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# **Example Namespace**

**NASA Planetary Data System**

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# USER GUIDE

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Short abstract for the namespace should go here

{ date }

{ author }

Note to authors who use this outline: The outline is a suggestion only. It includes the minimum of content needed to inform the dictionary user. Authors are expected to tailor the outline to their particular purposes, elaborating and providing context as needed.



## INTRODUCTION

1. Purpose of this User's Guide
2. Audience
3. Applicable Documents





## OVERVIEW OF THE {NAME} LOCAL DATA DICTIONARY

*What is this dictionary for? What kinds of products might use this dictionary? Who is the steward of this dictionary (person and node name)? How often is it updated? To whom should questions about it be directed? (Give an email address or link to a page with contact information.)*



## ORGANIZATION OF CLASSES AND ATTRIBUTES

*Give a schematic diagram or a list showing the hierarchy of classes in order of appearance in label. Refer the reader to the Definitions section for complete definitions. An example of such a list is given on the page [Filling Out The Spectral Dictionary Classes](#) on the PDS Small Bodies Node wiki. In this example the names of classes and attributes have hyperlinks to their definitions further down the page, a useful lookup tool.*

*The author should take into consideration the complexity of the dictionary when organizing this section. If the hierarchy is large or complicated, it may be helpful to break it down by class as shown in the following subsections, but don't forget to provide a high-level view of how the classes relate to one another.*

### 3.1 Class 1

*What is this class for?*

*Give a schematic diagram or a list of the attributes in this class in order of appearance in label. Refer reader to Definitions section for complete definitions.*

*Give label snippets showing use of the class and attributes, with annotations as appropriate. Refer reader to Examples section for complete examples.*

*Explain why some things are required and others are optional.*

*List and explain any rules that apply to this class (e.g. from Schematron).*

### 3.2 Class 2

[repeat this subsection for each class]



## DEFINITIONS

*Give an alphabetical list of all classes and attributes with complete definitions. (Useful ones, not silly ones like “The map\_projection\_name attribute provides the name of the map projection.”)*

*Include:*

- *Class or attribute name (indicate which it is; capitalize class names according to PDS4 standard)*
- *PDS4 data type (ASCII\_Short\_String\_Collapsed, ASCII\_Real, ASCII\_Date, etc.)*
- *Definition in complete sentences*
- *Cardinality (minimum and maximum number of values permitted)*
- *Nillable, yes or no? Explain when it is appropriate to use a nil value*
- *Minimum and maximum numeric values, if applicable*
- *Minimum and maximum number of characters, if applicable*
- *List of valid values, if applicable.*



## EXAMPLES

*Give one or more examples of label snippets for real products, annotated as appropriate. Make sure the examples can be successfully validated using the latest version of the PDS4 core dictionary and, of course, the dictionary described in this document.*





## <SB\_METADATA>

### REQUIRED

The *SBS\_Metadata* class provides metadata specific to the techniques and processes of small bodies research. In some cases the metadata is supplemental to more general metadata contained in other namespaces (metadata that should also be present in the product label).

## 6.1 <Observation\_Parameters>

### OPTIONAL

The *sb:Observational\_Parameters* class provides general attributes that small bodies researches find useful for a variety of types of observations. Not all subclasses will be applicable to all data types. The *sb:Filter* subclass may be repeated, but note that if this is a spectral observation, the relevant filter characteristics must be included the Spectral Dictionary (sp:). Additional filter information may be provided here if desired, of course.

### 6.1.1 <Exposure>

#### OPTIONAL

The *sb:Exposure* class is used to provide attributes describing what constitutes an “exposure” in the particular circumstances of the observation. It is used primarily with non-imaging data, or imaging data that does not fit the circumstances covered by the Imaging namespace. The Imaging namespace class should be used when it is applicable. This class may be used in addition to the Imaging class in order to provide additional detail via the *sb:exposure\_description* attribute.

