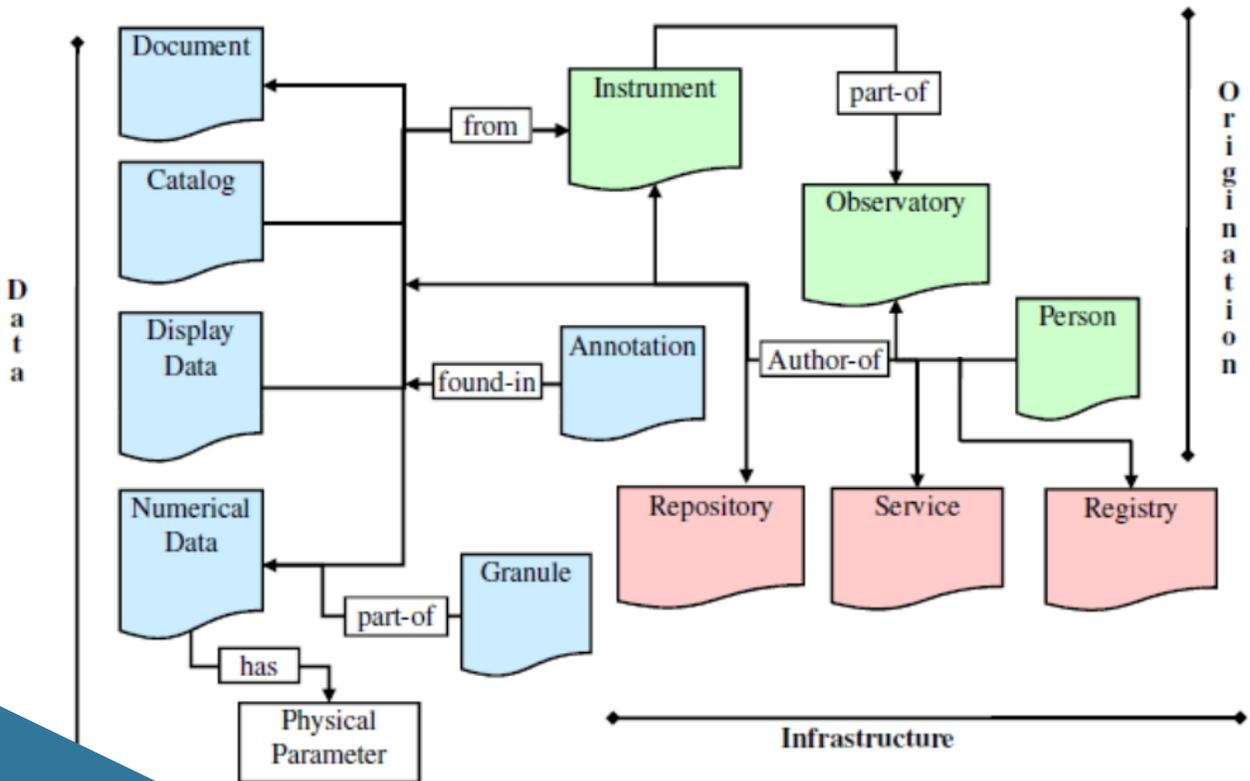


SPASE Ontology



SPASE Base Model

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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 for 1992 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.

The SPASE group website is located at <https://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 <https://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 resource 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 fully 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 led to further improvements of the data model. Version 1.1 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 <https://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.

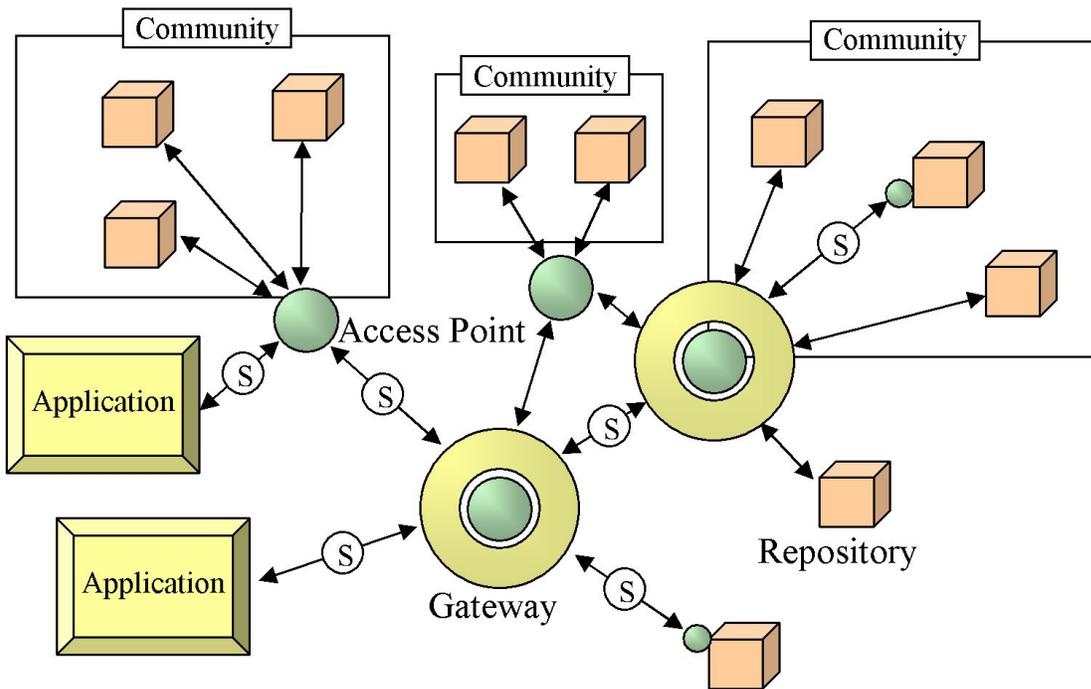


Figure 1: A possible data environment architecture. Information and data flows from Repositories to Applications through Access Points and Gateways. In this model, any Access Point or Gateway may be considered an instance of a Virtual Observatory. The portions of the system using SPASE-Data-Model-based messages are indicated with the (S).

3. SPASE Data Model

3.1. Resource Types

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

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

3.1.1. Data Resources

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

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

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, and
- Person

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

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.

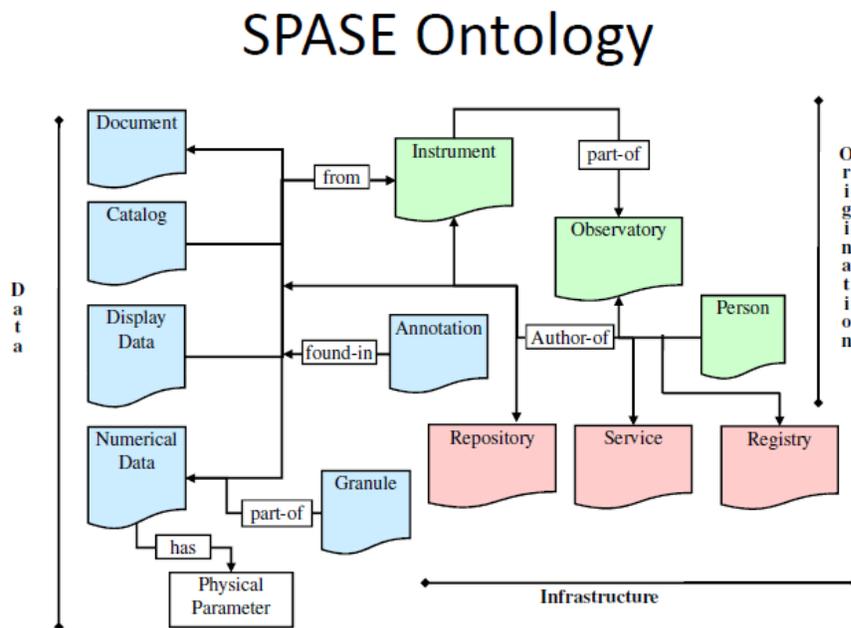


Figure 2: The association map between resources in the SPASE model. Arrows point in the direction of association.

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. 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.

3.4.1 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.

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
 1. Must be preceded by a blank line.
 2. 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)
 3. End with a blank line.
3. Tables
 1. Begin and end with a line that starts with "+--".
 2. The first "row" of a table is the field headings.
 3. Fields in a table are separated with a vertical bar ("|").
 4. Visual row separators are lines which begin with "|--".

3.5. 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.

4. Guidelines for Metadata Descriptions

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 necessary and if so create a 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.

5. Examples

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

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

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

```
<?xml version="1.0" encoding="UTF-8" ?>
<Spase>
  <Version>2.0.0</Version>
  <NumericalData>
    <ResourceID>spase://VMO/NumericalData/ACE/MAG/200301</ResourceID>
    <ResourceHeader>
      <ResourceName>ACEMAG200301</ResourceName>
      <ReleaseDate>2006-07-26T00:00:00.000</ReleaseDate>
      <Acknowledgement>
        User will acknowledge the data producer and instrument P.I. in any
        publication resulting from the use of these data.
      </Acknowledgement>
      <Description>
        ACE MFI 1-minute averaged magnetic-field data in GSE coordinates
        from Jan 2003. These data have been derived from the 16 second
        resolution ACE MFI which were linearly interpolated to a 1-minute
        time grid with time stamps at second zero of each minute.
      </Description>
    </NumericalData>
    <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>
      <PersonID>spase://SMWG/Person/James.M.Weygand</PersonID>
    </Contact>
```

```

</ResourceHeader>

<AccessInformation>
  <AccessRights>Open</AccessRights>
  <AccessURL>
    <URL>http://www.igpp.ucla.edu/getResource?format=text&id=spase://UCLA/ACEMAG200301</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>
    <SupportQuantity>Temporal</SupportQuantity>
  </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>
  <SupportQuantity>Positional</SupportQuantity>
</Support>
</Parameter>

</NumericalData>
</Spase>
```

6. 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. If "Container" is specified the element must have sub-elements specified.

