A Space and Solar Physics Data Model

from the SPASE Consortium

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1. Executive Summary

Research in Heliophysics requires information from multiple sources which includes data from and about spacecrafts, groundbased observatories, models, simulations and more. The results from research are also invaluable in building up a body of knowledge and need to be available. All the different sources and types of information are considered a "Resource". The Resources exist, are shared, exchanged and used in a framework called the "data environment". The SPASE (Space Physics Archive Search and Extract) group has defined a Data Model which is a set of terms and values along with the relationships between them that allow describing all the resources in a heliophysics data environment. It is the result of many years of effort by an international collaboration of heliophysicists and information scientists to unify and improve on existing Space and Solar Physics data models. The intent of this Data Model is to provide the means to describe resources, most importantly scientifically useful data products, in a uniform way so they may be easily registered, found, accessed, and used.

The Data Model provides enough detail to allow a scientist to understand the content of Data Products (e.g., a set of files for 3 second resolution Geotail magnetic field data for1992 to 2005), together with essential retrieval and contact information. It also allows for the incremental annotation of resources with expert assessments and the free association of resources to create bundles or networks of resources. Resource descriptions can be stored with the data or at remote locations. Sites can harvest the resource descriptions to enable services like a search engine or portal (Virtual Observatory). A typical use would be to have a collection of descriptions stored in one or more related internet-based registries of products; that can be queried with specifically designed search engines and ultimately link users to the data they need. The Data Model also provides constructs for describing components of such a data delivery system. This includes repositories, registries and services.

This document provides a specification of the SPASE Data Model. Sections 2 and 3 provide an overview of the origins and the concepts of the data model. Section 4 presents the set of elements in a hierarchy that shows the defined relationships among them. This is followed by usage suggestion and pedagogic examples in Section 5 and 6, and by the complete set of definitions of terms and enumerated lists in Section 7.

The SPASE group website is located at http://www.spase-group.org/

A PDF version of this document can be downloaded from the SPASE site.

2. Introduction

The SPASE (Space Physics Archive Search and Extract) Data Model is a set of terms and values along with the relationships between them that allow describing all the resources in a heliophysics data environment. It is the result of many years of effort by an international collaboration (see http://spase-group.org) to unify and improve on existing Space and Solar Physics data models. The intent of this Data Model is to provide the means to describe resources, most importantly scientifically useful data products, in a uniform way so they may be easily registered, found, accessed, and used.

The SPASE data model divides the heliophysics data environment into a limited set of resources types. A key resource type is Numerical Data. This type of resource typically consists of a set of files containing values of one or more physical variables and that differ from each other only by the time span. To full describe a Numerical Data resource requires other types of Resources, namely Observatory, Instrument, Person, and Repository, whose names are self-explanatory, and each of which has its own set of attributes. Often, numerical data are presented in prepared images (gif or jpeg), and such presentations are referred to as Display Data resources. The other data related resource types are Catalog which are lists of events; Annotation which enable expert comments on data products; and Granule which describe individual files within another resource (i.e., Numerical Data, Display Data or Catalog). Other types of resources include Document which can contain narratives or supporting information; Service that provide software to use data resources; Repository for storage locations; and Registry for metadata collections. Resource descriptions and the links in them are intended to make the Resource useful to scientific users.

2.1. History of Development

The data model presented here has grown from the efforts begun in 2002 that became formalized in regular teleconferences of a group of interested data providers, including scientific and technical representatives of some of the largest data holdings in the US, Europe, and Japan. As the effort to provide seamless access to distributed data proceeded, it became clear that the data model efforts were central. The SPASE Data Model was developed with an iterative process where additions were made when unaddressed needs were discovered. The original impetus occurred at an ISTP meeting in 1998 where a resolution was passed calling to make data more accessible. Interoperability test beds were constructed in 2001 and in 2002 a grassroots effort was undertaken to define the needs of community. In March of 2003 a meeting of many of the people in the Contributors list at the beginning of this document was convened to begin the data model construction in earnest. The initial effort involved collecting terms from CDPP, SWRI, NSSDC, ISTP, and other sets to form a starting point. Two years of teleconferences, e-mailed revisions, and occasional face-to-face efforts, along with the application of the terms to specific cases, led to the release of version 1.0 of the data model in November 2005. Following the release of version 1.0 many existing data products were described and lead to further improvements of the data model. Version1.1 was released in August 2006. At this time NASA established the Heliophysics VxOs and after an extended period of use and improvements version 1.2.2 was released in August of 2008. The version of the data model described in this document is an extension of this earlier release.

2.2. Intended Purpose

The design of the SPASE data model is based on a core set of principles related to the intended purpose of descriptive information (metadata), the data environment, and the operational environment. The overall goal of the Data Model is to be able to describe resources using a

taxonomy of terms familiar to the heliophysics domain. This taxonomy should provide sufficient scientific context and data content information for an individual to assess the applicability of the resource (data and metadata) to a research question. A data model is the cornerstone of an information system and one purpose for the SPASE Data Model to enable the creation of "Virtual Observatories" that will link the broad range of heliophysics resources which may be available in a loosely coupled distributed environment. Additional goals of the data model are to:

(1) Provide a way of registering products using a standard set of terms that allow the products to be found with simple searches and described so that users can determine their utility for a specific purpose;

(2) Allow searching for products containing particular physical quantities (e.g., magnetic field; spectral irradiance) that are variously represented in a diverse array of data products; and

(3) Facilitate a means of mapping comparable variables from many products onto a common set of terms so that visualization, analysis, and higher-order query tools and services can be used on all of them without regard to the origin of the data.

The content of a resource description based on the data model should enable services (either at the provider or in a VxO) to discover and access individual resources. The service layer can contain services for a variety of purposes. The basic functionality of the service layer is to provide the links necessary to connect user applications and search- and-retrieval front ends to data repositories. Ultimately, the data environment based on the data model will involve a number of software tools and services linked together as an internet-based environment. The data along with software tools and documentation associated with products will be directly accessible using standard web protocols (http, ftp). This "system" has the potential to provide capabilities that can aid even expert users of a particular dataset (e.g., on-the-fly coordinate transformations, the ability to merge datasets from different instruments, easy reference to related indices or other data), in addition to providing the broad access needed to investigate emerging questions in heliophysics.

2.3. Design Principles

The design of the SPASE data model begins with a few basic principles. These principles are:

1. Data is self-documented. Data resources have internal schema or structures for storing values. The physical structure is determined by the storage format. Each retrievable entity on the format is assigned a key or tag which can be used to retrieve the entity.

The SPASE Data Model does not attempt to describe the physical storage of the parameters, for example, the byte offsets, record format or data encoding in the data resource. Instead, the SPASE Data Model describes the scientific attributes of the parameter and links this to the parameter by a key or tag used by the storage format. Applications can use the SPASE descriptions to locate a parameter and the appropriate format-specific reader to extract parameters.

Not all data in the Heliophysics data environment is stored in self- documented formats. For example, data stored as ASCII tables. The method of assigning a key or tag name for each field in the ASCII table is external to the SPASE data model. This method must be part of an "format" specification which may be as simple as the first row of the table containing the tag

name of the field.

2. Resources are distributed. There are many providers of resources and these providers can be located anywhere in the world.

Each provider operates independently and activities are not necessarily coordinated. The SPASE data model assumes that providers have local autonomy and may operate under local rules or jurisdictions.

3. Online Resources have Universal Resource Locators (URL) If a resource is on-line it can be accessed and retrieved using Universal Resource Locators (URL).

4. The data environment is continuously evolving. New resources are actively generated either as part of an on-going experiment or as a result of analysis and assessment.

These new resources may be directly related to other resources. As new resources are generated or new associations defined the network or collections formed will expand over time.

2.4. Conceptual System Environment

The data model is intended to enable the sharing of knowledge through structured metadata (SPASE Descriptions) which can be exchanged in queries and responses between systems. The operational environment this occurs in is the current Internet where systems and users are loosely coupled and highly distributed. Special services or portals may harvest (collect) the SPASE descriptions from multiple sources to create an enriched capability for the user. For example, a search engine may provide a comprehensive search for a particular scientific discipline. The web site http:// hpde.gsfc.nasa.gov gives a guide to many currently active projects and a great deal of background information. Of particular interest there is the document entitled, "A Framework for Space and Solar Physics Virtual Observatories."

Figure 1 illustrates a conceptual architecture in a distributed environment. In this environment multiple communities have resources to share. The storage location of a resource is called a repository. Some of these repositories (boxes) have local SPASE descriptions which are available through a local registry service (balls). The contents of other repositories are described at external, possibly independent, locations which make the descriptions available through remote registries. Gateways (rings) can harvest and aggregate the resources from multiple registries or perform federated searches which provide a single access point to multiple registries. Applications access the registries to discover resources, determine their location and retrieve them from the repositories.

Community

Community

Community
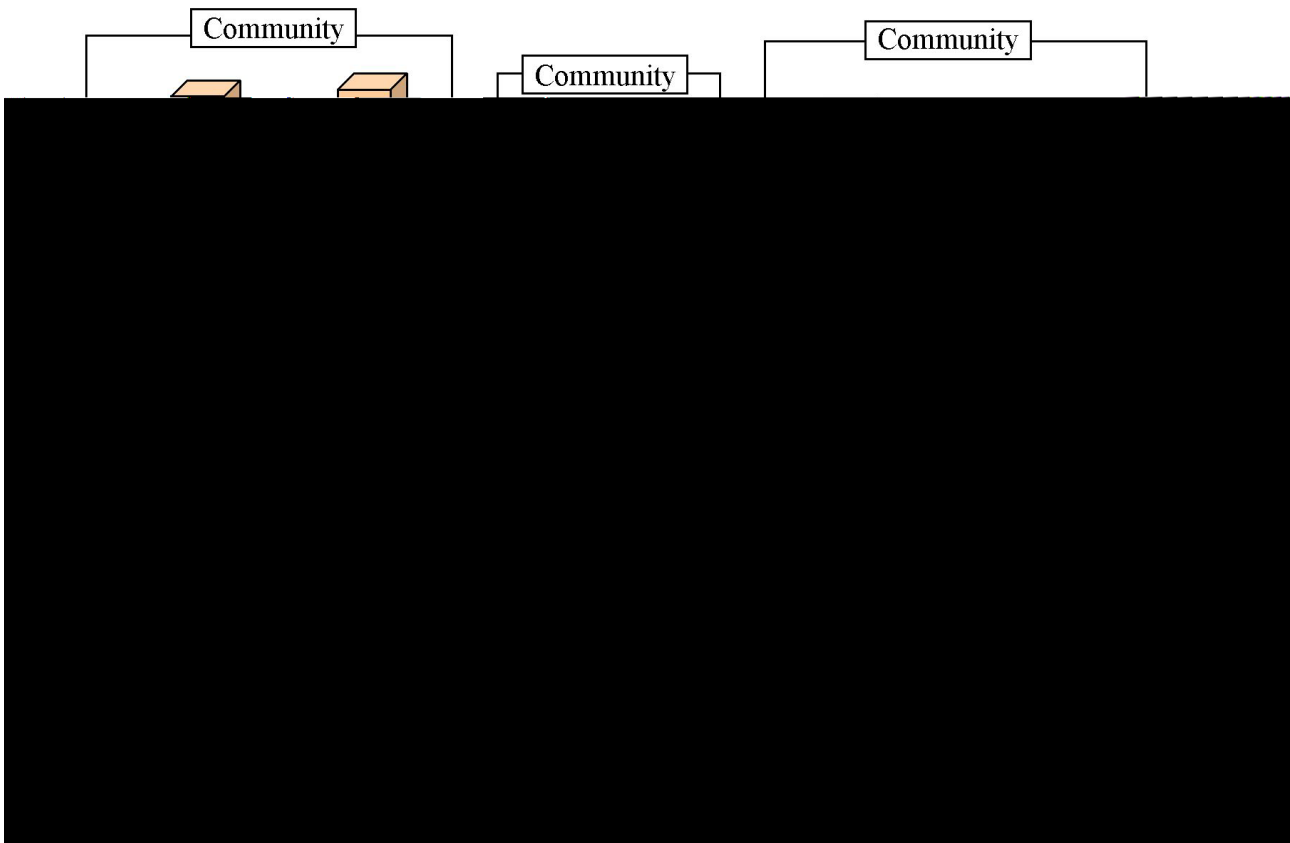
3. Guide to the SPASE Data Model

3.1. Resource Types

The top level entity in the SPASE data model is a Resource. There are 12 different types of resources. Each resource type consists of a set of attributes that characterize the resource. The resource types can be divided into three categories: Data Resources, Origination Resources and Infrastructure Resources.

This section provides an overview of the resource types. Complete details for each resource can be found in Section 4.

3.1.1. Data Resources

Data Resources describe one or more data products. A "data product" is a set of data that is uniformly processed and formatted, from one or more instruments, typically spanning the full duration of the observations of the relevant instrument(s). A data product may consist of a collection of granules of successive time spans, but may be high-level entities such as event catalogs. Data products can be images (Display Data), sample or observation values (Numerical Data), event lists (Catalog). Included in the Data Resource category are the resources used to describe individual files (Granule) which are part of data product sets and assessments of a resource (Annotations). The complete list of Data Resources is:

Numerical Data,
Display Data,
Catalog,
Granule, and
Annotation

3.1.2. Origination Resources

Origination Resources describe the generators or sources of data. Included in a Data Resource description is information about the origination of the data. A Data Resource will refer to one or more Origination Resource. The complete list of Origination Resources is:

Observatory,
Instrument,
Person, and
Document

3.1.3. Infrastructure Resources

Infrastructure Resources describe system components that are part of the exchange and use of data. This includes storage locations for data (Repository), metadata (Registry) and functions (Service). The complete list of Infrastructure Resources is:

Registry,
Repository, and
Service

3.1.4. Ontology

In the SPASE data model there can be associations between pairs of resources. Some associations are specific and are required in order to fully describe a resource. For example, an Instrument resource is always associated with an Observatory resource. The specific associations form an ontology which is illustrated in Figure 2. The SPASE data model also allows associations of resources which are not explicitly defined in the ontology. These associations are described and assigned a relationship type using generic association attributes.

SPASE Ontology
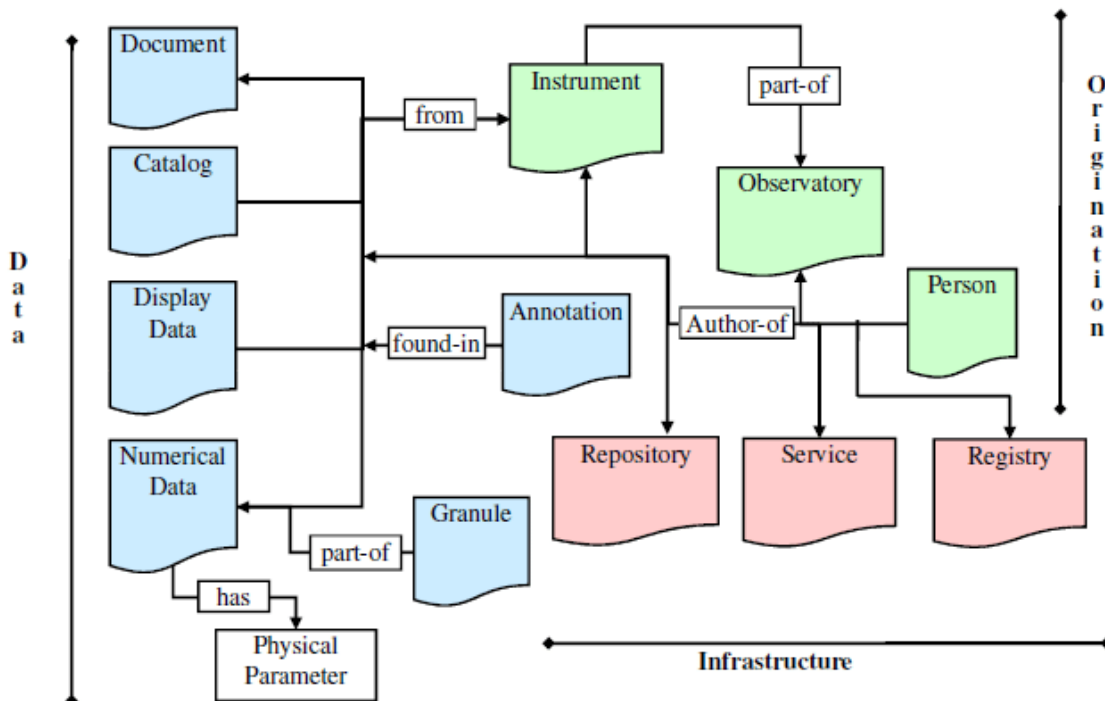
Figure 2: The association map between resources in the SPASE model. Arrows point in the direction of association.

3.2. Resource Identifiers

Every resource has a unique identifier so that it can be tracked and referenced within a system. This identifier is defined by the naming authority for the resource. The entity which acts as the naming authority is determined by the agency or group who provides the resource. Each resource identifier is a URI that has the form

scheme://authority/path

where "scheme" is "spase" for those resources administered through the SPASE framework, "authority" is the unique identifier for the naming authority within the data environment and "path" is the unique local identifier of the resource within the context of the "authority". The resource ID must be unique within the data environment.

To illustrate the definition of a resource identifier consider that there is a registered "authority" called "SMWG" which maintains information for spacecraft (Observatory) resources. One such spacecraft is GOES8. Now "SMWG" decides that the "path" to the GOES8 resource description should include the Resource Type as part of the path and that the observatory "name" will be "GOES8". So, the resource identifier would be:

spase://SMWG/Observatory/GOES8

The Resource ID is used to formally or informally associate one resource with another. For example an Instrument resource must be formally associated with an Observatory. A Numerical Data resource may be formally associated with an Instrument resource and informally associated with other Numerical Data resources. The free association of resources allows networks or collections to be formed from distributed resources and allows for new associations to be formed as needed without affecting existing associations.

3.3. Core Attributes

With the exception of Granule and Person, every resource has a common set of core attributes. The core attributes provide textual descriptions of the resource and the capability to reference external sources of information (Information URL). It also describes the context of the resource in the larger data environment. This context consists of associations with other resources (Association) and with previous versions (Prior ID). These attributes are grouped in a Resource Header and consists of:

> Resource Name
> Alternate Name
> Release Date
> Expiration Date
> Description
> Acknowledgement
> Contact
> Information URL
> Association
> Prior ID

3.4. Extensions

The SPASE Data Model allows for additional metadata to be embedded within a SPASE description. Every Resource Type has an "Extension" element which can contain metadata compliant with other data models. The "Extension" element has a SPASE data model type of "Text", but is not limited to alphanumeric characters and may contain tagged information.

3.5. Element Data Types

Each element in the SPASE Data Model has a data type. One design feature of the SPASE data model is that an element can contain either a value or other elements. Mixed content (elements and values) are not allowed. This allows the data model to be implemented in a wider range of metadata languages. The following data types are supported:

Container A container of other elements.

Count A whole number.

DateTime A value is given in the ISO 8601 recommended primary standard notation: YYYY-MM-DD. where YYYY is the year in the usual Gregorian calendar, MM is the month of the year between 01 (January) and 12 (December), and DD is the day of the month between 01 and 31. It may also have an optional time portion given in the ISO 8601 recommended primary standard notation: HH:MM:SS.sss where HH is the number of complete hours that have passed since midnight (00-24), MM is the number of complete minutes that have passed since the start of the hour (00-59), and SS is the number of complete seconds since the start of the minute (00-60), and sss are milliseconds that have passed since the start of the second (000-999). Time zones are not allowed so all times are in Universal Time. The time portion must follow the date portion with both portions separated by a "T". For example, "2004-07-29" is July 29, 2004 and "2004-07-29T12:30:00" is precisely 12:30 on July 29, 2004.

Duration A duration of time. A time value given in the ISO 8601 recommended primary standard notation: PTHH:MM:SS.sss where PT are tokens to indicate that the time value is a duration, HH is the number of complete hours that have passed since midnight (00-24), MM is the number of complete minutes that have passed since the start of the hour (00-59), and SS is the number of complete seconds since the start of the minute (00-60), and sss are milliseconds that have passed since the start of the second (000-999).

Enumeration Value is selected from a list of allowed values. The name of list is an additional attribute of the element. Lists may be externally controlled in which case the location of the list is indicated in the textual definition of the element.

Item An element which is a value for an enumerated list.

Numeric A fractional number which can be expressed in scientific notation. The string "NaN" represents not-a-number (flag) values and the string "INF" represents an infinitely large value. The value "-INF" represents an infinitely small value.

Sequence A list of whole number values where the order of the values is fixed. A space separates each value. For example, "1 2 3".

Text A string of alphanumeric characters. A text based "markup" is supported. See Text Mark-up section (3.4.1) for details.

URL Universal Resource Locator

3.5.1. Text Mark-up

While descriptive text may be brief, some formatting of the text may be necessary to convey the necessary information, for example, multiple paragraphs or nested lists. To ensure system portability text values in SPASE are sequences of alphanumeric one byte UTF-8 (US_ASCII)

characters with white space preserved. When text is displayed in some applications (a web browser is the best example) a strict preservation of white space may not result in a desirable presentation. Also, to make the metadata more human readable (for example in XML) additional white space may be introduced in the form of indentation. If strictly preserved, this could result in an undesirable presentation. To allow an author to express a preferred layout for the text, a special set of text "mark-up" rules are defined. The layout can then be determined by normalizing the text and applying a simple set of interpretation rules.

3.5.1.1. Text Normalization Rules

To aid in determining the layout or structural intent of the author the following rules are to be applied to text to create a normalized form:

1. All lines are to end with a newline character.
2. All text is left justified. No line has leading whitespace.

3.5.1.2. Text Interpretation Rules

After normalization of text the following rules can be used to interpret the layout intent of the author.

1. Blank lines indicate paragraph breaks.
2. Lists
   a. Must be preceded by a blank line.
   b. Items are indicated by a line beginning with a reserved character followed by a space. Three levels of lists are supported. The reserved characters are:
      * : First level list
      - : Second level list (must appear within a first level context)
      . : Third level list (must appear within a second level context)
   c. End with a blank line.
3. Tables
   a. Begin and end with a line that starts with "+--".
   b. The first "row" of a table is the field headings.
   c. Fields in a table are separated with a vertical bar ("|").
   d. Visual row separators are lines which begin with "|--".

4. The Data Model Presented Hierarchically

The taxonomy tree shows the inter-relationship of elements in the data model. This provides a "big picture" view of the SPASE data model. This taxonomy is implementation neutral. Details for each element are contained in the data dictionary.

