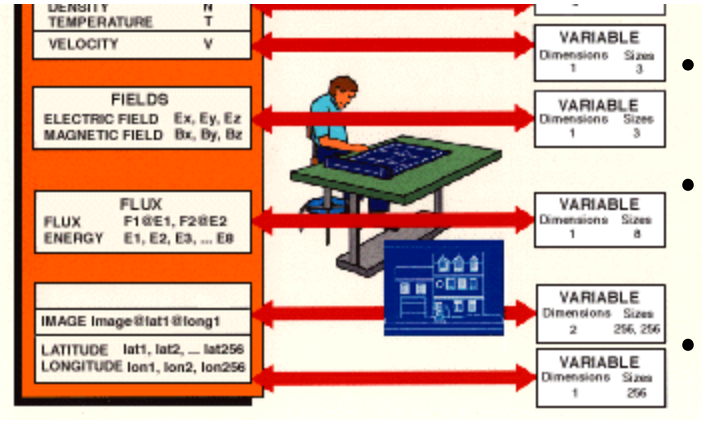
ISTP/IACG Variables

Introduction

We have identified three types of variables to be included in ISTP/IACG CDF files: **data** variables of primary importance (e.g., density, magnetic_field, particle_flux), **support_data** variables of secondary importance (e.g., time, energy_bands associated with particle_flux) and **metadata** variables (e.g., a variable holding "Bx,By,Bz" to label magnetic field). Variables are defined with CDF specifications and required attributes. Data variables also have attached variables for time and dependencies (support_data) and labels (metadata). The support_data variables can be attached to data variables via DEPEND_i variable attributes. Metadata variables can be attached to data variables via LABL_PTR_i variable attributes (see below).

Examples of data and support_data variables commonly found in ISTP/IACG investigations are shown below. They are mapped to their corresponding dimensions and sizes in CDF.

- Density and Temperature (**data**) in this example are scalars; in CDF they are associated with zero



dimension and no size.

- Plasma velocity, electric and magnetic fields (**data**) are vectors, i.e., three orthogonal components in some coordinate system, stored in one-dimension of size 3.
- Particle flux, for this example, has values at eight energy channels. Flux (**data**) and Energy (**support_data**) are stored as one-dimensional variables of size 8.
- The image array (**data**) maps into a two-dimensional variable with sizes 256 and 256. Latitude and longitude (**support_data**) are one-dimensional variables of size 256, providing the necessary coordinate indices for the image array.

NOTE: ISTP/IACG now encourages the use of zVariables which carry their own dimensionality. (The old style rVariables carry the dimensionality of the entire CDF and are intrinsically more complicated.) For more information about zVariables and rVariables consult the CDF home page.

Complete Variable Description

Data

These are variables of primary importance (e.g., density, magnetic_field, particle_flux). Data variables are completely defined with the combination of CDF specifications, variable attributes, and attached variables such as time and dependencies (support_data) and labels (metadata).

Naming

CDF Variable names must begin with a letter and can contain numbers and undercores, but no other special characters.

General

The following CDF variable specifications are required.

Data is always either Real or Integer type. Data is always time (record) varying, but can be of any dimensionality. Real or Integer data are always defined as having one element.

The following variable attributes are required.

- CATDESC
- DEPEND_0 = Epoch
- DEPEND_i
- DISPLAY_TYPE (time_series, spectrogram, stack_plot,image)
- FIELDNAM

- FILLVAL
- FORMAT/FORM_PTR
- LABLAXIS/LABL_PTR_i
- UNITS/UNIT_PTR
- VALIDMIN
- VALIDMAX
- VAR_TYPE = data

The need for DEPEND_i (other than DEPEND_0) and either LABLAXIS or LABL_PTR_i depends on the data itself and how it will be displayed. This is illustrated in examples in Variable Display.

Example of a simple scalar data variable.

We show here the variable, Ion number density, as it would appear in a CDF Skeleton table. We include all required variable attributes. Some recommended variable attributes are also shown. See the Display of this variable.

```
! Variable          Data      Number                  Record   Dimension
! Name              Type     Elements  Dims  Sizes  Variance  Variances
! --------          ----     --------  ----  -----  --------  ---------

  "SW_P_Den"      CDF_REAL4      1       0              T

  ! Attribute       Data
  ! Name            Type       Value
  ! --------        ----       -----

    "CATDESC"     CDF_CHAR     { "Ion number density (Solar Wind " -
                                 "Analyzer), scalar" }
    "DEPEND_0"    CDF_CHAR     { "Epoch" }
    "DICT_KEY"    CDF_CHAR     { "density>ion_number" }
    "DISPLAY_TYPE"
                  CDF_CHAR     { "time_series" }
    "FIELDNAM"    CDF_CHAR     { "Ion Number Density (CPI/SWA)" }
    "FILLVAL"     CDF_REAL4    { -1.0e+31 }
    "FORMAT"      CDF_CHAR     { "f8.3" }
    "LABLAXIS"    CDF_CHAR     { "Ion N" }
    "UNITS"       CDF_CHAR     { "#/cc" }
    "VALIDMIN"    CDF_REAL4    { 0.01 }
    "VALIDMAX"    CDF_REAL4    { 1000.0 }
    "VAR_NOTES"   CDF_CHAR     { "Assuming no helium (0.3 - several " -
                                 "hundred) if the density is less than " -
                                 "0.3/cc the higher moments (VEL,TEMP) " -
                                 "shall not be used because of the poor " -
                                 "counting statistics." }
    "VAR_TYPE"    CDF_CHAR     { "data" }.
```

