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.
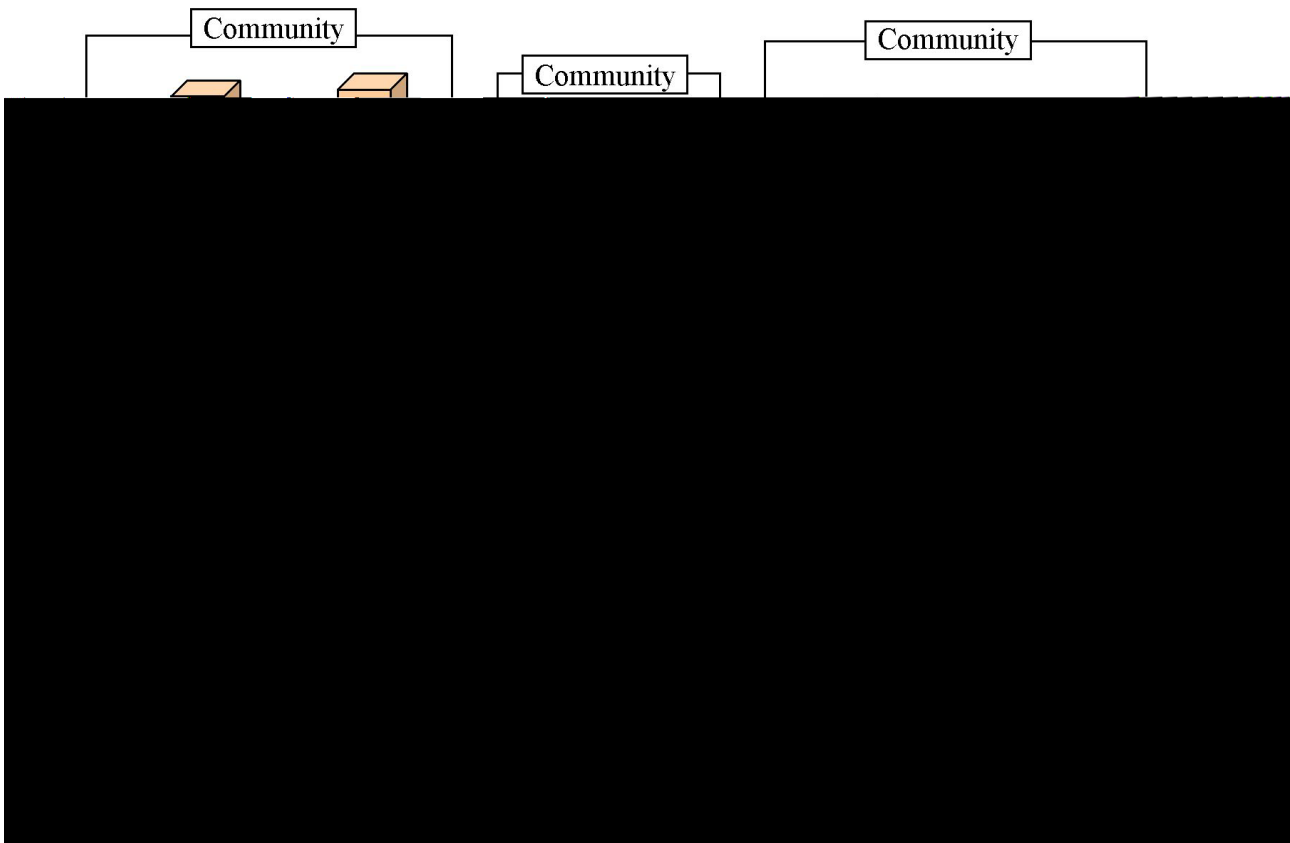
3. Guide to the SPASE Data Model

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 individual data products or data product sets. 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
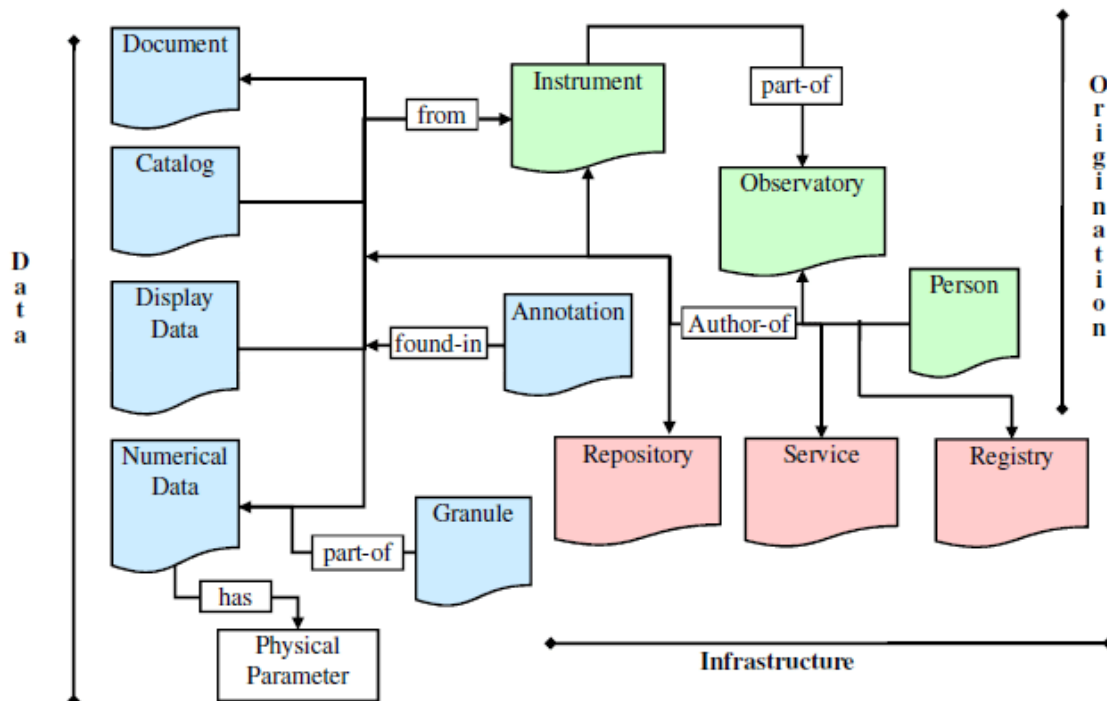
Figure 2: The association map between resources in the SPASE model. Arrows point in the direction of association.

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)
|     |     + Resource ID (1)
|     |     + Resource Header (1)
|     |     |     + Resource Name (1)
|     |     |     + Alternate Name (*)
|     |     |     + Release Date (1)
|     |     |     + Expiration Date (0)
|     |     |     + Description (1)
|     |     |     + Acknowledgement (0)
|     |     |     + Contact (+)
|     |     |     |     + Person ID (1)
|     |     |     |     + Role (+)
|     |     |     + Information URL (*)
|     |     |     |     + Name (0)
|     |     |     |     + URL (1)
|     |     |     |     + Description (0)
|     |     |     |     + Language (0)
|     |     |     + Association (*)
|     |     |     |     + Association ID (0)
|     |     |     |     + Association Type (0)
|     |     |     |     + Note (0)
|     |     |     + Prior ID (*)
|     |     + Access Information (+)
|     |     |     + Repository ID (1)
|     |     |     + Availability (0)
|     |     |     + Access Rights (0)
|     |     |     + Access URL (+)
|     |     |     |     + Name (0)
|     |     |     |     + URL (1)
|     |     |     |     + Description (0)
|     |     |     |     + Language (0)
|     |     |     + Format (1)
|     |     |     + Encoding (0)
|     |     |     + Data Extent (0)
|     |     |     |     + Quantity (1)
|     |     |     |     + Units (0)
|     |     |     |     + Per (0)
|     |     |     + Acknowledgement (0)
|     |     + Provider Resource Name (0)
|     |     + Provider Version (0)
```

```
|       |       + Instrument ID (*)
|       |       + Phenomenon Type (+)
|       |       + Time Span (0)
|       |       |       + Start Date (1)
|       |       |       + Stop Date (1 of B)
|       |       |       + Relative Stop Date (1 of B)
|       |       |       + Note (*)
|       |       + Caveats (0)
|       |       + Keyword (*)
|       |       + Input Resource ID (*)
|       |       + Parameter (*)
|       |       |       + Name (1)
|       |       |       + Set (*)
|       |       |       + Parameter Key (0)
|       |       |       + Description (0)
|       |       |       + Caveats (0)
|       |       |       + Cadence (0)
|       |       |       + Units (0)
|       |       |       + Units Conversion (0)
|       |       |       + Coordinate System (0)
|       |       |       |       + Coordinate Representation (0)
|       |       |       |       + Coordinate System Name (0)
|       |       |       + Rendering Hints (0)
|       |       |       |       + Display Type (0)
|       |       |       |       + Axis Label (0)
|       |       |       |       + Value Format (0)
|       |       |       |       + Scale Min (0)
|       |       |       |       + Scale Max (0)
|       |       |       |       + Scale Type (0)
|       |       |       + Structure (0)
|       |       |       |       + Size (0)
|       |       |       |       + Description (0)
|       |       |       |       + Element (*)
|       |       |       |       |       + Name (1)
|       |       |       |       |       + Component (0)
|       |       |       |       |       + Index (1)
|       |       |       |       |       + Parameter Key (0)
|       |       |       |       |       + Units (0)
|       |       |       |       |       + Units Conversion (0)
|       |       |       |       |       + Valid Min (0)
|       |       |       |       |       + Valid Max (0)
|       |       |       |       |       + Fill Value (0)
|       |       |       + Valid Min (0)
|       |       |       + Valid Max (0)
|       |       |       + Fill Value (0)
|       |       |       + Field (1 of C)
|       |       |       |       + Qualifier (*)
|       |       |       |       + Field Quantity (1)
|       |       |       |       + Frequency Range (0)
|       |       |       |       |       + Spectral Range (0)
|       |       |       |       |       + Low (1)
```

