress</p>   | <p><b>OrbitParametersGranule =</b><br/>OrbitParametersPointer</p>                        |
| <p><b>ContactAddress =</b><br/>StreetAddress +<br/>City +<br/>StateProvince +<br/>PostalCode +<br/>Country</p>                    | <p><b>Browse =</b><br/>BrowsePointer +<br/>BrowseSize +<br/>BrowseDescription</p>        |
| <p><b>Telephone =</b><br/>(TelephoneNumberType) +<br/>TelephoneNumber</p>   | <p><b>QAGranule =</b><br/>QAGranulePointer</p>   |
| <p><b>Spatial =</b><br/>SpatialCoverageType +<br/>0{CoordinateSystemContainer}1 +<br/>1{SpatialDomainContainer}1</p>              | <p><b>UserCommentDocument =</b><br/>UserCommentDocumentPointer</p>                       |
| <p><b>CoordinateSystemContainer =</b><br/>0{VerticalCoordinateSystemContainer}1 +<br/>0{HorizontalCoordinateSystemContainer}1</p> | <p><b>ProductionHistory =</b><br/>ProductionHistoryPointer</p>                           |
| <p><b>VerticalCoordinateSystemContainer =</b><br/>0{AltitudeSystemDefinition}1 +<br/>0{DepthSystemDefinition}1</p>                |  |

**Table 5. Compound Definitions (cont.)**

**Collection Level Compound Definitions**

**Granule Level Compound Definitions**

**AltitudeSystemDefinition =**

AltitudeDatumName +  
AltitudeDistanceUnits +  
AltitudeEncodingMethod +  
AltitudeResolution

**DepthSystemDefinition =**

DepthDatumName +  
DepthDistanceUnits +  
DepthEncodingMethod +  
DepthResolution

**HorizontalCoordinateSystemContainer =**

0{Geodetic Model}1+  
[PlanarCoordinateSystemContainer |  
GeographicCoordinateSystem |  
LocalCoordinateSystem]

**GeodeticModel =**

DenominatorofFlatteningRatio+  
EllipsoidName +  
(HorizontalDatumName) +  
SemiMajorAxis

**LocalCoordinateSystem =**

LocalCoordinateSystemDescription +  
LocalGeoreferenceInformation

**GeographicCoordinateSystem =**

GeographicCoordinateUnits +  
LatitudeResolution +  
LongitudeResolution

**PlanarCoordinateSystemContainer =**

1{PlanarCoordinateSystem}n



**Table 5. Compound Definitions (cont.)**

**Collection Level Compound Definitions**

**Granule Level Compound Definitions**

**PlanarCoordinateSystem =**

1{PlanarCoordinateInformation}1 +  
[MapProjection |  
LocalPlanarCoordinateSystem |  
GridCoordinateSystem]

**PlanarCoordinateInformation =**

PlanarCoordinateEncodingMethod +  
PlanarDistanceUnits +  
[DistanceandBearingRepresentation |  
CoordinateRepresentation]

**DistanceandBearingRepresentation =**

BearingReferenceMeridian+  
BearingResolution +  
BearingUnits +  
DistanceResolution +  
  
BearingReferenceDirection

**CoordinateRepresentation =**

AbscissaResolution +  
OrdinateResolution

**MapProjection =**

MapProjectionName +  
(MapProjectionPointer)

**LocalPlanarCoordinateSystem =**

LocalPlanarCoordinateSystemDescription +  
LocalPlanarGeoreferenceInformation

**GridCoordinateSystem =**

GridCoordinateSystemName

**SpatialDomainContainer =**

0{VerticalSpatialDomain}n +  
1{HorizontalSpatialDomainContainer}1

**Table 5. Compound Definitions (cont.)**

**Collection Level Compound Definitions**

**Granule Level Compound Definitions**

**VerticalSpatialDomain =**

VerticalSpatialDomainType +  
VerticalSpatialDomainValue

**HorizontalSpatialDomainContainer =**

0{ZoneIdentifierClass}1 +  
[Gpolygon]  
BoundingRectangle |  
Point |  
Circle]