Example of a vector magnetic field data variable.

We show here the variable, Vector Magnetic Field, as it would appear in a CDF Skeleton table. We include all required variable attributes. Some recommended variable attributes are also shown. See the Display of this variable.

(Magnetic Field does not need a DEPEND_1 because it does not depend on any support_data. In past

versions of the ISTP/IACG Guidelines we tied vectors to their coordinate system, but this is not really needed and so we have dropped the requirement. It is still allowable to include the tie via DEPEND_1.)

To see the LABL_PTR_1 values referenced below, see the label_B_GSE variable definition below.

```
! Variable          Data      Number                 Record   Dimension
! Name              Type     Elements  Dims  Sizes  Variance  Variances
! --------          ----     --------  ----  -----  --------  ---------

  "BGSE"          CDF_REAL4      1       1     3        T         T

  ! Attribute       Data
  ! Name            Type       Value
  ! --------        ----       -----

    "FIELDNAM"    CDF_CHAR     { "Magnetic field vector in GSE " -
                                 "coordinates (1 min)" }
    "VALIDMIN"    CDF_REAL4    { -65534.0 }
    "VALIDMAX"    CDF_REAL4    { 65534.0 }
    "UNITS"       CDF_CHAR     { "nT" }
    "FORMAT"      CDF_CHAR     { "E13.6" }
    "SCALETYP"    CDF_CHAR     { "linear" }
    "CATDESC"     CDF_CHAR     { "Magnetic field vector in GSE " -
                                 "cartesian coordinates (1 min)" }
    "FILLVAL"     CDF_REAL4    { -1.0e+31 }
    "LABL_PTR_1"  CDF_CHAR     { "label_B_GSE" }
    "DEPEND_0"    CDF_CHAR     { "Epoch" }
    "VAR_TYPE"    CDF_CHAR     { "data" }.
```

Example of a 1D flux data variable.

We show here the variable, Ion Differential Intensity, as it would appear in a CDF Skeleton table. We include all required variable attributes. Some recommended variable attributes are also shown. See the Display of this variable.

```
! Variable          Data      Number                 Record   Dimension
! Name              Type     Elements  Dims  Sizes  Variance  Variances
! --------          ----     --------  ----  -----  --------  ---------

  "IDiffI_I"      CDF_REAL4      1       1      12     T         T

  ! Attribute       Data
  ! Name            Type       Value
  ! --------        ----       -----

    "FIELDNAM"    CDF_CHAR     { "Spin-avg Ion Diff Inten (EPIC/ICS)" }
    "CATDESC"     CDF_CHAR     { "Ion Diff. Intensity, at 12 energies " -
                                 "67-1361 keV (EPIC/ICS)" }
    "VALIDMIN"    CDF_REAL4    { 1.000000e-04 }
    "VALIDMAX"    CDF_REAL4    { 1.000000e+10 }
    "SCALETYP"    CDF_CHAR     { "log" }
    "UNITS"       CDF_CHAR     { "1/[cm**2-s-sr-keV]" }
    "LABLAXIS"    CDF_CHAR     { "dJ/dE" }
    "FORMAT"      CDF_CHAR     { "E9.3" }
    "DEPEND_0"    CDF_CHAR     { "Epoch" }
    "DEPEND_1"    CDF_CHAR     { "IDiffI_I_Energy" }
    "DELTA_PLUS_VAR"
                  CDF_CHAR     { "IDiffI_I_Uncert" }
```

```
    "DELTA_MINUS_VAR"
                  CDF_CHAR     { "IDiffI_I_Uncert" }
    "DICT_KEY"    CDF_CHAR     { "particle_flux>ion_differential" }
    "VAR_TYPE"    CDF_CHAR     { "data" }
    "FILLVAL"     CDF_REAL4    { -1.000000e+31 }
    "DISPLAY_TYPE"
                  CDF_CHAR     { "spectrogram" } .
```

Example of a 2D sizes 28,12 data variable.