```
|    |    |    |    |    + High (1)
|    |    |    |    |    + Units (1)
|    |    |    |    |    + Bin (*)
|    |    |    |    |    |    + Band Name (0)
|    |    |    |    |    |    + Low (1)
|    |    |    |    |    |    + High (1)
|    |    |    + Particle (1 of C)
|    |    |    |    + Particle Type (+)
|    |    |    |    + Qualifier (*)
|    |    |    |    + Particle Quantity (1)
|    |    |    |    + Atomic Number (*)
|    |    |    |    + Energy Range (0)
|    |    |    |    |    + Low (1)
|    |    |    |    |    + High (1)
|    |    |    |    |    + Units (1)
|    |    |    |    |    + Bin (*)
|    |    |    |    |    |    + Band Name (0)
|    |    |    |    |    |    + Low (1)
|    |    |    |    |    |    + High (1)
|    |    |    |    + Azimuthal Angle Range (0)
|    |    |    |    |    + Low (1)
|    |    |    |    |    + High (1)
|    |    |    |    |    + Units (1)
|    |    |    |    |    + Bin (*)
|    |    |    |    |    |    + Band Name (0)
|    |    |    |    |    |    + Low (1)
|    |    |    |    |    |    + High (1)
|    |    |    |    + Polar Angle Range (0)
|    |    |    |    |    + Low (1)
|    |    |    |    |    + High (1)
|    |    |    |    |    + Units (1)
|    |    |    |    |    + Bin (*)
|    |    |    |    |    |    + Band Name (0)
|    |    |    |    |    |    + Low (1)
|    |    |    |    |    |    + High (1)
|    |    |    + Wave (1 of C)
|    |    |    |    + Qualifier (*)
|    |    |    |    + Wave Type (1)
|    |    |    |    + Wave Quantity (1)
|    |    |    |    + Energy Range (0)
|    |    |    |    |    + Low (1)
|    |    |    |    |    + High (1)
|    |    |    |    |    + Units (1)
|    |    |    |    |    + Bin (*)
|    |    |    |    |    |    + Band Name (0)
|    |    |    |    |    |    + Low (1)
|    |    |    |    |    |    + High (1)
|    |    |    |    + Wavelength Range (0)
|    |    |    |    |    + Spectral Range (0)
|    |    |    |    |    + Low (1)
|    |    |    |    |    + High (1)
```

```
|     |     |     |     |         + Units (1)
|     |     |     |     |         + Bin (*)
|     |     |     |     |             + Band Name (0)
|     |     |     |     |             + Low (1)
|     |     |     |     |             + High (1)
|     |     |     |         + Frequency Range (0)
|     |     |     |         |     + Spectral Range (0)
|     |     |     |         |     + Low (1)
|     |     |     |         |     + High (1)
|     |     |     |         |     + Units (1)
|     |     |     |         |     + Bin (*)
|     |     |     |         |         + Band Name (0)
|     |     |     |         |         + Low (1)
|     |     |     |         |         + High (1)
|     |     |     + Mixed (1 of C)
|     |     |     |     + Qualifier (*)
|     |     |     |     + Mixed Quantity (1)
|     |     |     |     + Particle Type (*)
|     |     |     + Support (1 of C)
|     |     |     |     + Qualifier (*)
|     |     |     |     + Support Quantity (1)
|     |     + Extension (*)
|     + Display Data (+ of A)
|     |     + Resource ID (1)
|     |     + Resource Header (1)
|     |     |     + Resource Name (1)
|     |     |     + Alternate Name (*)
|     |     |     + Release Date (1)
|     |     |     + Expiration Date (0)
|     |     |     + Description (1)
|     |     |     + Acknowledgement (0)
|     |     |     + Contact (+)
|     |     |     |     + Person ID (1)
|     |     |     |     + Role (+)
|     |     |     + Information URL (*)
|     |     |     |     + Name (0)
|     |     |     |     + URL (1)
|     |     |     |     + Description (0)
|     |     |     |     + Language (0)
|     |     |     + Association (*)
|     |     |     |     + Association ID (0)
|     |     |     |     + Association Type (0)
|     |     |     |     + Note (0)
|     |     |     + Prior ID (*)
|     |     + Access Information (+)
|     |     |     + Repository ID (1)
|     |     |     + Availability (0)
|     |     |     + Access Rights (0)
|     |     |     + Access URL (+)
|     |     |     |     + Name (0)
|     |     |     |     + URL (1)
```

```
|    |    |    |    + Description (0)
|    |    |    |    + Language (0)
|    |    |    + Format (1)
|    |    |    + Encoding (0)
|    |    |    + Data Extent (0)
|    |    |    |    + Quantity (1)
|    |    |    |    + Units (0)
|    |    |    |    + Per (0)
|    |    |    + Acknowledgement (0)
|    |    + Processing Level (0)
|    |    + Provider Resource Name (0)
|    |    + Provider Processing Level (0)
|    |    + Provider Version (0)
|    |    + Instrument ID (*)
|    |    + Measurement Type (+)
|    |    + Temporal Description (0)
|    |    |    + Time Span (1)
|    |    |    |    + Start Date (1)
|    |    |    |    + Stop Date (1 of B)
|    |    |    |    + Relative Stop Date (1 of B)
|    |    |    |    + Note (*)
|    |    |    + Cadence (0)
|    |    |    + Exposure (0)
|    |    + Spectral Range (*)
|    |    + Display Cadence (0)
|    |    + Observed Region (*)
|    |    + Caveats (0)
|    |    + Keyword (*)
|    |    + Input Resource ID (*)
|    |    + Parameter (*)
|    |    |    + Name (1)
|    |    |    + Set (*)
|    |    |    + Parameter Key (0)
|    |    |    + Description (0)
|    |    |    + Caveats (0)
|    |    |    + Cadence (0)
|    |    |    + Units (0)
|    |    |    + Units Conversion (0)
|    |    |    + Coordinate System (0)
|    |    |    |    + Coordinate Representation (0)
|    |    |    |    + Coordinate System Name (0)
|    |    |    + Rendering Hints (0)
|    |    |    |    + Display Type (0)
|    |    |    |    + Axis Label (0)
|    |    |    |    + Value Format (0)
|    |    |    |    + Scale Min (0)
|    |    |    |    + Scale Max (0)
|    |    |    |    + Scale Type (0)
|    |    |    + Structure (0)
|    |    |    |    + Size (0)
|    |    |    |    + Description (0)
```

```
|     |     |     |     + Element (*)
|     |     |     |     |     + Name (1)
|     |     |     |     |     + Component (0)
|     |     |     |     |     + Index (1)
|     |     |     |     |     + Parameter Key (0)
|     |     |     |     |     + Units (0)
|     |     |     |     |     + Units Conversion (0)
|     |     |     |     |     + Valid Min (0)
|     |     |     |     |     + Valid Max (0)
|     |     |     |     |     + Fill Value (0)
|     |     |     + Valid Min (0)
|     |     |     + Valid Max (0)
|     |     |     + Fill Value (0)
|     |     |     + Field (1 of C)
|     |     |     |     + Qualifier (*)
|     |     |     |     + Field Quantity (1)
|     |     |     |     + Frequency Range (0)
|     |     |     |     |     + Spectral Range (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + Band Name (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     + Particle (1 of C)
|     |     |     |     + Particle Type (+)
|     |     |     |     + Qualifier (*)
|     |     |     |     + Particle Quantity (1)
|     |     |     |     + Atomic Number (*)
|     |     |     |     + Energy Range (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + Band Name (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + Azimuthal Angle Range (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + Band Name (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + Polar Angle Range (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
```

```
|     |     |     |     |     |         + Band Name (0)
|     |     |     |     |     |         + Low (1)
|     |     |     |     |     |         + High (1)
|     |     |     + Wave (1 of C)
|     |     |     |         + Qualifier (*)
|     |     |     |         + Wave Type (1)
|     |     |     |         + Wave Quantity (1)
|     |     |     |         + Energy Range (0)
|     |     |     |     |         + Low (1)
|     |     |     |     |         + High (1)
|     |     |     |     |         + Units (1)
|     |     |     |     |         + Bin (*)
|     |     |     |     |             + Band Name (0)
|     |     |     |     |             + Low (1)
|     |     |     |     |             + High (1)
|     |     |     |         + Wavelength Range (0)
|     |     |     |     |         + Spectral Range (0)
|     |     |     |     |         + Low (1)
|     |     |     |     |         + High (1)
|     |     |     |     |         + Units (1)
|     |     |     |     |         + Bin (*)
|     |     |     |     |             + Band Name (0)
|     |     |     |     |             + Low (1)
|     |     |     |     |             + High (1)
|     |     |     |         + Frequency Range (0)
|     |     |     |     |         + Spectral Range (0)
|     |     |     |     |         + Low (1)
|     |     |     |     |         + High (1)
|     |     |     |     |         + Units (1)
|     |     |     |     |         + Bin (*)
|     |     |     |     |             + Band Name (0)
|     |     |     |     |             + Low (1)
|     |     |     |     |             + High (1)
|     |     |     + Mixed (1 of C)
|     |     |     |         + Qualifier (*)
|     |     |     |         + Mixed Quantity (1)
|     |     |     |         + Particle Type (*)
|     |     |     + Support (1 of C)
|     |     |     |         + Qualifier (*)
|     |     |     |         + Support Quantity (1)
|     |     + Extension (*)
|     + Numerical Data (+ of A)
|     |     + Resource ID (1)
|     |     + Resource Header (1)
|     |     |     + Resource Name (1)
|     |     |     + Alternate Name (*)
|     |     |     + Release Date (1)
|     |     |     + Expiration Date (0)
|     |     |     + Description (1)
|     |     |     + Acknowledgement (0)
|     |     |     + Contact (+)
```