**ZoneIdentifierClass =**

ZoneIdentifier

**Gpolygon =**

1{GpolygonContainer}n +

**GpolygonContainer=**

Gring +  
3{RingPoint}n

**GRing =**

ExclusionGRingFlag +

**GringPoint =**

GringPointLatitude +  
GringPointLongitude +  
GringPointSequenceNo

**BoundingRectangle =**

EastBoundingCoordinate +  
NorthBoundingCoordinate +  
SouthBoundingCoordinate +  
WestBoundingCoordinate

**Point =**

PointLatitude +  
PointLongitude

**Table 5. Compound Definitions (cont.)**

| <u>Collection Level Compound Definitions</u>   | <u>Granule Level Compound Definitions</u> |
|--|---|
| <b>Circle =</b><br>CenterLatitude +<br>CenterLongitude +<br>RadiusUnits +<br>RadiusValue   |   |
| <b>Temporal =</b><br>DateType +<br>TemporalRangeType +<br>TimeType +<br>EndsatPresentFlag +<br>Precisionof Seconds +<br>0{RegularPeriodic}n +<br>0{MultipleDateTimePeriod}n +<br>1 {[SingleDateTime  <br>RangeDateTime]} 1 |   |
| <b>RegularPeriodic =</b><br>Period1stDate +<br>Period1stTime +<br>PeriodCycleDurationUnit +<br>PeriodCycleDurationValue +<br>PeriodDurationUnit +<br>PeriodDurationValue +<br>PeriodName                                   |   |
| <b>MultipleDateTimePeriod =</b><br>MultipleDateName<br>2{SingleDateTimes}n   |   |
| <b><u>SingleDateTimes=</u></b><br><u>_CalendarDate +</u><br><u>_TimeofDay</u>  |   |

**Table 5. Compound Definitions (cont.)**

**Collection Level Compound Definitions**

**Granule Level Compound Definitions**

**RangeDateTime =**

RangeBeginningDate +  
RangeBeginningTime +  
RangeEndingDate +  
RangeEndingTime

**CSDTDescription =**

PrimaryCSDT +  
(CSDTComments) +  
Implementation +  
(IndirectReference)

**StorageMediumClass =**

StorageMedium

**AlgorithmPackage =**

PGEVersion +  
AlgorithmPackageVersion +  
SWVersion +  
AlgorithmPackageAcceptanceDate +  
AlgorithmPackageMaturityCode +  
AlgorithmPackageName +  
DeliveryPurpose +  
PGENAME +  
PGEIdentifier +  
PGEFunction +  
PGEDateLastModified +  
SWDateLastModified +  
0{SSAPComponent}n

**SSAPComponent =**

ComponentType +  
ComponentName +  
SSAPAlgorithmPackageName +  
SSAPInsertDate +  
0{SSAPComponentAPVersion}n

**SSAPComponentAPVersion =**

SSAPAlgPackageVersion

**Table 5. Compound Definitions (cont.)**

| <u>Collection Level Compound Definitions</u>   | <u>Granule Level Compound Definitions</u> |
|--|---|
| <b>UserCommentDocument =</b><br>UserCommentDocumentPointer   |   |
| <b>ValidationDocument =</b><br>ValidationDocumentPointer   |   |
| <b>QualityTextDocument =</b><br>QualityTextComment +<br>QualityTextDocumentPointer +<br>QualityTextCommentPointer  |   |
| <b>Document =</b><br>DocumentVersion +<br>DocumentUpdated +<br>Title +<br>DocumentCreated +<br>0{Author}n +<br>0{ProcessingReport}1 +<br>0{ReferencePaper}1 +<br>1{Guide}1 +<br>0{ProductionPlan}1 +<br>0{AlgorithmDescription}1   |   |
| <b>Author =</b><br>AuthorName+<br>AuthorAffiliation  |   |
| <b>Guide =</b><br>GuideName +<br>DataCenter +<br>0{AnalysisSourceGuide}1 +<br>0{CampaignGuide}1 +<br>0{PlatformGuide}1 +<br>0{RegionalAreaDefinitionGuide}1 +<br>0{InstrumentGuide}1 +<br>0{SensorGuide}1 +<br>0{ArchiveCenterGuide}1 +<br>0{ProcessingCenterGuide}1 +<br>0{ECSCollectionGuide}1 |   |