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.

Text

A string of alphanumeric characters. A text based "markup" is supported. See the "Text Mark-up" section in specification document for complete details.

7. Enumerations

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

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

Allowed Values:

[Open](#)

[Restricted](#)

Availability

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

Allowed Values:

[Offline](#)

[Online](#)

Coordinate Representation

Identifiers the representational form for coordinate system.ation has been expressed.

Allowed Values:

[Cartesian](#)

[Cylindrical](#)

[Spherical](#)

Coordinate System Name

Identifiers for coordinate systems in which the position, direction or observation has been expressed.

Allowed Values:

[CGM](#)

[DM](#)

[GEI](#)

[GEO](#)

[GSE](#)

[GSEQ](#)

[GSM](#)

[HAE](#)

[HEE](#)

[HEEQ](#)

[HG](#)

[HGI](#)

[J2000](#)

[LGM](#)

[MAG](#)

[MFA](#)

[RTN](#)

[SC](#)

[SE](#)
[SM](#)
[SR](#)
[SR2](#)
[SSE](#)

Earth

Identifiers for the regions surrounding the Earth.

Allowed Values:

[Magnetosheath](#)
[Magnetosphere](#)
[Near Surface](#)
[Surface](#)

Encoding

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

Allowed Values:

[ASCII](#)
[BZIP2](#)
[Base64](#)
[GZIP](#)
[None](#)
[Unicode](#)
[ZIP](#)

Field Qualifier

Identifiers for terms which can be associated with a Field Quantity.

Allowed Values:

[Average](#)
[Component](#)
[Deviation](#)
[Magnitude](#)
[Peak](#)
[Perpendicular](#)
[Variance](#)
[Vector](#)

Field Quantity

Identifiers for the physical attribute of the field.

Allowed Values:

[Cross Spectrum](#)
[Electric](#)
[Magnetic](#)
[Potential](#)
[Poynting Flux](#)

Format

Identifiers for data organized according to preset specifications.

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](#)
[QuickTime](#)
[TIFF](#)
[Text](#)
[UDF](#)
[VOTable](#)
[XML](#)

Heliosphere

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.

Allowed Values:

[Inner](#)
[Near Earth](#)
[Outer](#)
[Remote 1AU](#)

Instrument Type

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

Allowed Values:

[Antenna](#)
[Channeltron](#)
[Double Sphere](#)
[Electron Drift Instrument](#)
[Electrostatic Analyser](#)
[Energetic Particle Instrument](#)
[Faraday Cup](#)
[Flux Feedback](#)
[Fourier Transform Spectrograph](#)

[Imager](#)
[Langmuir Probe](#)
[Long Wire](#)
[Magnetometer](#)
[Mass Spectrometer](#)
[Microchannel Plate](#)
[Particle Correlator](#)
[Quadrispherical Analyser](#)
[Radar](#)
[Resonance Sounder](#)
[Search Coil](#)
[Spacecraft Potential Control](#)
[Spectral Power Receiver](#)
[Spectrometer](#)
[Waveform Receiver](#)

Magnetosphere

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.

Allowed Values:

[Magnetotail](#)
[Main](#)
[Polar](#)
[Radiation Belt](#)

Measurement Type

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

Allowed Values:

[Activity Index](#)
[Charged Particle Flux](#)
[Dopplergram](#)
[Dynamic Spectra](#)
[Electric Field](#)
[Energetic Particles](#)
[Image Intensity](#)
[Ion Composition](#)
[Irradiance](#)
[Magnetic Field](#)
[Magnetogram](#)
[Neutral Atom Images](#)
[Neutral Gas](#)
[Profile](#)
[Radiance](#)
[Radio Soundings](#)
[Radio and Plasma Waves](#)
[Thermal Plasma](#)

Near Surface

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

Allowed Values:

[Atmosphere](#)
[Auroral Region](#)
[Ionosphere](#)

Observatory Group

Allowed Values:

Observatory Name

Allowed Values:

Orientation

Identifiers for the axis of coordinate systems.

Allowed Values:

[H](#)
[Phi](#)
[R](#)
[Theta](#)
[X](#)
[Y](#)
[Z](#)

Particle Qualifier

Identifiers for terms which can be associated with a Particle Quantity.

Allowed Values:

[Average](#)
[Component](#)
[Deviation](#)
[Differential](#)
[Fit](#)
[Integral](#)
[Magnitude](#)
[Moment](#)
[Parallel](#)
[Peak](#)
[Perpendicular](#)
[Ratio](#)
[Variance](#)
[Vector](#)

Particle Quantity

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

Allowed Values:

[Alfven Mach Number](#)
[Average Charge State](#)
[Counts](#)
[Flux](#)
[Heat Flux](#)
[Mass](#)
[Mass Density](#)
[Number Density](#)
[Phase-Space Density](#)

[Plasma Beta](#)
[Pressure](#)
[Sonic Mach Number](#)
[Temperature](#)
[Thermal Speed](#)
[Velocity](#)

Particle Type

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

Allowed Values:

[Aerosol](#)
[Alpha Particle](#)
[Dust](#)
[Electron](#)
[Ion](#)
[Molecule](#)
[Neutral](#)
[Proton](#)

Phenomenon Type

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

Allowed Values:

[Bow Shock Crossing](#)
[Coronal Mass Ejection](#)
[Energetic Solar Particle Event](#)
[Forbush Decrease](#)
[Geomagnetic Storm](#)
[Interplanetary Shock](#)
[Magnetopause Crossing](#)
[Solar Flare](#)
[Solar Wind Extreme](#)

Photon Qualifier

Identifiers for terms which can be associated with a Photon Quantity.

Allowed Values:

[Average](#)
[Circular](#)
[Line of Sight](#)
[Linear](#)
[Peak](#)
[Stoke's Parameters](#)
[Variance](#)
[Vector](#)

Photon Quantity

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

Allowed Values:

[Emissivity](#)
[Equivalent Width](#)
[Flux](#)

[Intensity](#)
[Line Depth](#)
[Magnetic Field](#)
[Mode Amplitude](#)
[Polarization](#)
[Stoke's Parameters](#)
[Velocity](#)

Processing Level

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

Allowed Values:

[Calibrated](#)
[Raw](#)
[Uncalibrated](#)

Region

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

Allowed Values:

[Earth](#)
[Heliosphere](#)
[Sun](#)

Repository Name

Allowed Values:

[Open List](#)

Role

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

Allowed Values:

[Co-Investigator](#)
[Data Producer](#)
[General Contact](#)
[Principal Investigator](#)
[Project Scientist](#)
[Scientist](#)
[Team Leader](#)
[Team Member](#)
[Technical Contact](#)

Spectral Range

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.

Allowed Values:

[Gamma Rays](#)
[Hard X-rays](#)
[Infrared](#)
[Microwave](#)

[Optical](#)
[Radio Frequency](#)
[Ultraviolet](#)
[X-Rays](#)

Sun

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

Allowed Values:

[Chromosphere](#)
[Corona](#)
[Interior](#)
[Photosphere](#)
[Transition Region](#)

8. Data Model Tree

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

```
+ Spase (1)
|
| + Version (1)
| + Catalog (*)
|   |
|   | + Resource ID (1)
|   | + Resource Header (1)
|   |   |
|   |   | + Resource Name (1)
|   |   | + Alternate Name (*)
|   |   | + Release Date (1)
|   |   | + Description (1)
|   |   | + Acknowledgement (0)
|   |   | + Contact (1)
|   |   |   |
|   |   |   | + Person ID (1)
|   |   |   | + Role (+)
|   |   | + Information URL (*)
|   |   |   |
|   |   |   | + Name (0)
|   |   |   | + URL (1)
|   |   |   | + Description (0)
|   |   | + Association ID (*)
|   | + Access Information (1)
|   |   |
|   |   | + Repository ID (1)
|   |   | + Availability (0)
|   |   | + Access Rights (0)
|   |   | + Access URL (+)
|   |   |   |
|   |   |   | + Name (0)
|   |   |   | + URL (1)
|   |   |   | + Description (0)
|   |   | + Format (1)
|   |   | + Encoding (0)
|   |   | + Acknowledgement (0)
|   | + Provider Resource Name (0)
|   | + Provider Version (0)
|   | + Instrument ID (*)
|   | + Phenomenon Type (1)
|   | + Time Span (0)
|   |   |
|   |   | + Start Date (1)
|   |   | + End Date (0)
|   |   | + Relative End Date (0)
|   | + Caveats (0)
|   | + Keyword (*)
|   | + Input Resource ID (+)
| + Display Data (*)
|   |
|   | + Resource ID (1)
```