```
|    |    |    |    + Person ID (1)
|    |    |    |    + Role (+)
|    |    |    + Information URL (*)
|    |    |    |    + Name (0)
|    |    |    |    + URL (1)
|    |    |    |    + Description (0)
|    |    |    |    + Language (0)
|    |    |    + Association (*)
|    |    |    |    + Association ID (0)
|    |    |    |    + Association Type (0)
|    |    |    |    + Note (0)
|    |    |    + Prior ID (*)
|    |    + Access Information (+)
|    |    |    + Repository ID (1)
|    |    |    + Availability (0)
|    |    |    + Access Rights (0)
|    |    |    + Access URL (+)
|    |    |    |    + Name (0)
|    |    |    |    + URL (1)
|    |    |    |    + Description (0)
|    |    |    |    + Language (0)
|    |    |    + Format (1)
|    |    |    + Encoding (0)
|    |    |    + Data Extent (0)
|    |    |    |    + Quantity (1)
|    |    |    |    + Units (0)
|    |    |    |    + Per (0)
|    |    |    + Acknowledgement (0)
|    |    + Processing Level (0)
|    |    + Provider Resource Name (0)
|    |    + Provider Processing Level (0)
|    |    + Provider Version (0)
|    |    + Instrument ID (*)
|    |    + Measurement Type (+)
|    |    + Temporal Description (0)
|    |    |    + Time Span (1)
|    |    |    |    + Start Date (1)
|    |    |    |    + Stop Date (1 of B)
|    |    |    |    + Relative Stop Date (1 of B)
|    |    |    |    + Note (*)
|    |    |    + Cadence (0)
|    |    |    + Exposure (0)
|    |    + Spectral Range (*)
|    |    + Observed Region (*)
|    |    + Caveats (0)
|    |    + Keyword (*)
|    |    + Input Resource ID (*)
|    |    + Parameter (*)
|    |    |    + Name (1)
|    |    |    + Set (*)
|    |    |    + Parameter Key (0)
```

```
|     |     |     + Description (0)
|     |     |     + Caveats (0)
|     |     |     + Cadence (0)
|     |     |     + Units (0)
|     |     |     + Units Conversion (0)
|     |     |     + Coordinate System (0)
|     |     |     |     + Coordinate Representation (0)
|     |     |     |     + Coordinate System Name (0)
|     |     |     + Rendering Hints (0)
|     |     |     |     + Display Type (0)
|     |     |     |     + Axis Label (0)
|     |     |     |     + Value Format (0)
|     |     |     |     + Scale Min (0)
|     |     |     |     + Scale Max (0)
|     |     |     |     + Scale Type (0)
|     |     |     + Structure (0)
|     |     |     |     + Size (0)
|     |     |     |     + Description (0)
|     |     |     |     + Element (*)
|     |     |     |     |     + Name (1)
|     |     |     |     |     + Component (0)
|     |     |     |     |     + Index (1)
|     |     |     |     |     + Parameter Key (0)
|     |     |     |     |     + Units (0)
|     |     |     |     |     + Units Conversion (0)
|     |     |     |     |     + Valid Min (0)
|     |     |     |     |     + Valid Max (0)
|     |     |     |     |     + Fill Value (0)
|     |     |     + Valid Min (0)
|     |     |     + Valid Max (0)
|     |     |     + Fill Value (0)
|     |     |     + Field (1 of C)
|     |     |     |     + Qualifier (*)
|     |     |     |     + Field Quantity (1)
|     |     |     |     + Frequency Range (0)
|     |     |     |     |     + Spectral Range (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + Band Name (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     + Particle (1 of C)
|     |     |     |     + Particle Type (+)
|     |     |     |     + Qualifier (*)
|     |     |     |     + Particle Quantity (1)
|     |     |     |     + Atomic Number (*)
|     |     |     |     + Energy Range (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
```

```
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + Band Name (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + Azimuthal Angle Range (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + Band Name (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + Polar Angle Range (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + Band Name (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     + Wave (1 of C)
|     |     |     |     + Qualifier (*)
|     |     |     |     + Wave Type (1)
|     |     |     |     + Wave Quantity (1)
|     |     |     |     + Energy Range (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + Band Name (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + Wavelength Range (0)
|     |     |     |     |     + Spectral Range (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + Band Name (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
|     |     |     |     + Frequency Range (0)
|     |     |     |     |     + Spectral Range (0)
|     |     |     |     |     + Low (1)
|     |     |     |     |     + High (1)
|     |     |     |     |     + Units (1)
|     |     |     |     |     + Bin (*)
|     |     |     |     |     |     + Band Name (0)
|     |     |     |     |     |     + Low (1)
|     |     |     |     |     |     + High (1)
```

```
|       |       |       + Mixed (1 of C)
|       |       |       |       + Qualifier (*)
|       |       |       |       + Mixed Quantity (1)
|       |       |       |       + Particle Type (*)
|       |       |       + Support (1 of C)
|       |       |       |       + Qualifier (*)
|       |       |       |       + Support Quantity (1)
|       |       + Extension (*)
|       + Document (+ of A)
|       |       + Resource ID (1)
|       |       + Resource Header (1)
|       |       |       + Resource Name (1)
|       |       |       + Alternate Name (*)
|       |       |       + Release Date (1)
|       |       |       + Expiration Date (0)
|       |       |       + Description (1)
|       |       |       + Acknowledgement (0)
|       |       |       + Contact (+)
|       |       |       |       + Person ID (1)
|       |       |       |       + Role (+)
|       |       |       + Information URL (*)
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Association (*)
|       |       |       |       + Association ID (0)
|       |       |       |       + Association Type (0)
|       |       |       |       + Note (0)
|       |       |       + Prior ID (*)
|       |       + Access Information (+)
|       |       |       + Repository ID (1)
|       |       |       + Availability (0)
|       |       |       + Access Rights (0)
|       |       |       + Access URL (+)
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Format (1)
|       |       |       + Encoding (0)
|       |       |       + Data Extent (0)
|       |       |       |       + Quantity (1)
|       |       |       |       + Units (0)
|       |       |       |       + Per (0)
|       |       |       + Acknowledgement (0)
|       |       + Keyword (*)
|       |       + Document Type (1)
|       |       + Input Resource ID (*)
|       + Granule (+ of A)
|       |       + Resource ID (1)
```

```
|    |       + Release Date (1)
|    |       + Expiration Date (0)
|    |       + Parent ID (1)
|    |       + Prior ID (*)
|    |       + Start Date (1)
|    |       + Stop Date (1)
|    |       + Source (+)
|    |       |     + Source Type (1)
|    |       |     + URL (1)
|    |       |     + Mirror URL (*)
|    |       |     + Checksum (0)
|    |       |     |     + Hash Value (1)
|    |       |     |     + Hash Function (1)
|    |       |     + Data Extent (0)
|    |       |     |     + Quantity (1)
|    |       |     |     + Units (0)
|    |       |     |     + Per (0)
|    + Instrument (+ of A)
|    |       + Resource ID (1)
|    |       + Resource Header (1)
|    |       |     + Resource Name (1)
|    |       |     + Alternate Name (*)
|    |       |     + Release Date (1)
|    |       |     + Expiration Date (0)
|    |       |     + Description (1)
|    |       |     + Acknowledgement (0)
|    |       |     + Contact (+)
|    |       |     |     + Person ID (1)
|    |       |     |     + Role (+)
|    |       |     + Information URL (*)
|    |       |     |     + Name (0)
|    |       |     |     + URL (1)
|    |       |     |     + Description (0)
|    |       |     |     + Language (0)
|    |       |     + Association (*)
|    |       |     |     + Association ID (0)
|    |       |     |     + Association Type (0)
|    |       |     |     + Note (0)
|    |       |     + Prior ID (*)
|    |       + Instrument Type (+)
|    |       + Investigation Name (1)
|    |       + Observatory ID (1)
|    |       + Caveats (0)
|    |       + Extension (*)
|    + Observatory (+ of A)
|    |       + Resource ID (1)
|    |       + Resource Header (1)
|    |       |     + Resource Name (1)
|    |       |     + Alternate Name (*)
|    |       |     + Release Date (1)
|    |       |     + Expiration Date (0)
```