Notes: Occurence specifications are enclosed in parenthesis: 0 = optional, 1 = required, * = zero or more, + = 1 or more

```
+ Spase (1)
|     + Version (1)
|     + Catalog (+ of A)
|     |     + ResourceID (1)
|     |     + ResourceHeader (1)
|     |     |     + ResourceName (1)
|     |     |     + AlternateName (*)
|     |     |     + ReleaseDate (1)
|     |     |     + ExpirationDate (0)
|     |     |     + Description (1)
|     |     |     + Acknowledgement (0)
|     |     |     + Contact (+)
|     |     |     |     + PersonID (1)
|     |     |     |     + Role (+)
|     |     |     + InformationURL (*)
|     |     |     |     + Name (0)
|     |     |     |     + URL (1)
|     |     |     |     + Description (0)
|     |     |     |     + Language (0)
|     |     |     + Association (*)
|     |     |     |     + AssociationID (1)
|     |     |     |     + AssociationType (1)
|     |     |     |     + Note (0)
|     |     |     + PriorID (*)
|     |     + AccessInformation (+)
|     |     |     + RepositoryID (1)
|     |     |     + Availability (0)
|     |     |     + AccessRights (0)
|     |     |     + AccessURL (+)
|     |     |     |     + Name (0)
|     |     |     |     + URL (1)
|     |     |     |     + ProductKey (*)
|     |     |     |     + Description (0)
|     |     |     |     + Language (0)
|     |     |     + Format (1)
|     |     |     + Encoding (0)
|     |     |     + DataExtent (0)
|     |     |     |     + Quantity (1)
|     |     |     |     + Units (0)
|     |     |     |     + Per (0)
|     |     |     + Acknowledgement (0)
|     |     + ProviderResourceName (0)
```

```
|      |         + ProviderVersion (0)
|      |         + InstrumentID (*)
|      |         + PhenomenonType (+)
|      |         + TimeSpan (0)
|      |         |       + StartDate (1)
|      |         |       + StopDate (1 of B)
|      |         |       + RelativeStopDate (1 of B)
|      |         |       + Note (*)
|      |         + Caveats (0)
|      |         + Keyword (*)
|      |         + InputResourceID (*)
|      |         + Parameter (*)
|      |         |       + Name (1)
|      |         |       + Set (*)
|      |         |       + ParameterKey (0)
|      |         |       + Description (0)
|      |         |       + Caveats (0)
|      |         |       + Cadence (0)
|      |         |       + Units (0)
|      |         |       + UnitsConversion (0)
|      |         |       + CoordinateSystem (0)
|      |         |       |       + CoordinateRepresentation (1)
|      |         |       |       + CoordinateSystemName (1)
|      |         |       + RenderingHints (*)
|      |         |       |       + DisplayType (0)
|      |         |       |       + AxisLabel (0)
|      |         |       |       + RenderingAxis (0)
|      |         |       |       + Index (0)
|      |         |       |       + ValueFormat (0)
|      |         |       |       + ScaleMin (0)
|      |         |       |       + ScaleMax (0)
|      |         |       |       + ScaleType (0)
|      |         |       + Structure (0)
|      |         |       |       + Size (1)
|      |         |       |       + Description (0)
|      |         |       |       + Element (*)
|      |         |       |       |       + Name (1)
|      |         |       |       |       + Qualifier (*)
|      |         |       |       |       + Index (1)
|      |         |       |       |       + ParameterKey (0)
|      |         |       |       |       + Units (0)
|      |         |       |       |       + UnitsConversion (0)
|      |         |       |       |       + ValidMin (0)
|      |         |       |       |       + ValidMax (0)
|      |         |       |       |       + FillValue (0)
|      |         |       |       |       + RenderingHints (0)
|      |         |       |       |       |       + DisplayType (0)
|      |         |       |       |       |       + AxisLabel (0)
|      |         |       |       |       |       + RenderingAxis (0)
|      |         |       |       |       |       + Index (0)
|      |         |       |       |       |       + ValueFormat (0)
```

```
|    |    |    |    |    |    |    + ScaleMin (0)
|    |    |    |    |    |    |    + ScaleMax (0)
|    |    |    |    |    |    |    + ScaleType (0)
|    |    |    + ValidMin (0)
|    |    |    + ValidMax (0)
|    |    |    + FillValue (0)
|    |    |    + Field (1 of C)
|    |    |    |    + Qualifier (*)
|    |    |    |    + FieldQuantity (1)
|    |    |    |    + FrequencyRange (0)
|    |    |    |    |    + SpectralRange (0)
|    |    |    |    |    + Low (1)
|    |    |    |    |    + High (1)
|    |    |    |    |    + Units (1)
|    |    |    |    |    + Bin (*)
|    |    |    |    |    |    + BandName (0)
|    |    |    |    |    |    + Low (1)
|    |    |    |    |    |    + High (1)
|    |    |    + Particle (1 of C)
|    |    |    |    + ParticleType (+)
|    |    |    |    + Qualifier (*)
|    |    |    |    + ParticleQuantity (1)
|    |    |    |    + AtomicNumber (*)
|    |    |    |    + EnergyRange (0)
|    |    |    |    |    + Low (1)
|    |    |    |    |    + High (1)
|    |    |    |    |    + Units (1)
|    |    |    |    |    + Bin (*)
|    |    |    |    |    |    + BandName (0)
|    |    |    |    |    |    + Low (1)
|    |    |    |    |    |    + High (1)
|    |    |    |    + AzimuthalAngleRange (0)
|    |    |    |    |    + Low (1)
|    |    |    |    |    + High (1)
|    |    |    |    |    + Units (1)
|    |    |    |    |    + Bin (*)
|    |    |    |    |    |    + BandName (0)
|    |    |    |    |    |    + Low (1)
|    |    |    |    |    |    + High (1)
|    |    |    |    + PolarAngleRange (0)
|    |    |    |    |    + Low (1)
|    |    |    |    |    + High (1)
|    |    |    |    |    + Units (1)
|    |    |    |    |    + Bin (*)
|    |    |    |    |    |    + BandName (0)
|    |    |    |    |    |    + Low (1)
|    |    |    |    |    |    + High (1)
|    |    |    + Wave (1 of C)
|    |    |    |    + WaveType (1)
|    |    |    |    + Qualifier (*)
|    |    |    |    + WaveQuantity (1)
```

```
|     |     |     |     + EnergyRange (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + BandName (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + FrequencyRange (0)
|     |     |     |     |     + SpectralRange (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + BandName (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + WavelengthRange (0)
|     |     |     |     |     + SpectralRange (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + BandName (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     + Mixed (1 of C)
|     |     |     |     + MixedQuantity (1)
|     |     |     |     + ParticleType (*)
|     |     |     |     + Qualifier (*)
|     |     |     + Support (1 of C)
|     |     |     |     + Qualifier (*)
|     |     |     |     + SupportQuantity (1)
|     |     + Extension (*)
|     + DisplayData (+ of A)
|     |     + ResourceID (1)
|     |     + ResourceHeader (1)
|     |     |     + ResourceName (1)
|     |     |     + AlternateName (*)
|     |     |     + ReleaseDate (1)
|     |     |     + ExpirationDate (0)
|     |     |     + Description (1)
|     |     |     + Acknowledgement (0)
|     |     |     + Contact (+)
|     |     |     |     + PersonID (1)
|     |     |     |     + Role (+)
|     |     |     + InformationURL (*)
|     |     |     |     + Name (0)
|     |     |     |     + URL (1)
|     |     |     |     + Description (0)
|     |     |     |     + Language (0)
```

```
|       |       |       + Association (*)
|       |       |       |       + AssociationID (1)
|       |       |       |       + AssociationType (1)
|       |       |       |       + Note (0)
|       |       |       + PriorID (*)
|       |       + AccessInformation (+)
|       |       |       + RepositoryID (1)
|       |       |       + Availability (0)
|       |       |       + AccessRights (0)
|       |       |       + AccessURL (+)
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + ProductKey (*)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Format (1)
|       |       |       + Encoding (0)
|       |       |       + DataExtent (0)
|       |       |       |       + Quantity (1)
|       |       |       |       + Units (0)
|       |       |       |       + Per (0)
|       |       |       + Acknowledgement (0)
|       |       + ProcessingLevel (0)
|       |       + ProviderResourceName (0)
|       |       + ProviderProcessingLevel (0)
|       |       + ProviderVersion (0)
|       |       + InstrumentID (*)
|       |       + MeasurementType (+)
|       |       + TemporalDescription (0)
|       |       |       + TimeSpan (1)
|       |       |       |       + StartDate (1)
|       |       |       |       + StopDate (1 of B)
|       |       |       |       + RelativeStopDate (1 of B)
|       |       |       |       + Note (*)
|       |       |       + Cadence (0)
|       |       |       + Exposure (0)
|       |       + SpectralRange (*)
|       |       + DisplayCadence (0)
|       |       + ObservedRegion (*)
|       |       + Caveats (0)
|       |       + Keyword (*)
|       |       + InputResourceID (*)
|       |       + Parameter (*)
|       |       |       + Name (1)
|       |       |       + Set (*)
|       |       |       + ParameterKey (0)
|       |       |       + Description (0)
|       |       |       + Caveats (0)
|       |       |       + Cadence (0)
|       |       |       + Units (0)
|       |       |       + UnitsConversion (0)
```

```
|    |    |         + CoordinateSystem (0)
|    |    |         |    + CoordinateRepresentation (1)
|    |    |         |    + CoordinateSystemName (1)
|    |    |         + RenderingHints (*)
|    |    |         |    + DisplayType (0)
|    |    |         |    + AxisLabel (0)
|    |    |         |    + RenderingAxis (0)
|    |    |         |    + Index (0)
|    |    |         |    + ValueFormat (0)
|    |    |         |    + ScaleMin (0)
|    |    |         |    + ScaleMax (0)
|    |    |         |    + ScaleType (0)
|    |    |         + Structure (0)
|    |    |         |    + Size (1)
|    |    |         |    + Description (0)
|    |    |         |    + Element (*)
|    |    |         |    |    + Name (1)
|    |    |         |    |    + Qualifier (*)
|    |    |         |    |    + Index (1)
|    |    |         |    |    + ParameterKey (0)
|    |    |         |    |    + Units (0)
|    |    |         |    |    + UnitsConversion (0)
|    |    |         |    |    + ValidMin (0)
|    |    |         |    |    + ValidMax (0)
|    |    |         |    |    + FillValue (0)
|    |    |         |    |    + RenderingHints (0)
|    |    |         |    |    |    + DisplayType (0)
|    |    |         |    |    |    + AxisLabel (0)
|    |    |         |    |    |    + RenderingAxis (0)
|    |    |         |    |    |    + Index (0)
|    |    |         |    |    |    + ValueFormat (0)
|    |    |         |    |    |    + ScaleMin (0)
|    |    |         |    |    |    + ScaleMax (0)
|    |    |         |    |    |    + ScaleType (0)
|    |    |         + ValidMin (0)
|    |    |         + ValidMax (0)
|    |    |         + FillValue (0)
|    |    |         + Field (1 of C)
|    |    |         |    + Qualifier (*)
|    |    |         |    + FieldQuantity (1)
|    |    |         |    + FrequencyRange (0)
|    |    |         |    |    + SpectralRange (0)
|    |    |         |    |    + Low (1)
|    |    |         |    |    + High (1)
|    |    |         |    |    + Units (1)
|    |    |         |    |    + Bin (*)
|    |    |         |    |    |    + BandName (0)
|    |    |         |    |    |    + Low (1)
|    |    |         |    |    |    + High (1)
|    |    |         + Particle (1 of C)
|    |    |         |    + ParticleType (+)
```

```
|     |     |     |     + Qualifier (*)
|     |     |     |     + ParticleQuantity (1)
|     |     |     |     + AtomicNumber (*)
|     |     |     |     + EnergyRange (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + BandName (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + AzimuthalAngleRange (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + BandName (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + PolarAngleRange (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + BandName (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     + Wave (1 of C)
|     |     |     |     + WaveType (1)
|     |     |     |     + Qualifier (*)
|     |     |     |     + WaveQuantity (1)
|     |     |     |     + EnergyRange (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + BandName (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + FrequencyRange (0)
|     |     |     |     |     + SpectralRange (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + BandName (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + WavelengthRange (0)
|     |     |     |     |     + SpectralRange (0)
|     |     |     |     |     + Low (1)
```

```
|       |       |       |       |       + High (1)
|       |       |       |       |       + Units (1)
|       |       |       |       |       + Bin (*)
|       |       |       |       |       |       + BandName (0)
|       |       |       |       |       |       + Low (1)
|       |       |       |       |       |       + High (1)
|       |       |       + Mixed (1 of C)
|       |       |       |       + MixedQuantity (1)
|       |       |       |       + ParticleType (*)
|       |       |       |       + Qualifier (*)
|       |       |       + Support (1 of C)
|       |       |       |       + Qualifier (*)
|       |       |       |       + SupportQuantity (1)
|       |       + Extension (*)
|       + NumericalData (+ of A)
|       |       + ResourceID (1)
|       |       + ResourceHeader (1)
|       |       |       + ResourceName (1)
|       |       |       + AlternateName (*)
|       |       |       + ReleaseDate (1)
|       |       |       + ExpirationDate (0)
|       |       |       + Description (1)
|       |       |       + Acknowledgement (0)
|       |       |       + Contact (+)
|       |       |       |       + PersonID (1)
|       |       |       |       + Role (+)
|       |       |       + InformationURL (*)
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Association (*)
|       |       |       |       + AssociationID (1)
|       |       |       |       + AssociationType (1)
|       |       |       |       + Note (0)
|       |       |       + PriorID (*)
|       |       + AccessInformation (+)
|       |       |       + RepositoryID (1)
|       |       |       + Availability (0)
|       |       |       + AccessRights (0)
|       |       |       + AccessURL (+)
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + ProductKey (*)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Format (1)
|       |       |       + Encoding (0)
|       |       |       + DataExtent (0)
|       |       |       |       + Quantity (1)
|       |       |       |       + Units (0)
```

```
|    |    |    |    |    + Per (0)
|    |    |    |    + Acknowledgement (0)
|    |    + ProcessingLevel (0)
|    |    + ProviderResourceName (0)
|    |    + ProviderProcessingLevel (0)
|    |    + ProviderVersion (0)
|    |    + InstrumentID (*)
|    |    + MeasurementType (+)
|    |    + TemporalDescription (0)
|    |    |    + TimeSpan (1)
|    |    |    |    + StartDate (1)
|    |    |    |    + StopDate (1 of B)
|    |    |    |    + RelativeStopDate (1 of B)
|    |    |    |    + Note (*)
|    |    |    + Cadence (0)
|    |    |    + Exposure (0)
|    |    + SpectralRange (*)
|    |    + ObservedRegion (*)
|    |    + Caveats (0)
|    |    + Keyword (*)
|    |    + InputResourceID (*)
|    |    + Parameter (*)
|    |    |    + Name (1)
|    |    |    + Set (*)
|    |    |    + ParameterKey (0)
|    |    |    + Description (0)
|    |    |    + Caveats (0)
|    |    |    + Cadence (0)
|    |    |    + Units (0)
|    |    |    + UnitsConversion (0)
|    |    |    + CoordinateSystem (0)
|    |    |    |    + CoordinateRepresentation (1)
|    |    |    |    + CoordinateSystemName (1)
|    |    |    + RenderingHints (*)
|    |    |    |    + DisplayType (0)
|    |    |    |    + AxisLabel (0)
|    |    |    |    + RenderingAxis (0)
|    |    |    |    + Index (0)
|    |    |    |    + ValueFormat (0)
|    |    |    |    + ScaleMin (0)
|    |    |    |    + ScaleMax (0)
|    |    |    |    + ScaleType (0)
|    |    |    + Structure (0)
|    |    |    |    + Size (1)
|    |    |    |    + Description (0)
|    |    |    |    + Element (*)
|    |    |    |    |    + Name (1)
|    |    |    |    |    + Qualifier (*)
|    |    |    |    |    + Index (1)
|    |    |    |    |    + ParameterKey (0)
|    |    |    |    |    + Units (0)
```

```
|     |     |     |     |     + UnitsConversion (0)
|     |     |     |     |     + ValidMin (0)
|     |     |     |     |     + ValidMax (0)
|     |     |     |     |     + FillValue (0)
|     |     |     |     |     + RenderingHints (0)
|     |     |     |     |     |     + DisplayType (0)
|     |     |     |     |     |     + AxisLabel (0)
|     |     |     |     |     |     + RenderingAxis (0)
|     |     |     |     |     |     + Index (0)
|     |     |     |     |     |     + ValueFormat (0)
|     |     |     |     |     |     + ScaleMin (0)
|     |     |     |     |     |     + ScaleMax (0)
|     |     |     |     |     |     + ScaleType (0)
|     |     |     + ValidMin (0)
|     |     |     + ValidMax (0)
|     |     |     + FillValue (0)
|     |     |     + Field (1 of C)
|     |     |     |     + Qualifier (*)
|     |     |     |     + FieldQuantity (1)
|     |     |     |     + FrequencyRange (0)
|     |     |     |     |     + SpectralRange (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + BandName (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     + Particle (1 of C)
|     |     |     |     + ParticleType (+)
|     |     |     |     + Qualifier (*)
|     |     |     |     + ParticleQuantity (1)
|     |     |     |     + AtomicNumber (*)
|     |     |     |     + EnergyRange (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + BandName (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + AzimuthalAngleRange (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + BandName (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + PolarAngleRange (0)
|     |     |     |     |     + Low (1)
```

```
|      |      |      |      |      + High (1)
|      |      |      |      |      + Units (1)
|      |      |      |      |      + Bin (*)
|      |      |      |      |      |      + BandName (0)
|      |      |      |      |      |      + Low (1)
|      |      |      |      |      |      + High (1)
|      |      |      + Wave (1 of C)
|      |      |      |      + WaveType (1)
|      |      |      |      + Qualifier (*)
|      |      |      |      + WaveQuantity (1)
|      |      |      |      + EnergyRange (0)
|      |      |      |      |      + Low (1)
|      |      |      |      |      + High (1)
|      |      |      |      |      + Units (1)
|      |      |      |      |      + Bin (*)
|      |      |      |      |      |      + BandName (0)
|      |      |      |      |      |      + Low (1)
|      |      |      |      |      |      + High (1)
|      |      |      |      + FrequencyRange (0)
|      |      |      |      |      + SpectralRange (0)
|      |      |      |      |      + Low (1)
|      |      |      |      |      + High (1)
|      |      |      |      |      + Units (1)
|      |      |      |      |      + Bin (*)
|      |      |      |      |      |      + BandName (0)
|      |      |      |      |      |      + Low (1)
|      |      |      |      |      |      + High (1)
|      |      |      |      + WavelengthRange (0)
|      |      |      |      |      + SpectralRange (0)
|      |      |      |      |      + Low (1)
|      |      |      |      |      + High (1)
|      |      |      |      |      + Units (1)
|      |      |      |      |      + Bin (*)
|      |      |      |      |      |      + BandName (0)
|      |      |      |      |      |      + Low (1)
|      |      |      |      |      |      + High (1)
|      |      |      + Mixed (1 of C)
|      |      |      |      + MixedQuantity (1)
|      |      |      |      + ParticleType (*)
|      |      |      |      + Qualifier (*)
|      |      |      + Support (1 of C)
|      |      |      |      + Qualifier (*)
|      |      |      |      + SupportQuantity (1)
|      |      + Extension (*)
|      + Document (+ of A)
|      |      + ResourceID (1)
|      |      + ResourceHeader (1)
|      |      |      + ResourceName (1)
|      |      |      + AlternateName (*)
|      |      |      + ReleaseDate (1)
|      |      |      + ExpirationDate (0)
```

```
|       |       |       + Description (1)
|       |       |       + Acknowledgement (0)
|       |       |       + Contact (+)
|       |       |       |       + PersonID (1)
|       |       |       |       + Role (+)
|       |       |       + InformationURL (*)
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Association (*)
|       |       |       |       + AssociationID (1)
|       |       |       |       + AssociationType (1)
|       |       |       |       + Note (0)
|       |       |       + PriorID (*)
|       |       + AccessInformation (+)
|       |       |       + RepositoryID (1)
|       |       |       + Availability (0)
|       |       |       + AccessRights (0)
|       |       |       + AccessURL (+)
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + ProductKey (*)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Format (1)
|       |       |       + Encoding (0)
|       |       |       + DataExtent (0)
|       |       |       |       + Quantity (1)
|       |       |       |       + Units (0)
|       |       |       |       + Per (0)
|       |       |       + Acknowledgement (0)
|       |       + Keyword (*)
|       |       + DocumentType (1)
|       |       + MIMEType (1)
|       |       + InputResourceID (*)
|       + Granule (+ of A)
|       |       + ResourceID (1)
|       |       + ReleaseDate (1)
|       |       + ExpirationDate (0)
|       |       + ParentID (1)
|       |       + PriorID (*)
|       |       + StartDate (1)
|       |       + StopDate (1)
|       |       + Source (+)
|       |       |       + SourceType (1)
|       |       |       + URL (1)
|       |       |       + MirrorURL (*)
|       |       |       + Checksum (0)
|       |       |       |       + HashValue (1)
|       |       |       |       + HashFunction (1)
```

```
|     |     |     + DataExtent (0)
|     |     |     |     + Quantity (1)
|     |     |     |     + Units (0)
|     |     |     |     + Per (0)
|     + Instrument (+ of A)
|     |     + ResourceID (1)
|     |     + ResourceHeader (1)
|     |     |     + ResourceName (1)
|     |     |     + AlternateName (*)
|     |     |     + ReleaseDate (1)
|     |     |     + ExpirationDate (0)
|     |     |     + Description (1)
|     |     |     + Acknowledgement (0)
|     |     |     + Contact (+)
|     |     |     |     + PersonID (1)
|     |     |     |     + Role (+)
|     |     |     + InformationURL (*)
|     |     |     |     + Name (0)
|     |     |     |     + URL (1)
|     |     |     |     + Description (0)
|     |     |     |     + Language (0)
|     |     |     + Association (*)
|     |     |     |     + AssociationID (1)
|     |     |     |     + AssociationType (1)
|     |     |     |     + Note (0)
|     |     |     + PriorID (*)
|     |     + InstrumentType (+)
|     |     + InvestigationName (+)
|     |     + OperatingSpan (0)
|     |     |     + StartDate (1)
|     |     |     + StopDate (0)
|     |     |     + Note (*)
|     |     + ObservatoryID (1)
|     |     + Caveats (0)
|     |     + Extension (*)
|     + Observatory (+ of A)
|     |     + ResourceID (1)
|     |     + ResourceHeader (1)
|     |     |     + ResourceName (1)
|     |     |     + AlternateName (*)
|     |     |     + ReleaseDate (1)
|     |     |     + ExpirationDate (0)
|     |     |     + Description (1)
|     |     |     + Acknowledgement (0)
|     |     |     + Contact (+)
|     |     |     |     + PersonID (1)
|     |     |     |     + Role (+)
|     |     |     + InformationURL (*)
|     |     |     |     + Name (0)
|     |     |     |     + URL (1)
|     |     |     |     + Description (0)
```

```
|       |       |       |       + Language (0)
|       |       |       + Association (*)
|       |       |       |       + AssociationID (1)
|       |       |       |       + AssociationType (1)
|       |       |       |       + Note (0)
|       |       |       + PriorID (*)
|       |       + ObservatoryGroupID (*)
|       |       + Location (1)
|       |       |       + ObservatoryRegion (+)
|       |       |       + CoordinateSystemName (0)
|       |       |       + Latitude (0)
|       |       |       + Longitude (0)
|       |       |       + Elevation (0)
|       |       + OperatingSpan (0)
|       |       |       + StartDate (1)
|       |       |       + StopDate (0)
|       |       |       + Note (*)
|       |       + Extension (*)
|       + Person (+ of A)
|       |       + ResourceID (1)
|       |       + ReleaseDate (0)
|       |       + PersonName (0)
|       |       + OrganizationName (1)
|       |       + Address (0)
|       |       + Email (*)
|       |       + PhoneNumber (*)
|       |       + FaxNumber (0)
|       |       + Note (0)
|       |       + Extension (*)
|       + Registry (+ of A)
|       |       + ResourceID (1)
|       |       + ResourceHeader (1)
|       |       |       + ResourceName (1)
|       |       |       + AlternateName (*)
|       |       |       + ReleaseDate (1)
|       |       |       + ExpirationDate (0)
|       |       |       + Description (1)
|       |       |       + Acknowledgement (0)
|       |       |       + Contact (+)
|       |       |       |       + PersonID (1)
|       |       |       |       + Role (+)
|       |       |       + InformationURL (*)
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Association (*)
|       |       |       |       + AssociationID (1)
|       |       |       |       + AssociationType (1)
|       |       |       |       + Note (0)
|       |       |       + PriorID (*)
```

```
|       |         + AccessURL (1)
|       |         |      + Name (0)
|       |         |      + URL (1)
|       |         |      + ProductKey (*)
|       |         |      + Description (0)
|       |         |      + Language (0)
|       |     + Extension (*)
|     + Repository (+ of A)
|       |       + ResourceID (1)
|       |       + ResourceHeader (1)
|       |       |      + ResourceName (1)
|       |       |      + AlternateName (*)
|       |       |      + ReleaseDate (1)
|       |       |      + ExpirationDate (0)
|       |       |      + Description (1)
|       |       |      + Acknowledgement (0)
|       |       |      + Contact (+)
|       |       |      |      + PersonID (1)
|       |       |      |      + Role (+)
|       |       |      + InformationURL (*)
|       |       |      |      + Name (0)
|       |       |      |      + URL (1)
|       |       |      |      + Description (0)
|       |       |      |      + Language (0)
|       |       |      + Association (*)
|       |       |      |      + AssociationID (1)
|       |       |      |      + AssociationType (1)
|       |       |      |      + Note (0)
|       |       |      + PriorID (*)
|       |       + AccessURL (1)
|       |       |      + Name (0)
|       |       |      + URL (1)
|       |       |      + ProductKey (*)
|       |       |      + Description (0)
|       |       |      + Language (0)
|       |     + Extension (*)
|     + Service (+ of A)
|       |       + ResourceID (1)
|       |       + ResourceHeader (1)
|       |       |      + ResourceName (1)
|       |       |      + AlternateName (*)
|       |       |      + ReleaseDate (1)
|       |       |      + ExpirationDate (0)
|       |       |      + Description (1)
|       |       |      + Acknowledgement (0)
|       |       |      + Contact (+)
|       |       |      |      + PersonID (1)
|       |       |      |      + Role (+)
|       |       |      + InformationURL (*)
|       |       |      |      + Name (0)
|       |       |      |      + URL (1)
```

```
|      |      |      |      + Description (0)
|      |      |      |      + Language (0)
|      |      |      + Association (*)
|      |      |      |      + AssociationID (1)
|      |      |      |      + AssociationType (1)
|      |      |      |      + Note (0)
|      |      |      + PriorID (*)
|      |      + AccessURL (1)
|      |      |      + Name (0)
|      |      |      + URL (1)
|      |      |      + ProductKey (*)
|      |      |      + Description (0)
|      |      |      + Language (0)
|      |      + Extension (*)
|      + Annotation (+ of A)
|      |      + ResourceID (1)
|      |      + ResourceHeader (1)
|      |      |      + ResourceName (1)
|      |      |      + AlternateName (*)
|      |      |      + ReleaseDate (1)
|      |      |      + ExpirationDate (0)
|      |      |      + Description (1)
|      |      |      + Acknowledgement (0)
|      |      |      + Contact (+)
|      |      |      |      + PersonID (1)
|      |      |      |      + Role (+)
|      |      |      + InformationURL (*)
|      |      |      |      + Name (0)
|      |      |      |      + URL (1)
|      |      |      |      + Description (0)
|      |      |      |      + Language (0)
|      |      |      + Association (*)
|      |      |      |      + AssociationID (1)
|      |      |      |      + AssociationType (1)
|      |      |      |      + Note (0)
|      |      |      + PriorID (*)
|      |      + ImageURL (0)
|      |      + AnnotationType (1)
|      |      + PhenomenonType (0)
|      |      + ClassificationMethod (0)
|      |      + ConfidenceRating (0)
|      |      + TimeSpan (*)
|      |      |      + StartDate (1)
|      |      |      + StopDate (1 of B)
|      |      |      + RelativeStopDate (1 of B)
|      |      |      + Note (*)
|      |      + ObservationExtent (*)
|      |      |      + ObservedRegion (0)
|      |      |      + StartLocation (1)
|      |      |      + StopLocation (1)
|      |      |      + Note (*)
```

| | + Extension (*)

5. Guidelines for Metadata Descriptions of Products

The following sections describe the details of the SPASE Data Model, especially the metadata used to describe data. There is a richness in the available metadata that allows very detailed descriptions of products. Many of the types of metadata may not apply in your case or you may not need much detail to adequately describe your data holdings. But it must be remembered that the better data are described, the easier they will be to use.

To determine what level of detail is needed, we recommend considering not only what the user needs to find the correct data, but also what is necessary to know if the data will be useful for the requestor's purpose. The user might get this information by contacting you, but if the data were moved somewhere else and only the data description were available to determine the utility of the data, consider if the user would have sufficient information to know if this is the right data set and what problems might be associated with the use of these data. Also consider if additional documentation is neccesary and if so create an Document resource and associate it with the data resource. An "Information URL" may also be used to provide links to more detailed information.

In summary, products need not be described in minute detail, but users will need, at minimum, information for assessing what the data products represent and where to find them. Of course it is also useful to include information on how the data can be applied and common pitfalls in their use, but the first need is to make the products usefully visible.

6. Examples

As an example let us describe a person using SPASE metadata. This person is "John Smith" from Smith Foundation. While the SPASE data model is implementation neutral, XML representation is preferred. This example uses the SPASE XML form.

```
<?xml version="1.0" encoding="UTF-8" ?>
<Spase>
  <Version>2.0.0</Version>
   <Person>
     <ResourceID>spase://person/jsmith@smith.org</ResourceID>
     <PersonName>John Smith</PersonName>
     <OrganizationName>Smith Foundation</OrganizationName>
     <Address>1 Main St., Smithville, MA</Address>
     <Email>jsmith@smith.org</Email>
     <PhoneNumber>1-800-555-1212</PhoneNumber>
   </Person>
</Spase>
```

For a more extensive example let us consider a collection of numerical data from the magnetometer on the ACE spacecraft. This data set has been averaged to 1 minute intervals (cadence) and spans the beginning of the mission to the end of 2004 (1997-09-01 through 2004-12-31). The ACE spacecraft orbits the L1 point between the Earth and the Sun. While the SPASE data model is implementation neutral, XML representation is preferred. This example uses the SPASE XML form. The presented URLs are fictitious and will not direct you to the actual data.

```
<?xml version="1.0" encoding="UTF-8" ?>
<Spase>
  <Version>2.0.0</Version>
  <NumericalData>
     <ResourceID>spase://VMO/NumericalData/ACE/MAG/200301</ResourceID>
     <ResourceHeader>
        <ResourceName>ACEMAG200301</ResourceName>
        <ReleaseDate>2006-07-26T00:00:00.000</ReleaseDate>
        <Acknowledgement>
           User will acknowledge the data producer and instrument P.I. in any

           publication resulting from the use of these data.
        </Acknowledgement>
      <Description>
        ACE MFI 1-minute averaged magnetic-field data in GSE coordinates
        from Jan 2003. These data have been derived from the 16 second
        resolution ACE MFI which were linearly interpolated to a 1-minute
        time grid with time stamps at second zero of each minute.
      </Description>

     <Contact>
        <Role>PrincipalInvestigator</Role>
        <PersonID>spase://SMWG/Person/Norman.F.Ness</PersonID>
     </Contact>

     <Contact>
        <Role>Co-Investigator</Role>
        <PersonID>spase://SMWG/Person/Charles.Smith</PersonID>
     </Contact>

     <Contact>
        <Role>DataProducer</Role>
```

```
            <PresonID>spase://SMWG/Person/James.M.Weygand</PresonID>
        </Contact>
    </ResourceHeader>

    <AccessInformation>
        <AccessRights>Open</AccessRights>
        <AccessURL>

<URL>http://www.igpp.ucla.edu/getResource?format=text&id=spase://UCLA/ACEMAG200
301</URL>
        </AccessURL>
        <Format>Text</Format>
        <Encoding>GZIP</Encoding>
    </AccessInformation>

    <InstrumentID>spase://SMWG/ACE/MAG</InstrumentID>
    <MeasurementType>MagneticField</MeasurementType>

    <TemporalDescription>
        <TimeSpan>
          <StartDate>1997-01-01T00:00</StartDate>
          <StopDate>2004-01-31T23:59</StopDate>
        </TimeSpan>
        <Cadence>PT1M</Cadence>
    </TemporalDescription>

    <InstrumentRegion>Heliosphere.NearEarth</InstrumentRegion>
    <ObservedRegion>Heliosphere.NearEarth</ObservedRegion>

    <Parameter>
        <Name>SAMPLE_TIME_UTC</Name>
        <ParameterKey>time</ParameterKey>
        <Description>
         Sample UTC in the form DD MM YYYY hh mm ss where
            DD   = day of month (01-31)
            MM   = month of year (01-12)
            YYYY = Gregorian Year AD
            hh   = hour of day     (00:23)
            mm   = minute of hour  (00-59)
            ss   = second of minute (00-60).
        </Description>
        <Support>
          <SuportQuantity>Temporal</SuportQuantity>
        </Support>
    </Parameter>

    <Parameter>
        <Name>MAGNETIC_FIELD_VECTOR</Name>
        <Units>nT</Units>
        <CoordinateSystem>
            <CoordinateRepresentation>Cartesian</CoordinateRepresentation>
            <CoordinateSystemName>GSE</CoordinateSystemName>
        </CoordinateSystem>
        <Description>
            Magnetic field vector in GSE Coordinates (Bx, By, Bz).
        </Description>
        <Field>
            <Qualifier>Vector</Qualifier>
            <FieldQuantity>Magnetic</FieldQuantity>
        </Field>
    </Parameter>

    <Parameter>
        <Name>SPACECRAFT_POSITION_VECTOR</Name>
```

```
        <CoordinateSystem>
            <CoordinateRepresentation>Cartesian</CoordinateRepresentation>
            <CoordinateSystemName>GSE</CoordinateSystemName>
        </CoordinateSystem>
        <Units>EARTH RADII</Units>
        <UnitsConversion>6378.16 km</UnitsConversion>
        <Description>
            ACE spacecraft location in GSE coordinates (X,Y,Z)."
        </Description>
        <Support>
          <SuportQuantity>Positional</SupportQuantity>
        </Support>
    </Parameter>

  </NumericalData>
</Spase>
```

7. Definitions of the Data Model Terms

How to Read a Definition

Each element has certain attributes and context for use. The details for each element are presented in the following form:
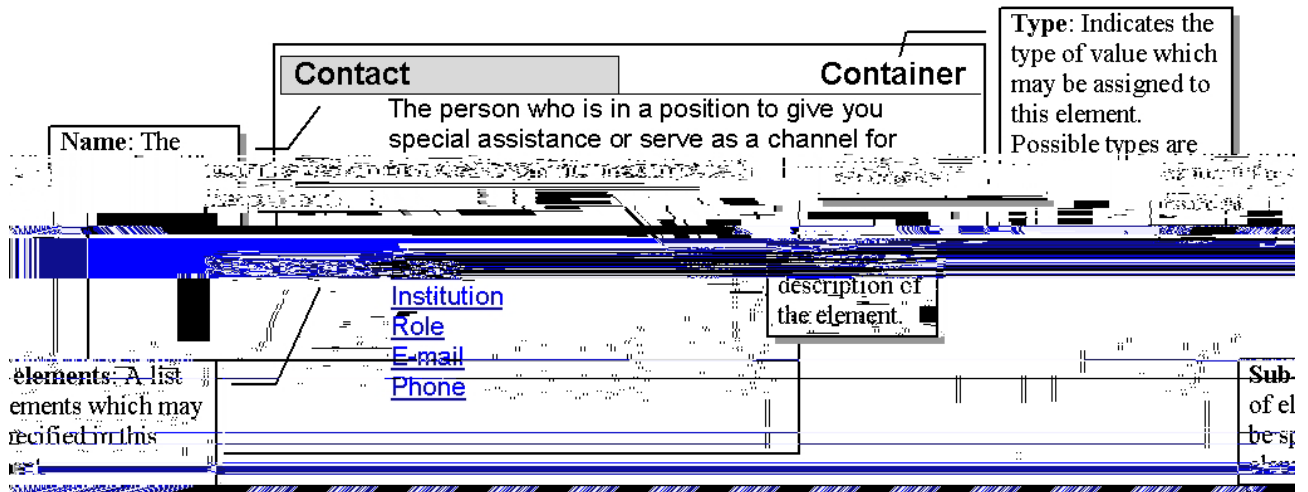
ACElectricField
Item

Alternating electric field component of a wave.

ACMagneticField
Item

Alternating magnetic field component of a wave.

ASCII
Item

A sequence of characters that adheres to American Standard Code for Information Interchange (ASCII) which is an 7-bit character-coding scheme.

AVI
Item

Audio Video Interleave (AVI) a digital format for movies that conforms to the Microsoft Windows Resource Interchange File Format (RIFF).

Absorption
Item

Decrease of radiant energy (relative to the background continuum spectrum).

AccessInformation
Container

Attributes of the resource which pertain to how to accessing the resource, availability and storage format.
> Sub-elements:
>> AccessRights
>> AccessURL
>> Acknowledgement
>> Availability
>> DataExtent
>> Encoding
>> Format
>> RepositoryID

AccessRights
Enumeration

Permissions granted or denied by the host of a product to allow other users to access and use the resource.
> Allowed Values:
>> Open
>> Restricted

AccessURL
Container

Attributes of the method for accessing a resource including a URL, name and description.
> Sub-elements:
>> Description
>> Language
>> Name
>> ProductKey
>> URL

Acknowledgement
Text

The individual, group or organization which should be acknowledged when the data is used in or contributes to a presentation or publication.

Active
Item

Exerting an influence or producing a change or effect. An active measurement is one which produces a transmission or excitation as a part of the measurement cycle.

ActiveRegion
Item

A localized, transient volume of the solar atmosphere in which PLAGEs, SUNSPOTS, FACULAe, FLAREs, etc. may be observed.

ActivityIndex
Item

An indication, derived from one or more measurements, of the level of activity of an object or

region, such as sunspot number, F10.7 flux, Dst, or the Polar Cap Indices.

Address	Text

Directions for finding some location; written on letters or packages that are to be delivered to that location.

Aerosol	Item

A suspension of fine solid or liquid particles in a gas.

AkasofuEpsilon	Item

A measure of the magnetopause energy flux and an indicator of the solar wind power available for subsequent magnetospheric energization. Defined as: $V*B^2*l^2\sin(theta/2)^4$ where B is the IMF, l is an empirical scaling parameter equal to 7 RE, and theta = $\tan(BY/BZ)^{-1}$ the IMF clock angle.

Albedo	Item

The ratio of reflected radiation from the surface to incident radiation upon it.

AlfvenMachNumber	Item

The ratio of the bulk flow speed to the Alfven speed.

