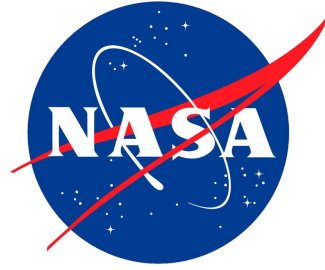


# International Solar-Terrestrial Physics (ISTP) metadata guidelines and their use at the Space Physics Data Facility (SPDF)

Eric Grimes on behalf of the SPDF team

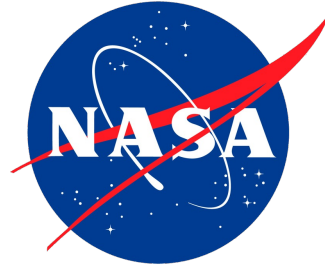
NASA GSFC/ADNET Systems

<https://spdf.gsfc.nasa.gov>



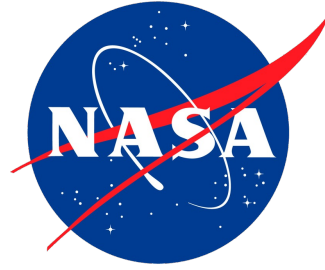
# Overview

- Brief introduction to the SPDF
- Brief introduction to the ISTP guidelines
- Tools for specifying ISTP metadata in CDF files (SKTEditor, and .SKT files)
- Examples showing how CDAWeb uses the ISTP metadata to provide access to a large number of datasets



# Introduction to the SPDF

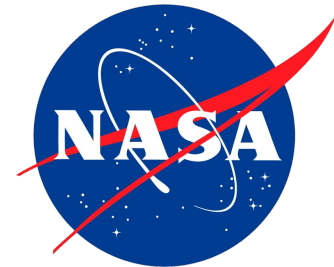
- Active archive of **in-situ** data from NASA heliophysics missions, and collaborative missions with other US and foreign agencies relevant to NASA **heliophysics science objectives** (planetary, NOAA, DoD, and ground-based magnetometers, aurora cameras, radars, etc.), from the Sun to the local interstellar medium, including planetary magnetosphere, ionosphere, thermosphere, and mesosphere
- SPDF provides three main science-enabling services besides archiving data
  - CDAWeb (Coordinated Data Analysis Web): browse, correlate, and display
  - SSCWeb (Satellite Situation Center): orbit/ground track displays and queries
  - OMNIWeb and COHOWeb for solar wind plasma, fields, and energetic particles



# Introduction to the SPDF

- SPDF enables multi-instrument, multi-mission heliophysics science
  - Specific mission/instrument data in context of other missions/data
  - Specific mission/instrument data as enriching context for other data
- SPDF also builds critical infrastructures for the **heliophysics data environment**:
  - Common Data Format (CDF) self-describing science file format:
    - <https://cdf.gsfc.nasa.gov>
  - Heliophysics Data Portal <https://heliophysicsdata.gsfc.nasa.gov> discipline-wide data inventory and access service
  - ISTP Metadata Guidelines:
    - [https://github.com/IHDE-Alliance/ISTP\\_metadata](https://github.com/IHDE-Alliance/ISTP_metadata)

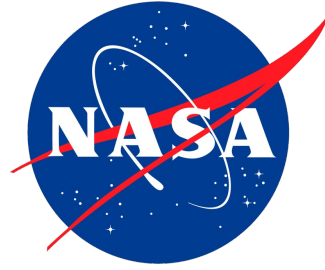




# ISTP Guidelines

- ISTP/IACG Guidelines (mid 1990s) and subsequent extensions by SPDF define implementation standards for CDFs and NetCDFs
  - Include general file naming conventions
  - Data is time-ordered and time-identified; times vary by record
    - Set of required and suggested metadata
  - Global attributes provide overall context of the dataset
  - Variable attributes can point to other variables by name
    - Attributes thus carry information about relationships among variables
    - Variables can carry metadata (e.g., labels for dimensional variables)
  - Missions add their own metadata requirements
- **ISTP metadata is independent of CDF and easily used in other self-describing science formats like CEFs, netCDFs and HDFs, and probably FITS and ASDF**

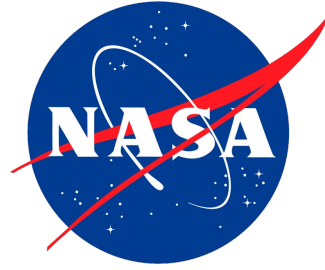
[https://github.com/IHDE-Alliance/ISTP\\_metadata](https://github.com/IHDE-Alliance/ISTP_metadata)



# ISTP Guidelines

- Global attributes required:
  - **Project**: identifies the name of the project and indicates ownership
  - **Source\_name**: identifies the mission or investigation that contains the sensors
  - **Descriptor**: the name of the instrument or sensor that collected the data
  - **Data\_type**: identifies the data type of the dataset
  - **Logical\_file\_id**: the name of the CDF file using the ISTP naming convention (source\_name/descriptor/data\_type/date/data\_version)
  - **PI\_name**: name of the principal investigator (PI)
  - **PI\_affiliation**: affiliation of the PI
  - **Discipline**: describes the science discipline and subdiscipline
  - **Mission\_group**: single value that is used to facilitate making choices of source through CDAWeb.
  - **Instrument\_type**: type of instrument (e.g., “Magnetic Fields (space)” or “Electric Fields (space)”)
  - **Data\_version**: the version of the data file; this gets incremented when a particular file is reproduced
  - **Logical\_source**: Includes the Source\_name, Data\_type and Descriptor information (e.g., mms1\_aspoc\_srvy\_l2)
  - **Logical\_source\_description**: short dataset description
  - **TEXT**: description of the experiment

[https://github.com/IHDE-Alliance/ISTP\\_metadata/blob/main/v1.0.0/02\\_metadata-global-attributes.md](https://github.com/IHDE-Alliance/ISTP_metadata/blob/main/v1.0.0/02_metadata-global-attributes.md)