```
|       |       |       + Description (1)
|       |       |       + Acknowledgement (0)
|       |       |       + Contact (+)
|       |       |       |       + Person ID (1)
|       |       |       |       + Role (+)
|       |       |       + Information URL (*)
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Association (*)
|       |       |       |       + Association ID (0)
|       |       |       |       + Association Type (0)
|       |       |       |       + Note (0)
|       |       |       + Prior ID (*)
|       |       + Observatory Group (*)
|       |       + Location (1)
|       |       |       + Observatory Region (+)
|       |       |       + Coordinate System Name (0)
|       |       |       + Latitude (0)
|       |       |       + Longitude (0)
|       |       |       + Elevation (0)
|       |       + Extension (*)
|       + Person (+ of A)
|       |       + Resource ID (1)
|       |       + Release Date (0)
|       |       + Person Name (0)
|       |       + Organization Name (1)
|       |       + Address (0)
|       |       + Email (*)
|       |       + Phone Number (*)
|       |       + Fax Number (0)
|       |       + Extension (*)
|       + Registry (+ of A)
|       |       + Resource ID (1)
|       |       + Resource Header (1)
|       |       |       + Resource Name (1)
|       |       |       + Alternate Name (*)
|       |       |       + Release Date (1)
|       |       |       + Expiration Date (0)
|       |       |       + Description (1)
|       |       |       + Acknowledgement (0)
|       |       |       + Contact (+)
|       |       |       |       + Person ID (1)
|       |       |       |       + Role (+)
|       |       |       + Information URL (*)
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Association (*)
```

```
|       |       |       |       + Association ID (0)
|       |       |       |       + Association Type (0)
|       |       |       |       + Note (0)
|       |       |       + Prior ID (*)
|       |       + Access URL (1)
|       |       |       + Name (0)
|       |       |       + URL (1)
|       |       |       + Description (0)
|       |       |       + Language (0)
|       |       + Extension (*)
|       + Repository (+ of A)
|       |       + Resource ID (1)
|       |       + Resource Header (1)
|       |       |       + Resource Name (1)
|       |       |       + Alternate Name (*)
|       |       |       + Release Date (1)
|       |       |       + Expiration Date (0)
|       |       |       + Description (1)
|       |       |       + Acknowledgement (0)
|       |       |       + Contact (+)
|       |       |       |       + Person ID (1)
|       |       |       |       + Role (+)
|       |       |       + Information URL (*)
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Association (*)
|       |       |       |       + Association ID (0)
|       |       |       |       + Association Type (0)
|       |       |       |       + Note (0)
|       |       |       + Prior ID (*)
|       |       + Access URL (1)
|       |       |       + Name (0)
|       |       |       + URL (1)
|       |       |       + Description (0)
|       |       |       + Language (0)
|       |       + Extension (*)
|       + Service (+ of A)
|       |       + Resource ID (1)
|       |       + Resource Header (1)
|       |       |       + Resource Name (1)
|       |       |       + Alternate Name (*)
|       |       |       + Release Date (1)
|       |       |       + Expiration Date (0)
|       |       |       + Description (1)
|       |       |       + Acknowledgement (0)
|       |       |       + Contact (+)
|       |       |       |       + Person ID (1)
|       |       |       |       + Role (+)
|       |       |       + Information URL (*)
```

```
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Association (*)
|       |       |       |       + Association ID (0)
|       |       |       |       + Association Type (0)
|       |       |       |       + Note (0)
|       |       |       + Prior ID (*)
|       |       + Access URL (1)
|       |       |       + Name (0)
|       |       |       + URL (1)
|       |       |       + Description (0)
|       |       |       + Language (0)
|       |       + Extension (*)
|       + Annotation (+ of A)
|       |       + Resource ID (1)
|       |       + Resource Header (1)
|       |       |       + Resource Name (1)
|       |       |       + Alternate Name (*)
|       |       |       + Release Date (1)
|       |       |       + Expiration Date (0)
|       |       |       + Description (1)
|       |       |       + Acknowledgement (0)
|       |       |       + Contact (+)
|       |       |       |       + Person ID (1)
|       |       |       |       + Role (+)
|       |       |       + Information URL (*)
|       |       |       |       + Name (0)
|       |       |       |       + URL (1)
|       |       |       |       + Description (0)
|       |       |       |       + Language (0)
|       |       |       + Association (*)
|       |       |       |       + Association ID (0)
|       |       |       |       + Association Type (0)
|       |       |       |       + Note (0)
|       |       |       + Prior ID (*)
|       |       + Image URL (0)
|       |       + Annotation Type (1)
|       |       + Phenomenon Type (0)
|       |       + Classification Method (0)
|       |       + Confidence Rating (0)
|       |       + Time Span (*)
|       |       |       + Start Date (1)
|       |       |       + Stop Date (1 of B)
|       |       |       + Relative Stop Date (1 of B)
|       |       |       + Note (*)
|       |       + Observation Extent (*)
|       |       |       + Observed Region (0)
|       |       |       + Start Location (1)
|       |       |       + Stop Location (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
<?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
<?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:
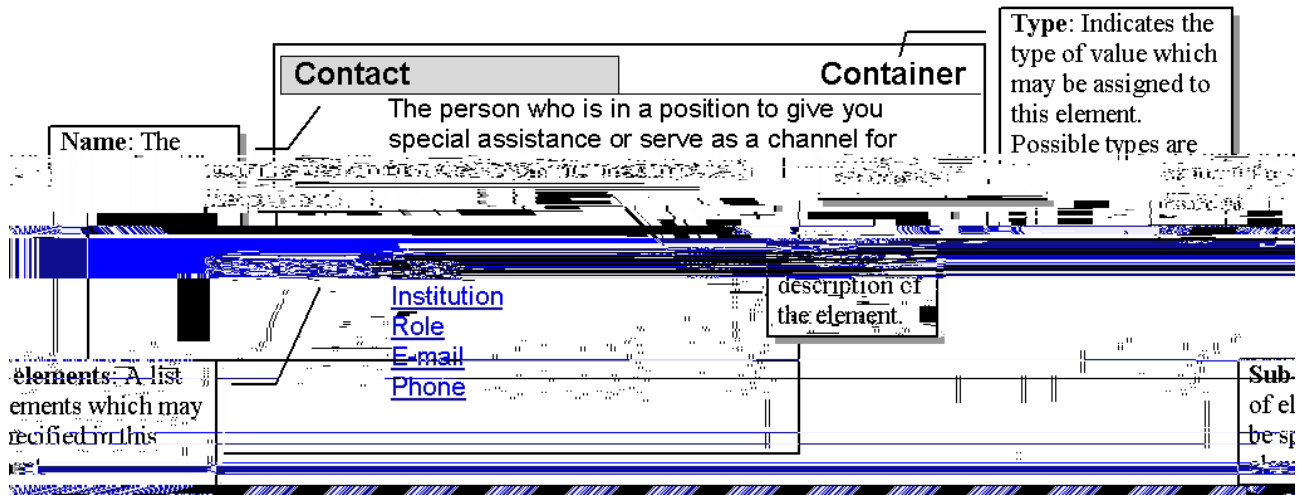
Absorption	Item

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

AC-Electric Field	Item

Alternating electric field component of a wave.

AC-Magnetic Field	Item

Alternating magnetic field component of a wave.

Access Information	Container

Attributes of the resource which pertain to how to accessing the resource, availability and storage format.
    Sub-elements:
        Access Rights
        Access URL
        Acknowledgement
        Availability
        Data Extent
        Encoding
        Format
        Repository ID

Access Rights	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

Access URL	Container

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

Active Region	Item

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

Activity Index	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.

Akasofu Epsilon   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.

Alfven Mach Number   Item

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

Alfven Velocity   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).

Alpha Particle   Item

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

Alternate Name   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:
                Annotation Type
                Classification Method
                Confidence Rating
                Extension
                Image URL
                Observation Extent
                Phenomenon Type
                Resource Header
                Resource ID
                Time Span

Annotation Type   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.

Archive Specialist   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.

ASCII	Item

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

Association	Container

Attributes of a relationship a resource has with another resource.
>   Sub-elements:
>   Association ID
>   Association Type
>   Note

Association ID	Text

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

Association Type	Enumeration

A characterization of the role or purpose of an associated resource.
>   Allowed Values:
>   Child Event Of
>   Derived From
>   Observed By
>   Other
>   Part Of
>   Revision Of

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.

Atomic Number	Numeric

The number of protons in the nucleus of an atom.

Aurora	Item

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

Auroral Region	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.

Average Charge State	Item

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

AVI	Item

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

Axis Label	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.

Azimuth Angle	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).

Azimuthal Angle Range	Container

The range of possible azimuthal angles for a group of energy observations. Default units are degrees.

    Sub-elements:

        Bin
        High
        Low
        Units

Band Name	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:

        Band Name
        High
        Low

Binary	Item

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

Bow Shock Crossing	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.

BZIP2	Item

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

Ca-K	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. Catalogues include lists of events, files in a product, and data availability.
> Sub-elements:
>> Access Information
>> Caveats
>> Extension
>> Input Resource ID
>> Instrument ID
>> Keyword
>> Parameter
>> Phenomenon Type
>> Provider Resource Name
>> Provider Version
>> Resource Header
>> Resource ID
>> Time Span

Caveats	Text

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

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.

CEF 1	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.

CEF 2	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>

Channeltron	Item

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.

Characteristic	Item

A quantity which can be easily identified and measured in a given environment.

Checksum	Container

A computed value that is dependent upon the contents of a digital data object. Primarily used to check whether errors or alterations have occurred during the transmission or storage of a data object.
>   Sub-elements:
>   Hash Function
>   Hash Value

Child Event Of	Item

A descendant or caused by another resource.

Chromosphere	Item

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.

Circular	Item

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.