We show here the variable, H+ number flux, as it would appear in a CDF Skeleton table. We include all required variable attributes. Some recommended attributes are also shown. See the Display of this variable.

```
! Variable          Data      Number                  Record   Dimension
! Name              Type     Elements  Dims  Sizes  Variance  Variances
! --------          ----     --------  ----  -----  --------  ---------

  "Flux_H"        CDF_REAL4      1       2   28 12      T        T T

  ! Attribute       Data
  ! Name            Type       Value
  ! --------        ----       -----

    "FIELDNAM"    CDF_CHAR     { "H+ number flux" }
    "VALIDMIN"    CDF_REAL4    { 0.0 }
    "VALIDMAX"    CDF_REAL4    { 1.0e+08 }
    "UNITS"       CDF_CHAR     { "#/(cm^2-s-keV/e-sr)" }
    "FORMAT"      CDF_CHAR     { "e12.4" }
    "LABL_PTR_1"
                  CDF_CHAR     { "H_energy_of_flux" }
    "LABL_PTR_2"
                  CDF_CHAR     { "H_angle_of_flux" }
    "MONOTON"     CDF_CHAR     { "FALSE   " }
    "FILLVAL"     CDF_REAL4    { -1.0e+31 }
    "CATDESC"     CDF_CHAR     { "H+ number flux for for 28 energy and " -
                                 "3 selected angle bins." }
    "VAR_TYPE"    CDF_CHAR     { "data" }
    "DICT_KEY"    CDF_CHAR     { "particle_flux>number_species_proton" }
    "DEPEND_0"    CDF_CHAR     { "Epoch_H" }
    "DEPEND_1"    CDF_CHAR     { "energy" }
    "DEPEND_2"    CDF_CHAR     { "angle" }
    "AVG_TYPE"    CDF_CHAR     { "standard" }
    "DISPLAY_TYPE"
                  CDF_CHAR     { "spectrogram>y=energy,z=Flux_H(*,1),z=F" -
                                 "lux_H(*,7),z=Flux_H(*,12)" }
    "SCALETYP"    CDF_CHAR     { "log" }
    "VAR_NOTES"   CDF_CHAR     { "Negative values reflect low counting " -
                                 "rates and background subtraction.  " } .
```

Support_Data

These are variables of secondary importance (e.g., time, energy_bands associated with particle_flux) .

Naming

CDF Variable names must begin with a letter and can contain numbers and undercores, but no other special characters.

General

The following CDF variable specifications are required.

Support_data is always either Real or Integer type. Support_data is usually time invariant, but can be time varying.

If a support_data variable is attached to a data variable via DEPEND_i, then it must be of the same size as the dimension i. See example below. Real or Integer data are always defined as having one element.

The following variable attributes are required.

- CATDESC
- DEPEND_0 = Epoch (if time varying)
- FIELDNAM
- FILLVAL (if time varying)
- FORMAT/FORM_PTR
- UNITS/UNIT_PTR
- VALIDMIN (if time varying)
- VALIDMAX (if time varying)
- VAR_TYPE = support_data

Example of Epoch time.

We show here the variable, Epoch as it would appear in a CDF Skeleton table. We include all required variable attributes. Some recommended attributes are also shown. Epoch is time varying and is attached to all time varying data variables via DEPEND_0. It is used for the x-axis in all displays below.

```
! Variable          Data      Number                  Record   Dimension
! Name              Type     Elements  Dims  Sizes  Variance  Variances
! --------          ----     --------  ----  -----  --------  ---------

  "Epoch"         CDF_EPOCH      1       0              T

  ! Attribute       Data
  ! Name            Type       Value
  ! --------        ----       -----

    "FIELDNAM"    CDF_CHAR     { "Time since 0 AD" }
    "VALIDMIN"    CDF_EPOCH    { 01-Jan-1994 00:00:00.000 }
    "VALIDMAX"    CDF_EPOCH    { 01-Jan-2020 00:00:00.000 }
    "LABLAXIS"    CDF_CHAR     { "Epoch" }
    "UNITS"       CDF_CHAR     { "ms" }
    "FILLVAL"     CDF_REAL8    { -1.0e+31 }
    "VAR_TYPE"    CDF_CHAR     { "support_data" }
    "DICT_KEY"    CDF_CHAR     { "time>Epoch" }
    "SCALETYP"    CDF_CHAR     { "linear" }
    "MONOTON"     CDF_CHAR     { "INCREASE" }
    "CATDESC"     CDF_CHAR     { "Interval centered time tag rounded to " -
                                 "nearest msecond " }.
```

```
  ! RV values were not requested.
```

Example of a simple 1D size 12 time varying support_data variable - energy.