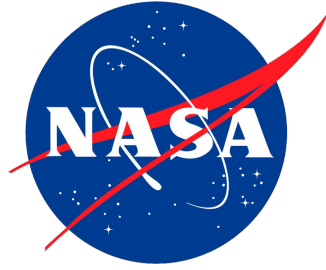


# ISTP Guidelines

- Variable attributes required for automated processing:
  - **CATDESC**: variable description
  - **DEPEND\_0**: points to time variables
  - **DEPEND\_1, 2, 3**: point to variables that describe other dimensions
  - **FIELDNAM**: short variable name for plots
  - **FILLVAL**: values indicating missing or bad data
  - **LABLAXIS/LABL\_PTR\_#**: axis and column titles
  - **UNITS/UNIT\_PTR**: units
  - **VALIDMIN/VALDMAX**: valid data range
  - **VAR\_TYPE**: describes the variable type (“data”, “support\_data”, etc)



# SKTEditor (Java)



SKTEditor: mms1\_aspoc\_srvy\_l2\_00000000\_v01.cdf

File Edit Tools Help

Information ISTEP Global Attributes Variables

Required Project  
STP>Solar-Terrestrial Physics

Source / Spacecraft Name  
MMS1>MMS Satellite Number 1

Descriptor / Instrument Name  
ASPOC>Active Spacecraft Potential Control

Data Type  
SRVY\_L2>Level-2 Survey

File Naming Convention  
source\_descriptor\_da... yyyyM...

PI Name PI Affiliation  
K. Torkar, R. Nakamura IWF

Discipline  
Space Physics>Magnetospheric Science

Mission Group Instrument Types  
MMS Spacecraft Potential Control

Data Version  
01

Logical Source / Short Dataset Description  
Level 2 Active Spacecraft Potential Control Survey Data

Extended Dataset Descriptive Text

Recommended Acknowledgement  
Refer to IWF/OAW for rules of acknowledgement

Rules of Use  
Refer to IWF/OAW for rules of use

SPASE ID Time Resolution  
spase://NASA/NumericalDat: 1 second

Generated by Generation Date

Link Text (describing on-line data)  
ASPOC  
ASPOC  
MMS

Link Title  
Data Caveats and Current Release Notes at LASP MMS SDC  
Team Home Page at IWF  
Public Overview at NASA

HTTP Link  
https://lasp.colorado.edu/mms/sdc/public/datasets/aspoc  
http://www.iwf.oeaw.ac.at/en/forschung/erdnaer-weltraum/  
http://www.nasa.gov/mission\_pages/mms

Modification History

Ready Show Messages

SKTEditor: mms1\_aspoc\_srvy\_l2\_00000000\_v01.cdf

File Edit Tools Variables Help

Information ISTEP Global Attributes Variables

Epoch

Name	Data Type	Time Varying	Dimensions	Compression	Check
mms1_aspoc_ionc	CDF_REAL4/1	true	0:[]	gzip.6	<input checked="" type="checkbox"/>
mms1_asp1_ionc	CDF_REAL4/1	true	0:[]	gzip.6	<input checked="" type="checkbox"/>
mms1_asp2_ionc	CDF_REAL4/1	true	0:[]	gzip.6	<input checked="" type="checkbox"/>
mms1_asp1_energy	Sparse Recd		Pad Value -1.0E30		<input checked="" type="checkbox"/>
mms1_asp2_energy	Sparse Recd		Pad Value -1.0E30		<input checked="" type="checkbox"/>
mms1_aspoc_status	None				<input checked="" type="checkbox"/>
mms1_aspoc_lbl	None				<input checked="" type="checkbox"/>
mms1_aspoc_var	None				<input checked="" type="checkbox"/>

Description Expanded Label  
Ion\_EmCurrnt\_Sum

Axis Information  
Label 1 Label 2 Label 3  
Ion EmCurrnt

One-Line Description  
ASPOC Ion Emission Current Sum, 1s resolution

Variable Notes

Value Uncertainty  
Plus Minus

Scale Type Format Units  
linear F5.1 uA

Plot Information  
Variable Type Display Type  
Data Time Series

Display Arguments

Depends  
Depend 0 Epoch  
Depend 1  
Depend 2  
Depend 3

Valid Min Fill all with selected value 0.0

Valid Max Fill all with selected value 100.0

Ready Show Messages

SKTEditor: mms1\_aspoc\_srvy\_l2\_00000000\_v01.cdf

File Edit Tools Variables Help

Information ISTEP Global Attributes Variables

Epoch

Name	Data Type	Time Varying	Dimensions	Compression	Check
mms1_aspoc_ionc	CDF_REAL4/1	true	0:[]	gzip.6	<input checked="" type="checkbox"/>
mms1_asp1_ionc	CDF_REAL4/1	true	0:[]	gzip.6	<input checked="" type="checkbox"/>
mms1_asp2_ionc	CDF_REAL4/1	true	0:[]	gzip.6	<input checked="" type="checkbox"/>
mms1_asp1_energy	Sparse Recd		Pad Value -1.0E30		<input checked="" type="checkbox"/>
mms1_asp2_energy	Sparse Recd		Pad Value -1.0E30		<input checked="" type="checkbox"/>
mms1_aspoc_status	None				<input checked="" type="checkbox"/>
mms1_aspoc_lbl	None				<input checked="" type="checkbox"/>
mms1_aspoc_var	None				<input checked="" type="checkbox"/>

Description Expanded Label  
Ion EmCurrnt

Axis Information  
Label 1 Label 2 Label 3  
Ion EmCurrnt

One-Line Description  
ASPOC Ion Emission Current Sum, 1s resolution

Variable Notes

Value Uncertainty  
Plus Minus

Scale Type Format Units  
linear F5.1 uA

Plot Information  
Variable Type Display Type  
Data Time Series

Display Arguments

Depends  
Depend 0 Epoch  
Depend 1  
Depend 2  
Depend 3

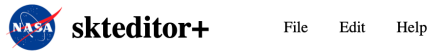
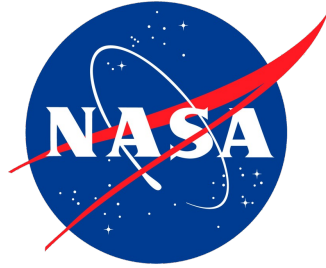
Valid Min Fill all with selected value 0.0

Valid Max Fill all with selected value 100.0

Messages  
Compliance Check for /Users/ewgrimes/masters/OMASTERS/mms1\_aspoc\_srvy\_l2\_00000000\_v01.cdf  
CDF File Version: 3.8.0  
File Last Leap Second: 2015-07-01  
Majority: Column  
/Users/ewgrimes/masters/OMASTERS/mms1\_aspoc\_srvy\_l2\_00000000\_v01.cdf is not ISTEP-Compliant.  
Global errors:  
Logical\_file\_id should be 'mms1\_aspoc\_srvy\_l2\_00000000\_v01'. It is ''.  
TEXT has no entries.  
Logical\_file\_id has no entries.  
The following variables are not ISTEP-compliant:  
mms1\_aspoc\_status  
DEPEND\_1 is a character type.  
mms1\_asp1\_ionc is ISTEP-Compliant.