Classification Method	Enumeration

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

Co-Investigator	Item

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

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

Confidence Rating	Enumeration

A classification of the certainty of an assertion.
> Allowed Values:
>> Probable
>> Strong
>> Unlikely
>> Weak

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:
>> Person ID
>> Role

Contributor	Item

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

Coordinate Representation	Enumeration

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

Coordinate System	Container

Specification of the origin and orientation of a set of typically orthogonal axes.
> Sub-elements:
>> Coordinate Representation
>> Coordinate System Name

Coordinate System Name	Enumeration

Identifies the coordinate system in which the position, direction or observation has been expressed.
> Allowed Values:
>> Carrington
>> CGM
>> DM
>> GEI
>> GEO
>> GSE
>> GSEQ
>> GSM
>> HAE
>> HCI
>> HEE
>> HEEQ
>> HG
>> HGI
>> J2000
>> LGM
>> MAG
>> MFA
>> RTN
>> SC

SE
SM
Spacecraft Orbit Plane
SR
SR2
SSE
WGS84

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.

Coronal Hole	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.

Coronal Mass Ejection	Item

A solar event which involves a burst of plasma which is ejected from the Sun into the interplanetary medium.

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.

Count Rate	Item

The number of events per unit time.

Counts	Item

An enumeration of the number of detection events occurring in a particle detector per unit time or over detector accumulation times.

Cross Spectrum	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.

D-Region	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.

Data Extent	Container

The area of storage in a file system required to store the contents of a resource. The data extent is expressed in unitized bytes.
    Sub-elements:
        Per
        Quantity

Units

Data Producer	Item

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

Deputy-PI	Item

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

Derived From	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 flux measurement within a given energy and solid-angle range.

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.

Direction Angle	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:
        Azimuth Angle
        Elevation Angle
        Polar Angle

Display Cadence	Duration

The time interval between the successive display elements.

Display Data	Container

A graphical representation of data wherein the underlying numeric values are not (readily) accessible for analysis.. Examples are line plots and spectrograms.
    Sub-elements:
        Access Information
        Caveats
        Display Cadence
        Extension
        Input Resource ID
        Instrument ID
        Keyword
        Measurement Type
        Observed Region
        Parameter
        Processing Level
        Provider Processing Level
        Provider Resource Name
        Provider Version
        Resource Header
        Resource ID
        Spectral Range
        Temporal Description

Display Type	Enumeration

The general styling or type of plot that is suitable for the variable.
Allowed Values:
>> Image
>> Plasmagram
>> Spectrogram
>> Stack Plot
>> Time Series
>> Wave Form

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>

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. Some examples of documents include a paper, letter, book, user guide, map, drawing, photograph, or image.
Sub-elements:
>> Access Information
>> Document Type
>> Input Resource ID
>> Keyword
>> Resource Header
>> Resource ID

Document Type	Enumeration

A characterization of the content or purpose of a document.
Allowed Values:
>> Paper

Doppler Frequency	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.

Double Sphere	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.

Dust Detector	Item

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

E-Region	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.Radiation Belt
Near Surface
Near Surface.Atmosphere
Near Surface.Auroral Region
Near Surface.Equatorial Region
Near Surface.Ionosphere
Near Surface.Ionosphere.D-Region
Near Surface.Ionosphere.E-Region
Near Surface.Ionosphere.F-Region
Near Surface.Ionosphere.Topside
Near Surface.Mesosphere
Near Surface.Plasmasphere
Near Surface.Polar Cap
Near Surface.South Atlantic Anomaly Region
Near Surface.Stratosphere
Near Surface.Thermosphere
Near Surface.Troposphere
Surface

EIT Wave	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.

Electric	Item

The physical attribute that exerts an electrical force.

Electric Field	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.

Electron Drift Instrument	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.

Electrostatic Analyser	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:
Component
Fill Value
Index

Name
Parameter Key
Units
Units Conversion
Valid Max
Valid Min

Elevation	Numeric

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

Elevation Angle	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
        Base64
        BZIP2
        GZIP
        None
        TAR
        Unicode
        ZIP

Energetic Particle Instrument	Item

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

Energetic Particles	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.

Energetic Solar Particle Event	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)

Energy Density	Item

The amount of energy per unit volume.

Energy Flux	Item

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

Energy Range	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.

Equatorial Region — Item

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

Equivalent Width — 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.

Expiration Date — 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.

Extreme Ultraviolet — 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

F-Region — 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.

Far Ultraviolet — 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

Faraday Cup — 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.

Fax Number — 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:
>> Field Quantity
>> Frequency Range
>> Qualifier

Field Quantity	Enumeration

The physical attribute of the field.
> Allowed Values:
>> Current
>> Electric
>> Electromagnetic
>> Gyrofrequency
>> Magnetic
>> Plasma Frequency
>> Potential
>> Poynting Flux

Field-Aligned	Item

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

Fill Value	Text

A value that indicates that a quantity is undefined.

Fit	Item

Values that make an model agree with the data.

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.

Flow Speed	Item

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

Flow Velocity	Item

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

Flux Feedback	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.

Forbush Decrease	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
CEF 1
CEF 2
FITS
GIF
HDF
HDF 4
HDF 5
HTML
IDFS
IDL
JPEG
MATLAB_4
MATLAB_6
MATLAB_7
MPEG
NCAR
NetCDF
PDF
PNG
Postscript
QuickTime
Text
Text.ASCII
Text.Unicode
TIFF
UDF
VOTable
XML

Fourier Transform Spectrograph	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.

Frequency Range	Container

The range of possible values for the observed frequency.
    Sub-elements:
        Bin
        High
        Low
        Spectral Range
        Units

Frequency-To-Gyrofrequency Ratio	Item

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

Gamma Rays	Item

Photons with a wavelength range: 0.00001 to 0.001 nm

GEI	Item

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

Geiger-Mueller Tube	Item

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

General Contact	Item

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

domain expert.

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.

Geomagnetic Storm	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.

GIF	Item

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

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:
      Expiration Date
      Parent ID
      Prior ID
      Release Date
      Resource ID
      Source
      Start Date
      Stop Date

Group	Item

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

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

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.

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/>

H-alpha	Item

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.

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.

Hard X-rays	Item

Photons with a wavelength range: 0.001 to 0.1 nm and an energy range of 12 keV to 120 keV

Hash Function	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

Hash Value	Text

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

HCI	Item

Heliographic Carrington Inertial.

HDF	Item

Hierarchical Data Format

HDF 4	Item

Hierarchical Data Format, Version 4

HDF 5	Item

Hierarchical Data Format, Version 5

He-10830	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.

He-304	Item

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

Heat Flux	Item

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

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.

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:
>> Inner
>> Near Earth

Outer
Remote 1AU

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

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>

High	Numeric

The largest value within a range of possible values.

HTML	Item

A text file containing structured information represented in the HyperText Mark-up Language (HTML). See <http://www.w3.org/MarkUp/>

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.

Image Intensity	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.

Image URL	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.

Imaging Spectrometer	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.

Inferred	Item

Determined by the analysis of other information or resources.

Information URL	Container

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

Infrared	Item

Photons with a wavelength range: 760 to 1.00x10^6 nm

Inner	Item

The region of the heliosphere extending radially out from the "surface" of the Sun to 1 AU.

Input Resource ID	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 which is used to sense and parametrize a physical phenomenon.
    Sub-elements:
        Caveats
        Extension
        Instrument Type
        Investigation Name
        Observatory ID
        Resource Header
        Resource ID

Instrument ID	Text

The identifier of an Instrument resource.

Instrument Status	Item

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

Instrument Type	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
        Double Sphere
        Dust Detector
        Electron Drift Instrument
        Electrostatic Analyser
        Energetic Particle Instrument
        Faraday Cup

Flux Feedback
Fourier Transform Spectrograph
Geiger-Mueller Tube
Imager
Imaging Spectrometer
Interferometer
Ion Chamber
Ion Drift
Langmuir Probe
Long Wire
Magnetometer
Mass Spectrometer
Microchannel Plate
Multispectral Imager
Neutral Atom Imager
Neutral Particle Detector
Particle Correlator
Particle Detector
Photometer
Photopolarimeter
Platform
Proportional Counter
Quadrispherical Analyser
Radar
Radiometer
Resonance Sounder
Retarding Potential Analyser
Riometer
Scintillation Detector
Search Coil
Sounder
Spacecraft Potential Control
Spectral Power Receiver
Spectrometer
Time Of Flight
Unspecified
Waveform Receiver

Integral	Enumeration

The summation of values above a given threshold and over area or solid-angle range.
> Allowed Values:
>> Area
>> Bandwidth
>> Solid Angle

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.

Interplanetary Shock	Item

A shock propagating generally antisunward 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.

Investigation Name   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)

Ion Chamber   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

Ion Composition   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.

Ion Drift   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:
              D-Region
              E-Region
              F-Region
              Topside

Irradiance   Item

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. The SI unit of irradiance is watts per square meter (W·m-2).

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.

K-7699	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.

Langmuir Probe	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.

LBH Band	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)

Line Depth	Item

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

Line Of Sight	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

Linear Scale	Item

Intervals which are equally spaced.

Location	Container

A position in space definable by a regional referencing system and geographic coordinates.
      Sub-elements:
            Coordinate System Name
            Elevation
            Latitude
            Longitude
            Observatory Region

Log Scale	Item

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

Long Wire	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>

Magnetic	Item

The physical attribute attributed to a magnet or its equivalent.

Magnetic Cloud	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.

Magnetic Field	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.")

Magnetometer	Item

An instrument which measures the ambient magnetic field.

Magnetopause Crossing	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.

Magnetosonic Mach Number	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
>> Radiation Belt

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).

Mass Density	Item

The mass of particles per unit volume.

Mass Spectrometer	Item

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

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.