AlfvenVelocity	Item

Phase velocity of the Alfven wave; In SI units it is the velocity of the magnetic field divided by the square root of the mass density times the permeability of free space (mu).

AlphaParticle	Item

A positively charged nuclear particle that consists of two protons and two neutrons.

AlternateName	Text

An alternative or shortened name used to refer to a resource. This includes acronyms, expanded names or a synonym for a resource.

Ancillary	Item

A complementary item which can be subordinate, subsidiary, auxiliary, supplementary to the primary item.

Anisotropy	Item

Direction-dependent property.

Annotation	Container

Information which is explanatory or descriptive which is associated with another resource.
> Sub-elements:
>> AnnotationType
>> ClassificationMethod
>> ConfidenceRating
>> Extension
>> ImageURL
>> ObservationExtent
>> PhenomenonType
>> ResourceHeader
>> ResourceID
>> TimeSpan

AnnotationType	Enumeration

A classification for an annotation.
> Allowed Values:
>> Anomaly
>> Event
>> Feature

Anomaly	Item

An interval where measurements or observations may be adversely affected.

Antenna	Item

A sensor used to measure electric potential.

ArchiveSpecialist	Item

An individual who is an expert on a collection of resources and may also be knowledgeable of the phenomenon and related physics represented by the resources. This includes librarians, curators, archive scientists and other experts.

Area	Item

Integration over the extent of a planar region, or of the surface of a solid.

Array	Item

A sequence of values corresponding to the elements in a rectilinear, n-dimension matrix. Each value can be referenced by a unique index.

ArrivalDirection	Item

An angular measure of the direction from which an energetic particle or photon was incident on a detector. The angles may be measured in any coordinate system.

Association	Container

Attributes of a relationship a resource has with another resource.
>	Sub-elements:
>>		AssociationID
>>		AssociationType
>>		Note

AssociationID	Text

The resource identifier for a resource with which this resource is closely associated.

AssociationType	Enumeration

A characterization of the role or purpose of an associated resource.
>	Allowed Values:
>>		ChildEventOf
>>		DerivedFrom
>>		ObservedBy
>>		Other
>>		PartOf
>>		RevisionOf

Asteroid	Item

A small extraterrestrial body consisting mostly of rock and metal that is in orbit around the sun.

Atmosphere	Item

The neutral gases surrounding a body that extends from the surface and is bound to the body by virtue of the gravitational attraction.

Atom	Item

Matter consisting of a nucleus surrounded by electrons which has no net charge.

AtomicNumber	Numeric

The number of protons in the nucleus of an atom.

AtomicNumberDetected	Item

The number of protons in the nucleus of an atom as determined by a detector.

Aurora	Item

An atmospheric phenomenon consisting of bands of light caused by charged solar particles following the earth's magnetic lines of force.

AuroralRegion	Item

The region in the atmospheric where electrically-charged particles bombarding the upper atmosphere of a planet in the presence of a magnetic field produce an optical phenomenon.

Automatic	Item

Determined by the analysis or assessment performed by a program or server.

Availability	Enumeration

An indication of the method or service which may be used to access the resource.
>   Allowed Values:
>   Offline
>   Online

Average	Item

The statistical mean; the sum of a set of values divided by the number of values in the set.

AverageChargeState	Item

A measure of the composite deficit (positive) or excess (negative) of electrons with respect to protons.

AxisLabel	Text

A short character string (approximately 10 characters, but preferably 6 characters - more only if absolutely required for clarity) which can be used to label a y-axis for a plot or to provide a heading for a data listing.

AzimuthAngle	Item

The angle between the projection into the i-j plane of a position or measured vector and the i-axis of the coordinate system. Mathematically defined as arctan(j/i). This term could be also applied to angles measured in different planes, for example the IMF clock angle defined as arctan(|By|/Bz).

AzimuthalAngleRange	Container

The range of possible azimuthal angles for a group of energy observations. Default units are degrees.
>   Sub-elements:
>   Bin
>   High
>   Low
>   Units

BZIP2	Item

An open standard algorithm by Julian Seward using Burrows-Wheeler block sorting and Huffman coding. See <http://www.bzip.org/>

BandName	Text

A common or provider assigned name for a range of values.

Bandwidth	Item

Integration over the width a frequency band.

Base64	Item

A data encoding scheme whereby binary-encoded data is converted to printable ASCII characters. It is defined as a MIME content transfer encoding for use in Internet e-mail. The only characters used are the upper- and lower-case Roman alphabet characters (A-Z, a-z), the numerals (0-9), and the "+" and "/" symbols, with the "=" symbol as a special suffix (padding) code.

Bin	Container

A grouping of observations according to a band or window of a common attribute.
>   Sub-elements:

BandName
High
Low

Binary	Item

A direct representation of the bits which may be stored in memory on a computer.

BowShockCrossing	Item

A crossing of the boundary between the undisturbed (except for foreshock effects) solar wind and the shocked, decelerated solar wind of the magnetosheath.

Browse	Item

A representation of an image which is suitable to reveal most or all of the details of the image.

CDF	Item

Common Data Format (CDF). A binary storage format developed at Goddard Space Flight Center (GSFC).

CEF	Item

Cluster Exchange Format (CEF) is a self-documenting ASCII format designed for the exchange of data. There are two versions of CEF which are not totally compatible.

CEF1	Item

Cluster Exchange Format (CEF), version 1, is a self-documenting ASCII format designed for the exchange of data. The metadata contains information compatible with the ISTP recommendations for CDF.

CEF2	Item

Cluster Exchange Format (CEF), version 2, is a self-documenting ASCII format designed for the exchange of data and introduced for Cluster Active Archive. Compared to version 1, the metadata description of vectors and tensors is different.

CGM	Item

Corrected Geomagnetic - A coordinate system from a spatial point with GEO radial distance and geomagnetic latitude and longitude, follow the epoch-appropriate IGRF/DGRF model field vector through to the point where the field line crosses the geomagnetic dipole equatorial plane. Then trace the dipole magnetic field vector Earthward from that point on the equatorial plane, in the same hemisphere as the original point, until the initial radial distance is reached. Designate the dipole latitude and longitude at that point as the CGM latitude and longitude of the original point. See <http://nssdc.gsfc.nasa.gov/space/cgm/cgmm_des.html>

CaK	Item

A spectrum with a wavelength of range centered near 393.5 nm. VSO nickname: Ca-K image with range of 391.9 nm to 395.2 nm.

Cadence	Duration

The time interval between the start of successive measurements.

Calibrated	Item

Data wherein sensor outputs have been convolved with instrument response function, often irreversibly, to yield data in physical units.

Carrington	Item

A coordinate system which is centered at the Sun and is "fixed" with respect to the synodic rotation rate; the mean synodic value is about 27.2753 days. The Astronomical Almanac gives a value for Carrington longitude of 349.03 degrees at 0000 UT on 1 January 1995.

Cartesian	Item

A representation in which a position vector or a measured vector (e.g., field or flow) is specified by its components along the base axes of the coordinate system.

Catalog   Container

A tabular listing of events or observational notes, especially those that have utility in aiding a user in locating data. Catalogs include lists of events, files in a product, and data availability. A Catalog resource is a type of "data product" which is a set of data that is uniformly processed and formatted, from one or more instruments, typically spanning the full duration of the observations of the relevant instrument(s). A data product may consist of a collection of granules of successive time spans, but may be a single high-level entity.

      Sub-elements:

              AccessInformation
              Caveats
              Extension
              InputResourceID
              InstrumentID
              Keyword
              Parameter
              PhenomenonType
              ProviderResourceName
              ProviderVersion
              ResourceHeader
              ResourceID
              TimeSpan

Caveats   Text

Information which may be important in the avoidance of the misuse of the resource, for instance instrument maladies, corruption or contamination.

Channeltron   Item

right-handed sense (that of the gyrating electrons) around the magnetic field.

ClassificationMethod	Enumeration

The technique used to determine the characteristics of an object.
      Allowed Values:
            Automatic
            Inferred
            Inspection

CoInvestigator	Item

An individual who is a scientific peer and major participant in an investigation.

ColorBar	Item

A spectrum or set of colors used to represent data values.

Column	Item

A two-dimensional measure of a quantity. The column is the area over which the quantity is measured.

Comet	Item

A relatively small extraterrestrial body consisting of a frozen mass that travels around the sun in a highly elliptical orbit.

Component	Enumeration

Projection of a vector along one of the base axes of a coordinate system.
      Allowed Values:
            I
            J
            K

ConfidenceRating	Enumeration

A classification of the certainty of an assertion.

Contact	Container

The person or organization who may be able to provide special assistance or serve as a channel for communication for additional information about a resource.
      Sub-elements:
            PersonID
            Role

Contributor	Item

An entity responsible for making contributions to the content of the resource.

CoordinateRepresentation	Enumeration

The method or form for specifying a given point or vector in a given coordinate system.
      Allowed Values:
            Cartesian
            Cylindrical
            Spherical

CoordinateSystem	Container

The specification of the orientation of a set of (typically) orthogonal base axes.
      Sub-elements:
            CoordinateRepresentation
            CoordinateSystemName

CoordinateSystemName	Enumeration

Identifies the coordinate system in which the position, direction or observation has been expressed.
      Allowed Values:
            CGM

Carrington
DM
ECEF
ENP
GEI
GEO
GSE
GSEQ
GSM
HAE
HCC
HCI
HCR
HEE
HEEQ
HG
HGI
HPC
HPR
J2000
LGM
MAG
MFA
RTN
SC
SE
SM
SR
SR2
SSE
SSE_L
SpacecraftOrbitPlane
WGS84

Core   Item

The central or main part of an object or calculated distribution. For example, the part of a distribution of particles at low energies that is a thermal (Maxwellian) population.

Corona   Item

The outermost atmospheric region of the Sun or a star, characterized by ionization temperatures above 10^5 K. The solar corona starts at about 2100 km above the photosphere; there is no generally defined upper limit.

CoronalHole   Item

An extended region of the corona, exceptionally low in density and associated with unipolar photospheric regions. A coronal hole can be an "open" magnetic field in the corona and (perhaps) inner heliosphere which has a faster than average outflow (wind); A region of lower than "quiet" ion and electron density in the corona; or a region of lower peak electron temperature in the corona than in the "quiet" corona.

CoronalMassEjection   Item

A solar event (CME) that involves a burst of plasma ejected into the interplanetary medium. CME's may be observed remotely relatively near the sun or in situ in the interplanetary medium. The latter type of observations are often referred to as Interplanetary CME's (ICME's).

Coronograph   Item

An instrument which can image things very close to the Sun by using a disk to block the Sun's bright surface which reveals the faint solar corona and other celestial objects.

CountRate   Item

The number of events per unit time.

Counts	Item

The number of detection events occurring in a detector over the detector accumulation time.

CrossSpectrum	Item

The Fourier transform of the cross correlation of two physical or empirical observations.

Current	Item

The flow of electrons through a conductor caused by a potential difference.

Cylindrical	Item

A coordinate representation of a position vector or measured vector (field or flow) by its k-component, the magnitude of its projection into the i-j plane, and the azimuthal angle of the i-j plane projection.

DM	Item

Dipole Meridian - A coordinate system centered at the observation point. Z axis is parallel to the Earth's dipole axis, positive northward. X is in the plane defined by Z and the line linking the observation point with the Earth's center. Y is positive eastward. See <http://cdpp.cnes.fr/00428.pdf>

DRegion	Item

The layer of the ionosphere that exists approximately 50 to 95 km above the surface of the Earth. One of several layers in the ionosphere.

Data	Item

A collection of organized information, usually the results of experience, observation or experiment, or a set of premises. This may consist of numbers, words, or images, particularly as measurements or observations of a set of variables.

DataExtent	Container

The area of storage in a file system required to store the contents of a resource. The default units for data extent is bytes.
> Sub-elements:
>> Per
>> Quantity
>> Units

DataProducer	Item

An individual who generated the resource and is familiar with its provenance.

DeputyPI	Item

An individual who is an administrative or scientific leader for an investigation operating under the supervision of a Principal Investigator.

DerivedFrom	Item

A transformed or altered version of a resource instance.

Description	Text

A narrative explanation with detail appropriate for the item it describes. For example a description of data resource should include discussions of the main quantities in the resource, possible uses and search terms. A description should also include whether any corrections (i.e, geometry, inertial) have been applied to the resource.

Deviation	Item

The difference between an observed value and the expected value of a quantity.

Differential	Item

A measurement within a narrow range of energy and/or solid angle.

Direction	Item

The spatial relation between an object and another object, the orientation of the object or the course along which the object points or moves.

DirectionAngle	Enumeration

The angle between a position vector or measured vector (or one of its projections onto a plane) and one of the base axes of the coordinate system.
>   Allowed Values:
>>   AzimuthAngle
>>   ElevationAngle
>>   PolarAngle

Directional	Item

A measurement within a narrow range of solid angle.

DisplayCadence	Duration

The time interval between the successive display elements.

DisplayData	Container

A graphical representation of data wherein the underlying numeric values are not (readily) accessible for analysis.. Examples are line plots and spectrograms. A Display Data resource is a type of "data product" which is a set of data that is uniformly processed and formatted, from one or more instruments, typically spanning the full duration of the observations of the relevant instrument(s). A data product may consist of a collection of granules of successive time spans, but may be a single high-level entity.
>   Sub-elements:
>>   AccessInformation
>>   Caveats
>>   DisplayCadence
>>   Extension
>>   InputResourceID
>>   InstrumentID
>>   Keyword
>>   MeasurementType
>>   ObservedRegion
>>   Parameter
>>   ProcessingLevel
>>   ProviderProcessingLevel
>>   ProviderResourceName
>>   ProviderVersion
>>   ResourceHeader
>>   ResourceID
>>   SpectralRange
>>   TemporalDescription

DisplayType	Enumeration

The general styling or type of plot that is suitable for the variable.
>   Allowed Values:
>>   Image
>>   Plasmagram
>>   Spectrogram
>>   StackPlot
>>   TimeSeries
>>   WaveForm

Document	Container

A set of information designed and presented as an individual entity. A document may contain plain or formatted text, in-line graphics, sound, other multimedia data, or hypermedia references. A Document resource is intended for use on digital objects that have no other identifier (e.g., DOI or ISBN).
>   Sub-elements:
>>   AccessInformation
>>   DocumentType

InputResourceID
Keyword
MIMEType
ResourceHeader
ResourceID

DocumentType   Enumeration

A characterization of the content, purpose, or style of the document.
Allowed Values:
Other
Poster
Presentation
Report
Specification
TechnicalNote
WhitePaper

DopplerFrequency   Item

Change in the frequency of a propagating wave due to motion of the source, the observer, the reflector, or the propagation medium.

Dopplergram   Item

A map or image depicting the spatial distribution of line-of-sight velocities of the observed object.

DoubleSphere   Item

A dipole antenna of which the active (sensor) elements are small spheres located at the ends of two wires deployed in the equatorial plane, on opposite sides of a spinning spacecraft.

Dust   Item

Free microscopic particles of solid material.

DustDetector   Item

An instrument which determines the mass and speed of ambient dust particles.

ECEF   Item

The Earth-Centered, Earth-Fixed (ECEF) coordinate system has point (0,0,0) defined as the center of mass of the Earth. Its axes are aligned with the International Reference Pole (IRP) and International Reference Meridian (IRM). The x-axis intersects the sphere of the Earth at 0 degree latitude (Equator) and 0 degree longitude (Greenwich). The z-axis points north. The y-axis completes the right handed coordinate system.

EITWave   Item

A wave in the corona of the Sun which produce shock waves on the Sun's chromosphere (Moreton Waves). EIT Waves are produced by large solar flare and expand outward at about 1,000 km/s. It usually appears as a slowly moving diffuse arc of brightening in H-alpha, and may travel for several hundred thousand km.

ENP   Item

ENP (also called PEN) - The P vector component points northward, perpendicular to orbit plane which for a zero degree inclination orbit is parallel to Earth's spin axis. The E vector component is perpendicular to P and N and points earthward. The N component is perpendicular to P and E and is positive eastward.

ERegion   Item

A layer of ionised gas occurring at 90-150km above the ground. One of several layers in the ionosphere. Also called the The Kennelly-Heaviside layer.

Earth   Enumeration

The third planet from the sun in our solar system.
Allowed Values:

> Magnetosheath
> Magnetosphere
> Magnetosphere.Magnetotail
> Magnetosphere.Main
> Magnetosphere.Polar
> Magnetosphere.RadiationBelt
> Moon
> NearSurface
> NearSurface.Atmosphere
> NearSurface.AuroralRegion
> NearSurface.EquatorialRegion
> NearSurface.Ionosphere
> NearSurface.Ionosphere.DRegion
> NearSurface.Ionosphere.ERegion
> NearSurface.Ionosphere.FRegion
> NearSurface.Ionosphere.Topside
> NearSurface.Mesosphere
> NearSurface.Plasmasphere
> NearSurface.PolarCap
> NearSurface.SouthAtlanticAnomalyRegion
> NearSurface.Stratosphere
> NearSurface.Thermosphere
> NearSurface.Troposphere
> Surface

Electric	Item

The physical attribute that exerts an electrical force.

ElectricField	Item

A region of space around a charged particle, or between two voltages within which a force is exerted on charged objects in its vicinity. An electric field is the electric force per unit charge.

Electromagnetic	Item

Electric and magnetic field variations in time and space that propagate through a medium or a vacuum with the wave's propagation, electric field, and magnetic field vectors forming an orthogonal triad. Waves in this category are detected by having their field quantities measured.

Electron	Item

An elementary particle consisting of a charge of negative electricity equal to about 1.602×10^{-19} Coulomb and having a mass when at rest of about 9.109534×10^{-28} gram.

ElectronDriftInstrument	Item

An active experiment to measure the electron drift velocity based on sensing the displacement of a weak beam of electrons after one gyration in the ambient magnetic field.

Electrostatic	Item

Collective longitudinal electric-field and plasma oscillations trapped within a body of plasma.

ElectrostaticAnalyser	Item

An instrument which uses charged plates to analyze the mass, charge and kinetic energies of charged particles which enter the instrument.

Element	Container

A component or individual unit of a multiple value quantity such as an array or vector.
> Sub-elements:
> > FillValue
> > Index
> > Name
> > ParameterKey
> > Qualifier
> > RenderingHints
> > Units

      UnitsConversion
      ValidMax
      ValidMin

Elevation	Numeric

The distance in meters above (positive) or below (negative) the "zero elevation" defined by the World Geodetic System reference frame (WGS84).

ElevationAngle	Item

The angle between the position or measured vector and the i-j plane of the coordinate system. Mathematically defined as arctan(k/SQRT(i^2+j^2)).

Email	Text

The electronic address at which the individual may be contacted expressed in the form "local-part@domain".

Emissivity	Item

The energy emitted spontaneously per unit bandwidth (typically frequency) per unit time per unit mass of source. Emissivity is usually integrated over all directions/solid angles.

Encoding	Enumeration

A set of unambiguous rules that establishes the representation of information within a file.
      Allowed Values:
            ASCII
            BZIP2
            Base64
            GZIP
            None
            S3_BUCKET
            TAR
            Unicode
            ZIP

EnergeticParticleInstrument	Item

An instrument that measures fluxes of charged particles as a function of time, direction of motion, mass, charge and/or species.

EnergeticParticles	Item

Pieces of matter that are moving very fast. Energetic particles include protons, electrons, neutrons, neutrinos, the nuclei of atoms, and other sub-atomic particles.

EnergeticSolarParticleEvent	Item

An enhancement of interplanetary fluxes of energetic ions accelerated by interplanetary shocks and/or solar flares.

Energy	Item

The capacity for doing work as measured by the capability of doing work (potential energy) or the conversion of this capability to motion (kinetic energy)

EnergyDensity	Item

The amount of energy per unit volume.

EnergyFlux	Item

The amount of energy passing through a unit area in a unit time.

EnergyRange	Container

The minimum and maximum energy values of the particles represented by a given "physical parameter" description.
      Sub-elements:
            Bin
            High

Low
Units

Ephemeris	Item

The spatial coordinates of a body as a function of time. When used as an Instrument Type it represents the process or methods used to generate spatial coordinates.

EquatorialRegion	Item

A region centered on the equator and limited in latitude by approximately 23 degrees north and south of the equator.

EquivalentWidth	Item

The spectral width of a total absorption line having the amount of absorbed radiant energy being equivalent to that in an observed absorption line.

Event	Item

An action or observation which occurs at a point in time.

Excel	Item

A Microsoft spreadsheet format used to hold a variety of data in tables which can include calculations.

ExpirationDate	DateTime

The date and time when a resource is no longer available. If the Expiration Date is specified then it indicates that resource should not be made available after that time. However, this is only advisory and in practice a resource description should be unpublished to eliminate access to a resource.

Exposure	Duration

The time interval over which an individual measurement is taken.

Extension	Text

A container of other metadata which is not part of the SPASE data model. The contents of this element are defined by individual usage. The organization and content are constrained by the implementation. For example, in an XML representation of the SPASE metadata the content must conform to the XML specifications.

ExtremeUltraviolet	Item

A spectrum with a wavelength range of 10.0 nm to 125.0nm. VSO nickname: EUV image with a range of of 10.0 nm to 125.0 nm

FITS	Item

Flexible Image Transport System (FITS) is a digital format primarily designed to store scientific data sets consisting of multi-dimensional arrays (1-D spectra, 2-D images or 3-D data cubes) and 2-dimensional tables containing rows and columns of data.

FRegion	Item

A layer that contains ionized gases at a height of around 150-800 km above sea level, placing it in the thermosphere. the F region has the highest concentration of free electrons and ions anywhere in the atmosphere. It may be thought of as comprising two layers, the F1-and F2-layers. One of several layers in the ionosphere. Also known as the Appleton layer.

FarUltraviolet	Item

A spectrum with a wavelength range of 122 nm to 200.0nm. VSO nickname: FUV image with a range of 122.0 nm to 200 nm

FaradayCup	Item

An instrument consisting of an electrode from which electrical current is measured while a charged particle beam (electrons or ions) impinges on it. Used to determine energy spectrum and sometimes ion composition of the impinging particles.

FaxNumber	Text

The symbols and numerals required to send a facsimile (FAX) to an individual by telephone. The string may contain punctuation marks such as dash (-) or dot (.) to separate fields within the string.

Feature	Item

A prominent or distinctive characteristic that occurs at a location or persists over a period of time.

Field	Container

The space around a radiating body within which its electromagnetic attributes can exert force on another similar body that is not in direct contact.
> Sub-elements:
>> FieldQuantity
>> FrequencyRange
>> Qualifier

FieldAligned	Item

The component of a quantity which is oriented in the same direction of a field.

FieldQuantity	Enumeration

The physical attribute of the field.
> Allowed Values:
>> Current
>> Electric
>> Electromagnetic
>> Gyrofrequency
>> Magnetic
>> PlasmaFrequency
>> Potential
>> PoyntingFlux

FillValue	Text

A value that indicates that a quantity is undefined.

Film	Item

An image recording medium on which usually a "negative" analog image is registered. A "positive" image can be recovered or reproduced from film, which is usually made of flexible materials for ease of storage and transportation.

Fit	Item

Values that make an model agree with the data.

FlowSpeed	Item

The rate at which particles or energy is passing through a unit area in a unit time.

FlowVelocity	Item

The volume of matter passing through a unit area perpendicular to the direction of flow in a unit of time.

Fluence	Item

The time integral of a flux. A fluence does not have any "per unit time" in its units.

FluxFeedback	Item

A search coil whose bandwidth and signal/noise ratio are increased by the application of negative feedback at the sensor (flux) level by driving a collocated coil with a signal from the preamplifier.

ForbushDecrease	Item

A rapid decrease in the observed galactic cosmic ray intensity following the passage of an

outwardly convecting interplanetary magnetic field disturbance, such as those associated with large CME's, that sweep some galactic cosmic rays away from Earth.

Format	Enumeration

The organization of data according to preset specifications. The value is selected from a list of accepted names for known, well documented formats.

> Allowed Values:
>> AVI
>> Binary
>> CDF
>> CEF
>> CEF1
>> CEF2
>> Excel
>> FITS
>> GIF
>> HDF
>> HDF4
>> HDF5
>> HTML
>> Hardcopy
>> Hardcopy.Film
>> Hardcopy.Microfiche
>> Hardcopy.Microfilm
>> Hardcopy.Photograph
>> Hardcopy.PhotographicPlate
>> Hardcopy.Print
>> IDFS
>> IDL
>> JPEG
>> MATLAB_4
>> MATLAB_6
>> MATLAB_7
>> MPEG
>> NCAR
>> NetCDF
>> PDF
>> PNG
>> Postscript
>> QuickTime
>> TIFF
>> Text
>> Text.ASCII
>> Text.Unicode
>> UDF
>> VOTable
>> XML

FormerPI	Item

An individual who had served as the administrative and scientific lead for an investigation, but no longer assumes that role.

FourierTransformSpectrograph	Item

An instrument that determines the spectra of a radiative source, using time-domain measurements and a Fourier transform.

Frequency	Item

The number of occurrences of a repeating event per unit time.

FrequencyRange	Container

The range of possible values for the observed frequency.

> Sub-elements:

Bin
High
Low
SpectralRange
Units

| FrequencyToGyrofrequencyRatio | Item |

The ratio of the characteristic frequency of a medium to gyrofrequency of a particle.

| GEI | Item |

GEI Geocentric Equatorial Inertial - A coordinate system where the Z axis is along Earth's spin vector, positive northward. X axis points towards the first point of Aries (from the Earth towards the Sun at the vernal equinox). See Russell, 1971. When the X axis is the direction of the mean vernal equinox of J2000, the coordinate system is also called GCI. Then the Z axis is also defined as being normal to the mean Earth equator of J2000.

| GEO | Item |

Geographic - geocentric corotating - A coordinate system where the Z axis is along Earth's spin vector, positive northward. X axis lies in Greenwich meridian, positive towards Greenwich. See Russell, 1971.

| GIF | Item |

Graphic Interchange Format (GIF) first introduced in 1987 by CompuServe. GIF uses LZW compression and images are limited to 256 colours.

| GSE | Item |

Geocentric Solar Ecliptic - A coordinate system where the X axis is from Earth to Sun. Z axis is normal to the ecliptic, positive northward. See Russell, 1971.

| GSEQ | Item |

Geocentric Solar Equatorial - A coordinate system where the X axis is from Earth to Sun. Y axis is parallel to solar equatorial plane. Z axis is positive northward. See Russell, 1971

| GSM | Item |

Geocentric Solar Magnetospheric - A coordinate system where the X axis is from Earth to Sun, Z axis is northward in a plane containing the X axis and the geomagnetic dipole axis. See Russell, 1971

| GZIP | Item |

An open standard algorithm distributed by GHU based on LZ77 and Huffman coding. See <http://www.gnu.org/software/gzip/gzip.html> or <http://www.gzip.org/>

| GammaRays | Item |

Photons with a wavelength range: 0.00001 to 0.001 nm

| GeigerMuellerTube | Item |

An instrument which measures density of ionizing radiation based on interactions with a gas.

| GeneralContact | Item |

An individual who can provide information on a range of subjects or who can direct you to a domain expert.

| GeomagneticStorm | Item |

A magnetospheric disturbance typically defined by variations in the horizontal component of the Earth's surface magnetic field. The variation typically starts with a field enhancement associated with a solar wind pressure pulse and continues with a field depression associated with an enhancement of the diamagnetic magnetospheric ring current.

| Granule | Container |

An accessible portion of another resource. A Granule may be composed of one or more

physical pieces (files) which are considered inseparable. For example, a data storage format that maintains metadata and binary data in separate, but tightly coupled files. Granules should not be used to group files that have simple relationships or which are associated through a parent resource. For example, each file containing a time interval data for a Numerical Data resource would each be considered a Granule. The ParentID of a Granule resource must be a NumericalData resource. The attributes of a Granule supersede the corresponding attributes in the NumericalData resource.

     Sub-elements:
                 ExpirationDate
                 ParentID
                 PriorID
                 ReleaseDate
                 ResourceID
                 Source
                 StartDate
                 StopDate

Group	Item

An assemblage of values that a certain relation or common characteristic.

Gyrofrequency	Item

The number of gyrations around a magnetic guiding center (field line) a charged particle makes per unit time due to the Lorentz force.

HAE	Item

Heliocentric Aries Ecliptic - A coordinate system where the Z axis is normal to the ecliptic plane, positive northward. X axis is positive towards the first point of Aries (from Earth to Sun at vernal equinox). Same as SE below. See Hapgood, 1992.

HCC	Item

Heliocentric Cartesian - A 3-D orthonormal coordinate system that is primarily intended to specify with two dimensions a point on the solar disk. The Z axis points toward the observer. The Y axis lies in the plane defined by the solar spin vector and the Z axis, positive northward. The X axis is perpendicular to the Y and Z axes, positive toward solar west. Standard representation for this system is via the point's x and y values, expressed either as physical distances or as fractions of the solar disk radius.

HCI	Item

Heliographic Carrington Inertial.

HCR	Item

Heliocentric Radial - A 3-D orthonormal coordinate system that is primarily intended to specify with two dimensions a point on the solar disk. The Z axis points toward the observer. The Y axis lies in the plane defined by the solar spin vector and the Z axis, positive northward. The X axis is perpendicular to the Y and Z axes, positive toward solar west. Standard representation for this system is via the point's distance rho from the Z axis [Rho = SQRT(x**2 + y**2)] and its phase angle psi measured counterclockwise from the +Y axis [psi = arctan (-y/x)]

HDF	Item

Hierarchical Data Format

HDF4	Item

Hierarchical Data Format, Version 4

HDF5	Item

Hierarchical Data Format, Version 5

HEE	Item

Heliocentric Earth Ecliptic - A coordinate system where the Z axis is normal to the ecliptic plane, positive northward. X axis points from Sun to Earth. See Hapgood, 1992

HEEQ   Item

Heliocentric Earth Equatorial - A coordinate system where the Z axis is normal to the solar equatorial plane, positive northward. X axis is generally Earthward in the plane defined by the Z axis and the Sun-Earth direction. See Hapgood, 1992.

HG   Item

Heliographic - A heliocentric rotating coordinate system where the Z axis is normal to the solar equatorial plane, positive northward. X, Y axes rotate with a 25.38 day period. The zero longitude (X axis) is defined as the longitude that passed through the ascending node of the solar equator on the ecliptic plane on 1 January, 1854 at 12 UT. See <http://nssdc.gsfc.nasa.gov/space/helios/coor_des.html>

HGI   Item

Microfilm
Photograph
PhotographicPlate
Print

HashFunction   Enumeration

A function or algorithm that converts a digital data object into a hash value. Typically the hash value is small and concise when compared to the digital data object.
    Allowed Values:
        MD5
        SHA1
        SHA256

HashValue   Text

The value calculated by a hash function, e.g. the message digest of a digital data object.