Ready Hide Messages

# SKTEditor (JavaScript)



Information Global Attributes Variable Attributes

**Required**

**Project**  
STP>Solar-Terrestrial Physics

**Source / Spacecraft Name**  
MMS1>MMS Satellite Number 1

**Descriptor / Instrument Name**  
ASPOC>Active Spacecraft Potential Control

**Data Type**  
SRVY\_L2>Level-2 Survey

**File Naming Convention**  
source\_descriptor\_datatype\_  yyyyMMdd

**PI Name**  **PI Affiliation**   
K. Torkar, R. Nakamura IWF

**Discipline**  
Space Physics>Magnetospheric Science

**Mission Group**  **Instrument Types**  
MMS  Spacecraft Potential Control

**Data Version**

**Logical File ID**

**Logical Source**  
mms1\_aspoc\_srvy\_l2

**Logical Source / Short Dataset Description**  
Level 2 Active Spacecraft Potential Control Survey Data

**Extended Dataset Descriptive Text**

**Recommended**

**Acknowledgement**  
Refer to IWF/OAW for rules of acknowledgement

**Rules of Use**  
Refer to IWF/OAW for rules of use

**DOI**

**SPASE ID**  **Time Resolution**   
spase://NASA/NumericalData/MMS/1/ASPOC/Survey 1 second

**Generated By**  **Generation Date**

**Link Text (describing on-line data)**

**ASPOC**

**MMS**

**Link Title**

**Data Caveats and Current Release Notes at LASP MMS SDC**

**Team Home Page at IWF**

**Public Overview at NASA**

**HTTP Link**  
<https://lasp.colorado.edu/mms/sdc/public/datasets/aspoc>  
<http://www.iwf.oeaw.ac.at/en/forschung/erdnaeher-weltraum/mms/mms-aspoc/>  
[http://www.nasa.gov/mission\\_pages/mms](http://www.nasa.gov/mission_pages/mms)

**Modification History**



Information Global Attributes Variable Attributes

**Epoch**  
mms1\_aspoc\_ionc  
mms1\_asp1\_ionc  
mms1\_asp2\_ionc  
mms1\_asp1\_energy  
mms1\_asp2\_energy  
mms1\_aspoc\_status  
mms1\_aspoc\_bl  
mms1\_aspoc\_var

**CDF Specifications**

**Name**  
mms1\_aspoc\_ionc

Data Type	Time Varying	Dimensions	Compression	Sparse Recd	Pad Value	Fill Value
CDF_REAL4	True	0:[]	GZIP.6	None	-1e+30	-1e+31

**Description**

**Expanded Label**  
Ion\_EmCurrnt\_Sum

**One-Line Description**  
ASPOC Ion Emission Current Sum, 1s resolution

**Variable Notes**

**Value Uncertainty**

**Plus**  **Minus**

**Axis Information**

Label 1	Label 2	Label 3
Ion_EmCurrnt_Sum		

**Scale Type**  linear  **Format**  F5.1  **Units**  uA

**Valid Min**

**Valid Max**

**Plot Information**

**Variable Type**  **Display Type**  Data  Time Series

**Display Arguments**

**Depends**

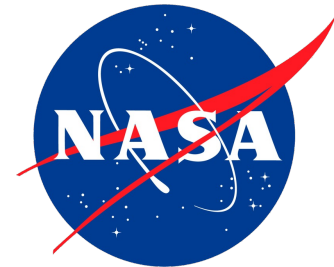
**Depend 0**  
Epoch

**Depend 1**

**Depend 2**

**Depend 3**

**Create New Variable**



# Skeleton Tables

- Skeleton tables are ASCII files that describe a CDF file
- You can create one from a CDF (with or without data) using our SkeletonTable program
- You can create a CDF from a skeleton table using our SkeletonCDF program
- The SkeletonTable and SkeletonCDF programs can be found at:
  - <https://cdf.gsfc.nasa.gov>
- Examples can be found at:
  - <https://spdf.gsfc.nasa.gov/pub/software/cdawlib/OSKELTABLES>

```
! Skeleton table for the "mms1_aspoc_srvy_l2_00000000_v01.cdf" CDF.
! Generated: Tuesday, 26-Sep-2023 16:07:53
! CDF created/modified by CDF V3.8.0
! Skeleton table created by CDF V3.8.1_0

#header
                                CDF NAME: mms1_aspoc_srvy_l2_00000000_v01.cdf
                                DATA ENCODING: NETWORK
                                MAJORITY: COLUMN
                                FORMAT: SINGLE

! Variables  G.Attributes  V.Attributes  Records  Dims  Sizes
! -----
!           0/9           29           29           0/z     0
! CDF_COMPRESSION: None
! (Valid compression: None, GZIP.1-9, RLE.0, HUFF.0, AHUFF.0)
! CDF_CHECKSUM: MD5
! (Valid checksum: None, MD5)
! CDF_LEAPSECONDLASTUPDATED: 20150701

#GLOBALAttributes

! Attribute      Entry      Data      Value
! Name           Number     Type
! -----
"Project"        1:         CDF_CHAR  { "STP>Solar-Terrestrial " -
"Physics" } .

"Discipline"     1:         CDF_CHAR  { "Space " -
"Physics>Magnetospheric " -
"Science" } .

"Source_name"    1:         CDF_CHAR  { "MMS1>MMS Satellite Number 1" } .

"Data_type"      1:         CDF_CHAR  { "SRVY_L2>Level-2 Survey" } .

"Descriptor"     1:         CDF_CHAR  { "ASPOC>Active Spacecraft " -
"Potential Control" } .

"Data_version"  1:         CDF_CHAR  { " " } .

"Generated_by"   1:         CDF_CHAR  { " " } .

"Generation_date" 1:         CDF_CHAR  { " " } .

"TITLE"          1:         CDF_CHAR  { "MMS ASPOC Beam Parameters" } .

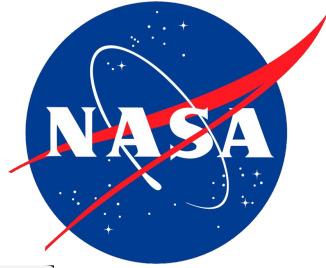
"TEXT"           1:         CDF_CHAR  { " " } .

"MODS"           1:         CDF_CHAR  { " " } .

"Logical_file_id" 1:         CDF_CHAR  { " " } .

"Logical_source" 1:         CDF_CHAR  { "mms1_aspoc_srvy_l2" } .
```