#### <exposure\_duration>

#### OPTIONAL

As in the Imaging namespace, *sb:exposure\_duration* indicates the total time a detector was exposed to or gathering a “signal”. This element is used in cases where non-standard imaging techniques (those not described by the Imaging dictionary) are used, or when the detector is detecting something other than photons.

### <exposure\_description

#### OPTIONAL

The *sb:exposure\_description* attribute should be used, typically in conjunction with the *exposure\_duration* attribute, when the data collection process involves something other than simple photon collection over a continuous period of time. The *exposure\_description* should define what constitutes as “exposure”, and/or how the “duration” is determined.

### 6.1.2 <Filter>

#### OPTIONAL, Repeatable

The *sb:Filter* class provides local and standard identification of the filter used to make the observation, as well as descriptive parameters to identify types of filter (broadband, LVF, etc.) and basic filter characteristics (bandpass, center wavelength).

### <filter\_name>

#### REQUIRED

The *sb:filter\_name* is a (frequently informal) identifier for the filter within the context of the source data collection. Typical values will be things like “Red”, “Clear”, or “CH4”. Values should be simple ASCII strings.

### <standard\_filter\_identification>

#### OPTIONAL

The *sb:standard\_filter\_identification* is used when the filter is one of a standard or well-known bandpass, for example “Johnson V” or “WFPC2 R”.

### <filter\_type>

#### REQUIRED

The *sb:filter\_type* attribute is a broad categorization of the nature of the pass band. Permissible values are defined as they are needed - contact the SB Steward for assistance.

Current permissible values are:

- **Clear**
- **Broadband**
- **Narrowband**
- **Linear Variable Filter (LVF)**

**<center\_wavelength>****OPTIONAL**

The *sb:center\_wavelength* attribute defines the nominal transmission peak of the filter transmission curve, assuming the spectral response is a Gaussian function.

**<center\_Wavelength\_is\_weighted>****OPTIONAL**

If the preceding *center\_wavelength* is actually a weighted center wavelength (rather than the peak of a nominal Gaussian function), then this attribute should be present with a value of “true”. The attribute should never appear without the *center\_wavelength* attribute.

**<short\_wavelength\_limit>****OPTIONAL**

The *sb:short\_wavelength\_limit* defines the smallest wavelength cutoff of a wavelength range.

**<long\_wavelength\_limit>****OPTIONAL**

The *sb:long\_wavelength\_limit* defines the largest wavelength cutoff of a wavelength range.

**<known\_short\_wavelength\_leak>****OPTIONAL**

If the filter in use has a known light leak on the short-wavelength side, the *sb:known\_short\_wavelength\_leak* flag should be present and set to “true”. This does NOT indicate that a correction has been applied - check the calibration processing for that information.

**<known\_long\_wavelength\_leak>****OPTIONAL**

If the filter in use has a known light leak on the long-wavelength side, the *sb:known\_long\_wavelength\_leak* flag should be present and set to “true”. This does NOT indicate that a correction has been applied - check the calibration processing for that information.

**<comment>****OPTIONAL**

The *sb:comment* is a place to note any unusual circumstances related to the filter.

### <pds:Internal\_Reference>

#### OPTIONAL, Repeatable

This class from the pds: namespace may be included here to link to documents in the archive specific to the filter - for example, a filter transmission curve. It may be repeated if there are multiple such documents.

The *pds:reference\_type* attribute in this class must have one of these values:

- data\_to\_filter\_transmission\_curve
- data\_to\_filter\_description

### 6.1.3 <Timing>

#### OPTIONAL

The *sb:Timing* class provides additional time specifications related to the observation. These might include times of particular interest, or alternate formats (Julian date, for example) of times expressed in ISO standard formats elsewhere. The *sb:comment* field should be used to explain any unusual or potentially ambiguous circumstances.

#### <midobservation\_time\_UTC\_YMD>

#### OPTIONAL

The *sb:midobservation\_time\_UTC\_YMD* attribute contains the UTC time corresponding the midpoint of the observation, in the format YYYY-MM-DDThh:mm:ss.sssZ (that is, the ISO YMD format with the ‘Z’ timezone indicator required to be present). Unusual circumstances relating to the definition of “midobservation” should be explained briefly in the *sb:comment* field of the containing class.