- + [Resource Header](#) (1)
 - + [Resource Name](#) (1)
 - + [Alternate Name](#) (*)
 - + [Release Date](#) (1)
 - + [Description](#) (1)
 - + [Acknowledgement](#) (0)
 - + [Contact](#) (1)
 - + [Person ID](#) (1)
 - + [Role](#) (+)
 - + [Information URL](#) (*)
 - + [Name](#) (0)
 - + [URL](#) (1)
 - + [Description](#) (0)
 - + [Association ID](#) (*)
- + [Access Information](#) (1)
 - + [Repository ID](#) (1)
 - + [Availability](#) (0)
 - + [Access Rights](#) (0)
 - + [Access URL](#) (+)
 - + [Name](#) (0)
 - + [URL](#) (1)
 - + [Description](#) (0)
 - + [Format](#) (1)
 - + [Encoding](#) (0)
 - + [Acknowledgement](#) (0)
- + [Provider Resource Name](#) (0)
- + [Provider Processing Level](#) (0)
- + [Provider Version](#) (0)
- + [Instrument ID](#) (1)
- + [Measurement Type](#) (+)
- + [Temporal Description](#) (0)
 - + [Time Span](#) (1)
 - + [Start Date](#) (1)
 - + [End Date](#) (0)
 - + [Relative End Date](#) (0)
 - + [Cadence](#) (0)
 - + [Exposure](#) (0)
- + [Spectral Range](#) (*)
- + [Display Cadence](#) (0)
- + [Instrument Region](#) (*)
- + [Observed Region](#) (*)
- + [Caveats](#) (0)
- + [Keyword](#) (*)
- + [Input Resource ID](#) (*)
- + [Numerical Data](#) (*)
 - + [Resource ID](#) (1)
 - + [Resource Header](#) (1)
 - + [Resource Name](#) (1)
 - + [Alternate Name](#) (*)
 - + [Release Date](#) (1)
 - + [Description](#) (1)

- + [Acknowledgement](#) (0)
- + [Contact](#) (1)
 - + [Person ID](#) (1)
 - + [Role](#) (+)
- + [Information URL](#) (*)
 - + [Name](#) (0)
 - + [URL](#) (1)
 - + [Description](#) (0)
- + [Association ID](#) (*)
- + [Access Information](#) (1)
 - + [Repository ID](#) (1)
 - + [Availability](#) (0)
 - + [Access Rights](#) (0)
 - + [Access URL](#) (+)
 - + [Name](#) (0)
 - + [URL](#) (1)
 - + [Description](#) (0)
 - + [Format](#) (1)
 - + [Encoding](#) (0)
 - + [Acknowledgement](#) (0)
- + [Provider Resource Name](#) (0)
- + [Provider Processing Level](#) (0)
- + [Provider Version](#) (0)
- + [Instrument ID](#) (1)
- + [Measurement Type](#) (+)
- + [Temporal Description](#) (0)
 - + [Time Span](#) (1)
 - + [Start Date](#) (1)
 - + [End Date](#) (0)
 - + [Relative End Date](#) (0)
 - + [Cadence](#) (0)
 - + [Exposure](#) (0)
- + [Spectral Range](#) (*)
- + [Instrument Region](#) (*)
- + [Observed Region](#) (*)
- + [Caveats](#) (0)
- + [Keyword](#) (*)
- + [Input Resource ID](#) (*)
- + [Physical Parameter](#) (+)
 - + [Name](#) (0)
 - + [Parameter Key](#) (1)
 - + [Description](#) (0)
 - + [Caveats](#) (0)
 - + [Cadence](#) (0)
 - + [Units](#) (0)
 - + [Units Conversion](#) (0)
 - + [Coordinate System](#) (0)
 - + [Coordinate Representation](#) (0)
 - + [Coordinate System Name](#) (0)
 - + [Dimension](#) (0)
 - + [Size](#) (1)

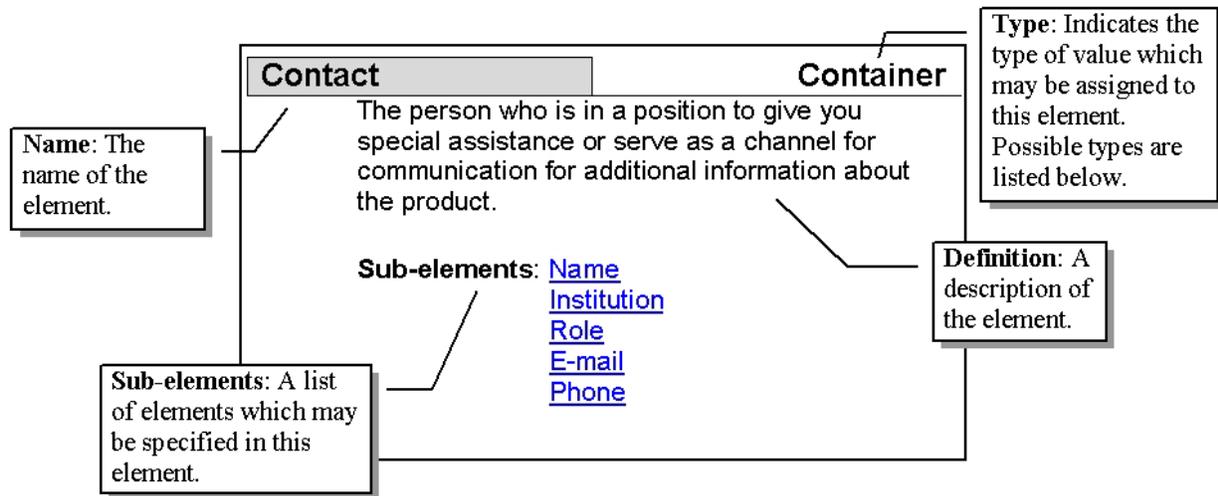
- + [Description](#) (1)
- + [Measured](#) (0)
 - + [Field](#) (0)
 - + [Orientation](#) (0)
 - + [Field Qualifier](#) (*)
 - + [Field Quantity](#) (1)
 - + [Particle](#) (0)
 - + [Particle Type](#) (+)
 - + [Particle Qualifier](#) (*)
 - + [Particle Quantity](#) (1)
 - + [Atomic Number](#) (*)
 - + [Energy Range](#) (0)
 - + [Low](#) (1)
 - + [High](#) (0)
 - + [Units](#) (1)
 - + [Bin](#) (*)
 - + [Low](#) (1)
 - + [High](#) (1)
 - + [Azimuthal Angle Range](#) (0)
 - + [Low](#) (1)
 - + [High](#) (1)
 - + [Units](#) (0)
 - + [Bin](#) (*)
 - + [Low](#) (1)
 - + [High](#) (1)
 - + [Polar Angle Range](#) (0)
 - + [Low](#) (1)
 - + [High](#) (1)
 - + [Units](#) (0)
 - + [Bin](#) (0)
 - + [Low](#) (1)
 - + [High](#) (1)
 - + [Photon](#) (0)
 - + [Photon Qualifier](#) (*)
 - + [Photon Quantity](#) (1)
 - + [Frequency Range](#) (0)
 - + [Low](#) (1)
 - + [High](#) (0)
 - + [Units](#) (1)
 - + [Bin](#) (*)
 - + [Low](#) (1)
 - + [High](#) (1)
 - + [Mixed](#) (0)
- + [Support](#) (0)
 - + [Other](#) (0)
 - + [Positional](#) (0)
 - + [Orientation](#) (+)
 - + [Temporal](#) (0)
- + [Granule](#) (*)
 - + [Resource ID](#) (1)
 - + [Release Date](#) (1)

- + [Parent ID](#) (1)
- + [URL](#) (1)
- + [Start Date](#) (1)
- + [Stop Date](#) (1)
- + [Instrument](#) (*)
 - + [Resource ID](#) (1)
 - + [Resource Header](#) (1)
 - + [Resource Name](#) (1)
 - + [Alternate Name](#) (*)
 - + [Release Date](#) (1)
 - + [Description](#) (1)
 - + [Acknowledgement](#) (0)
 - + [Contact](#) (1)
 - + [Person ID](#) (1)
 - + [Role](#) (+)
 - + [Information URL](#) (*)
 - + [Name](#) (0)
 - + [URL](#) (1)
 - + [Description](#) (0)
 - + [Association ID](#) (*)
 - + [Instrument Type](#) (1)
 - + [Investigation Name](#) (1)
 - + [Observatory ID](#) (1)
 - + [Caveats](#) (1)
- + [Observatory](#) (*)
 - + [Resource ID](#) (1)
 - + [Resource Header](#) (0)
 - + [Resource Name](#) (1)
 - + [Alternate Name](#) (*)
 - + [Release Date](#) (1)
 - + [Description](#) (1)
 - + [Acknowledgement](#) (0)
 - + [Contact](#) (1)
 - + [Person ID](#) (1)
 - + [Role](#) (+)
 - + [Information URL](#) (*)
 - + [Name](#) (0)
 - + [URL](#) (1)
 - + [Description](#) (0)
 - + [Association ID](#) (*)
 - + [Observatory Group](#) (0)
- + [Person](#) (*)
 - + [Resource ID](#) (1)
 - + [Release Date](#) (0)
 - + [Person Name](#) (0)
 - + [Organization Name](#) (1)
 - + [Address](#) (0)
 - + [Email](#) (*)
 - + [Phone Number](#) (*)
- + [Registry](#) (*)
 - + [Resource ID](#) (1)