**Table 5. Compound Definitions (cont.)**

| <u>Collection Level Compound Definitions</u>  | <u>Granule Level Compound Definitions</u> |
|---|---|
| <b>AnalysisSourceGuide =</b><br>AnalysisSourceGuidePointer  |   |
| <b>CampaignGuide =</b><br>CampaignGuidePointer  |   |
| <b>PlatformGuide =</b><br>PlatformGuidePointer  |   |
| <b>RegionalAreaDefinitionGuide =</b><br>RegionalAreaDefinitionGuidePointer +<br>GeographicalRegionName  |   |
| <b>InstrumentGuide =</b><br>InstrumentGuidePointer  |   |
| <b>SensorGuide =</b><br>SensorGuidePointer  |   |
| <b>ArchiveCenterGuide =</b><br>ArchiveCenterGuidePointer  |   |
| <b>ProcessingCenterGuide =</b><br>ProcessingCenterGuidePointer  |   |
| <b>ECSCollectionGuide =</b><br>ECSCollectionGuidePointer  |   |
| <b>ProcessingReport =</b><br>ProcessingReportType +<br>ProcessingReportPeriod +<br>[ProcessingResourceUsageReport  <br>ProcessingErrorReport  <br>ProcessingStatusReport] |   |
| <b>ProcessingResourceUsageReport =</b><br>ProcessingResourceUsageReportPointer  |   |
| <b>ProcessingErrorReport =</b><br>ProcessingErrorReportPointer  |   |

**Table 5. Compound Definitions (cont.)**

**Collection Level Compound Definitions**

**Granule Level Compound Definitions**

**ProcessingStatusReport =**

ProcessingStatusReportPointer

**ReferencePaper =**

ReferencePaperType +  
AbstractPointer +  
AccessInstructions +  
DateofReferencePaperPublication +  
ReferencePaperReference +  
[StandAloneDocument]  
JournalArticle]

**StandAloneDocument =**

StandAloneDocumentPointer

**JournalArticle =**

JournalArticlePointer +  
JournalArticleName

**ProductionPlan =**

ProductionPlanPointer +  
ProductionPlanStartDate +  
DAACName  
PlannedDataSets +  
ProductionPlanDescription +  
ProductionPlanEndDate +  
ProductionPlanForecast

**AlgorithmDescription =**

DescriptionType

**DetailedDesign**

DetailedDesignPointer

**SWDevelopmentStandard**

SWDevelopmentStandardPointer

**TestPlan**

TestPlanPointer

**Table 5. Compound Definitions (cont.)**

| <b><u>Collection Level Compound Definitions</u></b>                  | <b><u>Granule Level Compound Definitions</u></b> |
|--|--|
| <b>ProcessingFileDescription</b><br>ProcessingFileDescriptionPointer |  |
| <b>OperationsManual</b><br>OperationsManualPointer                   |  |
| <b>ProgrammersGuide</b><br>ProgrammersGuidePointer                   |  |
| <b>SystemDescription</b><br>SystemDescriptionPointer                 |  |
| <b>ATBD</b><br>ATBDPointer   |  |
| <b>PerformanceTestResults</b><br>PerformanceTestResultsPointer       |  |

This concludes the BNF document.



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