We show here the variable, Ion Energy, as it would appear in a CDF Skeleton table. We include all required variable attributes. Some recommended attributes are also shown. This support_data variable is attached to a data variable (Ion Diff. Intensity, at 12 energies 67-1361 keV) of the same dimensionality and size. See this vaiable used in a Display.

```
! Variable          Data      Number                  Record   Dimension
! Name              Type     Elements  Dims  Sizes  Variance  Variances
! --------          ----     --------  ----  -----  --------  ---------

  "IDiffI_I_Energy"
                  CDF_REAL4      1       1     12       T        T

  ! Attribute       Data
  ! Name            Type       Value
  ! --------        ----       -----

    "CATDESC"     CDF_CHAR     { "Ion Energy, at 12 channels energies " -
                                 "67-1361 keV (EPIC/ICS) " }
    "DELTA_PLUS_VAR"
                  CDF_CHAR     { "IDiffI_I_Eplus" }
    "DELTA_MINUS_VAR"
                  CDF_CHAR     { "IDiffI_I_Eminus" }
    "DEPEND_0"    CDF_CHAR     { "Epoch" }
    "DICT_KEY"    CDF_CHAR     { "energy>ion" }
    "FIELDNAM"    CDF_CHAR     { "Ion Energy (EPIC/ICS)" }
    "FILLVAL"     CDF_REAL4    { -1.000000e+31 }
    "FORMAT"      CDF_CHAR     { "F7.1" }
    "LABLAXIS"    CDF_CHAR     { "Ion Energy" }
    "UNITS"       CDF_CHAR     { "keV" }
    "VALIDMIN"    CDF_REAL4    { 67.3 }
    "VALIDMAX"    CDF_REAL4    { 1361.0 }
    "VAR_TYPE"    CDF_CHAR     { "support_data" }.
```

Metadata

These are variables of secondary importance e.g., a variable holding "Bx,By,Bz" to label magnetic field).

Naming

CDF Variable names must begin with a letter and can contain numbers and undercores, but no other special characters.

General

The following CDF variable specifications are required.

Metadata is always character type. Metadata is always time invariant if it is used to label a data variable. Metadata can be time varying if it is NOT used as a label.

If a metadata variable is attached to a data variable via LABL_PTR_i, then it must be of the same size as the dimension i. See example below.

Character metadata must define the number of elements to be the same as the number of characters used in its value - 6 in the example below.

The following variable attributes are required.

- CATDESC
- DEPEND_0 = Epoch (if time varying)
- FIELDNAM
- FILLVAL (if time varying)
- FORMAT/FORM_PTR
- VAR_TYPE = support_data

Example of a 1D size 3 metadata variable.

This metadata variable labels the cartesian GSE magnetic field (1D size 3) data variable. See this vaiable used in a Display

```
! Variable          Data      Number                  Record   Dimension
! Name              Type     Elements  Dims  Sizes  Variance  Variances
! --------          ----     --------  ----  -----  --------  ---------

  "label_B_GSE"   CDF_CHAR       6      1      3       F         T

  ! Attribute       Data
  ! Name            Type       Value
  ! --------        ----       -----

    "CATDESC"     CDF_CHAR     { "Label cartesian B" }
    "FIELDNAM"    CDF_CHAR     { "Label cartesian B" }
    "VAR_TYPE"    CDF_CHAR     { "metadata" }.

  ! NRV values follow...

  [ 1 ] = { "Bx GSE" }
  [ 2 ] = { "By GSE" }
  [ 3 ] = { "Bz GSE" }
```

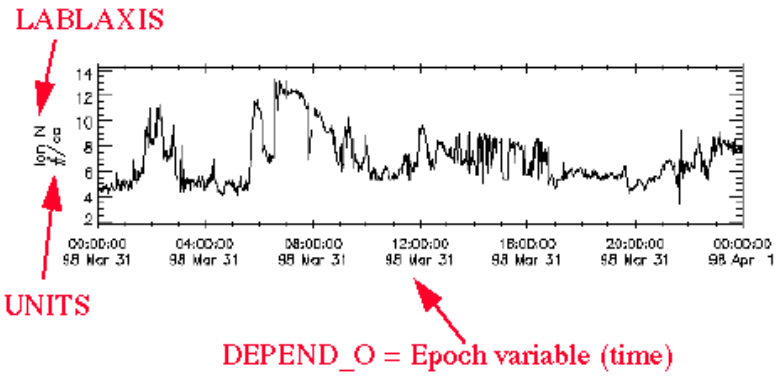
Variable Display

The dependencies and labels that need to be included with a data variable depend both on the data variable's dimensionality and on how the data variable will be displayed. We display several data variables below and point out which attributes and associated support_data and metadata variables are used to label the display.