He10830   Item

A spectrum with a wavelength range centered at 1082.9 nm. VSO nickname: He 10830 image with a range of 1082.5 nm to 1083.3 nm.

He304   Item

A spectrum centered around the resonance line of ionised helium at 304 Angstrom (30.4 nm).

HeatFlux   Item

Flow of thermal energy through a gas or plasma; typically computed as third moment of a distribution function.

Heliosheath   Item

The region extending radially outward from the heliospheric termination shock and in which the decelerated solar wind plasma is still significant.

Heliosphere   Enumeration

The solar atmosphere extending roughly from the outer corona to the edge of the solar plasma at the heliopause separating primarily solar plasma from interstellar plasma.
    Allowed Values:
        Heliosheath
        Inner
        NearEarth
        Outer
        Remote1AU

High   Numeric

The largest value within a range of possible values.

Horizontal   Item

Parallel to or in the plane of the horizon or a base line.

Hydrodynamic   Item

Periodic or quasi-periodic oscillations of fluid quantities.

I   Item

Projection of a vector along the first named axis of a coordinate system. Typically the X axis, but could be the R axis for an RTN coordinate system.

IDFS   Item

Instrument Data File Set (IDFS) is a set of files written in a prescribed format which contain data, timing data, and meta-data. IDFS was developed at Southwest Research Institute (SwRI).

IDL   Item

Interactive Data Language (IDL) save set. IDL is a proprietary format.

IJ	Item

A measure of the length of a position or measured vector projected into the i-j (typically X-Y) plane of the coordinate system.

IK	Item

A measure of the length of a position or measured vector projected into the i-k (typically X-Z) plane of the coordinate system.

Image	Item

A two-dimensional representation of data with values at each element of the array related to an intensity or a color.

ImageIntensity	Item

Measurements of the two-dimensional distribution of the intensity of photons from some region or object such as the Sun or the polar auroral regions; can be in any wavelength band, and polarized, etc.

ImageURL	URL

A URL to graphic, image or movie.

Imager	Item

An instrument which samples the radiation from an area at one or more spectral ranges emitted or reflected by an object.

ImagingSpectrometer	Item

An instrument which is a multispectral scanner with a very large number of channels (64-256 channels) with very narrow band widths.

Index	Sequence

The location of an item in an array or vector. An index can be multivalued to represent the location in a multidimensional object. The index of the first item is "1". A value of "0" is a wild card for all elements at the location in an array. A value of "-1" is a reference to the dimension at the location in the array. A "-1" is used when describing the attributes of the dimension, where as "0" or a positive integer is used to describe attributes of individual elements.

Inferred	Item

Determined by the analysis of other information or resources.

InformationURL	Container

Attributes of the method of acquiring additional information.
      Sub-elements:
            Description
            Language
            Name
            URL

Infrared	Item

Photons with a wavelength range: 760 to 1.00×10^6 nm

Inner	Item

The region of the heliosphere extending radially outward from the solar coronal base to just inside 1 AU.

InputResourceID	Text

The resource identifier for a resource which was used to generate this resource.

Inspection	Item

Determined by the analysis or assessment performed by a person.

Instrument	Container

A device that makes measurements used to characterize a physical phenomenon, or a family of like devices.

 Sub-elements:

 Caveats
 Extension
 InstrumentType
 InvestigationName
 ObservatoryID
 OperatingSpan
 ResourceHeader
 ResourceID

InstrumentID	Text

The identifier of an Instrument resource.

InstrumentMode	Item

An indication of a state (mode) in which the instrument is operating. How a mode influences the interpretation and representation of data is described in instrument related documentation.

InstrumentStatus	Item

A quantity directly related to the operation or function of an instrument.

InstrumentType	Enumeration

A characterization of an integrated collection of software and hardware containing one or more sensors and associated controls used to produce data on an environment.

 Allowed Values:

 Antenna
 Channeltron
 Coronograph
 DoubleSphere
 DustDetector
 ElectronDriftInstrument
 ElectrostaticAnalyser
 EnergeticParticleInstrument
 FaradayCup
 FluxFeedback
 FourierTransformSpectrograph
 Geiger-MuellerTube
 Imager
 ImagingSpectrometer
 Interferometer
 IonChamber
 IonDrift
 LangmuirProbe
 LongWire
 Magnetograph
 Magnetometer
 MassSpectrometer
 MicrochannelPlate
 MultispectralImager
 NeutralAtomImager
 NeutralParticleDetector
 ParticleCorrelator
 ParticleDetector
 Photometer
 PhotomultiplierTube
 Photopolarimeter
 Platform
 ProportionalCounter
 QuadrisphericalAnalyser
 Radar
 Radiometer
 ResonanceSounder

RetardingPotentialAnalyser
Riometer
ScintillationDetector
SearchCoil
SolidStateDetector
Sounder
SpacecraftPotentialControl
SpectralPowerReceiver
Spectrometer
TimeOfFlight
Unspecified
WaveformReceiver

Integral	Enumeration

A flux measurement in a broad range of energy and solid angle.
Allowed Values:
Area
Bandwidth
SolidAngle

Intensity	Item

The measurement of radiant or wave energy per unit detector area per unit bandwidth per unit solid angle per unit time.

Interferometer	Item

An instrument to study the properties of two or more waves from the pattern of interference created by their superposition.

Interior	Item

The region inside the body which is not visible from outside the body.

InterplanetaryShock	Item

A shock propagating generally anti-sunward through the slower solar wind, often seen in front of CME-associated plasma clouds.

Interstellar	Item

The region between stars outside of the star's heliopause.

InvestigationName	Text

The name given to the contract or engagement which enabled the data to be produced. Each investigation is associated with a Principal Investigator or Guest Investigator who was responsible for the original proposal. For single PI missions each major subsystem having its own identified Team Leader may also be classed as an "Investigation" for the purposes of data archiving.

Ion	Item

An atom that has acquired a net electric charge by gaining or losing one or more electrons.(Note: Z>2)

IonChamber	Item

A device in which the collected electrical charge from ionization in a gas-filled cavity is taken to be the proportion to some parameter (e.g. dose or exposure) of radiation field

IonComposition	Item

In situ measurements of the relative flux or density of electrically charged particles in the space environment. May give simple fluxes, but full distribution functions are sometimes measured.

IonDrift	Item

A device which measures the current produced by the displacement of ambient ions on a grid, thereby allowing the determination of the ion trajectory and velocity.

Ionosphere	Enumeration

The charged or ionized gases surrounding a body that are nominally bound to the body by virtue of the gravitational attraction.

    Allowed Values:

        DRegion
        ERegion
        FRegion
        Topside

Irradiance	Item

Irradiance - A radiometric term for the power of electromagnetic radiation at a surface, per unit area. "Irradiance" is used when the electromagnetic radiation is incident on the surface. Irradiance data may be reported in any units (i.e. counts/s) due to, for example, being at a particular wavelength, or to being a not-fully-calibrated relative measurement.

J	Item

Projection of a vector along the second named axis of a coordinate system. Typically the Y axis, but could be the T axis for an RTN coordinate system.

J2000	Item

An astronomical coordinate system which uses the mean equator and equinox of Julian date 2451545.0 TT (Terrestrial Time), or January 1, 2000, noon TT. (aka J2000) to define a celestial reference frame.

JK	Item

A measure of the length of a position or measured vector projected into the j-k (typically Y-Z) plane of the coordinate system.

JPEG	Item

A binary format for still images defined by the Joint Photographic Experts Group

Jupiter	Item

The fifth planet from the sun in our solar system.

K	Item

Projection of a vector along the third named axis of a coordinate system. Typically the Z axis, but could be the N axis for an RTN coordinate system.

K7699	Item

A spectrum with a wavelength range centred at 769.9 nm. VSO nickname: K-7699 dopplergram with a range of 769.8 nm to 770.0 nm.

Keyword	Text

A word or phrase that is relevant to the resource but does not exist in other documentary information.

LBHBand	Item

Lyman-Birge-Hopfield band in the far ultraviolet range with wavelength range of 140nm to 170 nm.

LGM	Item

Local Geomagnetic - A coordinate system used mainly for Earth surface or near Earth surface magnetic field data. X axis northward from observation point in a geographic meridian. Z axis downward towards Earth's center. In this system, H (total horizontal component) = SQRT $(Bx^2 + By^2)$ and D (declination angle) = arctan (By/Bx)

LangmuirProbe	Item

A monopole antenna associated with an instrument. The instrument applies a potential to the antenna which is swept to determine the voltage/current characteristic. This provides information about the plasma surrounding the probe and spacecraft.

Language	Text

The two character indicator of language selected from the ISO 630-1 codes for the representation of names of languages.

Latitude	Numeric

The angular distance north (positive) or south (negative) from the equator, measured along the meridian passing through the point.

Layout	Item

The structured arrangement of items in a collection.

LineDepth	Item

The measure of the amount of absorption below the continuum (depth) in a particular wavelength or frequency in an absorption spectrum.

LineOfSight	Item

The line of sight is the line that connects the observer with the observed object. This expression is often used with measurements of Doppler velocity and magnetic field in magnetograms, where only the component of the vector field directed along the line of sight is measured.

Linear	Item

Polarization where the E-field vector is confined to a given plane

LinearScale	Item

Intervals which are equally spaced.

Location	Container

A position in space definable by a regional referencing system and geographic coordinates.
    Sub-elements:
          CoordinateSystemName
          Elevation
          Latitude
          Longitude
          ObservatoryRegion

LogScale	Item

Intervals which are spaced proportionally to the logarithms of the values being represented.

LongWire	Item

A dipole antenna whose active (sensor) elements are two wires deployed in the equatorial plane on opposite sides of a spinning spacecraft, and whose length is several times greater than the spacecraft diameter.

Longitude	Numeric

The angular distance measured west (positive) or east (negative) from a north-south line called the Prime Meridian.

Low	Numeric

The smallest value within a range of possible values.

MAG	Item

Geomagnetic - geocentric. Z axis is parallel to the geomagnetic dipole axis, positive north. X is in the plane defined by the Z axis and the Earth's rotation axis. If N is a unit vector from the Earth's center to the north geographic pole, the signs of the X and Y axes are given by Y = N x Z, X = Y x Z.. See Russell, 1971, and <http://cdpp.cnes.fr/00428.pdf>

MATLAB_4	Item

MATLAB Workspace save set, version 4. MAT-files are double-precision, binary, MATLAB format files. MATLAB is a proprietary product of The MathWorks.

MATLAB_6	Item

MATLAB Workspace save set, version 6. MAT-files are double-precision, binary, MATLAB format files. MATLAB is a proprietary product of The MathWorks.

MATLAB_7	Item

MATLAB Workspace save set, version 7. MAT-files are double-precision, binary, MATLAB format files. Version 7 includes data compression and Unicode encoding. MATLAB is a proprietary product of The MathWorks.

MD5	Item

Message Digest 5 (MD5) is a 128-bit message digest algorithm created in 1991 by Professor Ronald Rivest.

MFA	Item

Magnetic Field Aligned - A coordinate system spacecraft-centered system with Z in the direction of the ambient magnetic field vector. X is in the plane defined by Z and the spacecraft-Sun line, positive sunward. See <http://cdpp.cnes.fr/00428.pdf>

MHD	Item

Hydrodynamic waves in a magnetized plasma in which the background magnetic field plays a key role in controlling the wave propagation characteristics.

MIMEType	Text

Multipurpose Internet Mail Extensions (MIME) type and sub-type which characterizes the format of a file. MIME media types are define in RFC memorandum RFC 2046. Current MIME types are maintained by Internet Assigned Numbers Authority (IANA) at http://www.iana.org/assignments/media-types/index.html. Commonly used MIME types are: application/vnd.ms-powerpoint (ppt, pptx), application/vnd.ms-excel (xls, xlsx), text/richtext (rtx), application/postscript (eps, ps), application/pdf (pdf), application/xml-dtd (dtd), text/html (htm, html), text/xml (xsl, xml, xsd), application/x-dvi (dvi). If a document is compressed the specified MIME type should be for the uncompressed document.

MPEG	Item

A digital format for movies defined by the Motion Picture Experts Group

Magnetic	Item

The physical attribute attributed to a magnet or its equivalent.

MagneticCloud	Item

A transient event observed in the solar wind characterized as a region of enhanced magnetic field strength, smooth rotation of the magnetic field vector and low proton density and temperature.

MagneticField	Item

A region of space near a magnetized body where magnetic forces can be detected (as measured by methods such as Zeeman splitting, etc.).

Magnetogram	Item

Measurements of the vector or line-of-sight magnetic field determined from remote sensing measurements of the detailed structure of spectral lines, including their splitting and polarization. ("Magnetogram.")

Magnetograph	Item

A special type of magnetometer that records a time plot of the local magnetic field near the instrument; or a telescope capable of determining the magnetic field strength and/or direction on a distant object such as the Sun, using the Zeeman splitting or other spectral signatures of magnetization.

Magnetometer	Item

An instrument which measures the ambient magnetic field.

MagnetopauseCrossing   Item

A crossing of the interface between the shocked solar wind in the magnetosheath and the magnetic field and plasma in the magnetosphere.

Magnetosheath   Item

The region between the bow shock and the magnetopause, characterized by very turbulent plasma.

MagnetosonicMachNumber   Item

The ratio of the velocity of fast mode waves to the Alfven velocity.

Magnetosphere   Enumeration

The region of space above the atmosphere or surface of the planet, and bounded by the magnetopause, that is under the direct influence of the planet's magnetic field.
      Allowed Values:
            Magnetotail
            Main
            Polar
            RadiationBelt

Magnetotail   Item

The region on the night side of the body where the magnetic filed is stretched backwards by the force of the solar wind. For Earth, the magnetotail begins at a night-side radial distance of 10 Re (X > -10Re).

Magnitude   Item

A measure of the strength of a vector quantity or length of its representational vector.

Main   Item

The region of the magnetosphere where the magnetic field lines are closed, but does not include the gaseous region gravitationally bound to the body.

Mars   Item

The forth planet from the sun in our solar system.

Mass   Item

The measure of inertia (mass) of individual objects (e.g., aerosols).

MassDensity   Item

The mass of particles per unit volume.

MassNumber   Item

The total number of protons and neutrons (together known as nucleons) in an atomic nucleus.

MassSpectrometer   Item

An instrument which distinguishes chemical species in terms of their different isotopic masses.

Maximum   Item

The largest value of a batch or sample or the upper bound of a probability distribution.

MeasurementType   Enumeration

A characterization of the quantitative assessment of a phenomenon.
      Allowed Values:
            ActivityIndex
            Dopplergram
            Dust
            ElectricField
            EnergeticParticles
            Ephemeris
            ImageIntensity

InstrumentStatus
IonComposition
Irradiance
MagneticField
Magnetogram
NeutralAtomImages
NeutralGas
Profile
Radiance
Spectrum
ThermalPlasma
Waves
Waves.Active
Waves.Passive

Median	Item

The measure of central tendency of a set of n. values computed by ordering the values and taking the value at position (n. + 1) / 2 when n. is odd or the arithmetic mean of the values at positions n. / 2 and (n. / 2) + 1 when n. is even.

Mercury	Item

The first planet from the sun in our solar system.

Mesosphere	Item

The layer of the atmosphere that extends from the Stratosphere to a range of 80 km to 85 km, temperature decreasing with height.

MetadataContact	Item

An individual who can affect a change in the metadata describing a resource.

MicrochannelPlate	Item

An instrument used for the detection of elementary particles, ions, ultraviolet rays and soft X-rays constructed from very thin conductive glass capillaries.

Microfiche	Item

A sheet of microfilm on which many pages of material have been photographed; a magnification system is used to read the material.

Microfilm	Item

Film rolls on which materials are photographed at greatly reduced size; a magnification system is used to read the material.

Microwave	Item

Photons with a wavelength range: 1.00x10^6 to 1.50x10^7 nm

Minimum	Item

The smallest value of a batch or sample or the lower bound of a probability distribution.

MirrorURL	URL

A Uniform Resource Locator (URL) to an alternate location of a resource.

Mixed	Container

A parameter derived from more than one of the type of parameter. For example, plasma beta, the ratio of plasma particle energy density to the energy density of the magnetic field permeating the plasma, is "mixed."
    Sub-elements:
            MixedQuantity
            ParticleType
            Qualifier

MixedQuantity	Enumeration

A characterization of the combined attributes of a quantity.
    Allowed Values:
                AkasofuEpsilon
                AlfvenMachNumber
                AlfvenVelocity
                FrequencyToGyrofrequencyRatio
                MagnetosonicMachNumber
                Other
                PlasmaBeta
                TotalPressure
                VCrossB

ModeAmplitude	Item

In helioseismology the magnitude of oscillation of waves of a particular geometry.

Molecule	Item

A group of atoms so united and combined by chemical affinity that they form a complete, integrated whole, being the smallest portion of any particular compound that can exist in a free state

Moment	Item

Parameters determined by integration over a distribution function convolved with a power of velocity.

Moon	Item

The only natural satellite of the Earth.

MultispectralImager	Item

An instrument which captures images at multiple spectral ranges.

NCAR	Item

The National Center for Atmospheric Research (NCAR) format. A complete description of that standard is given in appendix C of the "Report on Establishment & Operation of the Incoherent-Scatter Data Base", dated August 23, 1984, obtainable from NCAR, P.O. Box 3000 Boulder, Colorado 80307-3000.

NaD	Item

A spectrum with a wavelength range of centered at 589.3 nm. VSO nickname: Na-D image with a range of 588.8 nm to 589.8 nm.

Name	Text

A language unit by which a person or thing is known.

NearEarth	Item

The heliospheric region near the Earth which extends to and includes the area near the L1 and L2 Lagrange point.

NearSurface	Enumeration

The gaseous and possibly ionized environment of a body extending from the surface to some specified altitude. For the Earth, this altitude is 2000 km.
    Allowed Values:
                Atmosphere
                AuroralRegion
                EquatorialRegion
                Ionosphere
                Ionosphere.DRegion
                Ionosphere.ERegion
                Ionosphere.FRegion
                Ionosphere.Topside
                Mesosphere
                Plasmasphere

> PolarCap
> SouthAtlanticAnomalyRegion
> Stratosphere
> Thermosphere
> Troposphere

Neptune	Item

The seventh planet from the sun in our solar system.

NetCDF	Item

Unidata Program Center's Network Common Data Form (NetCDF). A self-describing portable data format for array-oriented data access. See <http://my.unidata.ucar.edu/content/software/netcdf>

NeutralAtomImager	Item

An instrument which measures the quantity and properties of neutral particles over a range of angles. Measured properties can include mass and energy.

NeutralAtomImages	Item

Measurements of neutral atom fluxes as a function of look direction; often related to remote energetic charged particles that lose their charge through charge-exchange and then reach the detector on a line-of-sight trajectory.

NeutralGas	Item

Measurements of neutral atomic and molecular components of a gas.

NeutralParticleDetector	Item

An instrument which measures the quantity and properties of neutral particles. Measured properties can include mass and plasma bulk densities.

Neutron	Item

An elementary particle that has no net charge and is a constituent of atomic nuclei, and that has a mass slightly large than a proton (1.673 x 10^(-24) gram.)

Ni6768	Item

A spectrum with a wavelength range centered at 676.8 nm. VSO nickname: Ni-6768 dopplergram with a range of of 676.7 nm to 676.9 nm.

None	Item

A lack or absence of anything.

Note	Text

Information which is useful or important for the understanding of a value or parameter.

NumberDensity	Item

The number of particles per unit volume.

NumberFlux	Item

The number of particles passing a unit area in unit time, possibly also per unit energy (or equivalent) and/or per unit look direction.

NumericalData	Container

Data stored as numerical values in one or more specified formats. A Numerical Data resource is a type of "data product" which is a set of data that is uniformly processed and formatted, from one or more instruments, typically spanning the full duration of the observations of the relevant instrument(s). A data product may consist of Parameters stored in a collection of granules of successive time spans or a single data granule.

> Sub-elements:
> > AccessInformation
> > Caveats

Extension
InputResourceID
InstrumentID
Keyword
MeasurementType
ObservedRegion
Parameter
ProcessingLevel
ProviderProcessingLevel
ProviderResourceName
ProviderVersion
ResourceHeader
ResourceID
SpectralRange
TemporalDescription

ObservationExtent	Container

The spatial area encompassed by an observation.
   Sub-elements:
         Note
         ObservedRegion
         StartLocation
         StopLocation

Observatory	Container

The host (spacecraft, network, facility) for instruments making observations, or a family of closely related hosts.
   Sub-elements:
         Extension
         Location
         ObservatoryGroupID
         OperatingSpan
         ResourceHeader
         ResourceID

ObservatoryGroupID	Text

The identifier of an Observatory resource which the referring resource is a member of.

ObservatoryID	Text

The identifier of an Observatory resource.

ObservatoryRegion	Enumeration

A spatial location distinguished by certain natural features or physical characteristics where an observatory is located.
   Allowed Values:
         Asteroid
         Comet
         Earth
         Earth.Magnetosheath
         Earth.Magnetosphere
         Earth.Magnetosphere.Magnetotail
         Earth.Magnetosphere.Main
         Earth.Magnetosphere.Polar
         Earth.Magnetosphere.RadiationBelt
         Earth.Moon
         Earth.NearSurface
         Earth.NearSurface.Atmosphere
         Earth.NearSurface.AuroralRegion
         Earth.NearSurface.EquatorialRegion
         Earth.NearSurface.Ionosphere
         Earth.NearSurface.Ionosphere.DRegion
         Earth.NearSurface.Ionosphere.ERegion

Earth.NearSurface.Ionosphere.FRegion
Earth.NearSurface.Ionosphere.Topside
Earth.NearSurface.Mesosphere
Earth.NearSurface.Plasmasphere
Earth.NearSurface.PolarCap
Earth.NearSurface.SouthAtlanticAnomalyRegion
Earth.NearSurface.Stratosphere
Earth.NearSurface.Thermosphere
Earth.NearSurface.Troposphere
Earth.Surface
Heliosphere
Heliosphere.Heliosheath
Heliosphere.Inner
Heliosphere.NearEarth
Heliosphere.Outer
Heliosphere.Remote1AU
Interstellar
Jupiter
Mars
Mercury
Neptune
Pluto
Saturn
Sun
Sun.Chromosphere
Sun.Corona
Sun.Interior
Sun.Photosphere
Sun.TransitionRegion
Uranus
Venus

ObservedBy	Item

Detected or originating from another resource.

ObservedRegion	Enumeration

The portion of space measured by the instrument at the time of an observation. A region is distinguished by certain natural features or physical characteristics. It is the location of the observatory for in situ data, the location or region sensed by remote sensing observatories and the location-of-relevance for parameters that are derived from observational data.

Allowed Values:

Asteroid
Comet
Earth
Earth.Magnetosheath
Earth.Magnetosphere
Earth.Magnetosphere.Magnetotail
Earth.Magnetosphere.Main
Earth.Magnetosphere.Polar
Earth.Magnetosphere.RadiationBelt
Earth.Moon
Earth.NearSurface
Earth.NearSurface.Atmosphere
Earth.NearSurface.AuroralRegion
Earth.NearSurface.EquatorialRegion
Earth.NearSurface.Ionosphere
Earth.NearSurface.Ionosphere.DRegion
Earth.NearSurface.Ionosphere.ERegion
Earth.NearSurface.Ionosphere.FRegion
Earth.NearSurface.Ionosphere.Topside
Earth.NearSurface.Mesosphere
Earth.NearSurface.Plasmasphere
Earth.NearSurface.PolarCap

Earth.NearSurface.SouthAtlanticAnomalyRegion
Earth.NearSurface.Stratosphere
Earth.NearSurface.Thermosphere
Earth.NearSurface.Troposphere
Earth.Surface
Heliosphere
Heliosphere.Heliosheath
Heliosphere.Inner
Heliosphere.NearEarth
Heliosphere.Outer
Heliosphere.Remote1AU
Interstellar
Jupiter
Mars
Mercury
Neptune
Pluto
Saturn
Sun
Sun.Chromosphere
Sun.Corona
Sun.Interior
Sun.Photosphere
Sun.TransitionRegion
Uranus
Venus

Offline	Item

Not directly accessible electronically. This includes resources which may to be moved to an on-line status in response to a given request.

Online	Item

Directly accessible electronically.

Open	Item

Access is granted to everyone.

OperatingSpan	Container

The interval in time from the first point at which an instrument or spacecraft was producing and sending data until the last such time, ignoring possible gaps.
    Sub-elements:
            Note
            StartDate
            StopDate

Optical	Item

Photons with a wavelength range: 380 to 760 nm

OrganizationName	Text

A unit within a company or other entity (e.g., Government agency or branch of service) within which many projects are managed as a whole.

Other	Item

Not classified with more specific terms. The context of its usage may be described in related text.

Outer	Item

The region of the heliosphere extending radially outward from just outside 1 AU to the heliospheric termination shock.

PDF	Item

A document expressed in the Portable Document Format (PDF) as defined by Adobe.

PNG	Item

A digital format for still images. Portable Network Graphics (PNG)

Parallel	Item

Having the same direction as a given direction

Parameter	Container

A container of information regarding a parameter whose values are part of the product. Every product contains or can be related to one or more parameters.

> Sub-elements:
>> Cadence
>> Caveats
>> CoordinateSystem
>> Description
>> Field
>> FillValue
>> Mixed
>> Name
>> ParameterKey
>> Particle
>> RenderingHints
>> Set
>> Structure
>> Support
>> Units
>> UnitsConversion
>> ValidMax
>> ValidMin
>> Wave

ParameterKey	Text

The name or identifier which can be used to access the parameter in the resource. The associated value is dependent on the service used to access the resource. For columnar ASCII data, use "Column_X" for a single-element parameter and "Column_X-Column_Y" for a multi-element parameter, where X and Y are the relevant column index. The first column index is 1.

ParentID	Text

The resource identifier for a resource that a resource is a part of. The resource inherits the attributes of the referenced resource. Attributes defined in the resource override attributes of the parent in the manner prescribed by the containing resource.

PartOf	Item

A portion of a larger resource.

Particle	Container

A description of the types of particles observed in the measurement. This includes both direct observations and inferred observations.

> Sub-elements:
>> AtomicNumber
>> AzimuthalAngleRange
>> EnergyRange
>> ParticleQuantity
>> ParticleType
>> PolarAngleRange
>> Qualifier

ParticleCorrelator	Item

An instrument which correlates particle flux to help identify wave/particle interactions.

ParticleDetector	Item

An instrument which detects particle flux!!!

ParticleQuantity	Enumeration

A characterization of the physical properties of the particle.
 Allowed Values:
 ArrivalDirection
 AtomicNumberDetected
 AverageChargeState
 ChargeState
 CountRate
 Counts
 Energy
 EnergyDensity
 EnergyFlux
 FlowSpeed
 FlowVelocity
 Fluence
 Gyrofrequency
 HeatFlux
 Mass
 MassDensity
 MassNumber
 NumberDensity
 NumberFlux
 ParticleRadius
 Phase-SpaceDensity
 PlasmaFrequency
 Pressure
 SonicMachNumber
 SoundSpeed
 Temperature
 ThermalSpeed
 Velocity

ParticleRadius	Item

The mean radius for a Gaussian distribution of particles with an axial ratio of 2 and a distribution width that varies as 0.5 radius. A value of zero means no cloud was detected.

ParticleType	Enumeration

A characterization of the kind of particle observed by the measurement.
 Allowed Values:
 Aerosol
 AlphaParticle
 Atom
 Dust
 Electron
 Ion
 Molecule
 Neutron
 Proton

Passive	Item

Movement or effect produced by outside influence. A passive measurement is one which does not produce a transmission or excitation as a part of the measurement cycle.

Peak	Item

The maximum value for the quantity in question, over a period of time which is usually equal to the cadence.

Per	Duration

The time interval over which a characterization applies. For example, the number of bytes

generated each day.

Perpendicular	Item

At right angles to a given direction.

Person	Container

An individual human being.
Sub-elements:
Address
Email
Extension
FaxNumber
Note
OrganizationName
PersonName
PhoneNumber
ReleaseDate
ResourceID

PersonID	Text

The identifier assigned to a Person description.

PersonName	Text

The words used to address an individual.

Perturbation	Item

Variations in the state of a system.

Phase	Item

A point or portion in a recurring series of changes.

PhaseAngle	Item

Phase difference between two or more waves, normally expressed in degrees.

PhaseSpaceDensity	Item

The number of particles per unit volume in the six-dimensional space of position and velocity.

PhenomenonType	Enumeration

The characteristics or categorization of an event type.
Allowed Values:
ActiveRegion
Aurora
BowShockCrossing
CoronalHole
CoronalMassEjection
EITWave
EnergeticSolarParticleEvent
ForbushDecrease
GeomagneticStorm
InterplanetaryShock
MagneticCloud
MagnetopauseCrossing
RadioBurst
SectorBoundaryCrossing
SolarFlare
SolarWindExtreme
StreamInteractionRegion
Substorm

PhoneNumber	Text

The symbols and numerals required to contact an individual by telephone. The string may

contain punctuation marks such as dash (-) or dot (.) to separate fields within the string.

Photograph	Item

An image (positive or negative) registered on a piece of photo-sensitive paper

PhotographicPlate	Item

A rigid (typically glass) medium that functions like film. Its rigidity is for guarding against image distortion due to medium deformation (caused by heat and humidity). Photographic plates are often used for astronomical photography.

Photometer	Item

An instrument which measures the strength of electromagnetic radiation within a spectral band which can range from ultraviolet to infrared and includes the visible spectrum.

PhotomultiplierTube	Item

A vacuum phototube that is an extremely sensitive detector of light in the ultraviolet, visible, and near-infrared ranges of the electromagnetic spectrum.

Photon	Item

Electromagnetic waves detected by techniques that utilize their corpuscular character (e.g., CCD, CMOS, photomultipliers).

Photopolarimeter	Item

An instrument which measures the intensity and polarization or radiant energy. A photopolarimeter is a combination of a photometer and a polarimeter.

Photosphere	Item

The atmospheric layer of the Sun or a star from which continuum radiation, especially optical, is emitted to space. For the Sun, the photosphere is about 500 km thick.

PlasmaBeta	Item

The ratio of the plasma pressure (nkT) to the magnetic pressure (B^2/2mu0) of the SUM(nkT)/(B^2/2mu0).

PlasmaFrequency	Item

A number-density-dependent characteristic frequency of a plasma.

PlasmaWaves	Item

Self-consistent collective oscillations of particles and fields (electric and magnetic) in a plasma.

Plasmagram	Item

The characterization of signal strengths in active sounding measurements as a function of virtual range or signal delay time and sounding frequency. A Plasmagram is also referred to as an Ionogram.

Plasmasphere	Item

A region of the magnetosphere consisting of low energy (cool) plasma. It is located above the ionosphere. The outer boundary of the plasmasphere is known as the plasmapause, which is defined by an order of magnitude drop in plasma density.