Measurement Type	Enumeration

A characterization of the quantitative assessment of a phenomenon.
>   Allowed Values:
>> Activity Index
>> Dopplergram
>> Electric Field
>> Energetic Particles
>> Ephemeris
>> Image Intensity
>> Instrument Status
>> Ion Composition
>> Irradiance
>> Magnetic Field
>> Magnetogram
>> Neutral Atom Images
>> Neutral Gas
>> Profile
>> Radiance
>> Spectrum
>> Thermal Plasma
>> Waves
>> Waves.Active

Waves.Passive

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.

Metadata Contact	Item

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

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.

Microchannel Plate	Item

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

Microwave	Item

Photons with a wavelength range: 1.00×10^6 to 1.50×10^7 nm

Mirror URL	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:
          Mixed Quantity
          Particle Type
          Qualifier

Mixed Quantity	Enumeration

A characterization of the combined attributes of a quantity.
  Allowed Values:
          Akasofu Epsilon
          Alfven Mach Number
          Alfven Velocity
          Frequency-To-Gyrofrequency Rat
          Magnetosonic Mach Number
          Other
          Plasma Beta
          Total Pressure
          V Cross B

Mode Amplitude	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.

MPEG	Item

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

Multispectral Imager	Item

An instrument which captures images at multiple spectral ranges.

Na-D	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.

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.

Near Earth	Item

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

Near Surface	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
>> Auroral Region
>> Equatorial Region
>> Ionosphere
>> Ionosphere.D-Region
>> Ionosphere.E-Region
>> Ionosphere.F-Region
>> Ionosphere.Topside
>> Mesosphere
>> Plasmasphere
>> Polar Cap
>> South Atlantic Anomaly Region
>> 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>

Neutral Atom Imager	Item

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

Neutral Atom Images	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.

Neutral Gas	Item

Measurements of neutral atomic and molecular components of a gas.

Neutral Particle Detector	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.)

Ni-6768	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.

Number Density	Item

The number of particles per unit volume.

Number Flux	Item

The number of particles passing through a unit area in a unit time.

Numerical Data	Container

Data product stored as numerical values in a specified format.
  Sub-elements:
          Access Information
          Caveats
          Extension
          Input Resource ID
          Instrument ID
          Keyword
          Measurement Type
          Observed Region
          Parameter
          Processing Level
          Provider Processing Level
          Provider Resource Name
          Provider Version
          Resource Header
          Resource ID
          Spectral Range
          Temporal Description

Observation Extent	Container

The spatial area encompassed by an observation.
  Sub-elements:
          Note
          Observed Region
          Start Location
          Stop Location

Observatory	Container

The host (spacecraft, network, facility) for instruments making observations.

Sub-elements:
>   Extension
>   Location
>   Observatory Group
>   Resource Header
>   Resource ID

Observatory Group	Text

A set of programmatically related observatories.

Observatory ID	Text

The identifier of an Observatory resource.

Observatory Region	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.Radiation Belt
>>   Earth.Near Surface
>>   Earth.Near Surface.Atmosphere
>>   Earth.Near Surface.Auroral Region
>>   Earth.Near Surface.Equatorial Region
>>   Earth.Near Surface.Ionosphere
>>   Earth.Near Surface.Ionosphere.D-Region
>>   Earth.Near Surface.Ionosphere.E-Region
>>   Earth.Near Surface.Ionosphere.F-Region
>>   Earth.Near Surface.Ionosphere.Topside
>>   Earth.Near Surface.Mesosphere
>>   Earth.Near Surface.Plasmasphere
>>   Earth.Near Surface.Polar Cap
>>   Earth.Near Surface.South Atlantic Anomaly Region
>>   Earth.Near Surface.Stratosphere
>>   Earth.Near Surface.Thermosphere
>>   Earth.Near Surface.Troposphere
>>   Earth.Surface
>>   Heliosphere
>>   Heliosphere.Inner
>>   Heliosphere.Near Earth
>>   Heliosphere.Outer
>>   Heliosphere.Remote 1AU
>>   Interstellar
>>   Jupiter
>>   Mars
>>   Mercury
>>   Neptune
>>   Pluto
>>   Saturn
>>   Sun
>>   Sun.Chromosphere
>>   Sun.Corona
>>   Sun.Interior
>>   Sun.Photosphere
>>   Sun.Transition Region
>>   Uranus
>>   Venus

Observed By   Item

Detected or originating from another resource.

Observed Region   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.Radiation Belt
        Earth.Near Surface
        Earth.Near Surface.Atmosphere
        Earth.Near Surface.Auroral Region
        Earth.Near Surface.Equatorial Region
        Earth.Near Surface.Ionosphere
        Earth.Near Surface.Ionosphere.D-Region
        Earth.Near Surface.Ionosphere.E-Region
        Earth.Near Surface.Ionosphere.F-Region
        Earth.Near Surface.Ionosphere.Topside
        Earth.Near Surface.Mesosphere
        Earth.Near Surface.Plasmasphere
        Earth.Near Surface.Polar Cap
        Earth.Near Surface.South Atlantic Anomaly Region
        Earth.Near Surface.Stratosphere
        Earth.Near Surface.Thermosphere
        Earth.Near Surface.Troposphere
        Earth.Surface
        Heliosphere
        Heliosphere.Inner
        Heliosphere.Near Earth
        Heliosphere.Outer
        Heliosphere.Remote 1AU
        Interstellar
        Jupiter
        Mars
        Mercury
        Neptune
        Pluto
        Saturn
        Sun
        Sun.Chromosphere
        Sun.Corona
        Sun.Interior
        Sun.Photosphere
        Sun.Transition Region
        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.

Optical   Item

Photons with a wavelength range: 380 to 760 nm

Organization Name   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 from, but not including, 1 AU to the farthest extent of the heliosphere (heliopause).

Paper   Item

A formal presentation of an idea or discovery typically more than a few pages in length.

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
            Coordinate System
            Description
            Field
            Fill Value
            Mixed
            Name
            Parameter Key
            Particle
            Rendering Hints
            Set
            Structure
            Support
            Units
            Units Conversion
            Valid Max
            Valid Min
            Wave

Parameter Key   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.

Parent ID   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.

Part Of   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:

  Atomic Number
  Azimuthal Angle Range
  Energy Range
  Particle Quantity
  Particle Type
  Polar Angle Range
  Qualifier

Particle Correlator	Item

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

Particle Detector	Item

An instrument which detects particle flux!!!

Particle Quantity	Enumeration

A characterization of the physical properties of the particle.

Allowed Values:

  Average Charge State
  Count Rate
  Counts
  Energy
  Energy Density
  Energy Flux
  Flow Speed
  Flow Velocity
  Gyrofrequency
  Heat Flux
  Mass
  Mass Density
  Number Density
  Number Flux
  Phase-Space Density
  Plasma Frequency
  Pressure
  Sonic Mach Number
  Temperature
  Thermal Speed
  Velocity

Particle Type	Enumeration

A characterization of the kind of particle observed by the measurement.

Allowed Values:

  Aerosol
  Alpha Particle
  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.

PDF	Item

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

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
     Fax Number
     Organization Name
     Person Name
     Phone Number
     Release Date
     Resource ID

Person ID	Text

The identifier assigned to a Person description.

Person Name	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.

Phase Angle	Item

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

Phase-Space Density	Item

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

Phenomenon Type	Enumeration

The characteristics or categorization of an event type.
  Allowed Values:
     Active Region
     Aurora
     Bow Shock Crossing
     Coronal Hole
     Coronal Mass Ejection
     EIT Wave
     Energetic Solar Particle Event
     Forbush Decrease
     Geomagnetic Storm
     Interplanetary Shock
     Magnetic Cloud
     Magnetopause Crossing
     Radio Burst
     Solar Flare
     Solar Wind Extreme
     Substorm

Phone Number 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.

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.

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.

Plasma Beta Item

The ratio of thermal pressure to magnetic pressure in plasma.

Plasma Frequency Item

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

Plasma Waves 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.

PNG Item

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

Polar Angle 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).

Polar Angle Range Container

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

Low
Units

Polar Cap   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.

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

A field which obeys Laplace's Equation.

Poynting Flux   Item

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

Pressure   Item

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

Principal Investigator   Item

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

Prior ID   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.

Processing Level   Enumeration

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

Profile   Item

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

Project Scientist   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

Propagation Time	Item

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

Proportional Counter	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 $1.673 \times 10^{(-24)}$ gram.

Provider Processing Level	Text

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

Provider Resource Name	Text

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

Provider Version	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.

Quadrispherical Analyser	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
>> Cross Spectrum
>> Deviation
>> Differential
>> Direction
>> Direction Angle
>> Direction Angle.Azimuth Angle
>> Direction Angle.Elevation Angle
>> Direction Angle.Polar Angle
>> Field-Aligned
>> Fit
>> Group
>> Integral
>> Integral.Area

Integral.Bandwidth
Integral.Solid Angle
Line Of Sight
Linear
Magnitude
Moment
Parallel
Peak
Perpendicular
Perturbation
Phase
Phase Angle
Projection
Projection.IJ
Projection.IK
Projection.JK
Pseudo
Ratio
Scalar
Spectral
Standard Deviation
Stoke's Parameters
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/>

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. The SI unit of radiance is watts per steradian per square meter (W*s*r^-1*m^-2).

Radiation Belt	Item

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

Radio Burst	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).

Radio Frequency	Item

Photons with a wavelength range: 100,000 to 1.00x10^11 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:
        Access URL
        Extension
        Resource Header
        Resource ID

Relative Stop Date	Duration

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

Release Date	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.