Scalar (0D) Time Series

We display below the Ion Number Density from the example simple scalar density. The y-axis labels come from variable attributes LABLAXIS and UNITS. The x-axis if defined by the Epoch variable (time). Ion

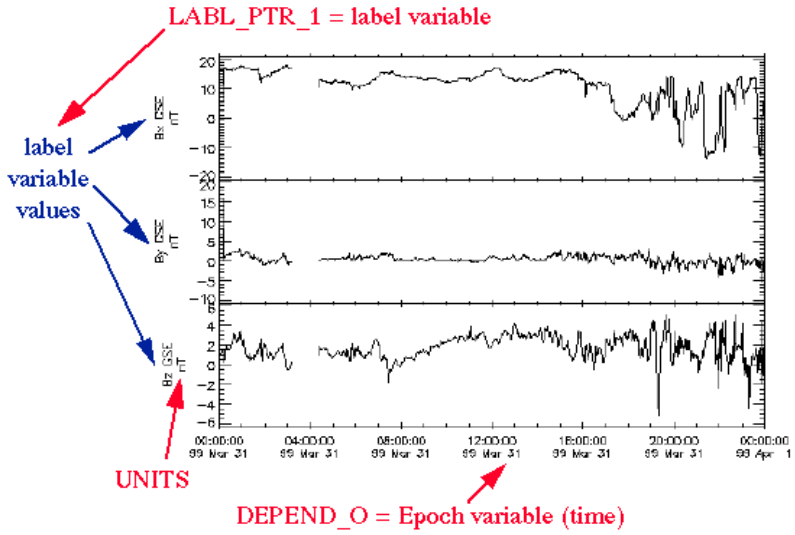
Number Density is tied to its time tag using the DEPEND_0 variable attribute. (Ion Number Density has 0 dimensions and does not need any other DEPEND_i defined.)



1D - size 3 Time Series

We display below the Magnetic Field from the example vector magnetic field. The y-axis labels come from 2 places: (1) Bx, By, Bz from the metadata variable "label_B_GSE" (labeled in blue) which is attached to the Magnetic Field variable via LABL_PTR_1 and (2) nT from the UNITS variable attribute. The x-axis if defined by the Epoch variable (time). Ion Number Density is tied to its time tag using the DEPEND_0 variable attribute.

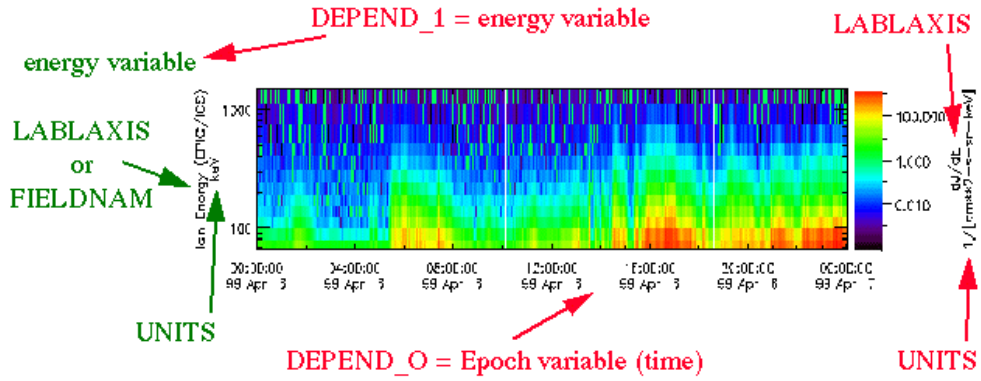
See also the metadata variable "label_B_GSE".



1D - size 12 Spectrogram

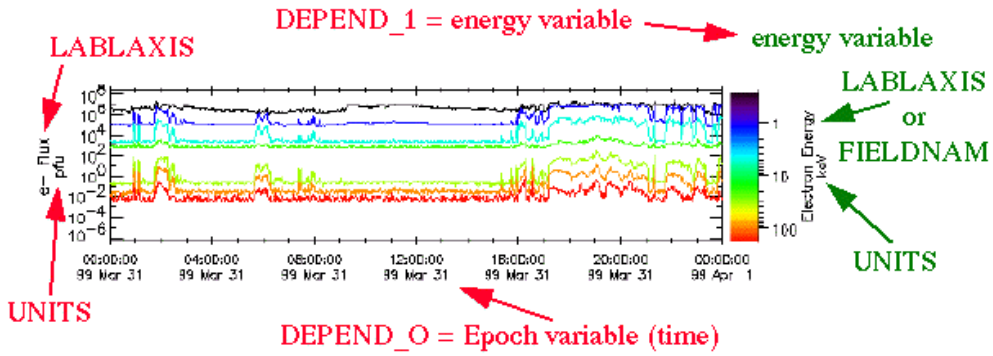
We display below the Ion Diff. Intensity, at 12 energies (67-1361 keV) from the example 1D flux. The z-axis labels come from variable attributes LABLAXIS and UNITS. The y-axis labels (labeled in green) come from the energy variable attached to Ion Diff. Intensity via the DEPEND_1 variable attribute, specifically the LABLAXIS (or FIELDNAM) and UNITS of the energy variable. The x-axis if defined by the Epoch variable (time). Ion Number Density is tied to its time tag using the DEPEND_0 variable attribute.