Platform	Item

A collection of components which can be positioned and oriented as a single unit. A platform may contain other platforms. For example, a spacecraft is a platform which may have components that can be articulated and are also considered platforms.

Pluto	Item

The ninth (sub)planet from the sun in our solar system.

Polar	Item

The region near the pole of a body. For a magnetosphere the polar region is the area where

magnetic field lines are open and includes the auroral zone.

PolarAngle	Item

The angle between the position or measured vector and the k-axis of the coordinate system. Mathematically defined as arctan([SQRT(i^2+j^2)]/k). This term could be also applied to angles between the vector and other components, for example the IMF cone angle defined as arccos(Bx/Bt).

PolarAngleRange	Container

The range of possible polar angles for a group of energy observations. Defaults units are degrees.
>   Sub-elements:
>   Bin
>   High
>   Low
>   Units

PolarCap	Item

The areas of the globe surrounding the poles and consisting of the region north of 60 degrees north latitude an the region south of 60 degrees south latitude.

Polarization	Item

Direction of the electric vector of an electromagnetic wave. The wave can be linearly polarized in any direction perpendicular to the direction of travel, circularly polarized (clockwise or counterclockwise), unpolarized, or mixtures of the above.

Positional	Item

The specification of the location of an object or measurement within a reference coordinate system. The position is usually expressed as a set of values corresponding to the location along a set of orthogonal axes together with the date/time of the observation.

Poster	Item

A set of information arranged on a single page or sheet, typically in a large format.

Postscript	Item

A page description programming language created by Adobe Systems Inc. that is a device-independent industry standard for representing text and graphics.

Potential	Item

The work required per unit charge to move a charge from a reference point to a point at infinity (electric potential is defined to be zero). The electric potential of a spacecraft is often referred to as the "spacecraft potential". The spacecraft potential is the electric potential of the spacecraft relative to the potential of the nearby plasma. The spacecraft potential is non-zero because the spacecraft charges to the level that the emitted photoelectron flux going to infinity is balanced by the plasma electron flux to the spacecraft.

PoyntingFlux	Item

Electromagnetic energy flux transported by a wave characterized as the rate of energy transport per unit area per steradian.

Presentation	Item

A set of information that is used when communicating to an audience.

Pressure	Item

The force per unit area exerted by a particle distribution or field.

PrincipalInvestigator	Item

An individual who is the administrative and scientific lead for an investigation.

Print	Item

A sheet of any written or printed material which may include notes or graphics. Multiple printed pages may be bound into a manuscript or book.

PriorID	Text

The resource identifier for a resource that is superseded or replaced by a resource.

Probable	Item

Likely given the available evidence. Considered in the range of 4-7 on a scale of 0-10.

ProcessingLevel	Enumeration

The standard classification of the processing performed on the product.
> Allowed Values:
>> Calibrated
>> Raw
>> Uncalibrated

ProductKey	Text

The key (identifier) of the resource within a Repository. This is a local identifier which can be used to retrieve or locate the resource.

Profile	Item

Measurements of a quantity as a function of height above an object such as the limb of a body.

ProjectScientist	Item

An individual who is an expert in the phenomenon and related physics explored by the project. A project scientist may also have a managerial role within the project.

Projection	Enumeration

A measure of the length of a position or measured vector as projected into a plane of the coordinate system.
> Allowed Values:
>> IJ
>> IK
>> JK

PropagationTime	Item

Time difference between transmission and reception of a wave in an active wave experiment.

ProportionalCounter	Item

An instrument which measures energy of ionization radiation based on interactions with a gas.

Proton	Item

An elementary particle that is a constituent of all atomic nuclei, that carries a positive charge numerically equal to the charge of an electron, and that has a mass of 1.673×10^{-24} gram.

ProviderProcessingLevel	Text

The provider specific classification of the processing performed on the product.

ProviderResourceName	Text

A short textual description of a resource used by the provider which may be used to identify a resource.

ProviderVersion	Text

Describes the release or edition of the product used by the provider. The formation rule may vary between providers. It is intended to aid in queries to the provider regarding the product.

Pseudo	Item

Similar to or having the appearance of something else. Can be used to indicate an estimation or approximation of a particular quantity.

Publisher   Item

An individual, organization, institution or government department responsible for the production and dissemination of a document.

QuadrisphericalAnalyser   Item

An instrument used for the 3-D detection of plasma, energetic electrons and ions, and for positive-ion composition measurements.

Qualifier   Enumeration

Characterizes the refinement to apply to a type or attribute of a quantity.

  Allowed Values:

    Anisotropy
    Array
    Average
    Characteristic
    Circular
    Column
    Component
    Component.I
    Component.J
    Component.K
    Core
    CrossSpectrum
    Deviation
    Differential
    Direction
    DirectionAngle
    DirectionAngle.AzimuthAngle
    DirectionAngle.ElevationAngle
    DirectionAngle.PolarAngle
    Directional
    Field-Aligned
    Fit
    Group
    Halo
    Integral
    Integral.Area
    Integral.Bandwidth
    Integral.SolidAngle
    LineOfSight
    Linear
    Magnitude
    Maximum
    Median
    Minimum
    Moment
    Parallel
    Peak
    Perpendicular
    Perturbation
    Phase
    PhaseAngle
    Projection
    Projection.IJ
    Projection.IK
    Projection.JK
    Pseudo
    Ratio
    Scalar
    Spectral
    StandardDeviation
    StokesParameters
    Strahl

Superhalo
Symmetric
Tensor
Total
Trace
Uncertainty
Variance
Vector

Quantity	Numeric

A value that describes a characteristic of a system.

QuickTime	Item

A format for digital movies, as defined by Apple Computer. See
<http://developer.apple.com/quicktime/>

RTN	Item

Radial Tangential Normal. Typically centered at a spacecraft. Used for IMF and plasma V vectors. R (radial) axis is radially away from the Sun, T (tangential) axis is normal to the plane formed by R and the Sun's spin vector, positive in the direction of planetary motion. N (normal) is R x T.

Radar	Item

An instrument that uses directional properties of returned power to infer spatial and/or other characteristics of a remote object.

Radiance	Item

A radiometric measurement that describes the amount of electromagnetic radiation that passes through or is emitted from a particular area, and falls within a given solid angle in a specified direction. They are used to characterize both emission from diffuse sources and reflection from diffuse surfaces.

RadiationBelt	Item

The region within a magnetosphere where high-energy particles could potentially be trapped in a magnetic field.

RadioBurst	Item

Emissions of the sun in radio wavelengths from centimeters to dekameters, under both quiet and disturbed conditions. Radio Bursts can be "Type I" consisting of many short, narrow-band bursts in the metric range (300 - 50 MHz).; "Type II" consisting of narrow-band emission that begins in the meter range (300 MHz) and sweeps slowly (tens of minutes) toward dekameter wavelengths (10 MHz).; "Type III" consisting of narrow-band bursts that sweep rapidly (seconds) from decimeter to dekameter wavelengths (500 - 0.5 MHz); and "Type IV" consisting of a smooth continuum of broad-band bursts primarily in the meter range (300 - 30 MHz).

RadioFrequency	Item

Photons with a wavelength range: 100,000 to 1.00×10^{11} nm

Radiometer	Item

An instrument for detecting or measuring radiant energy. Radiometers are commonly limited to infrared radiation.

Ratio	Item

The relative magnitudes of two quantities.

Raw	Item

Data in its original state with no processing to account for calibration!!!

Registry	Container

A location or facility where resources are cataloged.
    Sub-elements:

AccessURL
Extension
ResourceHeader
ResourceID

RelativeStopDate	Duration

An indication of the nominal end date relative to the present.

ReleaseDate	DateTime

The date and time when a resource is made available. The availability of a resource coincides with the release of a resource description. If the Release Date is specified as a future date then it indicates that resource should not be made available until that time. However, this is only advisory and in practice the Release Date should be the actual date the resource description was published.

Remote1AU	Item

A roughly toroidal region that includes the Earth's orbit, but exclusive of the region near the Earth.

RenderingAxis	Enumeration

A reference component of a plot or rendering of data. A plot typically is a 2-dimensional rendering with a horizontal and verticle axis. A third dimension can be introduced with a color coding of the rendered data.
      Allowed Values:
            ColorBar
            Horizontal
            Vertical

RenderingHints	Container

Attributes to aid in the rendering of parameter.
      Sub-elements:
            AxisLabel
            DisplayType
            Index
            RenderingAxis
            ScaleMax
            ScaleMin
            ScaleType
            ValueFormat

Report	Item

A document which describes the findings of some individual or group.

Repository	Container

A location or facility where resources are stored.
      Sub-elements:
            AccessURL
            Extension
            ResourceHeader
            ResourceID

RepositoryID	Text

The identifier of an Repository resource.

ResonanceSounder	Item

A combination of a radio receiver and a pulsed transmitter used to study the plasma surrounding a spacecraft by identifying resonances or cut-offs (of the wave dispersion relation), whose frequencies are related to the ambient plasma density and magnetic field. When the transmitter is off it is essentially a high frequency-resolution spectral power receiver.

ResourceHeader	Container

Attributes of a resource which pertain to the provider of the resource and descriptive information about the resource.
> Sub-elements:
>> Acknowledgement
>> AlternateName
>> Association
>> Contact
>> Description
>> ExpirationDate
>> InformationURL
>> PriorID
>> ReleaseDate
>> ResourceName

ResourceID	Text

A Resource ID is a URI that has the form "scheme://authority/path" where "scheme" is "spase" for those resources administered through the SPASE framework, "authority" is the unique identifier for the resource provider registered within the SPASE framework and "path" is the unique identifier of the resource within the context of the "authority". The resource ID must be unique within the SPASE framework.

ResourceName	Text

A short textual description of a resource which may be useful when read by a person.

Restricted	Item

Access to the product is regulated and requires some form of identification.

RetardingPotentialAnalyser	Item

An instrument which measures ion temperatures and ion concentrations using a planar ion trap.

RevisionOf	Item

A modified version of a resource instance.

Riometer	Item

An instrument which measure the signal strength in various directions of the galactic radio signals. Variations in these signals are influenced by solar flare activity and geomagnetic storm and substorm processes.

Role	Enumeration

The assigned or assumed function or position of an individual.
> Allowed Values:
>> ArchiveSpecialist
>> Co-Investigator
>> Contributor
>> DataProducer
>> Deputy-PI
>> Former-PI
>> GeneralContact
>> MetadataContact
>> PrincipalInvestigator
>> ProjectScientist
>> Publisher
>> Scientist
>> TeamLeader
>> TeamMember
>> TechnicalContact

S3_BUCKET	Item

A container of objects that comply with the Amazon Simple Storage Service (S3) specifications. A bucket has a unique, user-assigned key (name). A bucket can contain any number of objects with an aggregate size of 5 gigabytes. A bucket may be accompanied by up to 2 kilobytes of metadata.

SC	Item

Spacecraft - A coordinate system defined by the spacecraft geometry and/or spin. Often has Z axis parallel to spacecraft spin vector. X and Y axes may or may not corotate with the spacecraft. See SR and SR2 below.

SE	Item

Solar Ecliptic - A heliocentric coordinate system where the Z axis is normal to the ecliptic plane, positive northward. X axis is positive towards the first point of Aries (from Earth to Sun at vernal equinox). Same as HAE above. See <http://nssdc.gsfc.nasa.gov/space/helios/coor_des.html>

SHA1	Item

Secure Hash Algorithm (SHA), a 160-bit message digest algorithm developed by the NSA and described in Federal Information Processing Standard (FIPS) publication 180-1.

SHA256	Item

Secure Hash Algorithm (SHA), a 256-bit message digest algorithm developed by the NSA and described in Federal Information Processing Standard (FIPS) publication 180-1.

SM	Item

Solar Magnetic - A geocentric coordinate system where the Z axis is northward along Earth's dipole axis, X axis is in plane of z axis and Earth-Sun line, positive sunward. See Russell, 1971.

SR	Item

Spin Reference - A special case of a Spacecraft (SC) coordinate system for a spinning spacecraft. Z is parallel to the spacecraft spin vector. X and Y rotate with the spacecraft. See <http://cdpp.cnes.fr/00428.pdf>

SR2	Item

Spin Reference 2 - A special case of a Spacecraft (SC) coordinate system for a spinning spacecraft. Z is parallel to the spacecraft spin vector. X is in the plane defined by Z and the spacecraft-Sun line, positive sunward. See <http://cdpp.cnes.fr/00428.pdf>

SSE	Item

Spacecraft Solar Ecliptic - A coordinate system used for deep space spacecraft, for example Helios. - X axis from spacecraft to Sun. Z axis normal to ecliptic plane, positive northward. Note: Angle between normals to ecliptic and to Helios orbit plane ~ 0.25 deg.

SSE_L	Item

Selenocentric Solar Ecliptic. The X axis points from the center of the Earth's moon to the sun, the Z axis is normal to the ecliptic plane, positive northward. And the Y axis completes the right-handed set of axes.

Saturn	Item

The sixth planet from the sun in our solar system.

Scalar	Item

A quantity that is completely specified by its magnitude and has no direction.

ScaleMax	Numeric

The maximum value that the variable is expected to attain. Used, for example, by automated plotting software.

ScaleMin	Numeric

The minimum value that the variable is expected to attain. Used, for example, by automated plotting software.

ScaleType	Enumeration

The scaling to apply to an axis. If this attribute is not present, linear scale should be assumed.
    Allowed Values:

LinearScale
LogScale

Scientist — Item

An individual who is an expert in the phenomenon and related physics represented by the resource.

ScintillationDetector — Item

An instrument which detects flouresences of a material which is excited by high energy (ionizing) electromagnetic or charged particle radiation.

SearchCoil — Item

An instrument which measures the time variation of the magnetic flux threading a loop by measurement of the electric potential difference induced between the ends of the wire.

SectorBoundaryCrossing — Item

A sector boundary crossing is a transit by a spacecraft across the heliospheric current sheet separating the dominantly outward (away-from-the-sun) interplanetary magnetic field of one hemisphere of the heliosphere from the dominantly inward (toward-the-sun) polarity of the other hemisphere. Such crossings have multi-day intervals of opposite IMF dominant polarities on either side.

Service — Container

A location or facility that can perform a well defined task.
Sub-elements:
AccessURL
Extension
ResourceHeader
ResourceID

Set — Text

A collection of items for a particular purpose.

Size — Sequence

The number of elements in each dimension of a multi-dimensional array. A scalar has a size of 1. A multi-dimensional vector will have a size for each dimension. Note that the number of elements in the size of an N-dimensional array conveys the array's dimensionality while the product of those numbers conveys the total number of elements in the array. When size is used to describe a tensor it is the number of elements in the tensor. As such it has a limited set of values. A tensor of rank 1 has a size of 3, rank 2 a size of 9, rank 3 a size of 27 and rank n a size of 3^n.

SoftXRays — Item

X-Rays with an energy range of 0.12 keV to 12 keV.

SolarFlare — Item

An explosive event in the Sun's atmosphere which produces electromagnetic radiation across the electromagnetic spectrum at multiple wavelengths from long-wave radio to the shortest wavelength gamma rays.

SolarWindExtreme — Item

Intervals of unusually large or small values of solar wind attributes such as flow speed and ion density.

SolidAngle — Item

Integration over the angle in three-dimensional space that an object subtends at a point.

SolidStateDetector — Item

A detector of the charge carriers (electrons and holes) generated in semiconductors by energy deposited by gamma ray photons. Also known as a "semiconductor detector".

SonicMachNumber	Item

The ratio of the bulk flow speed to the speed of sound in the medium.

SoundSpeed	Item

The speed at which sound travels through a medium.

Sounder	Item

An instrument which measures the radiances from an object. A sounder may measure radiances at multiple spectral ranges.

Source	Container

The location and attributes of an object.
> Sub-elements:
>> Checksum
>> DataExtent
>> MirrorURL
>> SourceType
>> URL

SourceType	Enumeration

A characterization of the function or purpose of the source.
> Allowed Values:
>> Ancillary
>> Browse
>> Data
>> Layout
>> Thumbnail

SouthAtlanticAnomalyRegion	Item

The region where the Earth's inner van Allen radiation belt makes its closest approach to the planet's surface. The result is that, for a given altitude, the radiation intensity is higher over this region than elsewhere.

SpacecraftOrbitPlane	Item

A coordinate system where X lies in the plane normal to and in the direction of motion of the spacecraft, Z is normal to this plane and Y completes the triad in a right-handed coordinate system.

SpacecraftPotentialControl	Item

An instrument to control the electric potential of a spacecraft with respect to the ambient plasma by emitting a variable current of positive ions.

Spase	Container

Space Physics Archive Search and Extract (SPASE). The outermost container or envelope for SPASE metadata. This indicates the start of the SPASE metadata.
> Sub-elements:
>> Annotation
>> Catalog
>> DisplayData
>> Document
>> Granule
>> Instrument
>> NumericalData
>> Observatory
>> Person
>> Registry
>> Repository
>> Service
>> Version

Specification	Item

A detailed description of the requirements and other aspects of an object or component that may be used to develop an implementation.

Spectral	Item

Characterized as a range or continuum of frequencies

SpectralPowerReceiver	Item

A radio receiver which determines the power spectral density of the electric or magnetic field, or both, at one or more frequencies.

SpectralRange	Enumeration

The general term used to describe wavelengths or frequencies within a given span of values for those quantities.

> Allowed Values:
>> CaK
>> ExtremeUltraviolet
>> FarUltraviolet
>> GammaRays
>> Halpha
>> HardXrays
>> He10830
>> He304
>> Infrared
>> K7699
>> LBHBand
>> Microwave
>> NaD
>> Ni6768
>> Optical
>> RadioFrequency
>> SoftXRays
>> Ultraviolet
>> WhiteLight
>> XRays

Spectrogram	Item

The characterization of signal strengths as a function of frequency (or energy) and time.

Spectrometer	Item

An instrument that measures the component wavelengths of light (or other electromagnetic radiation) by splitting the light up into its component wavelengths.

Spectrum	Item

The distribution of a characteristic of a physical system or phenomenon, such as the energy emitted by a radiant source, arranged in the order of wavelengths.

Spherical	Item

A coordinate representation of a position vector or of a measured vector by its magnitude and two direction angles. The angles are relative to the base axes of the coordinate system used. Typically the angles are phi [azimuth angle, $=\arctan (j/i)$] and theta, where theta may be a polar angle, $\arctan \{[SQRT(i^2+j^2)]/k\}$, or an elevation angle, $\arctan [k/SQRT (i^2+j^2)]$.

StackPlot	Item

A representation of data showing multiple sets of observations on a single plot, possibly offsetting each plot by some uniform amount.

StandardDeviation	Item

The square root of the average of the squares of deviations about the mean of a set of data. Standard deviation is a statistical measure of spread or variability.

StartDate	DateTime

The specification of a starting point in time.

StartLocation	Text

The initial position in space.

Stoke's Parameters	Item

A set of four parameters (usually called I,Q, U and V) which describe the polarization state of an electromagnetic wave propagating through space.

StopDate	DateTime

The specification of a stopping point in time.

StopLocation	Text

The final position in space.

Strahl	Item

A distribution of particles concentrated in a narrow energy band. The band may be may be aligned with a secondary feature. For example, it may occur in a narrow cone aligned with the mean magnetic field direction.

Stratosphere	Item

The layer of the atmosphere that extends from the troposphere to about 30 km, temperature increases with height. The stratosphere contains the ozone layer.

StreamInteractionRegion	Item

The region (SIR) where two solar wind streams, typically having differing characteristics and solar sources, abut up against (and possibly partially interpenetrate) each other.

Strong	Item

Highly likely given the available evidence. Considered in the range of 7-10 on a scale of 0-10.

Structure	Container

The organization and relationship of individual values within a quantity.
> Sub-elements:
>> Description
>> Element
>> Size

Substorm	Item

A process by which plasma in the magnetotail becomes energized at a fast rate.

Sun	Enumeration

The star upon which our solar system is centered.
> Allowed Values:
>> Chromosphere
>> Corona
>> Interior
>> Photosphere
>> TransitionRegion

Superhalo	Item

The part of an object or distribution surrounding some central body or distribution evident in a second break in the distribution function (e.g., a different power law). It consists of a population at a higher energies than for a halo.

Support	Container

Information useful in understanding the context of an observation, typically observed or measured coincidentally with a physical observation.
> Sub-elements:
>> Qualifier

SupportQuantity

SupportQuantity	Enumeration

A characterization of the support information.
    Allowed Values:
        InstrumentMode
        Other
        Positional
        Temporal
        Velocity

Surface	Item

The outermost area of a solid object.

Symmetric	Item

Equal distribution about one or more axes.

TAR	Item

A file format used to collate collections of files into one larger file, for distribution or archiving, while preserving file system information such as user and group permissions, dates, and directory structures. The format was standardized by POSIX.1-1988 and later POSIX.1-2001.

TIFF	Item

A binary format for still pictures. Tagged Image Format File (TIFF). Originally developed by Aldus and now controlled by Adobe.

TeamLeader	Item

An individual who is the designated leader of an investigation.

TeamMember	Item

An individual who is a major participant in an investigation.

TechnicalContact	Item

An individual who can provide specific information with regard to the resource or supporting software

TechnicalNote	Item

A document summarizing the performance and other technical characteristics of a product, machine, component, subsystem or software in sufficient detail to be used by an engineer or researcher.

Temperature	Item

A measure of the kinetic energy of random motion with respect to the average. Temperature is properly defined only for an equilibrium particle distribution (Maxwellian distribution).

Temporal	Item

Pertaining to time.

TemporalDescription	Container

A characterization of the time over which the measurement was taken.
    Sub-elements:
        Cadence
        Exposure
        TimeSpan

Tensor	Item

A generalized linear "quantity" or "geometrical entity" that can be expressed as a multi-dimensional array relative to a choice of basis of the particular space on which it is defined.

Text	Enumeration

A sequence of characters which may have an imposed structure or organization.

Allowed Values:

ASCII
Unicode

ThermalPlasma	Item

Measurements of the plasma in the energy regime where the most of the plasma occurs. May be the basic fluxes in the form of distribution functions or the derived bulk parameters (density, flow velocity, etc.).

ThermalSpeed	Item

For a Maxwellian distribution, the difference between the mean speed and the speed within which ~69% (one sigma) of all the members of the speed distribution occur.

Thermosphere	Item

The layer of the atmosphere that extends from the Mesosphere to 640+ km, temperature increasing with height.

Thumbnail	Item

A small representation of an image which is suitable to infer what the full-sized imaged is like.

TimeOfFlight	Item

An instrument which measures the time it takes for a particle to travel between two detectors.

TimeSeries	Item

A representation of data showing a set of observations taken at different points in time and charted as a time series.

TimeSpan	Container

The duration of an interval in time.

Sub-elements:

Note
RelativeStopDate
StartDate
StopDate

Topside	Item

The region at the upper most areas of the ionosphere.

Total	Item

The summation of quantities over all possible species.

TotalPressure	Item

In an MHD fluid it is the number density (N) times Boltzmann constant times the temperature in Kelvin.

Trace	Item

The sum of the elements on the main diagonal (the diagonal from the upper left to the lower right) of a square matrix.

TransitionRegion	Item

A very narrow (<100 km) layer between the chromosphere and the corona where the temperature rises abruptly from about 8000 to about 500,000 K.

Troposphere	Item

The lowest layer of the atmosphere which begins at the surface and extends to between 7 km (4.4 mi) at the poles and 17 km (10.6 mi) at the equator, with some variation due to weather factors.

UDF	Item

Universal Data Format (UDF). The Optical Technology Storage Association's Universal Disk Format, based on ISO 13346. See <http://www.osta.org/specs/index.htm>

URL	Text

Uniform Resource Locator (URL) is the global address of documents and other resources on the World Wide Web. The first part of the address indicates what protocol to use, and the second part specifies the IP address or the domain name where the resource is located followed by the pathname of the resource. A URL is specified in the form protocol://server.domain.name:port/pathname. Example protocols are HTTP or FTP, server domain name is the Internet name.

Ultraviolet	Item

Photons with a wavelength range: 10 to 400 nm.

Uncalibrated	Item

Duplicate data are removed from the data stream and data are time ordered. Values are not adjusted for any potential biases or external factors.

Uncertainty	Item

A statistically defined discrepancy between a measured quantity and the true value of that quantity that cannot be corrected by calculation or calibration.

Unicode	Item

Text in multi-byte Unicode format.

Units	Text

A description of the standardized measurement increments in which a value is specified. The description is represented as a mathematical phrase. Units should be represented by widely accepted representation. For example, units should conform to the International System of Units (SI) which is maintained by BIPM (Bureau International des Poids et Mesures (see <http://www.bipm.fr/>) when appropriate or use tokens like "Re" to represent units of the Radius of the Earth. Within a phrase the circumflex (^) is used to indicate a power, a star (*) is used to indicate multiplication and a slash (/) division. When symbols are not separated by a mathematical operator, multiplication is assumed. Symbols for base units can be found at: <http://www.bipm.fr/en/si/si_brochure/chapter2/2-1/#symbols> and those for common derived units can be found at: <http://www.bipm.fr/en/si/derived_units/2-2-2.html>

UnitsConversion	Text

The multiplicative factor for converting a unit into International System of Units (SI) units. The factor is expressed in the form "number > x", where "number" is a numerical value and "x" is the appropriate SI units. The basic SI units are Enumerated: m (meter), N (newton), kg (kilogram), Pa (pascal), s (second), Hz (hertz), A (ampere), V (volt), K (kelvin), W (watt), rad (radian), J (joule), sr (steradian), C (coulomb), T (tesla), ohm (ohm), mho (mho or seimens), H (henry), and F (farad). Two useful units which are not SI units are: degree (angle), and unitless (no units). An example is: "1.0E-9>T" which converts the units, presumable nT, to Tesla. Another example is: "1.0e+3>m/s" which converts a velocity expressed in kilometers per second to meters per second.

Unlikely	Item

Not likely given the available evidence. Considered in the range of 0 on a scale of 0-10.

Unspecified	Item

A value which is not provided.

Uranus	Item

The eighth planet from the sun in our solar system.

VCrossB	Item

The cross product of the charge velocity (V) and the magnetic field (B). It is the electric field exerted on a point charge by a magnetic field.

VOTable	Item

A proposed IVOA standard designed as a flexible storage and exchange format for tabular data.

ValidMax	Text

The largest legitimate value.

ValidMin	Text

The smallest legitimate value.

ValueFormat	Text

A string defining the output format used when extracting data values out to a file or screen. The magnitude and the number of significant figures needed should be carefully considered. The output format string can be in either Fortran or C syntax.

Variance	Item

A measure of dispersion of a set of data points around their mean value. The expectation value of the squared deviations from the mean.

Vector	Item

A set of parameter values each along some independent variable (e.g., components of a field in three orthogonal spatial directions; atmospheric temperature values at several altitudes, or at a given latitude and longitude;).

Velocity	Item

Rate of change of position. Also used for the average velocity of a collection of particles, also referred to as "bulk velocity".

Venus	Item

The second planet from the sun in our solar system.

Version	Text

Indicates the release identifier. When used to indicate the release of the SPASE data model, it is a in the form Major.Minor.Fix where Major: A significant change in the architecture of the model or rewrite of the implementation. This includes major changes in design or implementation language. This number starts at 0 (zero). Minor: An addition of terms or features that require changes in documentation/external API. This number starts at 0 (zero). Fix: Any change that doesn't require documentation/external API changes. This number starts at 0 (zero).

Vertical	Item

Perpendicular to the plane of the horizon or a base line.

WGS84	Item

The World Geodetic System (WGS) defines a reference frame for the earth, for use in geodesy and navigation. The WGS84 uses the zero meridian as defined by the Bureau International de l'Heure.

Wave	Container

Periodic or quasi-periodic (AC) variations of physical quantities in time and space, capable of propagating or being trapped within particular regimes.
> Sub-elements:
>> EnergyRange
>> FrequencyRange
>> Qualifier
>> WaveQuantity
>> WaveType
>> WavelengthRange

WaveForm	Item

Spatial or temporal variations of wave amplitude over wave-period timescales.

WaveQuantity — Enumeration

A characterization of the physical properties of a wave.

Allowed Values:

- ACElectricField
- ACMagneticField
- Absorption
- Albedo
- DopplerFrequency
- Emissivity
- EnergyFlux
- EquivalentWidth
- Frequency
- Gyrofrequency
- Intensity
- LineDepth
- MagneticField
- ModeAmplitude
- PlasmaFrequency
- Polarization
- PoyntingFlux
- PropagationTime
- StokesParameters
- Velocity
- Wavelength

WaveType — Enumeration

A characterization of the carrier or phenomenon of wave information observed by the measurement.

Allowed Values:

- Electromagnetic
- Electrostatic
- Hydrodynamic
- MHD
- Photon
- PlasmaWaves

WaveformReceiver — Item

A radio receiver which outputs the value of one or more components of the electric and/or magnetic field as a function of time.

Wavelength — Item

The peak-to-peak distance over one wave period.

WavelengthRange — Container

The range of possible values for the observed wavelength.

Sub-elements:

- Bin
- High
- Low
- SpectralRange
- Units

Waves — Enumeration

Data resulting from observations of wave experiments and natural wave phenomena. Wave experiments are typically active and natural wave phenomena are passive. Examples of wave experiments include coherent/incoherent scatter radars, radio soundings, VLF propagation studies, ionospheric scintillation of beacon satellite signals, etc. Examples of natural wave phenomena include micropulsations, mesospheric gravity waves, auroral/plasmaspheric hiss, Langmuir waves, AKR, Jovian decametric radiation, solar radio bursts, etc.

Allowed Values:

- Active
- Passive

Weak	Item

Slightly likely given the available evidence. Considered in the range of 1-4 on a scale of 0-10.

WhiteLight	Item

Photons with a wavelength in the visible range for humans.

WhitePaper	Item

An authoritative report giving information or proposals on an issue.

XML	Item

eXtensible Mark-up Language (XML). A structured format for representing information. See <http://www.w3.org/XML/>

XRays	Item

Photons with a wavelength range: 0.001 <= x < 10 nm

ZIP	Item

An open standard for compression which is a variation of the LZW method and was originally used in the PKZIP utility.

8. Enumeration of Selected Quantities

Lists are either "open" or "closed". The items in a "closed" list are determined by the SPASE model and definitions of each item is in the SPASE data dictionary. The items in an "open" list are determined by an external control authority. The URL for the control authority is indicated in the definition of each "open" list.

AccessRights List   Closed

Identifiers for permissions granted or denied by the host of a product to allow other users to access and use the resource.

Term	Definition
Open	Access is granted to everyone.
Restricted	Access to the product is regulated and requires some form of identification.

AnnotationType List   Closed

Identifiers for an classification of an annotation.

Term	Definition
Anomaly	An interval where measurements or observations may be adversely affected.
Event	An action or observation which occurs at a point in time.
Feature	A prominent or distinctive characteristic that occurs at a location or persists over a period of time.

AssociationType List   Closed

Identifiers for resource associations.