# CDAWeb



**GODDARD SPACE FLIGHT CENTER**  
Space Physics Data Facility

[+ Goddard Home](#)  
[+ NASA Home](#)

+ SPDF HOME
+ MISSION DATA
+ MODELS at CCMC
+ SCIENCE ENABLED
+ AND MORE

**CDAWeb**

+ CDAWEB HOME

+ FEEDBACK

+ ABOUT CDAWEB

**Guides and Tutorials**

+ CDAWeb help

+ Internet browser help

**Direct Access to Data**

+ Direct HTTP(S) to Data

+ Direct FTP(S) to Data  
(FTPS required)

**Additional Services**

+ CDAWeb Inside IDL

+ Overview of Alternative Data Access Methods

+ Autoplots.org (non-NASA) interface to public CDAWeb database

+ New Plot Walk for viewing pre-generated plots

**Additional Resources**

+ Usage Statistics

+ Space Physics Use of CDF

+ SPASE & DOI Registry of CDAWeb data sets

+ Data Inventory Graphs

+ SPDF Home Page

**Coordinated Data Analysis Web (CDAWeb)**

CDAWeb contains selected public non-solar heliophysics data from current and past heliophysics missions and projects. Many datasets from current missions are updated regularly (even daily), including reprocessing older time periods, and SPDF only preserves the latest version. To find all of the public data and documents archived by the SPDF, see the [SPDF archive](#). To search for additional heliophysics data products, check the [heliophysics data portal](#).

**REMINDER: CDAWeb offers CREATION of subset/supersets of data sets (by date and variables), CREATION of uniformly time binned data, PLOTS in PDF, PS and PNG formatted files, MOVIES of specific image sequences, ON-THE-FLY Inventory plots, ADJUSTABLE height time/spectrogram plots, plus many more options...**

---

NEW

April 16, 2024: All SPDF web services for CDAWeb and SSCWeb will be unavailable from 10am - 10:30am EDT on Tuesday, 4/16/2024. Please plan your use of the services accordingly.

February 2024: Mars Global Surveyor (MGS) magnetometer data and Mars Science Laboratory (MSL) radiation data for many years have been added to the system, services and archive.

January 2024: A new plotting option has been added to allow auto-scaling by time (the default is to not autoscale time, but rather to show the time range requested). This option should allow users to more easily navigate burst data.

PREVIOUS DATA & SOFTWARE UPDATES ...

- **Select zero OR more Sources**  
(default = All Sources if  $\geq 1$  Instrument Type is selected)
- Balloons
- Geosynchronous Investigations
- Ground-Based Investigations
- Helio Ephemeris
- OMNI (Combined 1AU IP Data; Magnetic and Solar Indices)
- Smallsats/Cubesats
- Sounding Rockets
- ACE

- **Select zero OR more Instrument Types**  
(default = All Instrument Types if  $\geq 1$  Source is selected)
- Activity Indices
- Electric Fields (space)
- Electron Precipitation Bremsstrahlung
- Energetic Particle Detector
- Engineering
- Ephemeris/Attitude/Ancillary
- Gamma and X-Rays

SKTEditor: mms1\_aspoc\_srvy\_l2\_0000000\_v01.cdf

File Edit Tools Help

Information
ISTP Global Attributes
Variables

**Required**

Project  
STP>Solar--Terrestrial Physics

Source / Spacecraft Name  
MMS1>MMS Satellite Number 1

Descriptor / Instrument Name  
ASPOC>Active Spacecraft Potential Control

Data Type  
SRVY\_L2>Level-2 Survey

File Naming Convention  
source\_descriptor\_da...    yyyyM...

PI Name                      PI Affiliation  
K. Torkar, R. Nakamura      IWF

Discipline  
Space Physics>Magnetospheric Science

Mission Group              Instrument Types  
MMS                              Spacecraft Potential Control

Data Version                        
01                                     

Logical Source / Short Dataset Description  
Level 2 Active Spacecraft Potential Control Survey Data

Extended Dataset Descriptive Text

**Recommended**

Acknowledgement  
Refer to IWF/OAW for rules of acknowledgement

Rules of Use  
Refer to IWF/OAW for rules of use

SPASE ID                      Time Resolution  
spase://NASA/NumericalDat:    1 second

Generated by                      Generation Date

Link Text (describing on-line data)  
ASPOC  
ASPOC  
MMS

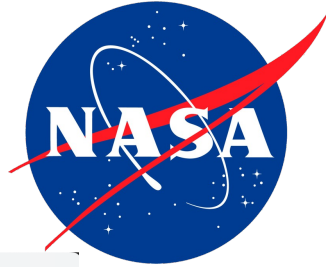
Link Title  
Data Caveats and Current Release Notes at LASP MMS SDC  
Team Home Page at IWF  
Public Overview at NASA


HTTP Link  
https://lasp.colorado.edu/mms/sdc/public/datasets/aspoc  
http://www.iwf.oeaw.ac.at/en/forschung/erdnaheer-weltraum/  
http://www.nasa.gov/mission\_pages/mms

Modification History

Ready
Show Messages

# CDAWeb



 **GODDARD SPACE FLIGHT CENTER**  
Space Physics Data Facility

+ Goddard Home  
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+ SPDF HOME   + MISSION DATA   + MODELS at CCMC   + SCIENCE ENABLED   + AND MORE

+ CDAWeb Home  
**CDAWeb**  
+ FEEDBACK

*Coordinated Data Analysis Web*

## CDAWeb Data Selector


SELECT AT LEAST ONE DATA SET below before pressing the "Submit" button to continue.