See also the Support data variable "IDiffI_I_Energy".



1D - size 7 Stacked Time Series

We display below Electron Flux at 7 energies (0.1 - 222 keV). As opposed to the spectrogram above, the y-axis labels come from variable attributes LABLAXIS and UNITS. The z-axis labels (labeled in green) come from the energy variable attached to Electron Flux via the DEPEND_1 variable attribute, specifically the LABLAXIS (or FIELDNAM) and UNITS of the energy variable. The x-axis if defined by the Epoch variable (time). Ion Number Density is tied to its time tag using the DEPEND_0 variable attribute.



2D - sizes 28, 12 Spectrogram

We display below H+ number flux using two different cuts through the 2D data. H+ number flux depends on energy (first dimension) and angle (second dimension). See Example - 2D flux.

There are two ways to plot spectrograms with 2D data:

- plot all energies (y-axis) and a few selected angle bins (in separate panels)
- plot all angles (y-axis) and a few selected energy bins (in separate panels).

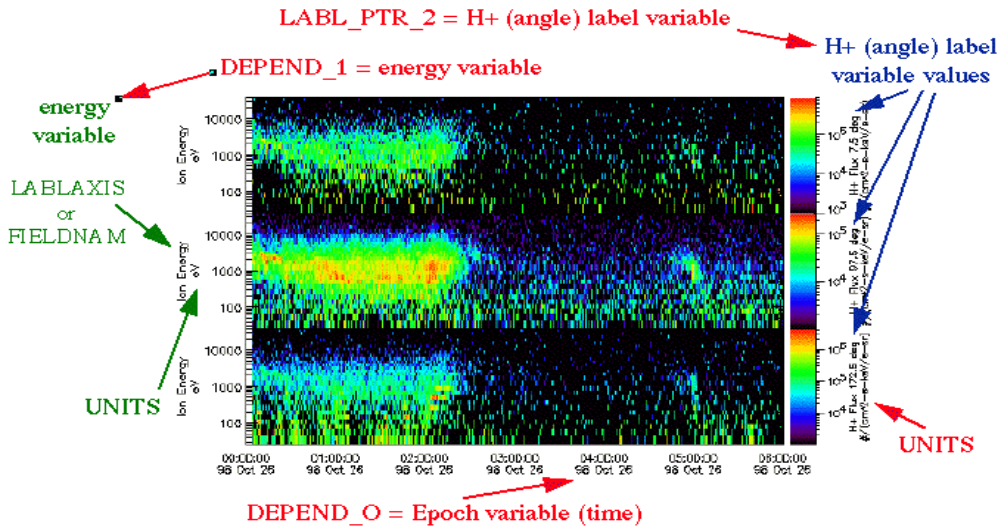
These are both illustrated below.

[H+ number flux needs two label variables to adequately label all possible spectrogram displays. LABL_PTR_1 points to a label (metadata) 1D variable of size 28; the label variable holds 28 H+ energy labels, e.g., "H+ Flux 4.4keV/e". LABL_PTR_2 points to a label (metadata) 1D variable of size 12; the label variable holds 12 H+ angle labels, e.g., "H+ Flux 7.5 deg".]

H+ number flux for 28 energies and 3 selected angle bins.

The 3 selected angle bins appear as separate panels. The energy attribute values (either the LABLAXIS value or the FIELDNAM value, along with the UNITS value) are used to label the y-axis on each panel. The energy support_data variable is attached to the data variable via the DEPEND_1 attribute.

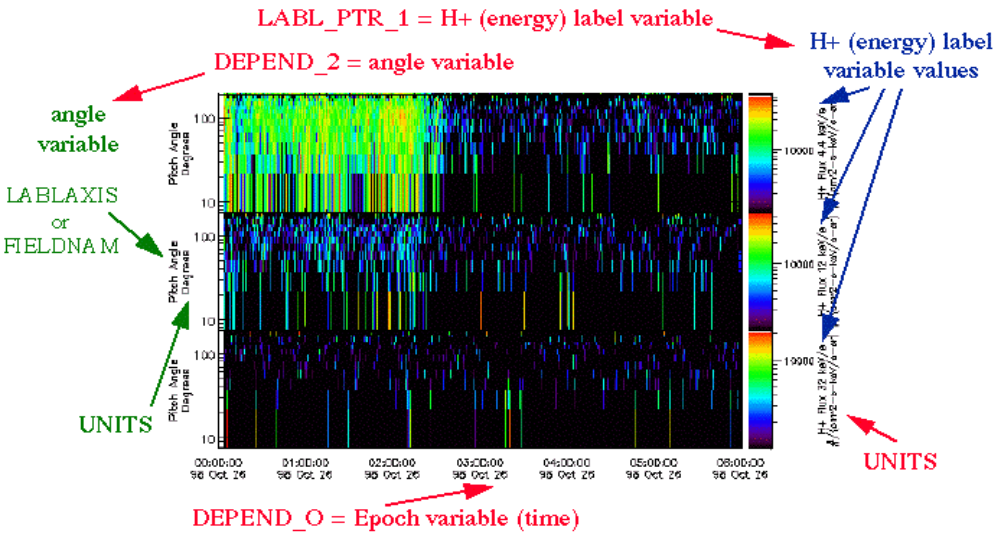
The z-axis (color bar) is labeled with selected values from the *H+ angle label variable* that is attached to the data variable via the LABL_PTR_2 attribute. The z-axis units come from the data variable UNITS attributes.