Term	Definition
ChildEventOf	A descendant or caused by another resource.
DerivedFrom	A transformed or altered version of a resource instance.
ObservedBy	Detected or originating from another resource.
Other	Not classified with more specific terms. The context of its usage may be described in related text.
PartOf	A portion of a larger resource.
RevisionOf	A modified version of a resource instance.

Availability List   Closed

Identifiers for indicating the method or service which may be used to access the resource.

Term	Definition
Offline	Not directly accessible electronically. This includes resources which may to be moved to an on-line status in response to a given request.
Online	Directly accessible electronically.

ClassificationMethod List   Closed

Identifiers for the technique used to determine the characteristics of an object.

Term	Definition
Automatic	Determined by the analysis or assessment performed by a

Inferred	Determined by the analysis of other information or resources.
Inspection	Determined by the analysis or assessment performed by a person.

Component List   Closed

Identifiers for the axis of coordinate systems.

Term	Definition
I	Projection of a vector along the first named axis of a coordinate system. Typically the X axis, but could be the R axis for an RTN coordinate system.
J	Projection of a vector along the second named axis of a coordinate system. Typically the Y axis, but could be the T axis for an RTN coordinate system.
K	Projection of a vector along the third named axis of a coordinate system. Typically the Z axis, but could be the N axis for an RTN coordinate system.

ConfidenceRating List   Closed

Identifiers for the classification of the certainty of an assertion.

Term	Definition
Probable	Likely given the available evidence. Considered in the range of 4-7 on a scale of 0-10.
Strong	Highly likely given the available evidence. Considered in the range of 7-10 on a scale of 0-10.
Unlikely	Not likely given the available evidence. Considered in the range of 0 on a scale of 0-10.
Weak	Slightly likely given the available evidence. Considered in the range of 1-4 on a scale of 0-10.

CoordinateRepresentation List   Closed

Identifiers of the method or form for specifying a given point or vector in a given coordinate system.

Term	Definition
Cartesian	A representation in which a position vector or a measured vector (e.g., field or flow) is specified by its components along the base axes of the coordinate system.
Cylindrical	A coordinate representation of a position vector or measured vector (field or flow) by its k-component, the magnitude of its projection into the i-j plane, and the azimuthal angle of the i-j plane projection.
Spherical	A coordinate representation of a position vector or of a measured vector by its magnitude and two direction angles. The angles are relative to the base axes of the coordinate system used. Typically the angles are phi [azimuth angle, =arctan (j/i)] and theta, where theta may be a polar angle, arctan {[SQRT(i^2+j^2)]/k}, or an elevation angle, arctan [k/SQRT (i^2+j^2)].

CoordinateSystemName List	Closed

Identifiers of the origin and orientation of a set of typically orthogonal axes.

Term	Definition
CGM	Corrected Geomagnetic - A coordinate system from a spatial point with GEO radial distance and geomagnetic latitude and longitude, follow the epoch-appropriate IGRF/DGRF model field vector through to the point where the field line crosses the geomagnetic dipole equatorial plane. Then trace the dipole magnetic field vector Earthward from that point on the equatorial plane, in the same hemisphere as the original point, until the initial radial distance is reached. Designate the dipole latitude and longitude at that point as the CGM latitude and longitude of the original point. See <http://nssdc.gsfc.nasa.gov/space/cgm/cgmm_des.html>
Carrington	A coordinate system which is centered at the Sun and is "fixed" with respect to the synodic rotation rate; the mean synodic value is about 27.2753 days. The Astronomical Almanac gives a value for Carrington longitude of 349.03 degrees at 0000 UT on 1 January 1995.
DM	Dipole Meridian - A coordinate system centered at the observation point. Z axis is parallel to the Earth's dipole axis, positive northward. X is in the plane defined by Z and the line linking the observation point with the Earth's center. Y is positive eastward. See <http://cdpp.cnes.fr/00428.pdf>
ECEF	The Earth-Centered, Earth-Fixed (ECEF) coordinate system has point (0,0,0) defined as the center of mass of the Earth. Its axes are aligned with the International Reference Pole (IRP) and International Reference Meridian (IRM). The x-axis intersects the sphere of the Earth at 0 degree latitude (Equator) and 0 degree longitude (Greenwich). The z-axis points north. The y-axis completes the right handed coordinate system.
ENP	ENP (also called PEN) - The P vector component points northward, perpendicular to orbit plane which for a zero degree inclination orbit is parallel to Earth's spin axis. The E vector component is perpendicular to P and N and points earthward. The N component is perpendicular to P and E and is positive eastward.
GEI	GEI Geocentric Equatorial Inertial - A coordinate system where the Z axis is along Earth's spin vector, positive northward. X axis points towards the first point of Aries (from the Earth towards the Sun at the vernal equinox). See Russell, 1971. When the X axis is the direction of the mean vernal equinox of J2000, the coordinate system is also called GCI. Then the Z axis is also defined as being normal to the mean Earth equator of J2000.
GEO	Geographic - geocentric corotating - A coordinate system where the Z axis is along Earth's spin vector, positive

	northward. X axis lies in Greenwich meridian, positive towards Greenwich. See Russell, 1971.
GSE	Geocentric Solar Ecliptic - A coordinate system where the X axis is from Earth to Sun. Z axis is normal to the ecliptic, positive northward. See Russell, 1971.
GSEQ	Geocentric Solar Equatorial - A coordinate system where the X axis is from Earth to Sun. Y axis is parallel to solar equatorial plane. Z axis is positive northward. See Russell, 1971
GSM	Geocentric Solar Magnetospheric - A coordinate system where the X axis is from Earth to Sun, Z axis is northward in a plane containing the X axis and the geomagnetic dipole axis. See Russell, 1971
HAE	Heliocentric Aries Ecliptic - A coordinate system where the Z axis is normal to the ecliptic plane, positive northward. X axis is positive towards the first point of Aries (from Earth to Sun at vernal equinox). Same as SE below. See Hapgood, 1992.
HCC	Heliocentric Cartesian - A 3-D orthonormal coordinate system that is primarily intended to specify with two dimensions a point on the solar disk. The Z axis points toward the observer. The Y axis lies in the plane defined by the solar spin vector and the Z axis, positive northward. The X axis is perpendicular to the Y and Z axes, positive toward solar west. Standard representation for this system is via the point's x and y values, expressed either as physical distances or as fractions of the solar disk radius.
HCI	Heliographic Carrington Inertial.
HCR	Heliocentric Radial - A 3-D orthonormal coordinate system that is primarily intended to specify with two dimensions a point on the solar disk. The Z axis points toward the observer. The Y axis lies in the plane defined by the solar spin vector and the Z axis, positive northward. The X axis is perpendicular to the Y and Z axes, positive toward solar west. Standard representation for this system is via the point's distance rho from the Z axis [Rho = SQRT(x**2 + y**2)] and its phase angle psi measured counterclockwise from the +Y axis [psi = arctan (-y/x)]
HEE	Heliocentric Earth Ecliptic - A coordinate system where the Z axis is normal to the ecliptic plane, positive northward. X axis points from Sun to Earth. See Hapgood, 1992
HEEQ	Heliocentric Earth Equatorial - A coordinate system where the Z axis is normal to the solar equatorial plane, positive northward. X axis is generally Earthward in the plane defined by the Z axis and the Sun-Earth direction. See Hapgood, 1992.
HG	Heliographic - A heliocentric rotating coordinate system where the Z axis is normal to the solar equatorial plane,

positive northward. X, Y axes rotate with a 25.38 day period. The zero longitude (X axis) is defined as the longitude that passed through the ascending node of the solar equator on the ecliptic plane on 1 January, 1854 at 12 UT. See <http://nssdc.gsfc.nasa.gov/space/helios/coor_des.html>

HGI	Heliographic Inertial - A heliocentric coordinate system where the Z axis is normal to the solar equatorial plane, positive northward. X axis is along the intersection line between solar equatorial and ecliptic planes. The X axis was positive at SE longitude of 74.367 deg on Jan 1, 1900. (See SE below.) See <http://nssdc.gsfc.nasa.gov/space/helios/coor_des.html>
HPC	Helioprojective Cartesian = A 3-D orthonormal (left-handed) coordinate system that is primarily intended to specify with two dimensions a point on the solar disk. The Z axis points from the observer to the center of the solar disk. The Y axis lies in the plane defined by the solar spin vector and the Z axis, positive northward. The X axis is perpendicular to the Y and Z axes, positive toward solar west. Given as the distance between the observer and the center of the solar disk, the standard representation of an (x,y) point on the solar disk is via the point's longitude angle [arctan (x/d)] and latitude angle [arctan y/d].
HPR	Helioprojective Radial - A 3-D orthonormal (left-handed) coordinate system that is primarily intended to specify with two dimensions a point on the solar disk. The Z axis points from the observer to the center of the solar disk. The Y axis lies in the plane defined by the solar spin vector and the Z axis, positive northward. The X axis is perpendicular to the Y and Z axes, positive toward solar west. Given as the distance between the observer and the center of the solar disk, the standard representation for this system of an (x,y) point on the solar disk is via the point's latitude angle theta {= arctan [SQRT(x**2 + y**2)]/d]} or equivalent declination parameter delta (= theta - 90 deg), and its phase angle psi as measured counter- clockwise from the +Y axis [psi = arctan (-y/x)].
J2000	An astronomical coordinate system which uses the mean equator and equinox of Julian date 2451545.0 TT (Terrestrial Time), or January 1, 2000, noon TT. (aka J2000) to define a celestial reference frame.
LGM	Local Geomagnetic - A coordinate system used mainly for Earth surface or near Earth surface magnetic field data. X axis northward from observation point in a geographic meridian. Z axis downward towards Earth's center. In this system, H (total horizontal component) = SQRT (Bx^2 + By^2) and D (declination angle) = arctan (By/Bx)
MAG	Geomagnetic - geocentric. Z axis is parallel to the

geomagnetic dipole axis, positive north. X is in the plane defined by the Z axis and the Earth's rotation axis. If N is a unit vector from the Earth's center to the north geographic pole, the signs of the X and Y axes are given by Y = N x Z, X = Y x Z.. See Russell, 1971, and <http://cdpp.cnes.fr/00428.pdf>

MFA	Magnetic Field Aligned - A coordinate system spacecraft-centered system with Z in the direction of the ambient magnetic field vector. X is in the plane defined by Z and the spacecraft-Sun line, positive sunward. See <http://cdpp.cnes.fr/00428.pdf>
RTN	Radial Tangential Normal. Typically centered at a spacecraft. Used for IMF and plasma V vectors. R (radial) axis is radially away from the Sun, T (tangential) axis is normal to the plane formed by R and the Sun's spin vector, positive in the direction of planetary motion. N (normal) is R x T.
SC	Spacecraft - A coordinate system defined by the spacecraft geometry and/or spin. Often has Z axis parallel to spacecraft spin vector. X and Y axes may or may not corotate with the spacecraft. See SR and SR2 below.
SE	Solar Ecliptic - A heliocentric coordinate system where the Z axis is normal to the ecliptic plane, positive northward. X axis is positive towards the first point of Aries (from Earth to Sun at vernal equinox). Same as HAE above. See <http://nssdc.gsfc.nasa.gov/space/helios/coor_des.html>
SM	Solar Magnetic - A geocentric coordinate system where the Z axis is northward along Earth's dipole axis, X axis is in plane of z axis and Earth-Sun line, positive sunward. See Russell, 1971.
SR	Spin Reference - A special case of a Spacecraft (SC) coordinate system for a spinning spacecraft. Z is parallel to the spacecraft spin vector. X and Y rotate with the spacecraft. See <http://cdpp.cnes.fr/00428.pdf>
SR2	Spin Reference 2 - A special case of a Spacecraft (SC) coordinate system for a spinning spacecraft. Z is parallel to the spacecraft spin vector. X is in the plane defined by Z and the spacecraft-Sun line, positive sunward. See <http://cdpp.cnes.fr/00428.pdf>
SSE	Spacecraft Solar Ecliptic - A coordinate system used for deep space spacecraft, for example Helios. - X axis from spacecraft to Sun. Z axis normal to ecliptic plane, positive northward. Note: Angle between normals to ecliptic and to Helios orbit plane ~ 0.25 deg.
SSE_L	Selenocentric Solar Ecliptic. The X axis points from the center of the Earth's moon to the sun, the Z axis is normal to the ecliptic plane, positive northward. And the Y axis completes the right-handed set of axes.
SpacecraftOrbitPlane	A coordinate system where X lies in the plane normal to and in the direction of motion of the spacecraft, Z is

normal to this plane and Y completes the triad in a right-handed coordinate system.

WGS84	The World Geodetic System (WGS) defines a reference frame for the earth, for use in geodesy and navigation. The WGS84 uses the zero meridian as defined by the Bureau International de l'Heure.

DirectionAngle List   Closed

Identifiers for the angle between a vector and a base axis.

Term	Definition
AzimuthAngle	The angle between the projection into the i-j plane of a position or measured vector and the i-axis of the coordinate system. Mathematically defined as arctan(j/i). This term could be also applied to angles measured in different planes, for example the IMF clock angle defined as arctan(|By|/Bz).
ElevationAngle	The angle between the position or measured vector and the i-j plane of the coordinate system. Mathematically defined as arctan(k/SQRT(i^2+j^2)).
PolarAngle	The angle between the position or measured vector and the k-axis of the coordinate system. Mathematically defined as arctan([SQRT(i^2+j^2)]/k). This term could be also applied to angles between the vector and other components, for example the IMF cone angle defined as arccos(Bx/Bt).

DisplayType List   Closed

Identifiers for types or classes of rendered data.

Term	Definition
Image	A two-dimensional representation of data with values at each element of the array related to an intensity or a color.
Plasmagram	The characterization of signal strengths in active sounding measurements as a function of virtual range or signal delay time and sounding frequency. A Plasmagram is also referred to as an Ionogram.
Spectrogram	The characterization of signal strengths as a function of frequency (or energy) and time.
StackPlot	A representation of data showing multiple sets of observations on a single plot, possibly offsetting each plot by some uniform amount.
TimeSeries	A representation of data showing a set of observations taken at different points in time and charted as a time series.
WaveForm	Spatial or temporal variations of wave amplitude over wave-period timescales.

DocumentType List   Closed

Identifiers for the characterization of the content or purpose of a document.

Term

	Definition
Other	Not classified with more specific terms. The context of its usage may be described in related text.
Poster	A set of information arranged on a single page or sheet, typically in a large format.
Presentation	A set of information that is used when communicating to an audience.
Report	A document which describes the findings of some individual or group.
Specification	A detailed description of the requirements and other aspects of an object or component that may be used to develop an implementation.
TechnicalNote	A document summarizing the performance and other technical characteristics of a product, machine, component, subsystem or software in sufficient detail to be used by an engineer or researcher.
WhitePaper	An authoritative report giving information or proposals on an issue.

Earth List — Closed

Identifiers for the regions surrounding the Earth.

Term	Definition
Magnetosheath	The region between the bow shock and the magnetopause, characterized by very turbulent plasma.
Magnetosphere	The region of space above the atmosphere or surface of the planet, and bounded by the magnetopause, that is under the direct influence of the planet's magnetic field.
Moon	The only natural satellite of the Earth.
NearSurface	The gaseous and possibly ionized environment of a body extending from the surface to some specified altitude. For the Earth, this altitude is 2000 km.
Surface	The outermost area of a solid object.

Encoding List — Closed

Identifiers for unambiguous rules that establishes the representation of information within a file.

Term	Definition
ASCII	A sequence of characters that adheres to American Standard Code for Information Interchange (ASCII) which is an 7-bit character-coding scheme.
BZIP2	An open standard algorithm by Julian Seward using Burrows-Wheeler block sorting and Huffman coding. See <http://www.bzip.org/>
Base64	A data encoding scheme whereby binary-encoded data is converted to printable ASCII characters. It is defined as a MIME content transfer encoding for use in Internet e-mail. The only characters used are the upper- and lower-case Roman alphabet characters (A-Z, a-z), the numerals (0-9), and the "+" and "/" symbols, with the "=" symbol as a special suffix (padding) code.
GZIP	An open standard algorithm distributed by GHU based

on LZ77 and Huffman coding. See
<http://www.gnu.org/software/gzip/gzip.html> or
<http://www.gzip.org/>

None	A lack or absence of anything.
S3_BUCKET	A container of objects that comply with the Amazon Simple Storage Service (S3) specifications. A bucket has a unique, user-assigned key (name). A bucket can contain any number of objects with an aggregate size of 5 gigabytes. A bucket may be accompanied by up to 2 kilobytes of metadata.
TAR	A file format used to collate collections of files into one larger file, for distribution or archiving, while preserving file system information such as user and group permissions, dates, and directory structures. The format was standardized by POSIX.1-1988 and later POSIX.1-2001.
Unicode	Text in multi-byte Unicode format.
ZIP	An open standard for compression which is a variation of the LZW method and was originally used in the PKZIP utility.

FieldQuantity List   Closed

Identifiers for the physical attribute of the field.

Term	Definition
Current	The flow of electrons through a conductor caused by a potential difference.
Electric	The physical attribute that exerts an electrical force.
Electromagnetic	Electric and magnetic field variations in time and space that propagate through a medium or a vacuum with the wave's propagation, electric field, and magnetic field vectors forming an orthogonal triad. Waves in this category are detected by having their field quantities measured.
Gyrofrequency	The number of gyrations around a magnetic guiding center (field line) a charged particle makes per unit time due to the Lorentz force.
Magnetic	The physical attribute attributed to a magnet or its equivalent.
PlasmaFrequency	A number-density-dependent characteristic frequency of a plasma.
Potential	The work required per unit charge to move a charge from a reference point to a point at infinity (electric potential is defined to be zero). The electric potential of a spacecraft is often referred to as the "spacecraft potential". The spacecraft potential is the electric potential of the spacecraft relative to the potential of the nearby plasma. The spacecraft potential is non-zero because the spacecraft charges to the level that the emitted photoelectron flux going to infinity is balanced by the plasma electron flux to the spacecraft.

PoyntingFlux   Electromagnetic energy flux transported by a wave
                         characterized as the rate of energy transport per unit area
                         per steradian.

Format List	Closed

Identifiers for data organized according to preset specifications.

Term	Definition
AVI	Audio Video Interleave (AVI) a digital format for movies that conforms to the Microsoft Windows Resource Interchange File Format (RIFF).
Binary	A direct representation of the bits which may be stored in memory on a computer.
CDF	Common Data Format (CDF). A binary storage format developed at Goddard Space Flight Center (GSFC).
CEF	Cluster Exchange Format (CEF) is a self-documenting ASCII format designed for the exchange of data. There are two versions of CEF which are not totally compatible.
CEF1	Cluster Exchange Format (CEF), version 1, is a self-documenting ASCII format designed for the exchange of data. The metadata contains information compatible with the ISTP recommendations for CDF.
CEF2	Cluster Exchange Format (CEF), version 2, is a self-documenting ASCII format designed for the exchange of data and introduced for Cluster Active Archive. Compared to version 1, the metadata description of vectors and tensors is different.
Excel	A Microsoft spreadsheet format used to hold a variety of data in tables which can include calculations.
FITS	Flexible Image Transport System (FITS) is a digital format primarily designed to store scientific data sets consisting of multi-dimensional arrays (1-D spectra, 2-D images or 3-D data cubes) and 2-dimensional tables containing rows and columns of data.
GIF	Graphic Interchange Format (GIF) first introduced in 1987 by CompuServe. GIF uses LZW compression and images are limited to 256 colours.
HDF	Hierarchical Data Format
HDF4	Hierarchical Data Format, Version 4
HDF5	Hierarchical Data Format, Version 5
HTML	A text file containing structured information represented in the HyperText Mark-up Language (HTML). See <http://www.w3.org/MarkUp/>
Hardcopy	A permanent reproduction, or copy in the form of a physical object, of any media suitable for direct use by a person.
IDFS	Instrument Data File Set (IDFS) is a set of files written in a prescribed format which contain data, timing data, and meta-data. IDFS was developed at Southwest Research Institute (SwRI).

IDL	Interactive Data Language (IDL) save set. IDL is a proprietary format.
JPEG	A binary format for still images defined by the Joint Photographic Experts Group
MATLAB_4	MATLAB Workspace save set, version 4. MAT-files are double-precision, binary, MATLAB format files. MATLAB is a proprietary product of The MathWorks.
MATLAB_6	MATLAB Workspace save set, version 6. MAT-files are double-precision, binary, MATLAB format files. MATLAB is a proprietary product of The MathWorks.
MATLAB_7	MATLAB Workspace save set, version 7. MAT-files are double-precision, binary, MATLAB format files. Version 7 includes data compression and Unicode encoding. MATLAB is a proprietary product of The MathWorks.
MPEG	A digital format for movies defined by the Motion Picture Experts Group
NCAR	The National Center for Atmospheric Research (NCAR) format. A complete description of that standard is given in appendix C of the "Report on Establishment & Operation of the Incoherent- Scatter Data Base", dated August 23, 1984, obtainable from NCAR, P.O. Box 3000 Boulder, Colorado 80307-3000.
NetCDF	Unidata Program Center's Network Common Data Form (NetCDF). A self-describing portable data format for array-oriented data access. See <http://my.unidata.ucar.edu/content/software/netcdf>
PDF	A document expressed in the Portable Document Format (PDF) as defined by Adobe.
PNG	A digital format for still images. Portable Network Graphics (PNG)
Postscript	A page description programming language created by Adobe Systems Inc. that is a device-independent industry standard for representing text and graphics.
QuickTime	A format for digital movies, as defined by Apple Computer. See <http://developer.apple.com/quicktime/>
TIFF	A binary format for still pictures. Tagged Image Format File (TIFF). Originally developed by Aldus and now controlled by Adobe.
Text	A sequence of characters which may have an imposed structure or organization.
UDF	Universal Data Format (UDF). The Optical Technology Storage Association's Universal Disk Format, based on ISO 13346. See <http://www.osta.org/specs/index.htm>
VOTable	A proposed IVOA standard designed as a flexible storage and exchange format for tabular data.
XML	eXtensible Mark-up Language (XML). A structured format for representing information. See <http://www.w3.org/XML/>

Hardcopy List   Closed

Identifiers for permanent reproductions, or copy in the form of a physical object, of any media

suitable for direct use by a person.

Term	Definition
Film	An image recording medium on which usually a "negative" analog image is registered. A "positive" image can be recovered or reproduced from film, which is usually made of flexible materials for ease of storage and transportation.
Microfiche	A sheet of microfilm on which many pages of material have been photographed; a magnification system is used to read the material.
Microfilm	Film rolls on which materials are photographed at greatly reduced size; a magnification system is used to read the material.
Photograph	An image (positive or negative) registered on a piece of photo-sensitive paper
PhotographicPlate	A rigid (typically glass) medium that functions like film. Its rigidity is for guarding against image distortion due to medium deformation (caused by heat and humidity). Photographic plates are often used for astronomical photography.
Print	A sheet of any written or printed material which may include notes or graphics. Multiple printed pages may be bound into a manuscript or book.

HashFunction List   Closed

Identifiers for functions or algorithms that convert a digital data object into a hash value.

Term	Definition
MD5	Message Digest 5 (MD5) is a 128-bit message digest algorithm created in 1991 by Professor Ronald Rivest.
SHA1	Secure Hash Algorithm (SHA), a 160-bit message digest algorithm developed by the NSA and described in Federal Information Processing Standard (FIPS) publication 180-1.
SHA256	Secure Hash Algorithm (SHA), a 256-bit message digest algorithm developed by the NSA and described in Federal Information Processing Standard (FIPS) publication 180-1.

Heliosphere List   Closed

Identifiers for regions of the solar atmosphere which extends roughly from the inner corona to the edge of the solar plasma at the heliopause separating primarily solar plasma from interstellar plasma.

Term	Definition
Heliosheath	The region extending radially outward from the heliospheric termination shock and in which the decelerated solar wind plasma is still significant.
Inner	The region of the heliosphere extending radially outward from the solar coronal base to just inside 1 AU.
NearEarth	The heliospheric region near the Earth which extends to

	and includes the area near the L1 and L2 Lagrange point.
Outer	The region of the heliosphere extending radially outward from just outside 1 AU to the heliospheric termination shock.
Remote1AU	A roughly toroidal region that includes the Earth's orbit, but exclusive of the region near the Earth.

InstrumentType List   Closed

Identifiers for the type of experiment the instrument performs. This is the technique of observation.

Term	Definition
Antenna	A sensor used to measure electric potential.
Channeltron	An instrument that detects electrons, ions, and UV-radiation, according to the principle of a secondary emission multiplier. It is typically used in electron spectroscopy and mass spectrometry.
Coronograph	An instrument which can image things very close to the Sun by using a disk to block the Sun's bright surface which reveals the faint solar corona and other celestial objects.
DoubleSphere	A dipole antenna of which the active (sensor) elements are small spheres located at the ends of two wires deployed in the equatorial plane, on opposite sides of a spinning spacecraft.
DustDetector	An instrument which determines the mass and speed of ambient dust particles.
ElectronDriftInstrument	An active experiment to measure the electron drift velocity based on sensing the displacement of a weak beam of electrons after one gyration in the ambient magnetic field.
ElectrostaticAnalyser	An instrument which uses charged plates to analyze the mass, charge and kinetic energies of charged particles which enter the instrument.
EnergeticParticleInstrument	An instrument that measures fluxes of charged particles as a function of time, direction of motion, mass, charge and/or species.
FaradayCup	An instrument consisting of an electrode from which electrical current is measured while a charged particle beam (electrons or ions) impinges on it. Used to determine energy spectrum and sometimes ion composition of the impinging particles.
FluxFeedback	A search coil whose bandwidth and signal/noise ratio are increased by the application of negative feedback at the sensor (flux) level by driving a collocated coil with a signal from the preamplifier.
FourierTransformSpectrograph	An instrument that determines the spectra of a radiative source, using time-domain measurements and a Fourier transform.
Imager	An instrument which samples the radiation from an area at one or more spectral ranges emitted or reflected by an

object.

ImagingSpectrometer	An instrument which is a multispectral scanner with a very large number of channels (64-256 channels) with very narrow band widths.
Interferometer	An instrument to study the properties of two or more waves from the pattern of interference created by their superposition.
IonChamber	A device in which the collected electrical charge from ionization in a gas-filled cavity is taken to be the proportion to some parameter (e.g. dose or exposure) of radiation field
IonDrift	A device which measures the current produced by the displacement of ambient ions on a grid, thereby allowing the determination of the ion trajectory and velocity.
LangmuirProbe	A monopole antenna associated with an instrument. The instrument applies a potential to the antenna which is swept to determine the voltage/current characteristic. This provides information about the plasma surrounding the probe and spacecraft.
LongWire	A dipole antenna whose active (sensor) elements are two wires deployed in the equatorial plane on opposite sides of a spinning spacecraft, and whose length is several times greater than the spacecraft diameter.
Magnetograph	A special type of magnetometer that records a time plot of the local magnetic field near the instrument; or a telescope capable of determining the magnetic field strength and/or direction on a distant object such as the Sun, using the Zeeman splitting or other spectral signatures of magnetization.
Magnetometer	An instrument which measures the ambient magnetic field.
MassSpectrometer	An instrument which distinguishes chemical species in terms of their different isotopic masses.
MicrochannelPlate	An instrument used for the detection of elementary particles, ions, ultraviolet rays and soft X-rays constructed from very thin conductive glass capillaries.
MultispectralImager	An instrument which captures images at multiple spectral ranges.
NeutralAtomImager	An instrument which measures the quantity and properties of neutral particles over a range of angles. Measured properties can include mass and energy.
NeutralParticleDetector	An instrument which measures the quantity and properties of neutral particles. Measured properties can include mass and plasma bulk densities.
ParticleCorrelator	An instrument which correlates particle flux to help identify wave/particle interactions.
ParticleDetector	An instrument which detects particle flux!!!
Photometer	An instrument which measures the strength of electromagnetic radiation within a spectral band which can range from ultraviolet to infrared and includes the visible spectrum.

PhotomultiplierTube	A vacuum phototube that is an extremely sensitive detector of light in the ultraviolet, visible, and near-infrared ranges of the electromagnetic spectrum.
Photopolarimeter	An instrument which measures the intensity and polarization or radiant energy. A photopolarimeter is a combination of a photometer and a polarimeter.
Platform	A collection of components which can be positioned and oriented as a single unit. A platform may contain other platforms. For example, a spacecraft is a platform which may have components that can be articulated and are also considered platforms.
ProportionalCounter	An instrument which measures energy of ionization radiation based on interactions with a gas.
QuadrisphericalAnalyser	An instrument used for the 3-D detection of plasma, energetic electrons and ions, and for positive-ion composition measurements.
Radar	An instrument that uses directional properties of returned power to infer spatial and/or other characteristics of a remote object.
Radiometer	An instrument for detecting or measuring radiant energy. Radiometers are commonly limited to infrared radiation.
ResonanceSounder	A combination of a radio receiver and a pulsed transmitter used to study the plasma surrounding a spacecraft by identifying resonances or cut-offs (of the wave dispersion relation), whose frequencies are related to the ambient plasma density and magnetic field. When the transmitter is off it is essentially a high frequency-resolution spectral power receiver.
RetardingPotentialAnalyser	An instrument which measures ion temperatures and ion concentrations using a planar ion trap.
Riometer	An instrument which measure the signal strength in various directions of the galactic radio signals. Variations in these signals are influenced by solar flare activity and geomagnetic storm and substorm processes.
ScintillationDetector	An instrument which detects flouresences of a material which is excited by high energy (ionizing) electromagnetic or charged particle radiation.
SearchCoil	An instrument which measures the time variation of the magnetic flux threading a loop by measurement of the electric potential difference induced between the ends of the wire.
SolidStateDetector	A detector of the charge carriers (electrons and holes) generated in semiconductors by energy deposited by gamma ray photons. Also known as a "semiconductor detector".
Sounder	An instrument which measures the radiances from an object. A sounder may measure radiances at multiple spectral ranges.
SpacecraftPotentialControl	An instrument to control the electric potential of a spacecraft with respect to the ambient plasma by emitting a variable current of positive ions.

SpectralPowerReceiver	A radio receiver which determines the power spectral density of the electric or magnetic field, or both, at one or more frequencies.
Spectrometer	An instrument that measures the component wavelengths of light (or other electromagnetic radiation) by splitting the light up into its component wavelengths.
TimeOfFlight	An instrument which measures the time it takes for a particle to travel between two detectors.
Unspecified	A value which is not provided.
WaveformReceiver	A radio receiver which outputs the value of one or more components of the electric and/or magnetic field as a function of time.

Integral List   Closed

Identifiers for values above a given threshold and over area or solid-angle range.

Term	Definition
Area	Integration over the extent of a planar region, or of the surface of a solid.
Bandwidth	Integration over the width a frequency band.
SolidAngle	Integration over the angle in three-dimensional space that an object subtends at a point.