- + [Resource Header](#) (1)
 - + [Resource Name](#) (1)
 - + [Alternate Name](#) (*)
 - + [Release Date](#) (1)
 - + [Description](#) (1)
 - + [Acknowledgement](#) (0)
 - + [Contact](#) (1)
 - + [Person ID](#) (1)
 - + [Role](#) (+)
 - + [Information URL](#) (*)
 - + [Name](#) (0)
 - + [URL](#) (1)
 - + [Description](#) (0)
 - + [Association ID](#) (*)
- + [Repository](#) (*)
 - + [Resource ID](#) (1)
 - + [Resource Header](#) (1)
 - + [Resource Name](#) (1)
 - + [Alternate Name](#) (*)
 - + [Release Date](#) (1)
 - + [Description](#) (1)
 - + [Acknowledgement](#) (0)
 - + [Contact](#) (1)
 - + [Person ID](#) (1)
 - + [Role](#) (+)
 - + [Information URL](#) (*)
 - + [Name](#) (0)
 - + [URL](#) (1)
 - + [Description](#) (0)
 - + [Association ID](#) (*)
- + [Service](#) (*)
 - + [Resource ID](#) (1)
 - + [Resource Header](#) (1)
 - + [Resource Name](#) (1)
 - + [Alternate Name](#) (*)
 - + [Release Date](#) (1)
 - + [Description](#) (1)
 - + [Acknowledgement](#) (0)
 - + [Contact](#) (1)
 - + [Person ID](#) (1)
 - + [Role](#) (+)
 - + [Information URL](#) (*)
 - + [Name](#) (0)
 - + [URL](#) (1)
 - + [Description](#) (0)
 - + [Association ID](#) (*)
 - + [Access URL](#) (1)
 - + [Name](#) (0)
 - + [URL](#) (1)
 - + [Description](#) (0)

9. Dictionary

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:



Access Information

[Container](#)

Attributes of the resource which pertain to how to acquire the resource, availability and storage format.

Since:1.0.0

Sub-elements [Repository ID](#)
[Availability](#)
[Access Rights](#)
[Access URL](#)
[Format](#)
[Encoding](#)
[Acknowledgement](#)

Used by: [Catalog](#)
[Display Data](#)
[Numerical Data](#)

Access Rights

[Enumeration](#)

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

Since:1.0.0

Allowed Values [Open](#)
[Restricted](#)

Used by: [Access Information](#)

Access URL

[Container](#)

Attributes of the method of acquiring a resource including a URL, name and description.

Since:1.0.0

Sub-elements [Name](#)
[URL](#)
[Description](#)

Used by: [Access Information Service](#)

Acknowledgement

[Text](#)

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

Since:1.0.0

Used by: [Access Information Resource Header](#)

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.

Since:1.0.0

Address

[Text](#)

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

Since:1.0.0

Used by: [Person](#)

Aerosol

[Item](#)

A suspension of fine solid or liquid particles in gas.

Since:1.0.0

Alfven Mach Number

[Item](#)

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

Since:1.0.0

Alpha Particle

[Item](#)

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

Since:1.0.0

Alternate Name

[Text](#)

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

Since:1.1.0

Used by: [Resource Header](#)

Antenna

[Item](#)

A sensor used to measure electric potential.

Since:1.0.0

ASCII

[Item](#)

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

Since:1.0.0

Association ID

[Text](#)

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

Since:1.1.0

Used by: [Resource Header](#)

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.

Since:1.1.0

Atomic Number

[Numeric](#)

The the number of protons in the nucleus of an atom.

Since:1.1.0

Used by: [Particle](#)

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.

Since:1.1.0

Availability

[Enumeration](#)

An indication of the method or service which may be used to access the resource.

Since:1.0.0

Allowed Values [Offline](#)
[Online](#)

Used by: [Access Information](#)

Average

[Item](#)

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

Since:1.0.0

Average Charge State

[Item](#)

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

Since:1.0.0

AVI

[Item](#)

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

Since:1.0.0

Azimuthal Angle

[Item](#)

The horizontal angular distance from a reference direction. For a vector (X,Y,Z) in any coordinate system, the azimuthal angle is $\arctan(Y/X)$.

Since:1.0.0

Azimuthal Angle Range

[Container](#)

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

Since:1.1.0

Sub-elements [Low](#)
[High](#)
[Units](#)
[Bin](#)

Used by: [Particle](#)

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.

Since:1.1.0

Bin

[Container](#)

A grouping of observations according to a band or window of a common attribute.

Since:1.1.0

Sub-elements [Low](#)
[High](#)

Used by: [Azimuthal Angle Range](#)
[Energy Range](#)
[Frequency Range](#)
[Polar Angle Range](#)

Binary

[Item](#)

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

Since:1.0.0

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.

Since:1.0.0

BZIP2

[Item](#)

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

Since:1.0.0

Cadence

[Time](#)

The time interval between the start of successive measurements.

Since:1.0.0

Used by: [Physical Parameter](#)
[Temporal Description](#)

Calibrated

[Item](#)

Data wherein sensor outputs have been convolved with instrument response function, often irreversibly, to yield physical parameter values.

Since:1.0.0

Cartesian

[Item](#)

A coordinate system in which the position of a point is determined by its distance from two or three mutually perpendicular axes.

Since:1.0.0

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.

Since:1.0.0

Sub-elements [Resource ID](#)
[Resource Header](#)
[Access Information](#)
[Provider Resource Name](#)
[Provider Version](#)
[Instrument ID](#)
[Phenomenon Type](#)
[Time Span](#)
[Caveats](#)
[Keyword](#)
[Input Resource ID](#)

Used by: [Spase](#)

Caveats

[Text](#)

Information which may be important in the avoidance of misuse of the resource. This includes things such as instrument malfunctions, corruption or contamination.

Since:1.0.0

Used by: [Catalog](#)
[Display Data](#)
[Instrument](#)
[Numerical Data](#)
[Physical Parameter](#)

CDF

[Item](#)

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

Since:1.0.0

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.

Since:1.0.0

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.

Since:1.0.0

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.

Since:1.0.0

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>

Since:1.0.0

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.

Since:1.0.0

Charged Particle Flux

[Item](#)

Measurements of fluxes of charged or ionized particles at above thermal energies, including relativistic particles of solar and galactic origin. May give simple fluxes, but more complete distributions are sometimes possible. Composition measurements may also be made.

Since:1.0.0

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.

Since:1.0.0

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.

Since:1.0.0

Co-Investigator

[Item](#)

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

Since:1.0.0

Component

[Item](#)

A part of a multi-part entity, e.g., the components of a vector.

Since:1.0.0

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.

Since:1.0.0

Sub-elements [Person ID](#)
[Role](#)

Used by: [Resource Header](#)

Coordinate Representation

[Enumeration](#)

The method or form for specifying a given point in a given coordinate system

Since:1.0.0

Allowed Values [Cartesian](#)
[Cylindrical](#)
[Spherical](#)

Used by: [Coordinate System](#)

Coordinate System

[Container](#)

Specification of the origin and orientation of axes against which the location of some point is given and the representative form of each point.

Since:1.0.0

Sub-elements [Coordinate Representation](#)
[Coordinate System Name](#)

Used by: [Physical Parameter](#)

Coordinate System Name

[Enumeration](#)

Identifies the coordinate system in which the position, direction or observation has been expressed.

Since:1.0.0

Allowed Values [CGM](#)
[DM](#)
[GEI](#)
[GEO](#)
[GSE](#)
[GSEQ](#)
[GSM](#)
[HAE](#)
[HEE](#)
[HEEQ](#)
[HG](#)
[HGI](#)
[J2000](#)
[LGM](#)
[MAG](#)
[MFA](#)
[RTN](#)
[SC](#)
[SE](#)
[SM](#)
[SR](#)
[SR2](#)
[SSE](#)

Used by: [Coordinate System](#)

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.

Since:1.0.0

Coronal Mass Ejection

[Item](#)

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

Since:1.0.0

Counts

[Item](#)

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

Since:1.0.0

Cross Spectrum

[Item](#)

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

Since:1.0.0

Cylindrical

[Item](#)

A system of curvilinear coordinates in which the position of a point in space is determined by its perpendicular distance from a given line, its distance from a selected reference plane perpendicular to this line, and its angular distance from a selected reference line when projected onto this plane.

Since:1.0.0

Data Producer

[Item](#)

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

Since:1.0.0

Dayside

[Item](#)

Sunward of a dawn-dusk meridian, either on the surface of, or above, some reference body.

Since:1.0.0

Description

[Text](#)

A detailed description of the resource which 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 it.

Since:1.0.0

Used by: [Access URL](#)
[Dimension](#)
[Information URL](#)
[Physical Parameter](#)

[Resource Header](#)

Deviation

[Item](#)

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

Since:1.0.0

Differential

[Item](#)

The ratio of the intensity of radiant energy scattered in a given direction to the incident irradiance and thus has dimensions of area per unit solid angle.

Since:1.1.0

Dimension

[Container](#)

Attributes of an independent variable or axis associated with the data.

Since:1.0.0

Sub-elements [Size](#)

[Description](#)

Used by: [Physical Parameter](#)

Display Cadence

[Time](#)

The time interval between the successive display elements.