[SELECT ALL checkboxes](#)  
[CLEAR ALL checkboxes](#)

Submit

- MMS1\_ASPOC\_SRVY\_L2:** Level 2 Active Spacecraft Potential Control Survey Data - K. Torkar, R. Nakamura (IWF)  
[Available Time Range: 2015/03/28 00:00:00 - 2024/03/04 23:59:59] [Info](#) [Metadata](#)
- MMS2\_ASPOC\_SRVY\_L2:** Level 2 Active Spacecraft Potential Control Survey Data - K. Torkar, R. Nakamura (IWF)  
[Available Time Range: 2015/03/28 00:00:00 - 2024/03/04 23:59:59] [Info](#) [Metadata](#)
- MMS3\_ASPOC\_SRVY\_L2:** Level 2 Active Spacecraft Potential Control Survey Data - K. Torkar, R. Nakamura (IWF)  
[Available Time Range: 2015/03/28 00:00:00 - 2024/03/04 23:59:59] [Info](#) [Metadata](#)
- MMS4\_ASPOC\_SRVY\_L2:** Level 2 Active Spacecraft Potential Control Survey Data - K. Torkar, R. Nakamura (IWF)  
[Available Time Range: 2015/03/28 00:00:00 - 2024/03/04 23:59:59] [Info](#) [Metadata](#)

Submit   Reset

 NASA Official: Robert M. Candey  
(301)286-6707, [Robert.M.Candey@nasa.gov](mailto:Robert.M.Candey@nasa.gov)  
Curator: Tami Kovalick  
Last Modified: 15 Apr 2024

Contact SPDF: NASA-SPDF-  
[Support@nasa.onmicrosoft.com](mailto:Support@nasa.onmicrosoft.com)  
+ Privacy Policy and Important Notices  
+ Accessibility

SKEditor: mms1\_aspoc\_srvy\_l2\_00000000\_v01.cdf

File Edit Tools Help

Information   ISTEP Global Attributes   Variables

**Required**

Project  
STP>Solar-Terrestrial Physics

Source / Spacecraft Name  
MMS1>MMS Satellite Number 1

Descriptor / Instrument Name  
ASPOC>Active Spacecraft Potential Control

Data Type  
SRVY\_L2>Level-2 Survey

File Naming Convention  
source\_descriptor\_da...   yyyyM...  

PI Name   PI Affiliation  
K. Torkar, R. Nakamura   IWF

Discipline  
Space Physics>Magnetospheric Science

Mission Group   Instrument Types  
MMS   Spacecraft Potential Control

Data Version  
01

Logical Source / Short Dataset Description  
Level 2 Active Spacecraft Potential Control Survey Data

Extended Dataset Descriptive Text

**Recommended**

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Refer to IWF/OAW for rules of acknowledgement

Rules of Use  
Refer to IWF/OAW for rules of use

SPASE ID   Time Resolution  
spase://NASA/NumericalData   1 second

Generated by   Generation Date

Link Text (describing on-line data)  
ASPOC  
ASPOC  
MMS

Link Title  
Data Caveats and Current Release Notes at LASP MMS SDC  
Team Home Page at IWF  
Public Overview at NASA

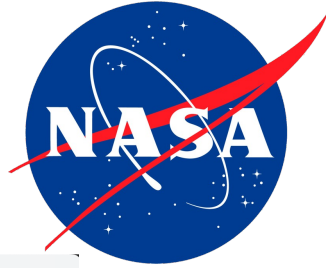
HTTP Link  
<https://lasp.colorado.edu/mms/sdc/public/datasets/aspoc>  
<http://www.iwf.oeaw.ac.at/en/forschung/erdnaehar-weltraum/>  
[http://www.nasa.gov/mission\\_pages/mms](http://www.nasa.gov/mission_pages/mms)

Modification History

Ready   Show Messages



# CDAWeb



Variable parameters (required for Listing, Creating and Plotting data only)

## MMS1\_ASPOC\_SRVY\_L2: [Info](#) [Metadata](#)

Level 2 Active Spacecraft Potential Control Survey Data - K. Torkar, R. Nakamura (IWF)

Available dates: 2015/03/28 00:00:00 - 2024/03/04 23:59:59

(Continuous coverage not guaranteed - check the [inventory graph](#) for coverage)

- ASPOC Ion Emission Current Sum, 1s resolution
- ASPOC Unit 1 Ion Emission Current, 1s resolution
- ASPOC Unit 2 Ion Emission Current, 1s resolution
- ASPOC Unit 1 Emitted Beam Energy, 1s resolution
- ASPOC Unit 2 Emitted Beam Energy, 1s resolution
- ASPOC Data Quality and Instrument Status, 1s resolution

[ASPOC [Data Caveats and Current Release Notes at LASP MMS SDC](#)]

[ASPOC [Team Home Page at IWF](#)]

[MMS [Public Overview at NASA](#)]

[MMS [Mission Page at NASA GSFC](#)]

[MMS/SMART [Investigation Overview at SwRI](#)]

Pressing the "Submit" button will spawn a new window/tab in order to support the new "Previous"

**Note:** the current SKTEditor interface is limited to 3 links, but more can be specified by clicking "Tools" -> "Attribute Editor" or by editing the skeleton table

SKTEditor: mms1\_aspoc\_srvy\_l2\_00000000\_v01.cdf

File Edit Tools Help

Information ISTEP Global Attributes Variables

**Required**

Project  
STP>Solar-Terrestrial Physics

Source / Spacecraft Name  
MMS1>MMS Satellite Number 1

Descriptor / Instrument Name  
ASPOC>Active Spacecraft Potential Control

Data Type  
SRVY\_L2>Level-2 Survey

File Naming Convention  
source\_descriptor\_da... yyyyM...