#### <midobservation\_time\_UTC\_JD>

#### OPTIONAL

The *sb:midobservation\_time\_UTC\_JD* attribute contains the UTC time corresponding to the midpoint of the observation, in full (as opposed to modified) Julian date format. The unit of “julian day” must be included when this attribute is used. Unusual circumstances relating to the definition of “midobservation” should be explained briefly in the *sb:comment* field of the containing class.

#### <start\_time\_UTC\_JD>

#### OPTIONAL

The *sb:start\_time\_UTC\_JD* attribute contains the UTC start time of a period of interest, typically the observation period, expressed as a Julian date. Units of “julian day” must be included when using this attribute.

**<stop\_time.UTC\_JD>****OPTIONAL**

The *sb:stop\_time.UTC\_JD* attribute contains the UTC ending time of a period of interest, typically the observation period, expressed as a Julian date. Units of “julian day” must be included when using this attribute.

**<comment>****OPTIONAL**

A free-text comment field for explaining any unusual circumstances.

## 6.2 <Additional\_Image\_Metadata>

**OPTIONAL**

The *sb:Additional\_Image\_Metadata* class provides metadata to supplement the standard image metadata supplied by the more general discipline classes. The *sb:comment* field may be used to note any unusual circumstances.

### 6.2.1 <pds:Local\_Internal\_Reference>

**REQUIRED**

This class is used tie the metadata of the *sb:Additional\_Image\_Metadata* class to a specific image object in this product.

The value of *pds:local\_reference\_type* must be:

- image\_to\_additional\_metadata

### 6.2.2 <comment>

**OPTIONAL**

Use this free-text comment field to note any unusual circumstances.

### 6.2.3 <image\_observation\_type>

**REQUIRED**

The *sb:image\_observation\_type* attribute indicates whether the data product is a single, 2D image, or an image “frame sequence” - a series of images obtained in a single observing sequence and processed as a set. If the images were intended to comprise a spectral cube or an movie sequence, then the data should be labeled accordingly and this class may not be present if there is no additional metadata needed. Additional types can be added to the permissible value list as needs arise. When in doubt, check with the PDS node curating the data or raise an issue on this dictionary.

Current permissible values for this attribute are:

- Frame Sequence
- Single Image

### 6.2.4 <Ancillary\_Data\_Objects>

#### OPTIONAL

The *sb:Ancillary\_Data\_Objects* class provides mappings between the primary image data in the product and the ancillary data (quality maps, error estimates, etc.) provided with it as part of the data product. The optional *sb:comment* field may be used to note any unusual circumstances.

#### <comment>

#### OPTIONAL

A free-form text field for noting unusual circumstances.

#### <Quality\_Map>

#### OPTIONAL

The *sb:Quality\_Map* class links the primary image data in the product to the data object (within the same product) containing the pixel-for-pixel quality assessment information. It also provides the definitions associated with the quality values. The optional *sb:comment* field may be used to note any unusual circumstances.

#### <pds:Local\_Internal\_Reference>

#### REQUIRED

This class is used to link to the data object in the product that contains the quality map for the image data.

The *pds:local\_reference\_type* must have this value:

- image\_to\_quality\_map

#### <Quality\_Map\_Definition>

#### REQUIRED

The *sb:Quality\_Map\_Definition* class defines attributes related to a “Quality Map” data structure - that is, an array with dimensions corresponding to the primary data array that contains pixel-for-pixel quality information for every pixel in the primary array. *sb:Quality\_Map\_Definition* lists the meaning of each quality values used in the map. Note that flag values defined for the Quality Map should not be used to replace *pds:Special\_Constants* values - in particular the *pds:missing\_constant* value - that should be included in the definition of either the primary data array or the Quality Map array itself. The *pds:Special\_Constants* class is used for visualization and data validation; the quality values defined are used for interpretation and analysis.