Since:1.0.0

Used by: [Display Data](#)

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.

Since:1.0.0

Sub-elements [Resource ID](#)

[Resource Header](#)

[Access Information](#)

[Provider Resource Name](#)

[Provider Processing Level](#)

[Provider Version](#)

[Instrument ID](#)

[Measurement Type](#)

[Temporal Description](#)

[Spectral Range](#)

[Display Cadence](#)

[Instrument Region](#)

[Observed Region](#)

[Caveats](#)

[Keyword](#)

[Input Resource ID](#)

Used by: [Spase](#)

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>>

Since:1.0.0

Dopplergram

[Item](#)

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

Since:1.0.0

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.

Since:1.0.0

Dust

[Item](#)

Free microscopic particles of solid material.

Since:1.0.0

Dynamic Spectra

[Item](#)

A three-dimensional representation of successive spectra which allows time evolution to be clearly seen. Time is plotted along the abscissa, frequency (or particle energy) along the ordinate, and the spectral power density (or differential particle flux) is represented by different shades of grey, or color. This representation is also known as a spectrogram.

Since:1.0.0

Earth

[Enumeration](#)

The third planet from the sun in our solar system.

Since:1.1.0

Allowed Values [Magnetosheath](#)
[Magnetosphere](#)
[Magnetosphere.Magnetotail](#)
[Magnetosphere.Main](#)
[Magnetosphere.Polar](#)
[Magnetosphere.Radiation Belt](#)
[Near Surface](#)
[Near Surface.Atmosphere](#)
[Near Surface.Auroral Region](#)
[Near Surface.Ionosphere](#)
[Surface](#)

Electric

[Item](#)

The physical attribute that exerts an electrical force.

Since:1.0.0

Electric Field

[Item](#)

Measurements of electric field vectors (sometimes not all components) as a time series.

Since:1.0.0

Electron

[Item](#)

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

Since:1.0.0

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.

Since:1.0.0

Electrostatic Analyser

[Item](#)

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

Since:1.0.0

Email

[Text](#)

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

Since:1.0.0

Used by: [Person](#)

Emissivity

[Item](#)

The ratio of radiant energy from a material to that from a blackbody at the same kinetic temperature

Since:1.0.0

Encoding

[Enumeration](#)

A set of unambiguous rules that establishes the representation of information within a file.

Since:1.0.0

Allowed Values [ASCII](#)
[BZIP2](#)
[Base64](#)
[GZIP](#)

[None](#)
[Unicode](#)
[ZIP](#)

Used by: [Access Information](#)

End Date

[DateTime](#)

The specification of a stopping point in time.

Since:1.0.0

Used by: [Time Span](#)

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

Since:1.0.0

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.

Since:1.0.0

Energetic Solar Particle Event

[Item](#)

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

Since:1.0.0

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)

Since:1.0.0

Energy Range

[Container](#)

The minimum and maximum energy values of the particles represented by a given physical parameter description.

Since:1.1.0

Sub-elements [Low](#)
[High](#)
[Units](#)
[Bin](#)

Used by: [Particle](#)

Equivalent Width

[Item](#)

The area of the spectral line profile divided by the peak height or depth.

Since:1.0.0

Exposure

[Time](#)

The time interval over which an individual measurement is taken.

Since:1.0.0

Used by: [Temporal Description](#)

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.

Since:1.0.0

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.

Since:1.0.0

Sub-elements [Orientation](#)

[Field Qualifier](#)

[Field Quantity](#)

Used by: [Measured](#)

Field Qualifier

[Enumeration](#)

Characterizes the directional and statistical aspects of the field observation.

Since:1.0.0

Allowed Values [Average](#)

[Component](#)

[Component.H](#)

[Component.Phi](#)

[Component.R](#)

[Component.Theta](#)

[Component.X](#)

[Component.Y](#)

[Component.Z](#)

[Deviation](#)

[Magnitude](#)

[Peak](#)

[Perpendicular](#)

[Variance](#)

[Vector](#)

Used by: [Field](#)

Field Quantity

[Enumeration](#)

The physical attribute of the field.

Since:1.1.0

Allowed Values [Cross Spectrum](#)

[Electric](#)
[Magnetic](#)
[Potential](#)
[Poynting Flux](#)

Used by: [Field](#)

Fit

[Item](#)

Values that make an model agree with the data.

Since:1.0.0

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.

Since:1.0.0

Flux

[Item](#)

In radiation studies, this refers to the amount of radiant energy passing through a unit area

Since:1.0.0

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.

Since:1.0.0

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.

Since:1.0.0

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.

Since:1.0.0

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](#)
[QuickTime](#)
[TIFF](#)
[Text](#)
[UDF](#)
[VOTable](#)
[XML](#)

Used by: [Access Information](#)

Fourier Transform Spectrograph

[Item](#)

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

Since:1.0.0

Frequency

[Item](#)

(1) The number of occurrences within a given time period. (2) Vibrations per second of the photon field; may be given as a single number, multiple numbers, or as ranges.

Since:1.0.0

Frequency Range

[Container](#)

The range of possible values for the observed frequency.

Since:1.1.0

Sub-elements [Low](#)

[High](#)

[Units](#)

[Bin](#)

Used by: [Photon](#)

Gamma Rays

[Item](#)

Photons with a wavelength range: 0.00001 to 0.001 nm

Since:1.0.0

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

Since:1.0.0

General Contact

[Item](#)

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

Since:1.0.0

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.

Since:1.0.0

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.

Since:1.0.0

GIF

[Item](#)

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

Since:1.0.0

Granule

[Container](#)

An accessible portion of another resource. The ParentID of a Granule resource must be a NumericalData resource. The attributes of a Granule supersede the corresponding attributes in the NumericalData resource.

Since:1.1.0

Sub-elements [Resource ID](#)
[Release Date](#)
[Parent ID](#)
[URL](#)
[Start Date](#)
[Stop Date](#)

Used by: [Spase](#)

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.

Since:1.0.0

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

Since:1.0.0

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

Since:1.0.0

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/>>

Since:1.0.0

H

[Item](#)

TheHierarchical Data Format

Since:1.1.0

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.

Since:1.0.0

Hard X-rays

[Item](#)

Photons with a wavelength range: 0.001 to 0.1 nm

Since:1.0.0

HDF

[Item](#)

Hierarchical Data Format

Since:1.0.0

HDF 4

[Item](#)

Hierarchical Data Format, Version 4

Since:1.0.0

HDF 5

[Item](#)

Hierarchical Data Format, Version 5

Since:1.0.0

Heat Flux

[Item](#)

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

Since:1.0.0

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

Since:1.0.0

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.

Since:1.0.0

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.

Since:1.0.0

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/coord_des.html

Since:1.0.0

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/coord_des.html>

Since:1.0.0

High

[Numeric](#)

The largest value within a range of possible values.

Since:1.1.0

Used by: [Azimuthal Angle Range](#)

[Bin](#)

[Energy Range](#)

[Frequency Range](#)

[Polar Angle Range](#)

High Latitude

[Item](#)

The region located poleward of 60 degrees of latitude.

Since:1.0.0

HTML

[Item](#)

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

Since:1.0.0

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).

Since:1.0.0

IDL

[Item](#)

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

Since:1.0.0

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.

Since:1.0.0

Imager

[Item](#)

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

Since:1.0.0

Information URL

[Container](#)

Attributes of the method of acquiring additional information.

Since:1.0.0

Sub-elements [Name](#)
[URL](#)
[Description](#)

Used by: [Resource Header](#)

Infrared

[Item](#)

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

Since:1.0.0

Inner

[Item](#)

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

Since:1.0.0

Input Resource ID

[Text](#)

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

Since:1.0.0

Used by: [Catalog](#)
[Display Data](#)
[Numerical Data](#)

Instrument

[Container](#)

A device which is used to sense and parameterize a physical phenomenon.

Since:1.0.0

Sub-elements [Resource ID](#)
[Resource Header](#)
[Instrument Type](#)
[Investigation Name](#)
[Observatory ID](#)
[Caveats](#)

Used by: [Spase](#)

Instrument ID

[Text](#)

The identifier of an Instrument resource.

Since:1.0.0

Used by: [Catalog](#)
[Display Data](#)
[Numerical Data](#)

Instrument Region

[Enumeration](#)

The portion of space occupied by the instrument at the time of an observation. A region is

distinguished by certain natural features or physical characteristics.

Since:1.0.0

Allowed Values [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.Ionosphere](#)
- [Earth.Surface](#)
- [Heliosphere](#)
- [Heliosphere.Inner](#)
- [Heliosphere.Near Earth](#)
- [Heliosphere.Outer](#)
- [Heliosphere.Remote 1AU](#)
- [Sun](#)
- [Sun.Chromosphere](#)
- [Sun.Corona](#)
- [Sun.Interior](#)
- [Sun.Photosphere](#)
- [Sun.Transition Region](#)

Used by: [Display Data](#)
[Numerical Data](#)

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.