Ionosphere List   Closed

Identifiers for ionospheric regions.

Term	Definition
DRegion	The layer of the ionosphere that exists approximately 50 to 95 km above the surface of the Earth. One of several layers in the ionosphere.
ERegion	A layer of ionised gas occurring at 90-150km above the ground. One of several layers in the ionosphere. Also called the The Kennelly-Heaviside layer.
FRegion	A layer that contains ionized gases at a height of around 150-800 km above sea level, placing it in the thermosphere. the F region has the highest concentration of free electrons and ions anywhere in the atmosphere. It may be thought of as comprising two layers, the F1-and F2-layers. One of several layers in the ionosphere. Also known as the Appleton layer.
Topside	The region at the upper most areas of the ionosphere.

Magnetosphere List   Closed

Identifiers for the region of space above the atmosphere or surface of the planet, and bounded by the magnetopause, that is under the direct influence of planet's magnetic field.

Term	Definition
Magnetotail	The region on the night side of the body where the magnetic filed is stretched backwards by the force of the solar wind. For Earth, the magnetotail begins at a night-side radial distance of 10 Re (X > -10Re).
Main	The region of the magnetosphere where the magnetic

field lines are closed, but does not include the gaseous region gravitationally bound to the body.

Polar	The region near the pole of a body. For a magnetosphere the polar region is the area where magnetic field lines are open and includes the auroral zone.
RadiationBelt	The region within a magnetosphere where high-energy particles could potentially be trapped in a magnetic field.

MeasurementType List	Closed

Identifiers for the method of making an estimated value of a quantity that forms the basis of an observation.

Term	Definition
ActivityIndex	An indication, derived from one or more measurements, of the level of activity of an object or region, such as sunspot number, F10.7 flux, Dst, or the Polar Cap Indices.
Dopplergram	A map or image depicting the spatial distribution of line-of-sight velocities of the observed object.
Dust	Free microscopic particles of solid material.
ElectricField	A region of space around a charged particle, or between two voltages within which a force is exerted on charged objects in its vicinity. An electric field is the electric force per unit charge.
EnergeticParticles	Pieces of matter that are moving very fast. Energetic particles include protons, electrons, neutrons, neutrinos, the nuclei of atoms, and other sub-atomic particles.
Ephemeris	The spatial coordinates of a body as a function of time. When used as an Instrument Type it represents the process or methods used to generate spatial coordinates.
ImageIntensity	Measurements of the two-dimensional distribution of the intensity of photons from some region or object such as the Sun or the polar auroral regions; can be in any wavelength band, and polarized, etc.
InstrumentStatus	A quantity directly related to the operation or function of an instrument.
IonComposition	In situ measurements of the relative flux or density of electrically charged particles in the space environment. May give simple fluxes, but full distribution functions are sometimes measured.
Irradiance	Irradiance - A radiometric term for the power of electromagnetic radiation at a surface, per unit area. "Irradiance" is used when the electromagnetic radiation is incident on the surface. Irradiance data may be reported in any units (i.e. counts/s) due to, for example, being at a particular wavelength, or to being a not-fully-calibrated relative measurement.
MagneticField	A region of space near a magnetized body where magnetic forces can be detected (as measured by methods such as Zeeman splitting, etc.).
Magnetogram	Measurements of the vector or line-of-sight magnetic

field determined from remote sensing measurements of the detailed structure of spectral lines, including their splitting and polarization. ("Magnetogram.")

NeutralAtomImages	Measurements of neutral atom fluxes as a function of look direction; often related to remote energetic charged particles that lose their charge through charge-exchange and then reach the detector on a line-of-sight trajectory.
NeutralGas	Measurements of neutral atomic and molecular components of a gas.
Profile	Measurements of a quantity as a function of height above an object such as the limb of a body.
Radiance	A radiometric measurement that describes the amount of electromagnetic radiation that passes through or is emitted from a particular area, and falls within a given solid angle in a specified direction. They are used to characterize both emission from diffuse sources and reflection from diffuse surfaces.
Spectrum	The distribution of a characteristic of a physical system or phenomenon, such as the energy emitted by a radiant source, arranged in the order of wavelengths.
ThermalPlasma	Measurements of the plasma in the energy regime where the most of the plasma occurs. May be the basic fluxes in the form of distribution functions or the derived bulk parameters (density, flow velocity, etc.).
Waves	Data resulting from observations of wave experiments and natural wave phenomena. Wave experiments are typically active and natural wave phenomena are passive. Examples of wave experiments include coherent/incoherent scatter radars, radio soundings, VLF propagation studies, ionospheric scintillation of beacon satellite signals, etc. Examples of natural wave phenomena include micropulsations, mesospheric gravity waves, auroral/plasmaspheric hiss, Langmuir waves, AKR, Jovian decametric radiation, solar radio bursts, etc.

MixedQuantity List   Closed

Identifiers for the combined attributes of a mixed parameter quantity.

Term	Definition
AkasofuEpsilon	A measure of the magnetopause energy flux and an indicator of the solar wind power available for subsequent magnetospheric energization. Defined as: $V*B^2*l^2 \sin(\theta/2)^4$ where B is the IMF, l is an empirical scaling parameter equal to 7 RE, and theta $= \tan(BY/BZ)^{-1}$ the IMF clock angle.
AlfvenMachNumber	The ratio of the bulk flow speed to the Alfven speed.
AlfvenVelocity	Phase velocity of the Alfven wave; In SI units it is the velocity of the magnetic field divided by the square root of the mass density times the permeability of free space (mu).
FrequencyToGyrofrequencyRatio	The ratio of the characteristic frequency of a medium to

gyrofrequency of a particle.

MagnetosonicMachNumber	The ratio of the velocity of fast mode waves to the Alfven velocity.
Other	Not classified with more specific terms. The context of its usage may be described in related text.
PlasmaBeta	The ratio of the plasma pressure (nkT) to the magnetic pressure (B^2/2mu0) of the SUM(nkT)/(B^2/2mu0).
TotalPressure	In an MHD fluid it is the number density (N) times Boltzmann constant times the temperature in Kelvin.
VCrossB	The cross product of the charge velocity (V) and the magnetic field (B). It is the electric field exerted on a point charge by a magnetic field.

NearSurface List	Closed

Identifiers for regions of the gaseous and possibly ionized environment of a body extending from the surface to some specified altitude.

Term	Definition
Atmosphere	The neutral gases surrounding a body that extends from the surface and is bound to the body by virtue of the gravitational attraction.
AuroralRegion	The region in the atmospheric where electrically-charged particles bombarding the upper atmosphere of a planet in the presence of a magnetic field produce an optical phenomenon.
EquatorialRegion	A region centered on the equator and limited in latitude by approximately 23 degrees north and south of the equator.
Ionosphere	The charged or ionized gases surrounding a body that are nominally bound to the body by virtue of the gravitational attraction.
Mesosphere	The layer of the atmosphere that extends from the Stratosphere to a range of 80 km to 85 km, temperature decreasing with height.
Plasmasphere	A region of the magnetosphere consisting of low energy (cool) plasma. It is located above the ionosphere. The outer boundary of the plasmasphere is known as the plasmapause, which is defined by an order of magnitude drop in plasma density.
PolarCap	The areas of the globe surrounding the poles and consisting of the region north of 60 degrees north latitude an the region south of 60 degrees south latitude.
SouthAtlanticAnomalyRegion	The region where the Earth's inner van Allen radiation belt makes its closest approach to the planet's surface. The result is that, for a given altitude, the radiation intensity is higher over this region than elsewhere.
Stratosphere	The layer of the atmosphere that extends from the troposphere to about 30 km, temperature increases with height. The stratosphere contains the ozone layer.
Thermosphere	The layer of the atmosphere that extends from the Mesosphere to 640+ km, temperature increasing with

height.

Troposphere | The lowest layer of the atmosphere which begins at the surface and extends to between 7 km (4.4 mi) at the poles and 17 km (10.6 mi) at the equator, with some variation due to weather factors.

ParticleQuantity List	Closed

Identifiers for the characterization of the physical properties of the particle.

Term	Definition
ArrivalDirection	An angular measure of the direction from which an energetic particle or photon was incident on a detector. The angles may be measured in any coordinate system.
AtomicNumberDetected	The number of protons in the nucleus of an atom as determined by a detector.
AverageChargeState	A measure of the composite deficit (positive) or excess (negative) of electrons with respect to protons.
ChargeState	Charge of a fully or partially stripped ion, in units of the charge of a proton. Charge state of a bare proton = 1.
CountRate	The number of events per unit time.
Counts	The number of detection events occurring in a detector over the detector accumulation time.
Energy	The capacity for doing work as measured by the capability of doing work (potential energy) or the conversion of this capability to motion (kinetic energy)
EnergyDensity	The amount of energy per unit volume.
EnergyFlux	The amount of energy passing through a unit area in a unit time.
FlowSpeed	The rate at which particles or energy is passing through a unit area in a unit time.
FlowVelocity	The volume of matter passing through a unit area perpendicular to the direction of flow in a unit of time.
Fluence	The time integral of a flux. A fluence does not have any "per unit time" in its units.
Gyrofrequency	The number of gyrations around a magnetic guiding center (field line) a charged particle makes per unit time due to the Lorentz force.
HeatFlux	Flow of thermal energy through a gas or plasma; typically computed as third moment of a distribution function.
Mass	The measure of inertia (mass) of individual objects (e.g., aerosols).
MassDensity	The mass of particles per unit volume.
MassNumber	The total number of protons and neutrons (together known as nucleons) in an atomic nucleus.
NumberDensity	The number of particles per unit volume.
NumberFlux	The number of particles passing a unit area in unit time, possibly also per unit energy (or equivalent) and/or per unit look direction.
ParticleRadius	The mean radius for a Gaussian distribution of particles with an axial ratio of 2 and a distribution width that

varies as 0.5 radius. A value of zero means no cloud was detected.

PlasmaFrequency	A number-density-dependent characteristic frequency of a plasma.
Pressure	The force per unit area exerted by a particle distribution or field.
SonicMachNumber	The ratio of the bulk flow speed to the speed of sound in the medium.
SoundSpeed	The speed at which sound travels through a medium.
Temperature	A measure of the kinetic energy of random motion with respect to the average. Temperature is properly defined only for an equilibrium particle distribution (Maxwellian distribution).
ThermalSpeed	For a Maxwellian distribution, the difference between the mean speed and the speed within which ~69% (one sigma) of all the members of the speed distribution occur.
Velocity	Rate of change of position. Also used for the average velocity of a collection of particles, also referred to as "bulk velocity".

ParticleType List   Closed

Identifiers for the characterization of the kind of particle observed by the measurement.

Term	Definition
Aerosol	A suspension of fine solid or liquid particles in a gas.
AlphaParticle	A positively charged nuclear particle that consists of two protons and two neutrons.
Atom	Matter consisting of a nucleus surrounded by electrons which has no net charge.
Dust	Free microscopic particles of solid material.
Electron	An elementary particle consisting of a charge of negative electricity equal to about 1.602×10^{-19} Coulomb and having a mass when at rest of about 9.109534×10^{-28} gram.
Ion	An atom that has acquired a net electric charge by gaining or losing one or more electrons.(Note: Z>2)
Molecule	A group of atoms so united and combined by chemical affinity that they form a complete, integrated whole, being the smallest portion of any particular compound that can exist in a free state
Neutron	An elementary particle that has no net charge and is a constituent of atomic nuclei, and that has a mass slightly large than a proton (1.673×10^{-24} gram.)
Proton	An elementary particle that is a constituent of all atomic nuclei, that carries a positive charge numerically equal to the charge of an electron, and that has a mass of 1.673×10^{-24} gram.

PhenomenonType List   Closed

Identifiers for the characteristics or categorization of an observation. Note: Joe King to provide.

Term	Definition

ActiveRegion	A localized, transient volume of the solar atmosphere in which PLAGEs, SUNSPOTS, FACULAe, FLAREs, etc. may be observed.
Aurora	An atmospheric phenomenon consisting of bands of light caused by charged solar particles following the earth's magnetic lines of force.
BowShockCrossing	A crossing of the boundary between the undisturbed (except for foreshock effects) solar wind and the shocked, decelerated solar wind of the magnetosheath.
CoronalHole	An extended region of the corona, exceptionally low in density and associated with unipolar photospheric regions. A coronal hole can be an "open" magnetic field in the corona and (perhaps) inner heliosphere which has a faster than average outflow (wind); A region of lower than "quiet" ion and electron density in the corona; or a region of lower peak electron temperature in the corona than in the "quiet" corona.
CoronalMassEjection	A solar event (CME) that involves a burst of plasma ejected into the interplanetary medium. CME's may be observed remotely relatively near the sun or in situ in the interplanetary medium. The latter type of observations are often referred to as Interplanetary CME's (ICME's).
EITWave	A wave in the corona of the Sun which produce shock waves on the Sun's chromosphere (Moreton Waves). EIT Waves are produced by large solar flare and expand outward at about 1,000 km/s. It usually appears as a slowly moving diffuse arc of brightening in H-alpha, and may travel for several hundred thousand km.
EnergeticSolarParticleEvent	An enhancement of interplanetary fluxes of energetic ions accelerated by interplanetary shocks and/or solar flares.
ForbushDecrease	A rapid decrease in the observed galactic cosmic ray intensity following the passage of an outwardly convecting interplanetary magnetic field disturbance, such as those associated with large CME's, that sweep some galactic cosmic rays away from Earth.
GeomagneticStorm	A magnetospheric disturbance typically defined by variations in the horizontal component of the Earth's surface magnetic field. The variation typically starts with a field enhancement associated with a solar wind pressure pulse and continues with a field depression associated with an enhancement of the diamagnetic magnetospheric ring current.
InterplanetaryShock	A shock propagating generally anti-sunward through the slower solar wind, often seen in front of CME-associated plasma clouds.
MagneticCloud	A transient event observed in the solar wind characterized as a region of enhanced magnetic field strength, smooth rotation of the magnetic field vector and low proton density and temperature.
MagnetopauseCrossing	A crossing of the interface between the shocked solar

	wind in the magnetosheath and the magnetic field and plasma in the magnetosphere.
RadioBurst	Emissions of the sun in radio wavelengths from centimeters to dekameters, under both quiet and disturbed conditions. Radio Bursts can be "Type I" consisting of many short, narrow-band bursts in the metric range (300 - 50 MHz).; "Type II" consisting of narrow-band emission that begins in the meter range (300 MHz) and sweeps slowly (tens of minutes) toward dekameter wavelengths (10 MHz).; "Type III" consisting of narrow-band bursts that sweep rapidly (seconds) from decimeter to dekameter wavelengths (500 - 0.5 MHz); and "Type IV" consisting of a smooth continuum of broad-band bursts primarily in the meter range (300 - 30 MHz).
SectorBoundaryCrossing	A sector boundary crossing is a transit by a spacecraft across the heliospheric current sheet separating the dominantly outward (away-from-the-sun) interplanetary magnetic field of one hemisphere of the heliosphere from the dominantly inward (toward-the-sun) polarity of the other hemisphere. Such crossings have multi-day intervals of opposite IMF dominant polarities on either side.
SolarFlare	An explosive event in the Sun's atmosphere which produces electromagnetic radiation across the electromagnetic spectrum at multiple wavelengths from long-wave radio to the shortest wavelength gamma rays.
SolarWindExtreme	Intervals of unusually large or small values of solar wind attributes such as flow speed and ion density.
StreamInteractionRegion	The region (SIR) where two solar wind streams, typically having differing characteristics and solar sources, abut up against (and possibly partially interpenetrate) each other.
Substorm	A process by which plasma in the magnetotail becomes energized at a fast rate.

ProcessingLevel List   Closed

Identifiers to characterize the amount and type of manipulation which has been applied to the sampled data.

Term	Definition
Calibrated	Data wherein sensor outputs have been convolved with instrument response function, often irreversibly, to yield data in physical units.
Raw	Data in its original state with no processing to account for calibration!!!
Uncalibrated	Duplicate data are removed from the data stream and data are time ordered. Values are not adjusted for any potential biases or external factors.

Projection List   Closed

Identifiers to projections into a coordinate system.

Term

	Definition
IJ	A measure of the length of a position or measured vector projected into the i-j (typically X-Y) plane of the coordinate system.
IK	A measure of the length of a position or measured vector projected into the i-k (typically X-Z) plane of the coordinate system.
JK	A measure of the length of a position or measured vector projected into the j-k (typically Y-Z) plane of the coordinate system.

Qualifier List	Closed

Identifiers for terms which refine the type or attribute of a quantity.

Term	Definition
Anisotropy	Direction-dependent property.
Array	A sequence of values corresponding to the elements in a rectilinear, n-dimension matrix. Each value can be referenced by a unique index.
Average	The statistical mean; the sum of a set of values divided by the number of values in the set.
Characteristic	A quantity which can be easily identified and measured in a given environment.
Circular	Relative to polarization, right-hand circularly polarized light is defined such that the electric field is rotating clockwise as seen by an observer towards whom the wave is moving. Left-hand circularly polarized light is defined such that the electric field is rotating counterclockwise as seen by an observer towards whom the wave is moving. The polarization of magnetohydrodynamic waves is specified with respect to the ambient mean magnetic field : right-hand polarized waves have a transverse electric field component which turns in a right-handed sense (that of the gyrating electrons) around the magnetic field.
Column	A two-dimensional measure of a quantity. The column is the area over which the quantity is measured.
Component	Projection of a vector along one of the base axes of a coordinate system.
Core	The central or main part of an object or calculated distribution. For example, the part of a distribution of particles at low energies that is a thermal (Maxwellian) population.
CrossSpectrum	The Fourier transform of the cross correlation of two physical or empirical observations.
Deviation	The difference between an observed value and the expected value of a quantity.
Differential	A measurement within a narrow range of energy and/or solid angle.
Direction	The spatial relation between an object and another object, the orientation of the object or the course along which the

object points or moves.

DirectionAngle	The angle between a position vector or measured vector (or one of its projections onto a plane) and one of the base axes of the coordinate system.
Directional	A measurement within a narrow range of solid angle.
Fit	Values that make an model agree with the data.
Group	An assemblage of values that a certain relation or common characteristic.
Halo	The part of an object or distribution surrounding some central body or distribution. For example, the particles above the core energies that show enhancements above the thermal population. Typically, a "power law tail" shows a break from the core Maxwellian at a particular energy.
Integral	A flux measurement in a broad range of energy and solid angle.
LineOfSight	The line of sight is the line that connects the observer with the observed object. This expression is often used with measurements of Doppler velocity and magnetic field in magnetograms, where only the component of the vector field directed along the line of sight is measured.
Linear	Polarization where the E-field vector is confined to a given plane
Magnitude	A measure of the strength of a vector quantity or length of its representational vector.
Maximum	The largest value of a batch or sample or the upper bound of a probability distribution.
Median	The measure of central tendency of a set of n. values computed by ordering the values and taking the value at position (n. + 1) / 2 when n. is odd or the arithmetic mean of the values at positions n. / 2 and (n. / 2) + 1 when n. is even.
Minimum	The smallest value of a batch or sample or the lower bound of a probability distribution.
Moment	Parameters determined by integration over a distribution function convolved with a power of velocity.
Parallel	Having the same direction as a given direction
Peak	The maximum value for the quantity in question, over a period of time which is usually equal to the cadence.
Perpendicular	At right angles to a given direction.
Perturbation	Variations in the state of a system.
Phase	A point or portion in a recurring series of changes.
PhaseAngle	Phase difference between two or more waves, normally expressed in degrees.
Projection	A measure of the length of a position or measured vector as projected into a plane of the coordinate system.
Pseudo	Similar to or having the appearance of something else. Can be used to indicate an estimation or approximation of a particular quantity.
Ratio	The relative magnitudes of two quantities.
Scalar	A quantity that is completely specified by its magnitude

and has no direction.

Spectral	Characterized as a range or continuum of frequencies
StandardDeviation	The square root of the average of the squares of deviations about the mean of a set of data. Standard deviation is a statistical measure of spread or variability.
Strahl	A distribution of particles concentrated in a narrow energy band. The band may be may be aligned with a secondary feature. For example, it may occur in a narrow cone aligned with the mean magnetic field direction.
Superhalo	The part of an object or distribution surrounding some central body or distribution evident in a second break in the distribution function (e.g., a different power law). It consists of a population at a higher energies than for a halo.
Symmetric	Equal distribution about one or more axes.
Tensor	A generalized linear "quantity" or "geometrical entity" that can be expressed as a multi-dimensional array relative to a choice of basis of the particular space on which it is defined.
Total	The summation of quantities over all possible species.
Trace	The sum of the elements on the main diagonal (the diagonal from the upper left to the lower right) of a square matrix.
Uncertainty	A statistically defined discrepancy between a measured quantity and the true value of that quantity that cannot be corrected by calculation or calibration.
Variance	A measure of dispersion of a set of data points around their mean value. The expectation value of the squared deviations from the mean.
Vector	A set of parameter values each along some independent variable (e.g., components of a field in three orthogonal spatial directions; atmospheric temperature values at several altitudes, or at a given latitude and longitude;).

Region List   Closed

Identifiers for areas of the physical world which may be occupied or observed.

Term	Definition
Asteroid	A small extraterrestrial body consisting mostly of rock and metal that is in orbit around the sun.
Comet	A relatively small extraterrestrial body consisting of a frozen mass that travels around the sun in a highly elliptical orbit.
Earth	The third planet from the sun in our solar system.
Heliosphere	The solar atmosphere extending roughly from the outer corona to the edge of the solar plasma at the heliopause separating primarily solar plasma from interstellar plasma.
Interstellar	The region between stars outside of the star's heliopause.
Jupiter	The fifth planet from the sun in our solar system.
Mars	The forth planet from the sun in our solar system.

Mercury	The first planet from the sun in our solar system.
Neptune	The seventh planet from the sun in our solar system.
Pluto	The ninth (sub)planet from the sun in our solar system.
Saturn	The sixth planet from the sun in our solar system.
Sun	The star upon which our solar system is centered.
Uranus	The eighth planet from the sun in our solar system.
Venus	The second planet from the sun in our solar system.

RenderingAxis List   Closed

Identifiers for the reference component of a plot or rendering of data.

Term	Definition
ColorBar	A spectrum or set of colors used to represent data values.
Horizontal	Parallel to or in the plane of the horizon or a base line.
Vertical	Perpendicular to the plane of the horizon or a base line.

Role List   Closed

Identifiers for the assigned or assumed function or position of an individual.

Term	Definition
ArchiveSpecialist	An individual who is an expert on a collection of resources and may also be knowledgeable of the phenomenon and related physics represented by the resources. This includes librarians, curators, archive scientists and other experts.
Contributor	An entity responsible for making contributions to the content of the resource.
DataProducer	An individual who generated the resource and is familiar with its provenance.
GeneralContact	An individual who can provide information on a range of subjects or who can direct you to a domain expert.
MetadataContact	An individual who can affect a change in the metadata describing a resource.
PrincipalInvestigator	An individual who is the administrative and scientific lead for an investigation.
ProjectScientist	An individual who is an expert in the phenomenon and related physics explored by the project. A project scientist may also have a managerial role within the project.
Publisher	An individual, organization, institution or government department responsible for the production and dissemination of a document.
Scientist	An individual who is an expert in the phenomenon and related physics represented by the resource.
TeamLeader	An individual who is the designated leader of an investigation.
TeamMember	An individual who is a major participant in an investigation.
TechnicalContact	An individual who can provide specific information with regard to the resource or supporting software

ScaleType List   Closed

Identifiers for scaling applied to a set of numbers.

Term	Definition
LinearScale	Intervals which are equally spaced.
LogScale	Intervals which are spaced proportionally to the logarithms of the values being represented.

SourceType List   Closed

Identifiers for the characterization of the function or purpose of a source.

Term	Definition
Ancillary	A complementary item which can be subordinate, subsidiary, auxiliary, supplementary to the primary item.
Browse	A representation of an image which is suitable to reveal most or all of the details of the image.
Data	A collection of organized information, usually the results of experience, observation or experiment, or a set of premises. This may consist of numbers, words, or images, particularly as measurements or observations of a set of variables.
Layout	The structured arrangement of items in a collection.
Thumbnail	A small representation of an image which is suitable to infer what the full-sized imaged is like.

SpectralRange List   Closed

Identifiers for names associated with wavelengths. Based on the ISO 21348 Solar Irradiance Standard. Additions have been made to extend the frequency ranges to include those used in space physics. Those additions are indicated in blue text. The "Total Solar Irradiance" category has not been included since it is a type of measurement and not a specific spectral range. See Appendix A - Comparison of Spectrum Domains for a comparison of the spectral ranges with other systems.

Term	Definition
CaK	A spectrum with a wavelength of range centered near 393.5 nm. VSO nickname: Ca-K image with range of 391.9 nm to 395.2 nm.
ExtremeUltraviolet	A spectrum with a wavelength range of 10.0 nm to 125.0nm. VSO nickname: EUV image with a range of of 10.0 nm to 125.0 nm
FarUltraviolet	A spectrum with a wavelength range of 122 nm to 200.0nm. VSO nickname: FUV image with a range of 122.0 nm to 200 nm
GammaRays	Photons with a wavelength range: 0.00001 to 0.001 nm
Halpha	A spectrum with a wavelength range centered at 656.3 nm. VSO nickname: H-alpha image with a spectrum range of of 655.8 nm to 656.8 nm.
HardXrays	Photons with a wavelength range: 0.001 to 0.1 nm and an energy range of 12 keV to 120 keV
He10830	A spectrum with a wavelength range centered at 1082.9 nm. VSO nickname: He 10830 image with a range of 1082.5 nm to 1083.3 nm.
He304	A spectrum centered around the resonance line of ionised helium at 304 Angstrom (30.4 nm).

Infrared	Photons with a wavelength range: 760 to 1.00x10^6 nm
K7699	A spectrum with a wavelength range centred at 769.9 nm. VSO nickname: K-7699 dopplergram with a range of 769.8 nm to 770.0 nm.
LBHBand	Lyman-Birge-Hopfield band in the far ultraviolet range with wavelength range of 140nm to 170 nm.
Microwave	Photons with a wavelength range: 1.00x10^6 to 1.50x10^7 nm
NaD	A spectrum with a wavelength range of centered at 589.3 nm. VSO nickname: Na-D image with a range of 588.8 nm to 589.8 nm.
Ni6768	A spectrum with a wavelength range centered at 676.8 nm. VSO nickname: Ni-6768 dopplergram with a range of of 676.7 nm to 676.9 nm.
Optical	Photons with a wavelength range: 380 to 760 nm
RadioFrequency	Photons with a wavelength range: 100,000 to 1.00x10^11 nm
SoftXRays	X-Rays with an energy range of 0.12 keV to 12 keV.
Ultraviolet	Photons with a wavelength range: 10 to 400 nm.
WhiteLight	Photons with a wavelength in the visible range for humans.
XRays	Photons with a wavelength range: $0.001 <= x < 10$ nm

Sun List   Closed

Identifiers for regions of the star upon which our solar system is centered.

Term	Definition
Chromosphere	The region of the Sun's (or a star's) atmosphere above the temperature minimum and below the Transition Region. The solar chromosphere is approximately 400 km to 2100 km above the photosphere, and characterized by temperatures from 4500 - 28000 K.
Corona	The outermost atmospheric region of the Sun or a star, characterized by ionization temperatures above 10^5 K. The solar corona starts at about 2100 km above the photosphere; there is no generally defined upper limit.
Interior	The region inside the body which is not visible from outside the body.
Photosphere	The atmospheric layer of the Sun or a star from which continuum radiation, especially optical, is emitted to space. For the Sun, the photosphere is about 500 km thick.
TransitionRegion	A very narrow (<100 km) layer between the chromosphere and the corona where the temperature rises abruptly from about 8000 to about 500,000 K.

SupportQuantity List   Closed

Identifiers for the information useful in understanding the context of an observation, typically observed or measured coincidentally with a physical observation.

Term	Definition
InstrumentMode	An indication of a state (mode) in which the instrument is

operating. How a mode influences the interpretation and representation of data is described in instrument related documentation.

Other	Not classified with more specific terms. The context of its usage may be described in related text.
Positional	The specification of the location of an object or measurement within a reference coordinate system. The position is usually expressed as a set of values corresponding to the location along a set of orthogonal axes together with the date/time of the observation.
Temporal	Pertaining to time.
Velocity	Rate of change of position. Also used for the average velocity of a collection of particles, also referred to as "bulk velocity".

Text List   Closed

Identifiers for the encoding of sequences of characters.

Term	Definition
ASCII	A sequence of characters that adheres to American Standard Code for Information Interchange (ASCII) which is an 7-bit character-coding scheme.
Unicode	Text in multi-byte Unicode format.

WaveQuantity List   Closed

Identifiers for the characterization of the physical properties of a wave.

Term	Definition
ACElectricField	Alternating electric field component of a wave.
ACMagneticField	Alternating magnetic field component of a wave.
Absorption	Decrease of radiant energy (relative to the background continuum spectrum).
Albedo	The ratio of reflected radiation from the surface to incident radiation upon it.
DopplerFrequency	Change in the frequency of a propagating wave due to motion of the source, the observer, the reflector, or the propagation medium.
Emissivity	The energy emitted spontaneously per unit bandwidth (typically frequency) per unit time per unit mass of source. Emissivity is usually integrated over all directions/solid angles.
EnergyFlux	The amount of energy passing through a unit area in a unit time.
EquivalentWidth	The spectral width of a total absorption line having the amount of absorbed radiant energy being equivalent to that in an observed absorption line.
Frequency	The number of occurrences of a repeating event per unit time.
Gyrofrequency	The number of gyrations around a magnetic guiding center (field line) a charged particle makes per unit time due to the Lorentz force.
Intensity	The measurement of radiant or wave energy per unit

	detector area per unit bandwidth per unit solid angle per unit time.
LineDepth	The measure of the amount of absorption below the continuum (depth) in a particular wavelength or frequency in an absorption spectrum.
MagneticField	A region of space near a magnetized body where magnetic forces can be detected (as measured by methods such as Zeeman splitting, etc.).
ModeAmplitude	In helioseismology the magnitude of oscillation of waves of a particular geometry.
PlasmaFrequency	A number-density-dependent characteristic frequency of a plasma.
Polarization	Direction of the electric vector of an electromagnetic wave. The wave can be linearly polarized in any direction perpendicular to the direction of travel, circularly polarized (clockwise or counterclockwise), unpolarized, or mixtures of the above.
PoyntingFlux	Electromagnetic energy flux transported by a wave characterized as the rate of energy transport per unit area per steradian.
PropagationTime	Time difference between transmission and reception of a wave in an active wave experiment.
Velocity	Rate of change of position. Also used for the average velocity of a collection of particles, also referred to as "bulk velocity".
Wavelength	The peak-to-peak distance over one wave period.

WaveType List   Closed

Identifiers for the carrier or phenomenum of wave information observed by the measurement.