*sb:Quality\_Map* structure:

- <sb:flags\_are\_bit\_flags>

#### REQUIRED

The *sb:flag\_are\_bit\_flags* attribute contains “true” if the flags being defined within the containing class correspond to specific bits within a single integer field. When this is the case, all flag should have values that are exponents of 2. Typically, when bit flags are used, several flags may be combined within a single field (so a quality value may be 10, indicating that the flags corresponding to the values 8 and 2 are both set, for example).

- <sb:best\_quality\_value>

**REQUIRED**

The *sb:best\_quality\_value* attribute provides the value used within a quality map to indicate the best quality pixels. When bit flags are in use, for example, the “best” quality is typically 0 (zero) - that is, no quality issues are flagged at all.

- <Quality\_Flag\_Definition>

**REQUIRED, Repeatable**

The *sb:Quality\_Flag\_Definition* class defines one flag value with its corresponding meaning within a *sb:Quality\_Map\_Definition* class. Note that flag values here should not be used to replace *pds:Special\_Constants* values - in particular the *pds:missing\_constant* value - that should be included in the definition of the data array itself. The *pds:Special\_Constants* class is used for visualization and data validation; the *sb:Quality\_Flag\_Definitions* are used for interpretation and analysis.

- <flag\_value>

**REQUIRED**

The *sb:flag\_value* attribute defines an integer value that corresponds to a specific condition or assessment within the containing data structure, typically a quality map.

- <flag\_meaning>

**REQUIRED**

The *sb:flag\_meaning* attribute defines the significance of the particular value when it occurs in the associated context (typically a quality map, for example).

**<comment>****OPTIONAL**

A free-form text field for noting unusual circumstances.

**<Error\_Estimates\_Map>****OPTIONAL**

The *sb:Error\_Estimates\_Map* class links the primary image data in the product to the data object (within the same product) containing the pixel-for-pixel error estimates. The definition of the data object itself should indicate the unit of measure of the errors and related information. The optional *sb:comment* in this class can be used to note any unusual circumstances not related to reading (that is, input/output of) the error map data.

**<pds:Local\_Internal\_Reference>****REQUIRED**

This class is used to link to the data object in this product containing the error estimates corresponding to the pixels of the image data.

The *pds:local\_reference\_type* must be:

- image\_to\_error\_map

### <comment>

Free-form text to note unusual circumstances.

### <SNR\_Map>

#### OPTIONAL

The *sb:SNR\_Map* class links the primary image data in the product to the data object (within the same product) containing the pixel-for-pixel signal-to-noise ratio information. The optional *sb:comment* field may be used to note any unusual circumstances.

### <pds:Local\_Internal\_Reference>

#### REQUIRED

This class is used to link to the data object in this product containing the corresponding signal-to-noise ratio for the pixels of the image data.

The *pds:local\_reference\_type* must be:

- *image\_to\_snr\_map*

### <comment>

Free-form text to note unusual circumstances.

## 6.2.5 <Calibration\_Applied>

#### OPTIONAL

The *sb:Calibration\_Applied* class provide flags to indicate specific calibration processes that have been performed, as well as references to files provided with the archive that were used as part of the processing. The optional *sb:comment* field may be used to note any unusual circumstances.

### <comment>

#### OPTIONAL

Free-format text to note unusual circumstances

### <bias\_subtraction>

#### OPTIONAL

The *sb:bias\_subtraction* attribute should be present and contain the value “true” if bias subtraction has been performed as part of the processing applied to the data comprising the product.



**<dark\_current\_removal>****OPTIONAL**

The *sb:dark\_current\_removal* attribute should be present and contain the value “true” if dark current removal has been performed as part of the processing applied to the data comprising the product.

**<flat\_field\_subtraction>****OPTIONAL**

The *sb:flat\_field\_subtraction* attribute should be present and contain the value “true” if flat field subtraction has been performed as part of the processing applied to the data comprising the product.