Since:1.0.0

Allowed Values [Antenna](#)

- [Channeltron](#)
- [Double Sphere](#)
- [Electron Drift Instrument](#)
- [Electrostatic Analyser](#)
- [Energetic Particle Instrument](#)
- [Faraday Cup](#)
- [Flux Feedback](#)
- [Fourier Transform Spectrograph](#)
- [Imager](#)
- [Langmuir Probe](#)
- [Long Wire](#)

[Magnetometer](#)
[Mass Spectrometer](#)
[Microchannel Plate](#)
[Particle Correlator](#)
[Quadrispherical Analyser](#)
[Radar](#)
[Resonance Sounder](#)
[Search Coil](#)
[Spacecraft Potential Control](#)
[Spectral Power Receiver](#)
[Spectrometer](#)
[Waveform Receiver](#)

Used by: [Instrument](#)

Integral

[Item](#)

The summation of values over a given area or range.

Since:1.1.0

Intensity

[Item](#)

The amount of energy transmitted by electromagnetic radiation, for example, the number of photons arriving in a given time.

Since:1.0.0

Interior

[Item](#)

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

Since:1.0.0

Interplanetary Shock

[Item](#)

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

Since:1.0.0

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.

Since:1.0.0

Used by: [Instrument](#)

Ion

[Item](#)

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

Since:1.0.0

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.

Since:1.0.0

Ionosphere

[Item](#)

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

Since:1.1.0

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 (W7m-2).

Since:1.0.0

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.

Since:1.1.0

JPEG

[Item](#)

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

Since:1.0.0

Keyword

[Text](#)

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

Since:1.0.0

Used by: [Catalog](#)
[Display Data](#)
[Numerical Data](#)

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.

Since:1.0.0

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) = $\text{SQRT}(B_x^2 + B_y^2)$ and D (declination angle) = $\arctan(B_y/B_x)$

Since:1.0.0

Line Depth

[Item](#)

In spectra, a measure of the amount of absorption for a particular wavelength or frequency in the spectrum

Since:1.0.0

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.

Since:1.0.0

Linear

[Item](#)

Relative to polarization, confinement of the E-field vector to a given plane

Since:1.0.0

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.

Since:1.0.0

Low

[Numeric](#)

The smallest value within a range of possible values.

Since:1.1.0

Used by: [Azimuthal Angle Range](#)

[Bin](#)

[Energy Range](#)

[Frequency Range](#)

[Polar Angle Range](#)

Low Latitude

[Item](#)

The region located at or anti-poleward of 60 degrees of latitude.

Since:1.0.0

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 $Y = N \times Z$, $X = Y \times Z$. See Russell, 1971, and <<http://cdpp.cnes.fr/00428.pdf>>

Since:1.0.0

Magnetic

[Item](#)

The physical attribute attributed to a magnet or its equivalent.

Since:1.0.0

Magnetic Field

[Item](#)

Measurements of magnetic field vectors (sometimes not all components) as time series; can be space- or ground-based. Also, [Zeeman splitting, etc. based]: A region of space near a magnetized body where magnetic forces can be detected [as measured by methods such as Zeeman splitting, etc.]

Since:1.0.0

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.)

Since:1.0.0

Magnetometer

[Item](#)

An instrument which measures the ambient magnetic field.

Since:1.0.0

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.

Since:1.0.0

Magnetosheath

[Item](#)

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

Since:1.0.0

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.

Since:1.0.0

Allowed Values [Magnetotail](#)

[Main](#)
[Polar](#)
[Radiation Belt](#)

Magnetotail

[Item](#)

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

Since:1.0.0

Magnitude

[Item](#)

A measure of the strength or size of a vector quantity.

Since:1.0.0

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.

Since:1.0.0

Mass

[Item](#)

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

Since:1.0.0

Mass Density

[Item](#)

The mass of particles per unit volume.

Since:1.0.0

Mass Spectrometer

[Item](#)

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

Since:1.0.0

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.

Since:1.1.0

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.

Since:1.1.0

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.

Since:1.1.0

Measured

[Container](#)

Attributes of observations obtained from an instrument or sensor.

Since:1.0.0

Sub-elements [Field](#)
[Particle](#)
[Photon](#)
[Mixed](#)

Used by: [Physical Parameter](#)

Measurement Type

[Enumeration](#)

A characterization of the quantitative assessment of a phenomenon.

Since:1.0.0

Allowed Values [Activity Index](#)
[Charged Particle Flux](#)
[Dopplergram](#)
[Dynamic Spectra](#)
[Electric Field](#)
[Energetic Particles](#)
[Image Intensity](#)
[Ion Composition](#)
[Irradiance](#)
[Magnetic Field](#)
[Magnetogram](#)
[Neutral Atom Images](#)
[Neutral Gas](#)
[Profile](#)
[Radiance](#)
[Radio Soundings](#)
[Radio and Plasma Waves](#)
[Thermal Plasma](#)

Used by: [Display Data](#)
[Numerical Data](#)

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>>

Since:1.0.0

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.

Since:1.0.0

Microwave

[Item](#)

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

Since:1.0.0

Mixed

[Text](#)

A measured observation which is derived from a combination of two or more individual measurements.

Since:1.0.0

Used by: [Measured](#)

Mode Amplitude

[Item](#)

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

Since:1.0.0

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

Since:1.0.0

Moment

[Item](#)

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

Since:1.0.0

MPEG

[Item](#)

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

Since:1.0.0

Name

[Text](#)

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

Since:1.0.0

Used by: [Access URL](#)
[Information URL](#)
[Physical Parameter](#)

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.

Since:1.1.0

Near Earth

[Item](#)

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

Since:1.1.0

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.

Since:1.0.0

Allowed Values [Atmosphere](#)
[Auroral Region](#)
[Ionosphere](#)

NetCDF

[Item](#)

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

Since:1.0.0

Neutral

[Item](#)

Either a particle, an object, or a system that has a net electric charge of zero

Since:1.0.0

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.

Since:1.0.0

Neutral Gas

[Item](#)

Measurements of neutral atomic and molecular components of a body and its surrounding environments.

Since:1.0.0

Nightside

[Item](#)

Anti-Sunward of a dawn-dusk meridian, either on the surface of, or above, some reference body.

Since:1.0.0

None

[Item](#)

A lack or absence of anything.

Since:1.0.0

Number Density

[Item](#)

The number of particles per unit volume.

Since:1.0.0

Numerical Data

[Container](#)

Data stored as numerical values in a specified format.

Since:1.0.0

Sub-elements [Resource ID](#)
[Resource Header](#)
[Access Information](#)
[Provider Resource Name](#)
[Provider Processing Level](#)
[Provider Version](#)
[Instrument ID](#)
[Measurement Type](#)
[Temporal Description](#)
[Spectral Range](#)
[Instrument Region](#)
[Observed Region](#)
[Caveats](#)
[Keyword](#)
[Input Resource ID](#)
[Physical Parameter](#)

Used by: [Spase](#)

Observatory

[Container](#)

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

Since:1.0.0

Sub-elements [Resource ID](#)
[Resource Header](#)
[Observatory Group](#)

Used by: [Spase](#)

Observatory Group

[Text](#)

A set of programmatically related observatories. The value is taken from an approved list of

observatory group names.

Since:1.0.0

Used by: [Observatory](#)

Observatory ID

[Text](#)

The identifier of an Observatory resource.

Since:1.0.0

Used by: [Instrument](#)

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.

Since:1.0.0

Allowed Values [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.Ionosphere](#)

[Earth.Surface](#)

[Heliosphere](#)

[Heliosphere.Inner](#)

[Heliosphere.Near Earth](#)

[Heliosphere.Outer](#)

[Heliosphere.Remote 1AU](#)

[Sun](#)

[Sun.Chromosphere](#)

[Sun.Corona](#)

[Sun.Interior](#)

[Sun.Photosphere](#)

[Sun.Transition Region](#)

Used by: [Display Data](#)

[Numerical Data](#)

Offline

[Text](#)

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

Since:1.0.0

Online

[Item](#)

Directly accessible electronically.

Since:1.0.0

Open

[Item](#)

Access is granted to everyone.

Since:1.0.0

Open List

[Item](#)

An enumeration list that is open so that any text string is a valid member of the list. In context of the SPASE schema, ObservatoryGroup, ObservatoryName and RepositoryName are the only enumeration lists that are designated as open!!!

Since:1.0.0

Optical

[Item](#)

Photons with a wavelength range: 380 to 760 nm

Since:1.0.0

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.

Since:1.0.0

Used by: [Person](#)

Orientation

[Enumeration](#)

The direction within a coordinate system.

Since:1.1.0

Allowed Values [H](#)

[Phi](#)

[R](#)

[Theta](#)

[X](#)

[Y](#)

[Z](#)

Used by: [Field](#)

[Positional](#)

Other

[Text](#)

Values, such as flags, that are not time tags, location data or measured or derived parameters.

Since:1.0.0

Used by: [Support](#)

Outer

[Item](#)

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

Since:1.0.0

Parallel

[Item](#)

Having the same direction as a given direction

Since:1.0.0

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.

Since:1.1.0

Used by: [Physical Parameter](#)

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 perscribed by the containing resource.

Since:1.1.0

Used by: [Granule](#)

Particle

[Container](#)

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

Since:1.0.0

Sub-elements [Particle Type](#)
[Particle Qualifier](#)
[Particle Quantity](#)
[Atomic Number](#)
[Energy Range](#)
[Azimuthal Angle Range](#)
[Polar Angle Range](#)

Used by: [Measured](#)

Particle Correlator

[Item](#)

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

Since:1.0.0

Particle Qualifier

[Enumeration](#)

Characterizes the directional and statistical aspects of the particle observation.