Remote 1AU	Item

The heliospheric region near the Earth's orbit, but exclusive of the region near the Earth.

Rendering Hints	Container

Attributes to aid in the rendering of parameter.
    Sub-elements:
        Axis Label
        Display Type
        Scale Max
        Scale Min
        Scale Type
        Value Format

Repository	Container

A location or facility where resources are stored.
    Sub-elements:
        Access URL
        Extension
        Resource Header
        Resource ID

Repository ID	Text

The identifier of an Repository resource.

Resonance Sounder	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.

Resource Header	Container

Attributes of a resource which pertain to the provider of the resource and descriptive information about the resource.

Sub-elements:
> Acknowledgement
> Alternate Name
> Association
> Contact
> Description
> Expiration Date
> Information URL
> Prior ID
> Release Date
> Resource Name

Resource ID	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.

Resource Name	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.

Retarding Potential Analyser	Item

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

Revision Of	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:
> Archive Specialist
> Co-Investigator
> Contributor
> Data Producer
> Deputy-PI
> General Contact
> Metadata Contact
> Principal Investigator
> Project Scientist
> Publisher
> Scientist
> Team Leader
> Team Member
> Technical Contact

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.

Saturn	Item

The sixth planet from the sun in our solar system.

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.

Scalar	Item

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

Scale Max	Numeric

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

Scale Min	Numeric

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

Scale Type	Enumeration

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

Scientist	Item

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

Scintillation Detector	Item

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

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>

Search Coil	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.

Service	Container

A location or facility that can perform a well defined task.
    Sub-elements:
        Access URL
        Extension
        Resource Header
        Resource ID

Set	Text

A collection of items for a particular purpose.

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.

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.

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.

Soft X-Rays	Item

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

Solar Flare	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.

Solar Wind Extreme	Item

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

Solid Angle	Item

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

Sonic Mach Number	Item

The ratio of the bulk flow speed to the speed of sound in the 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
>		Data Extent
>		Mirror URL
>		Source Type
>		URL

Source Type	Enumeration

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

South Atlantic Anomaly Region	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.

Spacecraft Orbit Plane	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.

Spacecraft Potential Control	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
Display Data
Document
Granule
Instrument
Numerical Data
Observatory
Person
Registry
Repository
Service
Version

Spectral	Item

Characterized as a range or continuum of frequencies

Spectral Power Receiver	Item

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

Spectral Range	Enumeration

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

Allowed Values:
Ca-K
Extreme Ultraviolet
Far Ultraviolet
Gamma Rays
H-alpha
Hard X-rays
He-10830
He-304
Infrared
K-7699
LBH Band
Microwave
Na-D
Ni-6768
Optical
Radio Frequency
Soft X-Rays
Ultraviolet
White-Light
X-Rays

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)].

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.

Stack Plot	Item

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

Standard Deviation	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.

Start Date	DateTime

The specification of a starting point in time.

Start Location	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.

Stop Date	DateTime

The specification of a stopping point in time.

Stop Location	Text

The final position in space.

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.

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
>>>>Transition Region

Support	Container

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

Support Quantity	Enumeration

A characterization of the support information.
>>Allowed Values:
>>>>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.

Team Leader	Item

An individual who is the designated leader of an investigation!!!

Team Member	Item

An individual who is a major participant in an investigation.

Technical Contact	Item

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

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.

Temporal Description	Container

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

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

Thermal Plasma	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.).

Thermal Speed	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.

TIFF	Item

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

Time Of Flight	Item

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

Time Series	Item

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

Time Span	Container

The duration of an interval in time.
  Sub-elements:
    Note
    Relative Stop Date
    Start Date
    Stop Date

Topside	Item

The region at the upper most areas of the ionosphere.

Total	Item

The summation of quantities over all possible species.

Total Pressure	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.

Transition Region	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>

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>

Units Conversion	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-5>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.

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.

V Cross B	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.

Valid Max	Text

The largest legitimate value.

Valid Min	Text

The smallest legitimate value.

Value Format	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).

VOTable	Item

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

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:

Energy Range
Frequency Range
Qualifier
Wave Quantity
Wave Type
Wavelength Range

Wave Form   Item

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

Wave Quantity   Enumeration

A characterization of the physical properties of a wave.
Allowed Values:
Absorption
AC-Electric Field
AC-Magnetic Field
Doppler Frequency
Emissivity
Energy Flux
Equivalent Width
Frequency
Gyrofrequency
Intensity
Line Depth
Magnetic Field
Mode Amplitude
Plasma Frequency
Polarization
Poynting Flux
Propagation Time
Stoke's Parameters
Velocity
Wavelength

Wave Type   Enumeration

A characterization of the carrier or phenomenon of wave information observed by the
measurement.
Allowed Values:
Electromagnetic
Electrostatic
Hydrodynamic
MHD
Photon
Plasma Waves

Waveform Receiver   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.

Wavelength Range   Container

The range of possible values for the observed wavelength.
Sub-elements:
Bin
High
Low
Spectral Range
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.

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.

White-Light	Item

Photons with a wavelength in the visible range for humans!!!

X-Rays	Item

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

XML	Item

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

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.

Access Rights 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.

Annotation Type 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.

Association Type List   Closed

Identifiers for resource associations.

Term	Definition
Child Event Of	A descendant or caused by another resource.
Derived From	A transformed or altered version of a resource instance.
Observed By	Detected or originating from another resource.
Other	Not classified with more specific terms. The context of its usage may be described in related text.
Part Of	A portion of a larger resource.
Revision Of	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.

Classification Method 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

	program or server.
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.

Confidence Rating 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.

Coordinate Representation 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)].

| Coordinate System Name List | Closed |

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

Term	Definition
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.
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>
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>
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
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.
HCI	Heliographic Carrington Inertial.
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>
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.
Spacecraft Orbit Plane	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.
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.
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.

Direction Angle List   Closed

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

Term	Definition
Azimuth Angle	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 $\arctan(j/i)$.
Elevation Angle	The angle between the position or measured vector and the i-j plane of the coordinate system. Mathematically defined as $\arctan(k/\sqrt{i^2+j^2})$.

| Polar Angle | 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). |

Display Type 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.
Stack Plot	A representation of data showing multiple sets of observations on a single plot, possibly offsetting each plot by some uniform amount.
Time Series	A representation of data showing a set of observations taken at different points in time and charted as a time series.
Wave Form	Spatial or temporal variations of wave amplitude over wave-period timescales.

Document Type List   Closed

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

Term	Definition
Paper	A formal presentation of an idea or discovery typically more than a few pages in length.

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.
Near Surface	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.
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.
BZIP2	An open standard algorithm by Julian Seward using Burrows-Wheeler block sorting and Huffman coding. See <http://www.bzip.org/>
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.
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.

Field Quantity 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.
Plasma Frequency	A number-density-dependent characteristic frequency of a plasma.
Potential	A field which obeys Laplace's Equation.
Poynting Flux	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.
CEF 1	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.
CEF 2	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.
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
HDF 4	Hierarchical Data Format, Version 4
HDF 5	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/>
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/>
Text	A sequence of characters which may have an imposed structure or organization.
TIFF	A binary format for still pictures. Tagged Image Format File (TIFF). Originally developed by Aldus and now controlled by Adobe.
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/>

Hash Function 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
Inner	The region of the heliosphere extending radially out from the "surface" of the Sun to 1 AU.
Near Earth	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 from, but not including, 1 AU to the farthest extent of the heliosphere (heliopause).
Remote 1AU	The heliospheric region near the Earth's orbit, but exclusive of the region near the Earth.

Instrument Type 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.
Double Sphere	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 Detector	An instrument which determines the mass and speed of ambient dust particles.
Electron Drift Instrument	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 Analyser	An instrument which uses charged plates to analyze the mass, charge and kinetic energies of charged particles which enter the instrument.
Energetic Particle Instrument	An instrument that measures fluxes of charged particles as a function of time, direction of motion, mass, charge and/or species.
Faraday Cup	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.
Flux Feedback	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.
Fourier Transform Spectrograph	An instrument that determines the spectra of a radiative source, using time-domain measurements and a Fourier transform.
Geiger-Mueller Tube	An instrument which measures density of ionizing radiation based on interactions with a gas.
Imager	An instrument which samples the radiation from an area at one or more spectral ranges emitted or reflected by an object.
Imaging Spectrometer	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.
Ion Chamber	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
Ion Drift	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.
Langmuir Probe	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.
Long Wire	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.
Magnetometer	An instrument which measures the ambient magnetic field.
Mass Spectrometer	An instrument which distinguishes chemical species in terms of their different isotopic masses.
Microchannel Plate	An instrument used for the detection of elementary particles, ions, ultraviolet rays and soft X-rays constructed from very thin conductive glass capillaries.
Multispectral Imager	An instrument which captures images at multiple spectral ranges.
Neutral Atom Imager	An instrument which measures the quantity and properties of neutral particles over a range of angles. Measured properties can include mass and energy.
Neutral Particle Detector	An instrument which measures the quantity and

properties of neutral particles. Measured properties can include mass and plasma bulk densities.

Particle Correlator	An instrument which correlates particle flux to help identify wave/particle interactions.
Particle Detector	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.
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.
Proportional Counter	An instrument which measures energy of ionization radiation based on interactions with a gas.
Quadrispherical Analyser	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.
Resonance Sounder	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.
Retarding Potential Analyser	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.
Scintillation Detector	An instrument which detects flouresences of a material which is excited by high energy (ionizing) electromagnetic or charged particle radiation.
Search Coil	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.
Sounder	An instrument which measures the radiances from an object. A sounder may measure radiances at multiple spectral ranges.
Spacecraft Potential Control	An instrument to control the electric potential of a

spacecraft with respect to the ambient plasma by emitting a variable current of positive ions.