Term	Definition
Electromagnetic	Electric and magnetic field variations in time and space that propagate through a medium or a vacuum with the wave's propagation, electric field, and magnetic field vectors forming an orthogonal triad. Waves in this category are detected by having their field quantities measured.
Electrostatic	Collective longitudinal electric-field and plasma oscillations trapped within a body of plasma.
Hydrodynamic	Periodic or quasi-periodic oscillations of fluid quantities.
MHD	Hydrodynamic waves in a magnetized plasma in which the background magnetic field plays a key role in controlling the wave propagation characteristics.
Photon	Electromagnetic waves detected by techniques that utilize their corpuscular character (e.g., CCD, CMOS, photomultipliers).
PlasmaWaves	Self-consistent collective oscillations of particles and fields (electric and magnetic) in a plasma.

Waves List   Closed

Identifiers for experimental and natural wave phenomena.

Term

	Definition
Active	Exerting an influence or producing a change or effect. An active measurement is one which produces a transmission or excitation as a part of the measurement cycle.
Passive	Movement or effect produced by outside influence. A passive measurement is one which does not produce a transmission or excitation as a part of the measurement cycle.

9. Appendix A - Comparison of Spectrum Domains

Electromagnetic Spectrum Domains
(all wavelengths given in nanometers)

Band	Wavelength [ISO 21348]		Wavelength [EGSO]		Wavelength [VSO]	
	min	max	min	max	min	max
Gamma	0.00001	0.001	-	0.025		
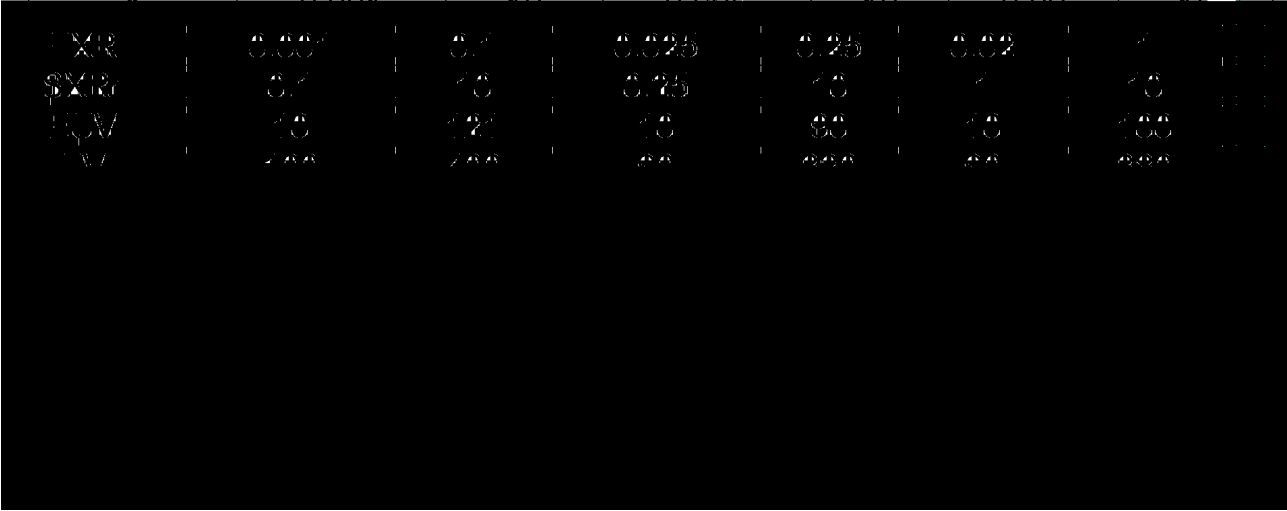
10. Bibliography

National Solar Observatory Sacramento Peak
http://www.sunspot.noao.edu/sunspot/pr/glossary.html

Terms and Definitions
http://www.pgd.hawaii.edu/eschool/glossary.htm

International System of Units (SI)
http://www.bipm.fr/en/si
Base units: http://www.bipm.fr/en/si/si_brochure/chapter2/2-1/#symbols
and those for Common derived units: http://www.bipm.fr/en/si/derived_units/2-2-2.html

ISO 8601:2004 - Date Format
http://en.wikipedia.org/wiki/ISO_8601
- or -
http://www.iso.ch/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=40874
- or -
http://www.iso.org/iso/en/prods-services/popstds/datesandtime.html

RFC 3339 - Date and Time on the Internet
The basis for the ISO 8601 standard. http://www.ietf.org/rfc/rfc3339.txt

RFC 1014 - XDR: External Data Representation standard
http://www.faqs.org/rfcs/rfc1014.html

11. Index

12. Change History

0.99.1	
2005-06-23	Removed duplicate entries.
2005-06-23	Added Chris Harvey's definitions for Electron Drift.
2005-06-23	Particle Correlator and Spacecraft Potential Control.
2005-06-23	Released.

0.99.2	
2005-07-07	Corrected "Numerical Data" entry under Product
2005-07-07	Released.

0.99.3	
2005-08-03	Added definitions supplied by J. Thieman, C. Harvey and T.King; Significant revision of document as suggested by Joe Hourcle

0.99.4	
2005-08-08	Restructured the taxonomy of elements to match the one suggested by A. Roberts.
2005-08-08	Added definitions for new elements introduced in the new taxonomy.
2005-08-08	Released.

0.99.5	
2005-08-26	Clarified some definitions and corrected typographical errors based on comments from J. Thieman and J. Hourcle.
2005-08-26	Changed data types of "Integer" to "Count" and "Double" to "Numeric".
2005-08-26	Added document elements to product resources.
2005-08-26	Added catalog, display data to top list.
2005-08-26	Included region descriptions from J. King with additions suggested by K. Reardon.
2005-08-26	Add parameters loosely based on a model proposed by A.Roberts.
2005-08-26	Released.

0.99.6	
2005-09-07	Corrected the inclusion of Atmosphere-Ionosphere regions into the Magnetosphere.
2005-09-07	Changed Surface to Ground.
2005-09-07	Removed Body and references to it.
2005-09-07	Added Spherical and Cartesian under Position.
2005-09-07	Remove Ratio (Numerator and Denominator).
2005-09-07	Change Upper Latitude to High Latitude, Lower to Low.
2005-09-07	Introduced "Photon Context" and "Particle Context" as replacements for "Independent Variable".
2005-09-07	Removed "Provider" and "Manufacture" resources and replaced with ID pointers.

0.99.7	
2005-09-08	Under Parameter add Description, Tensor Order.
2005-09-08	Change Photon Context and Particle Context to Independent Variable.
2005-09-08	Move Wavelength and Wave Number under Photon Independent Variable.
2005-09-08	Drop Speed from Particle Independent Variable.
2005-09-08	Move Polar Angle under Particle Independent Variable.
2005-09-08	Add Analysis Method under Field/Electric and

Field/Magnetic.

2005-09-08	Add Wave Form, Spectra etc. under Analysis Method.
2005-09-08	Add Near 1AU under Heliosphere; Add Body under Atmosphere-Ionosphere, Magnetosphere and Ground.
2005-09-08	Add all planets + Moon under Body.
2005-09-08	Update definition of Magnetotail, etc. to be generic, add Earth examples.
2005-09-08	Change "Acceptable abbreviation" to "Conventional abbreviation" since abbreviations are not supported in the model.
2005-09-08	Released.

0.99.8

2005-11-03	General clean-up and alignment with the schema agreed upon at the APL meeting (Nov 2-4, 2005)
2005-11-03	Released.

0.99.9

2005-11-18	Incorporate comments from consortium members on the "final" draft before the release of version 1.0
2005-11-18	Released.

1.0.0

2005-11-22	Incorporate comments from consortium members on the "final" draft before the release of version 1.0.
2005-11-22	Added Phenomenon Type list and defined terms in the list.
2005-11-22	Released.

1.0.1

2006-01-03	Changes in value type for elements: Exposure, InputResourceID, RepositoryName, Size.
2006-01-03	Added elements: Pressure.
2006-01-03	Released.

1.0.2

2006-03-07	Added "Project Scientist" to dictionary and "Role".
2006-03-07	Added "Caveats" under "Instrument".
2006-03-07	Added "Repository" resource class.
2006-03-07	Added "Registry" resource class.
2006-03-07	Released.

1.0.3

2006-04-27	Added "Earth" as a enumeration with "Magnetosphere" as a member.
2006-04-27	Changed "Observed Region" and "Instrument Region" to enumerations.
2006-04-27	Changed definition of "Item" to indicate it is a value of an enumeration.
2006-04-27	Move "Access Rights" under "Access Information".
2006-04-27	Made "Acknowledgement optional.
2006-04-27	Change "HF Radar" to "Radar".
2006-04-27	Added "NCAR" as a "Format".
2006-04-27	Dropped N, Z, Q from dictionary.
2006-04-27	Moved Mass and Size under "Particle Physical Quantity" and changed to type item.
2006-04-27	Added "Near Earth" under "Heliosphere" and added "Outside Bowshock" and "Orbital" under "Near Earth".
2006-04-27	Changed "Spectral Range Name" to "Spectral Range" for consistency.
2006-04-27	Correct links to "Stoke's Parameters".
2006-04-27	Released.

1.1.0

2006-08-31	Removed "Orbital".
2006-08-31	Modified definition of "Near Earth".
2006-08-31	Changed "Instrument type" to allow multiple occurrences.
2006-08-31	Made data type of "Mixed" text.
2006-08-31	Added "Service" resource class.
2006-08-31	Updated description of "Resource ID".
2006-08-31	Added MAT_4, MAT_6, MAT_7 and VOTable as a Format.
2006-08-31	Added J2000 as a coordinate system.
2006-08-31	Added Base64 as an Encoding.
2006-08-31	Added Parent ID, Energy Range, Frequency Range, Azimuthal Angle Range, Polar Angle Range, Atomic Number Range, Integral, Differential, Low and High.
2006-08-31	Remove Coordinate System from Particle Physical Parameter.
2006-08-31	Updated Pressure definition.
2006-08-31	Add ObservatoryID under Instrument.
2006-08-31	Remove Observatory ID from Numerical Data and Display Data.
2006-08-31	Changed definition of Investigation Name.
2006-08-31	Remove Access Right from Display Data.
2006-08-31	Change Repository Name to Repository ID under Access Information.
2006-08-31	Added Granule.
2006-08-31	Added Parameter Key under Physical Parameter.
2006-08-31	Add Release Date to Resource Header, Person, and Granule.
2006-08-31	Changed "alias" to "alternate name".
2006-08-31	Removed "Instrument Name" and "Observatory Name".
2006-08-31	Added ChargeState to Particle Quantity.
2006-08-31	Add Field Component container.
2006-08-31	Add Statistics to Phenomenon Type.
2006-08-31	Released.

1.1.1

	Changed InstrumentID and Bin to multiple occurrence.
	Removed enumeration of Component.
	Modified definition of Units.
	Changed AccessURL to type container.

1.2.0

2007-05-22	Added Aurora and Substorm under Phenomenon Type.
2007-05-22	Added Checksum, Hash Value, Hash Function, MD5 and SHA1, SHA256.
2007-05-22	Added Note as a term and added Note under Timespan.
2007-05-22	Added all planets, Comet and Asteroid as regions.
2007-05-22	Added Data Extent, Bytes and Per to describe the size of a resource.
2007-05-22	Added Data Extent to Access URL and Granule.
2007-05-22	Added the ValidMin, ValidMax and FillValue to Physical Parameter.
2007-05-22	Added Uncertainty and Standard Deviation to qualifiers.
2007-05-22	Added Expiration Date to Resource Header and Granule.
2007-05-22	Added Longitude and Latitude to Orientation.
2007-05-22	Updated Phi and Theta definitions.
2007-05-22	Added Ephemeris as an Instrument Type.
2007-05-22	Added Sequence as a element type and changes Size to a Sequence.
2007-05-22	Defined PriorID and added PriorID to ResourceHeader and Granule.
2007-05-22	Changed InstrumentID in DisplayData and

	NumericalData to one or more occurrences.
2007-05-22	Added Metadata Contact to Role.
2007-05-22	Modified definitions of H, Flux, Integral and Differential.
2007-05-22	Cardinality of Access Information changed from 1 to + (1 or more).
2007-05-22	Added Deputy-PI to Roles;Changed cardinality of Caveats under Instrument to optional.
2007-05-22	Added Element with members of Name, Index, ParameterKey and Component.
2007-05-22	Added Element under Dimension.
2007-05-22	Removed Orientation.
2007-05-22	Made Component and enumeration with the values from Orientation.
2007-05-22	Added InstrumentStatus to MeasurementType.
2007-05-22	Converted Support to an enumeration with Other, Positional and Temporal as members.
2007-05-22	Added ProcessingLevel, Removed Theta and Phi.
2007-05-22	Added Postscript as a Format.
2007-05-22	Added "Extension" as a container.
2007-05-22	Made "URL" in "Granule" multi-valued.
2007-05-22	Changed name of "Date" data type to "DateTime" and "Time" data type to "Duration" to be consistent with conventional terminology.
2007-05-22	Under "Physical Parameter" made "Parameter Key" optional and "Name" required.
2007-05-22	Removed "Dynamic Spectra" from "Measurement Type".
2007-05-22	Added "Spectrum" to "Measurement Type".
2007-05-22	Removed D, H, T, N, Latitude, Longitude from the dictionary.
2007-05-22	Added "Theta" and "Phi" to "Component".
2007-05-22	Added Location container under Observatory and added the elements Latitude, Longitude, Elevation, ObservatoryGroup.
2007-05-22	Added ITM regions under Near Surface.
2007-05-22	Remove Instrument Region from NumericalData.
2007-05-22	Added WGS84 as a Coordinate System Name.
2007-05-22	Released.

1.2.1

2008-03-20	Added SpacecraftOrbitPlane to CoordinateSystemName.
2008-03-20	Added Parallel and PhaseAngle to FieldQualifier.
2008-03-20	Added Current, GyroFrequency, Energy, PlasmaFrequency to the appropriate ParticleQuantity, FieldQuantity, or PhotonQuantity.
2008-03-20	Added Characteristic to ParticleQualifier.
2008-03-20	Add EnergyRange and WavelengthRange to PhotonQuantity.
2008-03-20	Added White-light, H-alpha, He-10830, Ca-K, Na-D, Extreme Ultraviolet, Ni-6768, K-7699 to dictionary and to SpectralRange.
2008-03-20	Added Time Of Flight Interferometer, Photometer, Radiometer, Coronograph, ProportionalCounter, ScintillationDetector, Photopolarimeter, Geiger-MuellerTube, NeutralParticleDetector, Sounder, NeutralAtomImager, RetardingPotentialAnalyser, MultispectralImager, ImagingSpectrometer, Riometer, Unspecified to Instrument Type.
2008-03-20	Added Archive Specialist to Role.
2008-03-20	Added Flow Speed, Number Flux to Particle Quantity.
2008-03-20	Added Energy Flux to Particle Quantity and Photon Quantity.
2008-03-20	Added Anisotropy to Particle Qualifier.
2008-03-20	Added Carrington and HCI to Coordinate System.

2008-03-20	Updated definitions of Vector and Size.
2008-03-20	Removed Flux and Intensity.
2008-03-20	Released.

1.2.2

2008-07-31	Change "Plasmafrequency" to "Plasma Frequency".
2008-07-31	Change "Plasmafrequency" to "Plasma Frequency".
2008-07-31	Change "Retarding Potential Analyser" to "Retarding Potential Analyzer"
2008-07-31	Change "Time-of-flight" to "Time of flight".
2008-07-31	Change "Observatory Group" to "Observatory Name".
2008-07-31	Removed "Offline" from "Medium".
2008-07-31	Remove "Field Component" from lists.
2008-07-31	Remove "Near Earth" as a list.
2008-07-31	Added "Ionosphere" as a list.
2008-07-31	Azimuthal Angle,Dayside,Electric Field Instrument,Frequency,High Latitude,Low Latitude,Nightside,Polar Angle,Provider ID,Provider Release Date,RTF,SGI,Soft X-rays,Spatial Range,TeX,Wavelength,Wavenumber,XDR
2008-07-31	Added Repository ID and Stop Date
2008-08-14	Released.

1.3.0

2007	Add WavelengthRange to dictionary; Add BandName to Bin.
2007	Added SupportQuantity to Support.
2007	Moved Extension into each resource class.
2007	Add SpectralRange to EnergyRange, FrequencyRange and WavelengthRange.
2007	Added Units, UnitsConversion, ValidMin, ValidMax, FillValue to Element
2007	Added Fax Number to Person.
2007	Added Contributor and Publisher to dictionary and Role.
2007	Added Language to dictionary.
2008	Introduced Document resource.
2008	Added Document Type enumeration and Paper as an item.
2008	Added Number Flux to Particle Quantity.
2008	Moved CrossSpectrum from FieldQuantity to FieldQualifier.
2008	Added Electromagnetic to FieldQuantity.
2008	Added PhysicalParameter to Catalog and DisplayData.
2008-04-24	Removed "Structure Type" from dictionary and Structure.
2008-04-24	Removed "Observatory Group" from dictionary and Observatory.
2008-04-25	Removed "Provider Release Date" from dictionary.
2008-05-20	Added "Magnetic Cloud" to dictionary and "Phenomenon Type"
2008-05-20	Changed cardinality of "Phenomenon Type" to + in Catalog.
2008-04-24	Restored "Observatory Group" and made it multiple occurrence.
2008-05-22	Added "TAR" to the dictionary and to "Encoding Type".
2008-05-22	Made "Encoding Type" multiple occurrence (*) in "Access Information".
2008-05-22	Changed "End Date" to "Stop Date" and "Relative End Date" to "Relative Stop Date".
2008-05-22	Added "Active Region" to dictionary and "Phenomenon Type".
2008-05-22	Added "Coronal Hole" to dictionary and "Phenomenon Type".

2008-05-22	Added "Radio Burst" to dictionary and "Phenomenon Type".
2008-05-22	Added "EIT Waves" to dictionary and "Phenomenon Type".
2008-05-22	Fixed spelling of "Plasma Frequency" in the "Photon Qualifier" list.
2008-05-22	Removed "Array" from the Field, Photon and Particle qualifier lists.

1.3.1

2008-07-21	Updated description of duration type.
2008-07-31	Added "Set" to "Physical Parameter"
2008-07-31	Added "Source" dictionary and to "Granule", Removed URL, Checksum and Data Extent from Granule (now in Source)
2008-07-31	Added "Source Type" as a list with possible values of Data, Layout, Ancillary, Browse and Thumbnail.
2008-07-31	Added "Qualifier" as a unified list of all qualifiers. Removed "Field Qualifier", "Photon Qualifier" and "Particle Qualifier" from the dictionary. Replaced each with "Qualifier" in the ontology. Added "Qualifier" to "Support"
2008-07-31	Added "Trace" to the dictionary and to the "Qualifier" list.
2008-07-31	Added "Ion Drift" and "Dust Detector" to the dictionary and to the "Instrument Type" list.
2008-07-31	Added "Platform" to the dictionary and to the "Instrument Type" list, remove "Ephemeris" from the "Instrument Type" list.
2008-09-04	Added "Rendering Hints" with elements Format, AxisLabel, DisplayType, ScaleMin, ScaleMax, ScaleType and related enumerated values.
2008-09-04	Added "Symmetric" to the dictionary and to Qualifier.
2008-09-04	Changed "Physical Parameter" to "Parameter".
2008-09-04	Removed "Measured" and shifted containers under "Measured" up one level.
2008-09-04	Added "Velocity" to "Support Quantity".
2008-09-04	Added "Count Rate" to the dictionary and to "Particle Quantity".

1.3.2

2008-10-07	Removed "Charged Particle Flux" from Measurement Type and the dictionary.
2008-10-07	Added "Interstellar" to dictionary and Region.
2008-10-15	Changed "Format" under "Rendering Hints" to "Value Format" to eliminate name conflict with "Format".

1.3.3

2008-10-16	Added the "Association" container and "Association Type" enumeration to the dictionary. Modified the ontology to replace "Association Type" with the new "Association" container.

1.3.4

2009-01-14	Added "Wave", "Passive" and "Active" to the dictionary. Added "Wave" as an enumeration. Remove "Radio and Plasma Waves" and "Radio Soundings" from the "Measurement Type" enumeration and added "Wave" to the enumeration.
2009-01-14	Added "Linear Scale" and "Log Scale" to the dictionary. Removed "Log" from the dictionary. Modified the definition of "Linear" to remove reference scaled related usage. Updated the "Scale" enumeration with the name

	changes.
2009-01-14	Added "Language" under "Information URL".
2009-01-14	Changed the definition of "Text" and converted "Text" to an enumeration with possible encoding types.
2009-01-14	Modified "Component" to consist of "I", "J", "K". Added "Direction Angle", and "Projection" to "Qualifier". Removed "R", "Theta", "Phi", "X", "Y", and "Z". Added "Direction Angle" as an enumeration with values of "Azimuth Angle", "Polar Angle" and "Elevation Angle". Added "Projection" as an enumeration with value of "IJ", "IK", and "JK".
2009-01-22	Modified definition of "Mixed"
2009-01-22	Changed occurrence of "Particle" to one or more.
2009-01-23	Added "Ion Chamber" to dictionary and "Instrument Type" list.
2009-02-05	Added (restored) "Intensity" to dictionary and "Photon Quantity" list.
2009-02-05	Changed "Line-of-sight" to "Line Of Sight".
2009-02-05	Added "Psuedo" and "Column" to the dictionary and to "Qualifier" list.
2009-02-26	Added "Annotation" resource and "Annotation Type" and "Confidence Rating" enumerations. The terms "Anomaly", "Event", "Feature", "Probable", "Good", "High" were added to support the new enumerations.
2009-02-27	Change "Wave" to "Waves".

1.3.5

2009-03-25	Updated definitions for "Numeric" and "Text" data types.
2009-03-26	Changed "Mixed" to a container with "Qualifier" and "Mixed Quantity" as attributes. Added "Mixed Quantity" enumeration with allowed values of "Alfven Mach Number", "Other", "Plasma Beta", "Thermal Pressure", "Alfven Velocity", "Magnetosonic Mach Number", "Plasma Beta", and "Plasma Frequency-To-Gyrofrequency Ratio".
2009-03-26	Added "Access URL" to "Repository" and "Registry".
2009-03-26	Added "Image URL" to "Annotation" and dictionary
2009-03-26	Various editorial updates to definitions, spelling and typos
2009-03-26	Added "Plasmagram", "Spectrogram" and "Wave Form" to the dictionary and to the "Display Type" list.
2009-03-26	Changed the name of "Photon" to "Waves" and "PhotonQuantity" to "WaveQuantity". Added "Wave Type" with values of "Electromagnetic", "Electrostatic", "Photon", "Plasma Waves", "Hydrodynamic", and "MHD".
2009-03-26	Updated definitions of "Emissivity", "Equivalent Width", "Gyrofrequency", "Intensity", "Line Depth", "Plasma Frequency", "Poynting Flux". Added "Wave Type" with values of "Electromagnetic", "Electrostatic", "Photon", "Plasma Waves", "Hydrodynamic", and "MHD".
2009-03-26	Added "Absorption", "AC-Electric Field", "AC-Magnetic Field", "Doppler Frequency", "Frequency", "Propagation Time", and "Wavelength" to dictionary and "Wave Quantity". Added "Wave Type" with values of "Electromagnetic", "Electrostatic", "Photon", "Plasma Waves", "Hydrodynamic", and "MHD".
2009-03-26	Added "Far Ultraviolet", "HE-304", "LBH Band" and "Soft X-Rays" to dictionary and "Spectral Range".
2009-04-06	Removed "Spectral Range" from under "Energy Range".

1.3.6

2009-04-09	Added "Atom" and "Neutron" to "Particle Type".

2009-04-09	Added "Array" and "Total" to "Qualifier".
2009-04-09	Added "Particle Type" to "Mixed".
2009-04-09	Added "Unlikely" and "Weak" to the dictionary and modified "Confidence Rating" to have values "Unlikely", "Weak", "Probable", and "Strong".
2009-04-09	Added "Classification Method" as a enumeration with allowed values of "Automatic", "Inspection", and "Inferred". Added "Classification Method" to "Annotation".
2009-04-09	Added "Observation Extent" with attributes of "Observed Region", "Start Location", "Stop Location" and "Note". Added "Observation Extent" to "Annotation".
2009-04-09	Added "Child Event Of" and "Observed By" to "Association Type".
2009-04-09	Added "Area", "Bandwidth" and "Solid Angle" to "Integral", added "Field-Aligned", "Group", "Perturbation", "Phase" and "Spectral" to "Qualifier".

2.0.0

2009-04-15	Released.

2.0.1

2009-07-12	Changed "Rendering Hints" to 0-to-many occurrence.
2009-07-12	Under "Element" replaced "Component" with "Qualifier" and allow multiple occurrences.
2009-07-12	Update the description of "Index" data type to explain wild cards.
2009-07-12	Added "Sound Speed" to dictionary and to "Particle Quantity".
2009-07-12	Updates to the definition "Access URL", "Data Extent", "Polar" and "Sonic Mach Number".

2.0.2

2009-09-24	Added "Atomic Number Detected", "Mass Number" and "Charge State" to dictionary and to "Particle Quantity" enumeration. Also added "Direction Angle" to "Particle Quantity".
2009-10-08	Added "Arrival Direction" to dictionary and to "Particle Quantity" enumeration. Added "Instrument Mode" to dictionary and "Support Quantity". Updated definitions of "Charge State" and "Atomic Number Detected".
2009-11-05	Added "Stream Interaction Region" to dictionary and to "Phenomenon Type" enumeration. Updated definition of "Coronal Mass Ejection".
2009-11-18	Modified definitions for "Observatory" and "Instrument".

2.0.3

2010-02-04	Added "Former-PI" to dictionary and to "Role" enumeration; Added "Note" to "Person".
2010-03-19	Updated definitions for "Number Flux", "Energy Flux", "Differential", and "Integral"; Added "Dust" to "Measurement Type" enumeration;

2.1.0

2010-03-19	Released.

2.2.0

2010-04-15	Added "Hardcopy" as an enumeration to dictionary and to "Format"; Added "Film", "Photographic Plate", "Photograph", "Microfiche", "Microfilm", "Print" to dictionary and to "Hardcopy" enumeration; Changed "Observatory Group" to "Observatory Group ID";

	Updated definition of "Observatory" to make it more suitable for creation of conceptual Observatories.; Added "Operating Span" to dictionary with elements "Start Date", "Stop Date" and "Note"; Added "Operating Span" to "Instrument" and "Observatory".;
2010-05-21	Added "Heliosheath" to dictionary and to "Heliosphere" enumeration;
2010-06-25	Added "Fluence" to dictionary and "Particle Quantity"; Updated definitions for "Number Flux", "Coordinate System" and "Counts"; Added "HCC" (Heliocentric Cartesian), "HCR" (Heliocentric Radial), HPC (Helioprojective Cartesian) and "HPR" (Helioprojective Radial) to dictionary and "Coordinate System Name"
2010-08-17	Added "S3_BUCKET" to dictionary and "Encoding"; Add "Directional" to dictionary and to "Qualifier"; updated definition for "Energy Flux" and "Differential"
2010-08-20	Updated definitions of "Outer", "Inner", "Heliosheath" and "Remote 1AU"
2010-09-15	Added "Excel" to dictionary and to "Format" list; Added "Rendering Axis", and "Index" to dictionary and under "Rendering Hints"; Add "Vertical", "Horizontal", and "Color Bar" to dictionary and to the "Rendering Hints" enumeration; Changed cardinality of "Investigation Name" from 1 to +; Add "Median, " Maximum" and "Minimum" to dictionary and to "Qualifer" list.;
2010-09-17	Added "SSE_L" to dictionary and to "Coordinate System Name" list;
2011-01-06	Updated definition for "irradence".
2011-01-06	Released.

2.2.1

2011-05-12	Strike "product" from the definition of "Numerical Data".;
2011-06-16	Added "core", "halo", "strahl" and "superhalo" to the dictionary and to "Qualifier";
2011-08-18	Released.

2.2.2

2011-09-26	Add "Rendering Hints" under "Element"; Set occurrence for "Coordinate Representation" and "Coordinate System Name" under "Coordinate Sytem" to required (1); Set "Size" under "Structure" to required (1); Set "Association ID" and "Association Type" under "Association" to required (1).
2011-10-27	Update definition of "Document"; Add "MIME Type" to dictionary and "Document" structure; Add "Presentation", "Poster", "White Paper", "Technical Note", "Specification" and "Report" to dictionary and to "Document Type" enumeration; Remove "Paper" from dictionary.
2012-02-02	Add "Sector Boundary Crossing" to the dictionary and the "Phenomenon Type" list.; Add "Product Key" to the dictionary and under "Access Information";
2012-02-27	Add "Albedo" to the dictionary and to "Wave Quantity" list.; Add "Partical Radius" to the dictionary and to the "Particle Quantity" list;
2012-02-27	Released.

2.2.3

2012-03-15	Modified definition of "Numerical Data" as suggested by R. Weigel and D.A. Roberts; Modified definition of "Potential" as suggested by F. Mozer, D.A. Roberts and S. Fung; Add "Magnetograph" to dictionary and

	"Instrument Type" as suggested by J. King
2012-05-10	Modified definitions of "GEI", "Azimuth Angle", "Elevation Angle" and "Polar Angle" as suggested by J.Merka; Add definition for "ENP and add to "Coordinate System Name" enumeration as suggested by J. Merka; Add definitions of "Photomultiplier Tube" and "Solid State Detector" to dictionary and "Intrument Type" as suggested by B. Weigel.
2012-05-24	Add definition of "Moon" and add to "Earth" enumeration as suggested by T. Narock.
2014-05-22	Released.

2.2.4

2015-05-28	Add coordinate systems MSO, VSO, KSO, KSM, JSO, JSM to dictionary and CoordinateSystemName, Add SolarUVFlux and IMFClockAngle to dictionary and MixedQuantity.
2015-05-31	Released.

2.2.5

2015-06-12	Add moons and magnetosphere to planets. Only the larger moons which are typically encountered or simulated were added.
2015-06-12	Add coordinate systems to enumeration.

2.2.6

2015-09-09	Released.

2.2.7

2016-07-21	Change occurrence of Particle->ParticalType from + to * and Wave->WaveType from 1 to 0.
2016-07-21	Add JSON and CSV to the dictionary and to Format enumeration.

2.2.8

2016-07-21	Released.

2.2.9

2017-02-09	Add CadenceMin, CadenceMax, ExposureMin, ExposureMax, PartiallyRestricted, Confidence, ProviderName, MassRange, PitchAngleRange; Change occurrence of Observatory/OperatingSpan from 1 to +.
2017-09-07	Add HGRTN, HERTN to dictionary and to CoordinateSystemName. Add Entropy to dictionary and ParticleQuantity.
2017-11-14	Released.

2.2.10

2018-02-08	Add DOI to dictionary and to ResourceHeader.