Since:1.0.0

Allowed Values [Average](#)

[Component](#)
[Component.H](#)
[Component.Phi](#)
[Component.R](#)
[Component.Theta](#)
[Component.X](#)
[Component.Y](#)
[Component.Z](#)
[Deviation](#)
[Differential](#)
[Fit](#)
[Integral](#)
[Magnitude](#)
[Moment](#)
[Parallel](#)
[Peak](#)
[Perpendicular](#)
[Ratio](#)
[Variance](#)
[Vector](#)

Used by: [Particle](#)

Particle Quantity

[Enumeration](#)

A characterization of the physical properties of the particle.

Since:1.1.0

Allowed Values [Alfven Mach Number](#)
[Average Charge State](#)
[Counts](#)
[Flux](#)
[Heat Flux](#)
[Mass](#)
[Mass Density](#)
[Number Density](#)
[Phase-Space Density](#)
[Plasma Beta](#)
[Pressure](#)
[Sonic Mach Number](#)
[Temperature](#)
[Thermal Speed](#)
[Velocity](#)

Used by: [Particle](#)

Particle Type

[Enumeration](#)

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

Since:1.0.0

Allowed Values [Aerosol](#)
[Alpha Particle](#)
[Dust](#)
[Electron](#)
[Ion](#)
[Molecule](#)
[Neutral](#)
[Proton](#)

Used by: [Particle](#)

PDF [Item](#)

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

Since:1.0.0

Peak [Item](#)

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

Since:1.0.0

Perpendicular [Item](#)

At right angles to a given direction.

Since:1.0.0

Person [Container](#)

An individual human being.

Since:1.0.0

Sub-elements [Resource ID](#)
[Release Date](#)
[Person Name](#)
[Organization Name](#)
[Address](#)
[Email](#)
[Phone Number](#)

Used by: [Spase](#)

Person ID [Text](#)

The identifier assigned to a Person description.

Since:1.0.0

Used by: [Contact](#)

Person Name [Text](#)

The words used to address an individual.

Since:1.0.0

Used by: [Person](#)

Phase-Space Density

[Item](#)

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

Since:1.0.0

Phenomenon Type

[Enumeration](#)

The characteristics or categorization of an event type.

Since:1.0.0

Allowed Values [Bow Shock Crossing](#)
[Coronal Mass Ejection](#)
[Energetic Solar Particle Event](#)
[Forbush Decrease](#)
[Geomagnetic Storm](#)
[Interplanetary Shock](#)
[Magnetopause Crossing](#)
[Solar Flare](#)
[Solar Wind Extreme](#)

Used by: [Catalog](#)

Phi

[Item](#)

The component of a vector in a spherical coordinate system in the direction of the angle between the x-axis and the line from the origin to the measured point.

Since:1.1.0

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.

Since:1.0.0

Used by: [Person](#)

Photon

[Container](#)

Photon (radio through gamma-rays): the fundamental particle or quantum of electromagnetic radiation (radiant energy)

Since:1.0.0

Sub-elements [Photon Qualifier](#)
[Photon Quantity](#)
[Frequency Range](#)

Used by: [Measured](#)

Photon Qualifier

[Enumeration](#)

Characterizes the directional and statistical aspects of the photon observation.

Since:1.0.0

Allowed Values [Average](#)
[Circular](#)

[Line of Sight](#)
[Linear](#)
[Peak](#)
[Stoke's Parameters](#)
[Variance](#)
[Vector](#)

Used by: [Photon](#)

Photon Quantity

[Enumeration](#)

A characterization of the physical properties of the photon.

Since:1.1.0

Allowed Values [Emissivity](#)
[Equivalent Width](#)
[Flux](#)
[Intensity](#)
[Line Depth](#)
[Magnetic Field](#)
[Mode Amplitude](#)
[Polarization](#)
[Stoke's Parameters](#)
[Velocity](#)

Used by: [Photon](#)

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.

Since:1.0.0

Physical 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.

Since:1.0.0

Sub-elements [Name](#)
[Parameter Key](#)
[Description](#)
[Caveats](#)
[Cadence](#)
[Units](#)
[Units Conversion](#)
[Coordinate System](#)
[Dimension](#)
[Measured](#)
[Support](#)

Used by: [Numerical Data](#)

Plasma Beta

[Item](#)

The ratio of the plasma pressure to the magnetic pressure.

Since:1.0.0

PNG

[Item](#)

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

Since:1.0.0

Polar

[Item](#)

The region near the pole of a body. For a magnetosphere the polar region is the area where magnetic field lines are open and includes the aural zone.

Since:1.1.0

Polar Angle

[Item](#)

The angle between the Z axis and the given vector direction.

Since:1.0.0

Polar Angle Range

[Container](#)

The range of possible polar angles for a group of energy observations. Defaults units are degrees.

Since:1.1.0

Sub-elements [Low](#)
[High](#)
[Units](#)
[Bin](#)

Used by: [Particle](#)

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.

Since:1.0.0

Positional

[Container](#)

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.

Since:1.0.0

Sub-elements [Orientation](#)

Used by: [Support](#)

Potential

[Item](#)

A field which obeys Laplace's Equation.

Since:1.0.0

Poynting Flux

[Item](#)

The rate of energy transport per unit area per steradian.

Since:1.0.0

Pressure

[Item](#)

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

Since:1.1.0

Principal Investigator

[Item](#)

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

Since:1.0.0

Profile

[Item](#)

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

Since:1.0.0

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.

Since:1.1.0

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.

Since:1.0.0

Provider ID

[Item](#)

The identifier for a Contact resource for the person or organization who provided the resource.

Since:1.0.0

Provider Processing Level

[Text](#)

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

Since:1.0.0

Used by: [Display Data](#)
[Numerical Data](#)

Provider Release Date

[DateTime](#)

The date the product was made available by the provider. The Provider Release Date is relevant only to the product life-cycle of the provider.

Since:1.0.0

Provider Resource Name

[Text](#)

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

Since:1.0.0

Used by: [Catalog](#)

[Display Data](#)

[Numerical Data](#)

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.

Since:1.0.0

Used by: [Catalog](#)

[Display Data](#)

[Numerical Data](#)

Quadrispherical Analyser

[Item](#)

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

Since:1.0.0

QuickTime

[Item](#)

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

Since:1.0.0

R

[Item](#)

The component of a vector along in the radial direction in a spherical system.

Since:1.1.0

Radar

[Item](#)

An instrument which uses radar to obtain an image of an object.

Since:1.0.0

Radiance

[Item](#)

A radiometric measurement that describe 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 ($W7sr^{-1}m^{-2}$).

Since:1.0.0

Radiation Belt

[Item](#)

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

Since:1.1.0

Radio and Plasma Waves

[Item](#)

Measurements of electric and/or magnetic fields using electric or magnetic antennas at frequencies anywhere between the spacecraft spin frequency and the characteristic frequencies of the ambient plasma. The output can be waveform, power spectral density, or other statistical parameters.

Since:1.0.0

Radio Frequency

[Item](#)

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

Since:1.0.0

Radio Soundings

[Item](#)

Measurements of plasma density, magnetic field and possibly other parameters of the space environment by active probing of the plasma by radio waves.

Since:1.0.0

Ratio

[Item](#)

The relative magnitudes of two quantities.

Since:1.1.0

Raw

[Item](#)

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

Since:1.0.0

Registry

[Container](#)

A location or facility where resources are cataloged.

Since:1.1.0

Sub-elements [Resource ID](#)
[Resource Header](#)

Used by: [Spase](#)

Relative End Date

[DateTime](#)

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

Since:1.1.0

Used by: [Time Span](#)

Release Date

[Date/Time](#)

The point in time when an item is made available.

Since:1.1.0

Used by: [Granule](#)

[Person](#)

[Resource Header](#)

Remote 1AU

[Item](#)

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

Since:1.1.0

Repository

[Container](#)

A location or facility where resources are stored.

Since:1.1.0

Sub-elements [Resource ID](#)

[Resource Header](#)

Used by: [Spase](#)

Repository ID

[Text](#)

The identifier of an Repository resource.

Since:1.0.0

Used by: [Access Information](#)

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.

Since:1.0.0

Resource Header

[Container](#)

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

Since:1.0.0

Sub-elements [Resource Name](#)

[Alternate Name](#)

[Release Date](#)

[Description](#)

[Acknowledgement](#)

[Contact](#)

[Information URL](#)

[Association ID](#)

Used by: [Catalog](#)
[Display Data](#)
[Instrument](#)
[Numerical Data](#)
[Observatory](#)
[Registry](#)
[Repository](#)
[Service](#)

Resource ID

[Text](#)

A Resource ID is a URI that has the form scheme://authority/path where scheme is space 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.

Since:1.0.0

Used by: [Catalog](#)
[Display Data](#)
[Granule](#)
[Instrument](#)
[Numerical Data](#)
[Observatory](#)
[Person](#)
[Registry](#)
[Repository](#)
[Service](#)

Resource Name

[Text](#)

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

Since:1.0.0

Used by: [Resource Header](#)

Restricted

[Item](#)

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

Since:1.0.0

Role

[Enumeration](#)

The assigned or assumed function or position of an individual.