Spectral Power Receiver	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.
Time Of Flight	An instrument which measures the time it takes for a particle to travel between two detectors.
Unspecified	A value which is not provided.
Waveform Receiver	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.
Solid Angle	Integration over the angle in three-dimensional space that an object subtends at a point.

Ionosphere List   Closed

Identifiers for ionospheric regions.

Term	Definition
D-Region	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.
E-Region	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.
F-Region	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.
Radiation Belt	The region within a magnetosphere where high-energy particles could potentially be trapped in a magnetic field.

Measurement Type List	Closed

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

Term	Definition
Activity Index	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.
Electric Field	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.
Energetic Particles	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.
Image Intensity	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.
Instrument Status	A quantity directly related to the operation or function of an instrument.
Ion Composition	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	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. The SI unit of irradiance is watts per square meter (W·m-2).
Magnetic Field	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.")
Neutral Atom Images	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.
Neutral Gas	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. The SI unit of radiance is watts per steradian per square meter (W*s*r^-1*m^-2).
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.
Thermal Plasma	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.

Mixed Quantity List   Closed

Identifiers for the combined attributes of a mixed parameter quantity.

Term	Definition
Akasofu Epsilon	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.
Alfven Mach Number	The ratio of the bulk flow speed to the Alfven speed.
Alfven Velocity	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).
Magnetosonic Mach Number	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.

Plasma Beta	The ratio of thermal pressure to magnetic pressure in plasma.
Total Pressure	In an MHD fluid it is the number density (N) times Boltzmann constant times the temperature in Kelvin.
V Cross B	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.

Near Surface 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.
Auroral Region	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.
Equatorial Region	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.
Polar Cap	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.
South Atlantic Anomaly Region	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.

Particle Quantity List   Closed

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

Term	Definition
Average Charge State	A measure of the composite deficit (positive) or excess (negative) of electrons with respect to protons.
Count Rate	The number of events per unit time.
Counts	An enumeration of the number of detection events occurring in a particle detector per unit time or over detector accumulation times.
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)
Energy Density	The amount of energy per unit volume.
Energy Flux	The amount of energy passing through a unit area in a unit time.
Flow Speed	The rate at which particles or energy is passing through a unit area in a unit time.
Flow Velocity	The volume of matter passing through a unit area perpendicular to the direction of flow in a unit of 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.
Heat Flux	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).
Mass Density	The mass of particles per unit volume.
Number Density	The number of particles per unit volume.
Number Flux	The number of particles passing through a unit area in a unit time.
Phase-Space Density	The number of particles per unit volume in the six-dimensional space of position and velocity.
Plasma Frequency	A number-density-dependent characteristic frequency of a plasma.
Pressure	The force per unit area exerted by a particle distribution or field.
Sonic Mach Number	The ratio of the bulk flow speed to the speed of sound in the 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).
Thermal Speed	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".

Particle Type 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.
Alpha Particle	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.

Phenomenon Type List   Closed

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

Term	Definition
Active Region	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.
Bow Shock Crossing	A crossing of the boundary between the undisturbed (except for foreshock effects) solar wind and the shocked, decelerated solar wind of the magnetosheath.
Coronal Hole	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.
Coronal Mass Ejection	A solar event which involves a burst of plasma which is ejected from the Sun into the interplanetary medium.
EIT Wave	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.

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

Forbush Decrease 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.

Geomagnetic Storm 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.

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

Magnetic Cloud 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.

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

Radio Burst 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).

Solar Flare 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.

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

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

Processing Level 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.
Cross Spectrum	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 flux measurement within a given energy and solid-angle range.
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.
Direction Angle	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.
Field-Aligned	The component of a quantity which is oriented in the same direction of a field.
Fit	Values that make an model agree with the data.
Group	An assemblage of values that a certain relation or common characteristic.
Integral	The summation of values above a given threshold and over area or solid-angle range.
Line Of Sight	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.
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.
Phase Angle	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

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

Role List   Closed

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

Term	Definition
Archive Specialist	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.
Co-Investigator	An individual who is a scientific peer and major participant in an investigation.
Contributor	An entity responsible for making contributions to the content of the resource.
Data Producer	An individual who generated the resource and is familiar with its provenance.
Deputy-PI	An individual who is an administrative or scientific leader for an investigation operating under the supervision of a Principal Investigator.
General Contact	An individual who can provide information on a range of subjects or who can direct you to a domain expert.
Metadata Contact	An individual who can affect a change in the metadata describing a resource.
Principal Investigator	An individual who is the administrative and scientific lead for an investigation.
Project Scientist	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.
Team Leader	An individual who is the designated leader of an investigation!!!
Team Member	An individual who is a major participant in an investigation.
Technical Contact	An individual who can provide specific information with regard to the resource or supporting software

Scale Type List   Closed

Identifiers for scaling applied to a set of numbers.

Term	Definition
Linear Scale	Intervals which are equally spaced.
Log Scale	Intervals which are spaced proportionally to the logarithms of the values being represented.

Source Type 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.

Spectral Range 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
Ca-K	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.
Extreme Ultraviolet	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
Far Ultraviolet	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
Gamma Rays	Photons with a wavelength range: 0.00001 to 0.001 nm
H-alpha	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.
Hard X-rays	Photons with a wavelength range: 0.001 to 0.1 nm and an energy range of 12 keV to 120 keV
He-10830	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.
He-304	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
K-7699	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.
LBH Band	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
Na-D	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.

Ni-6768	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
Radio Frequency	Photons with a wavelength range: 100,000 to 1.00x10^11 nm
Soft X-Rays	X-Rays with an energy range of 0.12 keV to 12 keV.
Ultraviolet	Photons with a wavelength range: 10 to 400 nm.
White-Light	Photons with a wavelength in the visible range for humans!!!
X-Rays	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.
Transition Region	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.

Support Quantity 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
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.

Wave Quantity List
Closed

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

Term	Definition
Absorption	Decrease of radiant energy (relative to the background continuum spectrum).
AC-Electric Field	Alternating electric field component of a wave.
AC-Magnetic Field	Alternating magnetic field component of a wave.
Doppler Frequency	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.
Energy Flux	The amount of energy passing through a unit area in a unit time.
Equivalent Width	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.
Line Depth	The measure of the amount of absorption below the continuum (depth) in a particular wavelength or frequency in an absorption spectrum.
Magnetic Field	A region of space near a magnetized body where magnetic forces can be detected (as measured by methods such as Zeeman splitting, etc.).
Mode Amplitude	In helioseismology the magnitude of oscillation of waves of a particular geometry.
Plasma Frequency	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.

Poynting Flux	Electromagnetic energy flux transported by a wave characterized as the rate of energy transport per unit area per steradian.
Propagation Time	Time difference between transmission and reception of a wave in an active wave experiment.
Stoke's Parameters	A set of four parameters (usually called I,Q, U and V) which describe the polarization state of an electromagnetic wave propagating through space.
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.

Wave Type 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).
Plasma Waves	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		
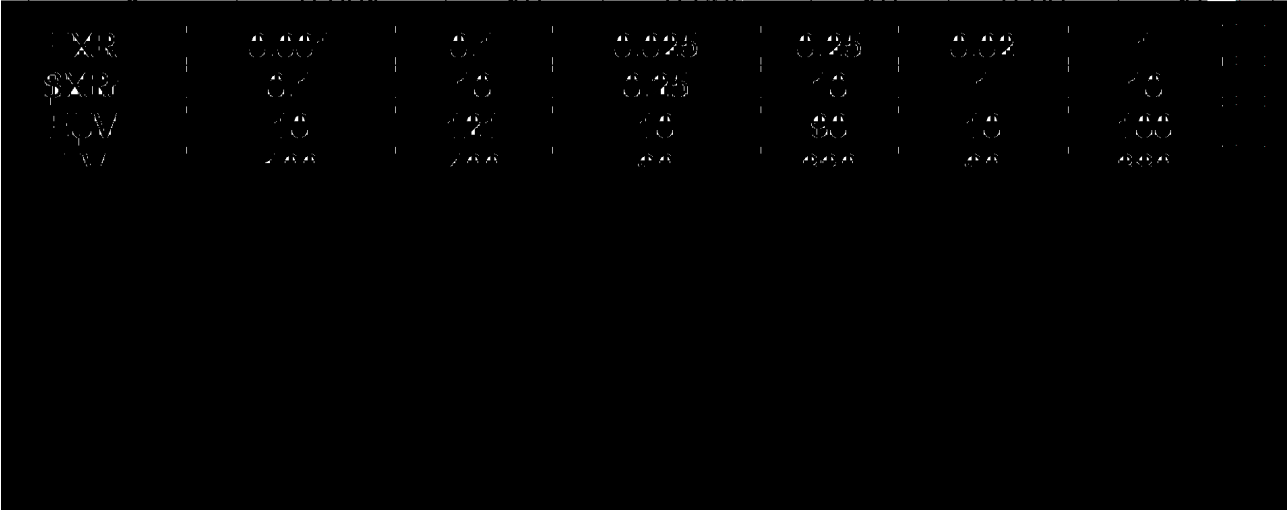
10. Bibliography

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	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	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.

1.2.2

2008-08-14	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, Radiomenter, 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

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", "Pertubation", "Phase" and "Spectral" to "Qualifier".

2.0.0

2009-04-15	Released.