H+ number flux for 12 angles and 3 selected energy bins.

The 3 selected energy bins appear as separate panels. The angle attribute values (either the LABLAXIS value or the FIELDNAM value, along with the UNITS value) are used to label the y-axis on each panel. The angle support_data variable is attached to the data variable via the DEPEND_2 attribute.

The z-axis (color bar) is labeled with selected values from the *H+ energy label variable* that is attached to the data variable via the LABL_PTR_1 attribute. The z-axis units come from the data variable UNITS attributes.



Required support_data variables

For IACG use (expanded international community with missions outside the core ISTP) and for ISTP higher resolution definitive data or for event data, **only Epoch is now required.** A quality flag is still recommended.

Epoch (required)

"Epoch" should be the first variable in each CDF data set. All time varying variables in the CDF data set will depend on the "Epoch" variable (or on a CDF_EPOCH type variable) - more than one CDF_EPOCH type variable is allowed in a data set to allow for more than one time resolution. For ISTP the time value of a record refers to the center of the accumulation period for the record if the measurement is not an instantaneous one.

Epoch allows for a scalar representation of time which provides for seamless crossings of day and year boundaries. Epoch time is simply the time in milliseconds A.D. CDF toolkit programs will display and expect CDF_EPOCH values in the format dd-mmm-yyyy hh:mm:ss.ccc where dd is the day of the month, mmm is the month, yyyy is the year, hh is the hour, mm is the minute, ss is the second and ccc is the millisecond (e.g., 01-Aug-1992 10:30:05.025). "Epoch" will be monotonically increasing so that the attribute MONOTON should be defined as "INCREASE".

(Note: All CDF data sets using the Epoch variable should use the subroutines provided in the CDF toolkit for making the conversion between this value and year, month, day, etc. These routines are available as black boxes from NSSDC. To determine Epoch time it is only necessary to call the subroutine compute_Epoch(year, month, day, hour, minute, second, msec, Epoch) with arguments as shown.for making the conversion between this value and year, month, day, etc. This ensures that all users use the same conversion when generating their CDF data sets and will therefore have the same view of the effects of the various calendar changes that have occurred over the last two thousand years.)

An Example of "Epoch" is shown below.

```
! Variable          Data      Number                  Record   Dimension
! Name              Type     Elements  Dims  Sizes  Variance  Variances
! --------          ----     --------  ----  -----  --------  ---------

  "Epoch"         CDF_EPOCH      1       0              T

  ! Attribute       Data
  ! Name            Type       Value
  ! --------        ----       -----

    "FIELDNAM"    CDF_CHAR     { "Time since 0 AD" }
    "VALIDMIN"    CDF_EPOCH    { 01-Jan-1994 00:00:00.000 }
    "VALIDMAX"    CDF_EPOCH    { 01-Jan-2020 00:00:00.000 }
    "LABLAXIS"    CDF_CHAR     { "Epoch" }
    "UNITS"       CDF_CHAR     { "ms" }
    "FILLVAL"     CDF_REAL8    { -1.0e+31 }
    "VAR_TYPE"    CDF_CHAR     { "support_data" }
    "DICT_KEY"    CDF_CHAR     { "time>Epoch" }
    "SCALETYP"    CDF_CHAR     { "linear" }
    "MONOTON"     CDF_CHAR     { "INCREASE" }
    "CATDESC"     CDF_CHAR     { "Interval centered time tag rounded to " -
                                 "nearest msecond " }.
```

```
  ! RV values were not requested.
```

Quality Flag (recommended)

Each ISTP/IACG CDF data set should contain at least one quality or status flag which is record varying. The CDF data set designer may choose to have more than one if the data warrants this.

Time_PB5

Time_PB5 is the second variable in an ISTP KP CDF data set. It is not required for IACG or ISTP higher resolution or event data. Time_PB5 is another way of presenting time which allows for easy recognition of the time value when looking at the data, for instance in a data dump. For ISTP the time value of a record refers to the center of the accumulation period for the record if the measurement is not an instantaneous one.

Time_PB5 is given in YEAR (4 digit), DAY OF YEAR (note: January 1 is Day 1), and MSEC OF DAY (elapsed ms). These are all signed integer*4 numbers and are stored as the three elements of the one-dimensional variable named ``Time_PB5", e.g. 1992, 214, 0 would be August 1, 1992 at midnight.