PI Name  
K. Torkar, R. Nakamura

PI Affiliation  
IWF

Discipline  
Space Physics>Magnetospheric Science

Mission Group  
MMS

Instrument Types  
Spacecraft Potential Control

Data Version  
01

Logical Source / Short Dataset Description  
Level 2 Active Spacecraft Potential Control Survey Data

Extended Dataset Descriptive Text

**Recommended**

Acknowledgement  
Refer to IWF/OAW for rules of acknowledgement

Rules of Use  
Refer to IWF/OAW for rules of use

SPASE ID  
spase://NASA/NumericalData

Time Resolution  
1 second

Generated by  
Generation Date

Link Text (describing on-line data)  
ASPOC  
ASPOC  
MMS

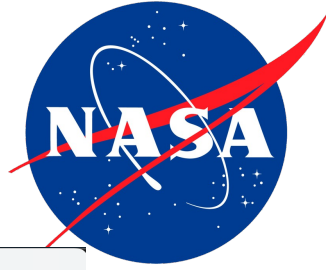
Link Title  
Data Caveats and Current Release Notes at LASP MMS SDC  
Team Home Page at IWF  
Public Overview at NASA

HTTP Link  
https://lasp.colorado.edu/mms/sdc/public/datasets/aspoc  
http://www.iwf.oeaw.ac.at/en/forschung/erdnahe-r-weltraum/  
http://www.nasa.gov/mission\_pages/mms

Modification History

Ready

# CDAWeb



Variable parameters (required for Listing, Creating and Plotting data only)

## MMS1\_ASPOC\_SRVY\_L2: [Info](#) [Metadata](#)

Level 2 Active Spacecraft Potential Control Survey Data - K. Torkar, R. Nakamura (IWF)

Available dates: 2015/03/28 00:00:00 - 2024/03/04 23:59:59

(Continuous coverage not guaranteed - check the [inventory graph](#) for coverage)

- ASPOC Ion Emission Current Sum, 1s resolution
- ASPOC Unit 1 Ion Emission Current, 1s resolution
- ASPOC Unit 2 Ion Emission Current, 1s resolution
- ASPOC Unit 1 Emittted Beam Energy, 1s resolution
- ASPOC Unit 2 Emittted Beam Energy, 1s resolution
- ASPOC Data Quality and Instrument Status, 1s resolution

[ASPOC [Data Caveats and Current Release Notes at LASP MMS SDC](#)]

[ASPOC [Team Home Page at IWF](#)]

[MMS [Public Overview at NASA](#)]

[MMS [Mission Page at NASA GSFC](#)]

[MMS/SMART [Investigation Overview at SwRI](#)]

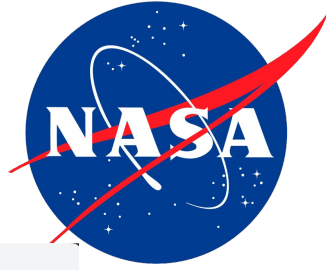
Pressing the "Submit" button will spawn a new window/tab in order to support the new "Prev


Submit Reset

**Note:** support data (e.g., the Epoch and label variables) aren't shown in the CDAWeb interface

The screenshot shows the SKTEditor interface for the file 'mms1\_aspoc\_srvy\_l2\_00000000\_v01.cdf'. The 'Variables' tab is active, showing a list of variables on the left and configuration options on the right. The variable 'mms1\_aspoc\_ior' is selected. The configuration includes CDF Specifications (Name: mms1\_aspoc\_ior, Data Type: CDF\_REAL4/1, Time Varying: true, Dimensions: 0: [], Compression: gzip.6), Description (Expanded Label: Ion\_EmCurrnt\_Sum, One-Line Description: ASPOC Ion Emission Current Sum, 1s resolution), Axis Information (Label 1: Ion\_EmCurrnt\_), Scale Type (linear), Format (F5.1), and Units (uA). The 'Depends' section shows a dependency on 'Epoch'. The 'Valid Min' and 'Valid Max' fields are set to 0.0 and 100.0 respectively. A 'Check' button is visible in the top right corner of the configuration area.

# CDAWeb





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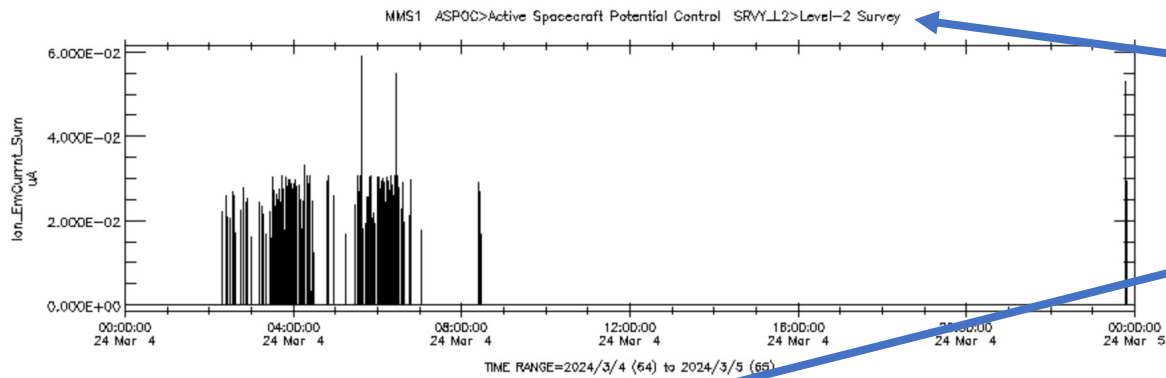
[+ SPDF HOME](#) | [+ MISSION DATA](#) | [+ MODELS at CCMC](#) | [+ SCIENCE ENABLED](#) | [+ AND MORE](#)

[+ CDAWeb Home](#)  
**CDAWeb**

[+ FEEDBACK](#)


**Coordinated Data Analysis Web**

## MMS1\_ASPOC\_SRVY\_L2




Please acknowledge PI, K. Torkar, R. Nakamura at IWF and CDAWeb when using these data.  
 Generated by CDAWeb on Mon Apr 15 11:30:38 2024

[<< Previous time range](#) | [Next time range >>](#)  
[>> Zoom IN time range <<](#) | [<< Zoom OUT time range >>](#)  
[< Pan left](#) | [Pan right >](#)

**Current Requested Time Range:**  
 2024/03/04 00:00:00.000 to 2024/03/05 00:00:00.000  
 1 day(s) 0 hours 0 minutes 0 seconds

[Return to: CDAWeb Data Explorer](#)

[notes and caveats](#)


**NASA Official:** Robert M. Candey  
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**Curator:** Tami Kovalick  
 Last Modified: 15 Apr 2024

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 Support@nasa.onmicrosoft.com  
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SKTEditor: mms1\_aspoc\_srvy\_l2\_00000000\_v01.cdf

File Edit Tools Help

Information ISTEP Global Attributes Variables

**Required**

Project: STP>Solar-Terrestrial Physics

Source / Spacecraft Name: MMS1>MMS Satellite Number 1

Descriptor / Instrument Name: ASPOC>Active Spacecraft Potential Control

Data Type: SRVY\_L2>Level-2 Survey

File Naming Convention: source\_descriptor\_da... yyyyM...