**<scattered\_light\_correction>****OPTIONAL**

The *sb:scattered\_light\_correction* attribute should be present and contain the value “true” if scattered light correction has been applied as part of the processing of the data comprising the product.

**<conversion\_to\_physical\_units>****OPTIONAL**

The *sb:conversion\_to\_physical\_units* attribute should be present and contain the value “true” if the primary data is expressed in physical units once any value offset and scaling factor included in the definition of the data structure have been applied.

**<Calibration\_Reference\_Files>****OPTIONAL**

The *sb:Calibration\_Reference\_Files* class provides explicit references to key calibration files provided as part of the archive. Note that these references are required to be to specific versions of calibration files, as calibration processes and details typically evolve over time. The optional *sb:comment* should be used to note any unusual circumstances related to the calibration files as a group. The optional *pds:comment* field in the *pds:Internal\_Reference* class should be used to note any unusual circumstances related to any particular referenced file.

The *sb:Calibration\_Reference\_Files* class has the following structure:

- <comment>

**OPTIONAL**

Free-format text for noting unusual circumstances.

- <Flat\_Field>

**OPTIONAL**

The *sb:Flat\_Field* class identifies the PDS archive product containing the flat field used to calibrate the data in the product.

- <file\_name>

**OPTIONAL**

The *sb:file\_name* attribute should contain the name, preferably without path information, of the file referenced more formally by a *pds:Internal\_Reference* class in the same containing class. The file name is provided as a matter of convenience and for use as a validation cross-check when the data are accepted for archiving. Path information is unlikely to be useful once the data are archived, and as the data are curated both paths and file names may change. Consequently, the logical identifier appearing in the *pds:Internal\_Reference* should be considered the positive identification of the file in question within the archive, rather than the name.

- <pds:Internal\_Reference>

### REQUIRED

This class provides the formal reference to the flat field product.

The *pds:reference\_type* must have the value **image\_to\_flat\_field**

- <comment>

### OPTIONAL

Free-format text to note unusual circumstances

- <Dark\_Field>

### OPTIONAL

The *sb:Dark\_Field* class identifies the PDS archive product containing the dark field used to calibrate the data in the product.

- <file\_name>

### OPTIONAL

The *sb:file\_name* attribute should contain the name, preferably without path information, of the file referenced more formally by a *pds:Internal\_Reference* class in the same containing class. The file name is provided as a matter of convenience and for use as a validation cross-check when the data are accepted for archiving. Path information is unlikely to be useful once the data are archived, and as the data are curated both paths and file names may change. Consequently, the logical identifier appearing in the *pds:Internal\_Reference* should be considered the positive identification of the file in question within the archive, rather than the name.

- <pds:Internal\_Reference>

### REQUIRED

This class provides the formal reference to the flat field product.

The *pds:reference\_type* must have the value **image\_to\_dark\_field**

- <comment>

### OPTIONAL

Free-format text to note unusual circumstances

- <Bad\_Pixel\_Map>

### OPTIONAL

The *sb:Bad\_Pixel\_Map* class identifies the PDS archive product containing the bad pixel map applied in processing the data in the product.

- <file\_name>

### OPTIONAL

The *sb:file\_name* attribute should contain the name, preferably without path information, of the file referenced more formally by a *pds:Internal\_Reference* class in the same containing class. The file name is provided as a matter of convenience and for use as a validation cross-check when the data are accepted for archiving. Path information is unlikely to be useful once the data are archived, and as the data are curated both paths and file names may change. Consequently, the logical identifier appearing in the *pds:Internal\_Reference* should be considered the positive identification of the file in question within the archive, rather than the name.

- <pds:Internal\_Reference>

#### **REQUIRED**

This class provides the formal reference to the flat field product.

The *pds:reference\_type* must have the value **image\_to\_bad\_pixel\_map**

- <comment>

#### **OPTIONAL**

Free-format text to note unusual circumstances

### **6.2.6 <Additional\_Geometry\_Metadata>**

**OPTIONAL**

### **6.2.7 <Per\_Frame\_Metadata>**

**OPTIONAL**