"Time_PB5" has three ``attached" variables which provide labels units and formats for the three components. These are called ``label_time", ``unit\_time", and ``format_time", respectively, and are shown in the example below.

```
! Variable          Data      Number                 Record   Dimension
! Name              Type     Elements  Dims  Sizes  Variance  Variances
! --------          ----     --------  ----  -----  --------  ---------

  "Time_PB5"      CDF_INT4       1       0              T

  ! Attribute       Data
  ! Name            Type       Value
  ! --------        ----       -----

    "FIELDNAM"    CDF_CHAR     { "Time PB5" }
    "VALIDMIN"    CDF_INT4     { 1997, 237, 0 }
    "VALIDMAX"    CDF_INT4     { 2020, 366, 0 }
    "VAR_TYPE"    CDF_CHAR     { "support_data" }
    "FORM_PTR"    CDF_CHAR     { "format_time" }
    "LABL_PTR_1"
                  CDF_CHAR     { "label_time" }
    "UNIT_PTR"    CDF_CHAR     { "unit_time" }
    "FILLVAL"     CDF_INT4     { -2147483648 }
    "DEPEND_0"    CDF_CHAR     { "Epoch" }
    "DICT_KEY"    CDF_CHAR     { "time>PB5" }
    "CATDESC"     CDF_CHAR     { "Time of observation in Year, Day, & " -
                                 "milliseconds (5 min)" }
    "SCALETYP"    CDF_CHAR     { "LINEAR" } .

  ! RV values were not requested.



! Variable          Data      Number                 Record   Dimension
! Name              Type     Elements  Dims  Sizes  Variance  Variances
```

```
! --------          ----     --------  ----  -----  --------  ---------

  "unit_time"     CDF_CHAR       4      0             F

  ! Attribute       Data
  ! Name            Type       Value
  ! --------        ----       -----

    "FIELDNAM"    CDF_CHAR     { "Units for Time_PB5" }
    "VAR_TYPE"    CDF_CHAR     { "metadata" }
    "DICT_KEY"    CDF_CHAR     { "label>" }
    "CATDESC"     CDF_CHAR     { "Units for Time_PB5" } .

  ! NRV values follow...

    [1] = { "year" }
    [2] = { "day " }
    [3] = { "msec" }



! Variable          Data      Number                 Record   Dimension
! Name              Type     Elements  Dims  Sizes  Variance  Variances
! --------          ----     --------  ----  -----  --------  ---------

 "label_time"    CDF_CHAR      27        0             F

  ! Attribute       Data
  ! Name            Type       Value
  ! --------        ----       -----

    "FIELDNAM"    CDF_CHAR     { "Label for Time_PB5" }
    "VAR_TYPE"    CDF_CHAR     { "metadata" }
    "DICT_KEY"    CDF_CHAR     { "label>" }
    "CATDESC"     CDF_CHAR     { "Label for Time_PB5" } .

  ! NRV values follow...

    [1] = { "Year                        " }
    [2] = { "Day of Year (Jan 1 = Day 1)" }
    [3] = { "Elapsed milliseconds of day" }



! Variable          Data      Number                 Record   Dimension
! Name              Type     Elements  Dims  Sizes  Variance  Variances
! --------          ----     --------  ----  -----  --------  ---------

  "format_time"   CDF_CHAR       2       0             F

  ! Attribute       Data
  ! Name            Type       Value
  ! --------        ----       -----

    "FIELDNAM"    CDF_CHAR     { "Format for Time_PB5" }
    "VAR_TYPE"    CDF_CHAR     { "metadata" }
    "DICT_KEY"    CDF_CHAR     { "label>" }
    "CATDESC"     CDF_CHAR     { "Format for Time_PB5" } .

  ! NRV values follow...

    [1] = { "I4" }
```

```
[2] = { "I3" }
[3] = { "I8" }
```

Post Gap Flag

At the May 1992 ISTP SWG it was decided that a `record varying "Post Gap" Quality Flag would also be included in each KP record.

(Note: This I*4 Flag is included in every record and is defined in the following way: 0 - no gap occurred immediately prior to this record [thus most of the time this Flag would be set to 0]; 1 - the gap occurred because the instrument was not in a mode that allowed for the production of KPs; 2 - the gap occurred because Level Zero or SIRIUS data were missing; 3 - the gap occurred because Level Zero or SIRIUS data were too noisy to compute KPs. Integer numbers above 9 can be used by the PI team to define other gap conditions, as required.)

A variable similar to this is recommended for inclusion in CDFs to indicate real and substantial data gaps. The detailed definition of this flag should appear in the CDF metadata in the VAR_NOTES attribute.

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* Return to ISTP/IACG Guidelines

* Return to Space Physics Use of CDF

*CDF home page

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