Since:1.0.0

Allowed Values [Co-Investigator](#)
[Data Producer](#)
[General Contact](#)
[Principal Investigator](#)
[Project Scientist](#)
[Scientist](#)
[Team Leader](#)

[Team Member](#)
[Technical Contact](#)

Used by: [Contact](#)

RTF

[Item](#)

Rich Text Format (RTF). Structured information as defined by Microsoft.

Since:1.0.0

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 $R \times T$.

Since:1.0.0

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.

Since:1.0.0

Scientist

[Item](#)

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

Since:1.0.0

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/coord_des.html>

Since:1.0.0

Search Coil

[Item](#)

A loop of wire used to determine the time variation of the magnetic flux threading the loop by measurement of the electric potential difference induced between the ends of the wire.

Since:1.0.0

Service

[Container](#)

A location or facility that can perform a well defined task.

Since:1.1.0

Sub-elements [Resource ID](#)
[Resource Header](#)

[Access URL](#)

Used by: [Spase](#)

SGI

[Item](#)

Binary data compatible with Silicon Graphic platforms.

Since:1.0.0

Size

[Count](#)

The physical dimensions, proportions, magnitude, or extent of an object..

Since:1.0.0

Used by: [Dimension](#)

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.

Since:1.0.0

Soft X-rays

[Item](#)

Range: $0.1 \leq x < 10$ nm; Conventional abbreviation: XUV

Since:1.0.0

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.

Since:1.0.0

Solar Wind Extreme

[Item](#)

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

Since:1.0.0

Sonic Mach Number

[Item](#)

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

Since:1.0.0

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.

Since:1.0.0

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.

Since:1.0.0

Sub-elements [Version](#)
[Catalog](#)
[Display Data](#)
[Numerical Data](#)
[Granule](#)
[Instrument](#)
[Observatory](#)
[Person](#)
[Registry](#)
[Repository](#)
[Service](#)

Spatial Range [Item](#)

A description, in an appropriate coordinate system, of the positions of the elements of an image; may be done using a reference and relative positions, or with bins giving the description of a 2-D grid.

Since:1.0.0

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.

Since:1.0.0

Spectral Range [Enumeration](#)

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

Since:1.1.0

Allowed Values [Gamma Rays](#)
[Hard X-rays](#)
[Infrared](#)
[Microwave](#)
[Optical](#)
[Radio Frequency](#)
[Ultraviolet](#)
[X-Rays](#)

Used by: [Display Data](#)
[Numerical Data](#)

Spectrometer [Item](#)

An instrument that measures the component wavelengths of light or other electromagnetic

radiation into its component wavelengths.

Since:1.0.0

Spectrum

[Item](#)

Measurements of the intensity of radiation as a function of frequency or wavelength.

Since:1.0.0

Spherical

[Item](#)

A system of curvilinear coordinates characterized by an azimuthal angle (longitude), a polar angle (latitude), and a distance (radius) from a point to the origin.

Since:1.0.0

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>>

Since:1.0.0

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>>

Since:1.0.0

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.

Since:1.0.0

Start Date

[DateTime](#)

The specification of a starting point in time.

Since:1.0.0

Used by: [Granule](#)
[Time Span](#)

Stop Date

[DateTime](#)

The specification of a stopping point in time.

Since:1.0.0

Used by: [Granule](#)

Statistics

[Item](#)

Measurements of attributes of a sample from a population.

Since:1.1.0

Stoke's Parameters

[Item](#)

The four coordinates (usually called I, Q, U, and V) relative to a particular basis for the representation of the polarization state of an electromagnetic wave propagating through space.

Since:1.0.0

Sun

[Enumeration](#)

The star upon which our solar system is centered.

Since:1.0.0

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.

Since:1.0.0

Sub-elements [Other](#)

[Positional](#)

[Temporal](#)

Used by: [Physical Parameter](#)

Surface

[Item](#)

The outermost area of a solid object.

Since:1.0.0

Team Leader

[Item](#)

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

Since:1.0.0

Team Member

[Item](#)

An individual who is a major participant in an investigation.

Since:1.0.0

Technical Contact

[Item](#)

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

Since:1.0.0

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).

Since:1.0.0

Temporal

[Text](#)

Pertaining to time.

Since:1.0.0

Used by: [Support](#)

Temporal Description

[Container](#)

A characterization of the time over which the measurement was taken.

Since:1.0.0

Sub-elements [Time Span](#)

[Cadence](#)

[Exposure](#)

Used by: [Display Data](#)

[Numerical Data](#)

TeX

[Item](#)

A document expressed in the typesetting language TeX originally defined by Donald Knuth.

Since:1.0.0

Text

[Item](#)

ASCII text

Since:1.0.0

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.).

Since:1.0.0

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.

Since:1.0.0

Theta

[Item](#)

The component of a vector in a spherical coordinate system in the direction of the angle between the z-axis and the line from the origin to the measured point. In a cylindrical coordinate system it is the angle between the x-axis and the line from the origin to the point.

Since:1.1.0

TIFF

[Item](#)

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

Since:1.0.0

Time Span

[Container](#)

The duration of an interval in time.

Since:1.1.0

Sub-elements [Start Date](#)
[End Date](#)
[Relative End Date](#)

Used by: [Catalog](#)
[Temporal Description](#)

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.

Since:1.0.0

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>>

Since:1.0.0

Ultraviolet

[Item](#)

Photons with a wavelength range: 10 to 400 nm

Since:1.0.0

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.

Since:1.0.0

Unicode

[Item](#)

Text in multi-byte Unicode format.

Since:1.0.0

Units

[Text](#)

A description of the standardized measurement increments in which a value is specified. The description is represented as a mathematical phrase. Individual units within the phrase must

conform to the International System of Units (SI) which is maintained by BIPM (Bureau International des Poids et Mesures. See <<http://www.bipm.fr/>>). The symbol associated with a unit should be used in the phrase. Within the 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>

Since:1.0.0

Used by: [Azimuthal Angle Range](#)
[Energy Range](#)
[Frequency Range](#)
[Physical Parameter](#)
[Polar Angle Range](#)

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-1>km/s which converts a velocity expressed in meters per second to kilometers per second.

Since:1.0.0

Used by: [Physical Parameter](#)

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.

Since:1.0.0

Used by: [Access URL](#)
[Granule](#)
[Information URL](#)

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.

Since:1.0.0

Vector

[Item](#)

A quantity having both magnitude and direction, e.g. displacement, velocity, acceleration and force.

Since:1.0.0

Velocity

[Item](#)

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

Since:1.0.0

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).

Since:1.0.0

Used by: [Spase](#)

VOTable

[Item](#)

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

Since:1.1.0

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.

Since:1.0.0

Wavelength

[Item](#)

The distance between successive points of equal amplitude and phase on a wave (for example, crest to crest or trough to trough)

Since:1.0.0

Wavenumber

[Item](#)

A quantity that is inversely proportional to the wavelength of a wave.

Since:1.0.0

X

[Item](#)

The component of a vector along the X-axis in a cartessian coordinate system.

Since:1.1.0

XDR

[Item](#)

Binary data in the eXternal Data Representation (XDR) format. See RFC 1014
<<http://www.faqs.org/rfcs/rfc1014.html>>

Since:1.0.0

XML

[Item](#)

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

Since:1.0.0

X-Rays

[Item](#)

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

Since:1.0.0

Y

[Item](#)

The component of a vector along the Y-axis in a cartessian coordinate system.

Since:1.1.0

Z

[Item](#)

The component of a vector along the Z-axis in a cartessian coordinate system.

Since:1.0.0

ZIP

[Item](#)

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

Since:1.0.0

10. History

0.99.1

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

0.99.2

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

0.99.3

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

0.99.4

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

0.99.5

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

0.99.6

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

0.99.7

- 2005-09-08 Under Parameter add Description, Tensor Order.
- 2005-09-08 Change Photon Context and Particle Context to Independent Variable.
- 2005-09-08 Move Wavelength and Wave Number under Photon Independent Variable.

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

0.99.8

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

0.99.9

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

1.0.0

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

1.0.1

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

1.0.2

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

1.0.3

- 2006-04-27 Added "Earth" as a enumeration with "Magnetosphere" as a member.
- 2006-04-27 Changed "Observed Region" and "Instrument Region" to enumerations.
- 2006-04-27 Changed definition of "Item" to indicate it is a value of an enumeration.
- 2006-04-27 Move "Access Rights" under "Access Information".
- 2006-04-27 Made "Acknowledgement" options.
- 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.

11. 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>

12. 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		
X	0.001	10	0.025	10	0.02	15
HXR	0.001	0.1	0.025	0.25	0.02	1
SXR ₁	0.1	10	0.25	10	1	10
EUV	10	121	10	90	10	100
UV	100	400	90	320	90	380
Visible	380	760	320	700	350	1000
IR	760	10 ⁶	700	10 ⁶	700	3.5*10 ⁵
Near IR	760	1400	700	25*10 ²	700	
Mid IR	1400	3000	25*10 ²	5*10 ⁴		
Far IR	3000	10 ⁶	5*10 ⁴	10 ⁶	3.5*10 ⁵	
Microwaves	10 ⁶	1.5*10 ⁷	10 ⁶	10 ⁹		
Radio	10 ⁵	10 ¹¹	10 ⁹	-	10 ⁷	10 ⁹

¹ Also called "XUV" in ISO 21348