PI Name: K. Torkar, R. Nakamura | PI Affiliation: IWF

Discipline: Space Physics>Magnetospheric Science

Mission Group: MMS | Instrument Types: Spacecraft Potential Control

Data Version: 01

Logical Source / Short Dataset Description: Level 2 Active Spacecraft Potential Control Survey Data

Extended Dataset Descriptive Text:

**Recommended**

Acknowledgement: Refer to IWF/OAW for rules of acknowledgement

Rules of Use: Refer to IWF/OAW for rules of use

SPASE ID: spase://NASA/NumericalData | Time Resolution: 1 second

Generated by: | Generation Date:

Link Text (describing on-line data): ASPOC, ASPOC, MMS

Link Title: Data Caveats and Current Release Notes at LASP MMS SDC

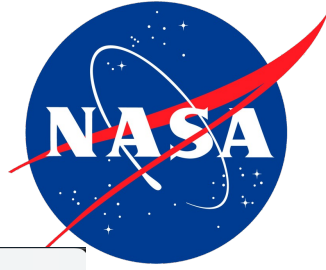
Team Home Page at IWF: | Public Overview at NASA: | HTTP Link: https://lasp.colorado.edu/mms/sdc/public/datasets/aspoc, http://www.iwf.oeaw.ac.at/en/forschung/erdnaheer-weltraum/, http://www.nasa.gov/mission\_pages/mms

Modification History:

Ready [Show Messages](#)



# CDAWeb



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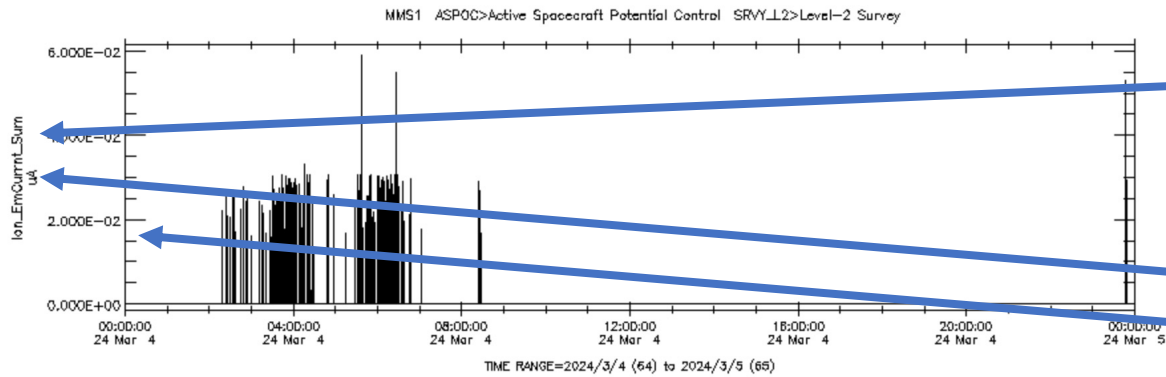
[+ SPDF HOME](#)   [+ MISSION DATA](#)   [+ MODELS at CCMC](#)   [+ SCIENCE ENABLED](#)   [+ AND MORE](#)

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**CDAWeb**

[+ FEEDBACK](#)

Coordinated Data Analysis Web

## MMS1\_ASPOC\_SRVY\_L2



Please acknowledge PI, K. Torkar, R. Nakamura at MF and CDAWeb when using these data.  
 Generated by CDAWeb on Mon Apr 15 11:30:38 2024

[<< Previous time range](#)   [Next time range >>](#)  
[>> Zoom IN time range <<](#)   [<< Zoom OUT time range >>](#)  
[< Pan left](#)   [Pan right >](#)

**Current Requested Time Range:**  
 2024/03/04 00:00:00.000 to 2024/03/05 00:00:00.000  
 1 day(s) 0 hours 0 minutes 0 seconds

[Return to: CDAWeb Data Explorer](#)

[notes and caveats](#)

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**Curator:** Tami Kovalick  
 Last Modified: 15 Apr 2024

**Contact SPDF:** NASA-SPDF-  
 Support@nasa.onmicrosoft.com  
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 + Accessibility

SKTEditor: mms1\_aspoc\_srvy\_l2\_00000000\_v01.cdf

File Edit Tools Variables Help

Information ISTEP Global Attributes Variables

Epoch	Name	Data Type	Time Varying	Dimensions	Compression
mms1_aspoc_iorc	mms1_aspoc_iorc	CDF_REAL4/1	true	0:[]	gzip.6
mms1_asp1_iorc		Sparse Recd		Pad Value	-1.0E30
mms1_asp2_iorc		None			
mms1_asp1_energy					
mms1_asp2_energy					
mms1_aspoc_status					
mms1_aspoc_lbl					
mms1_aspoc_var					

Check

**Description**  
 Expanded Label: Ion\_EmCurrnt\_Sum  
 One-Line Description: ASPOC Ion Emission Current Sum, 1s resolution  
 Variable Notes:

**Axis Information**

Label 1	Label 2	Label 3	Label 4	Label 5	Label 6
Ion_EmCurrnt					

**Scale Type**: linear   **Format**: F5.1   **Units**: uA

**Value Uncertainty**  
 Plus:   Minus:

**Plot Information**  
 Variable Type: Data   Display Type: Time Series

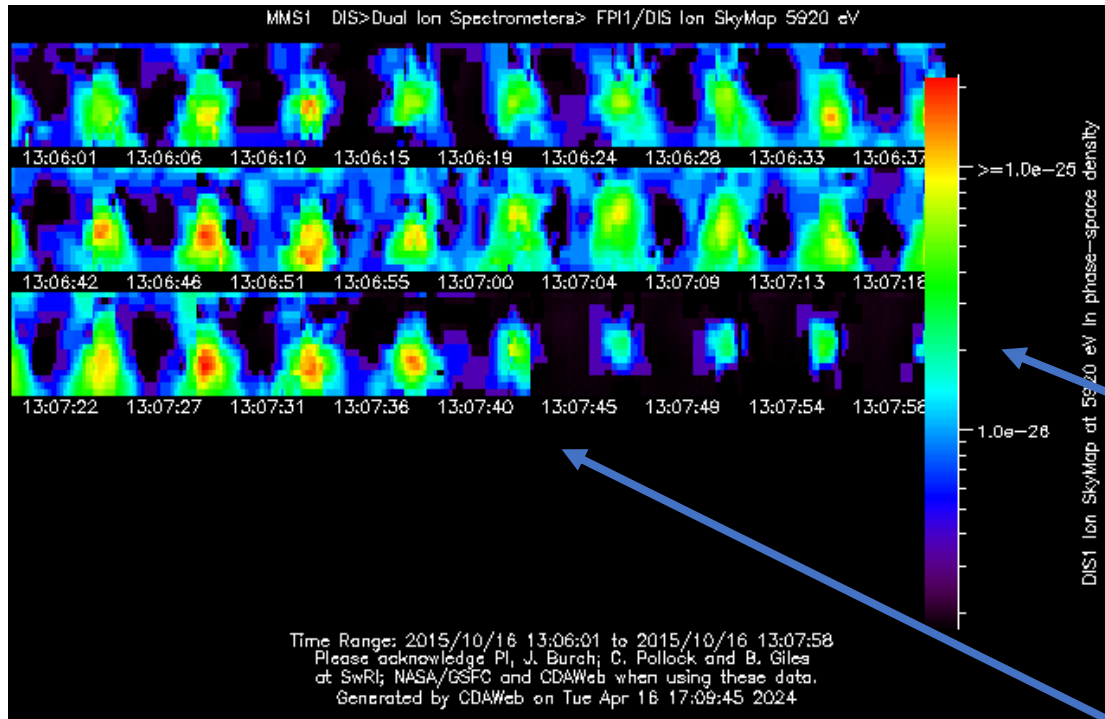
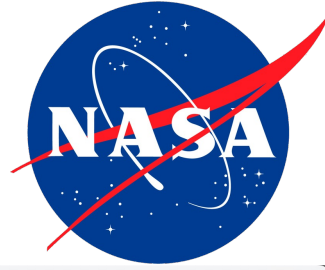
**Depends**  
 Depend 0: Epoch  
 Depend 1:  
 Depend 2:  
 Depend 3:

**Valid Min**: Fill all with selected value   0.0

**Valid Max**: Fill all with selected value   100.0

Ready   Show Messages

# CDAWeb



SKTEditor: mms1\_fpi\_fast\_l2\_dis-dist\_00000000\_v01.cdf

File Edit Tools Variables Help

Information ISTEP Global Attributes Variables

Epoch  
Epoch\_plus\_var  
Epoch\_minus\_var  
mms1\_dis\_dist\_fast  
mms1\_dis\_dist\_fast1\_movie  
mms1\_dis\_dist\_fast6  
mms1\_dis\_dist\_fast6\_movie  
mms1\_dis\_dist\_fast9  
mms1\_dis\_dist\_fast9\_movie  
mms1\_dis\_dist\_fast12  
mms1\_dis\_dist\_fast12\_movie  
mms1\_dis\_dist\_fast14  
mms1\_dis\_dist\_fast14\_movie  
mms1\_dis\_dist\_fast16  
mms1\_dis\_dist\_fast16\_movie  
mms1\_dis\_dist\_fast18  
mms1\_dis\_dist\_fast18\_movie  
mms1\_dis\_dist\_fast20  
mms1\_dis\_dist\_fast20\_movie  
mms1\_dis\_dist\_fast23  
mms1\_dis\_dist\_fast23\_movie  
mms1\_dis\_dist\_fast26  
mms1\_dis\_dist\_fast26\_movie  
mms1\_dis\_dist\_fast32  
mms1\_dis\_dist\_fast32\_movie  
mms1\_dis\_disterr\_fast  
mms1\_dis\_errorflags\_fast  
mms1\_dis\_compressionloss\_fast  
mms1\_dis\_startdelphi\_count\_fast  
mms1\_dis\_startdelphi\_angle\_fast  
mms1\_dis\_sector\_index\_fast

CDF Specifications  
Name Data Type Time Varying Dimensions Compression  
mms1\_dis\_dist\_fast26 CDF\_REAL4/1 true 3:[32,16,32] gzip.6  
Sparse Recd None Pad Value -1.0E30

Description  
Expanded Label  
FPI1/DIS Ion SkyMap 5920 eV  
One-Line Description  
MMS1 FPI/DIS fast sky-map instrument distribution - 5920 eV (E26) using averaged even/odd steps  
Variable Notes  
Az bin: sector ind=00 looks "after" (spin-phase) Sun, ..., sector ind=31 looks "before" Sun dir. Head field-of-view: pixel index=00 looks to zenith, ..., pixel index=15 looks to nadir. FPI operations nominally bin data from 64 energy filters into 32 pairwise energy bins, indexed 0-31. Nominally, bins are

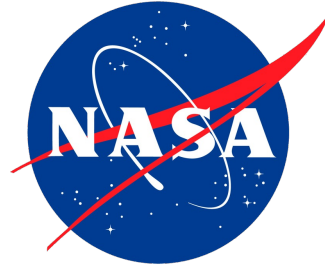
Value Uncertainty  
Plus Minus  
mms1\_dis\_disterr\_fast mms1\_dis\_disterr\_fast

Axis Information  
Label 1 Label 2 Label 3  
DIS1 Ion SkyMap at 5920 eV mms1\_dis\_pix... mms1\_dis\_ene...  
Label 4 Label 5 Label 6  
Scale Type Format Units  
log E12.2 phase-space density

Plot Information  
Variable Type Display Type  
Data Image  
Depends  
Depend 0 Epoch  
Depend 1 mms1\_dis\_phi\_fast  
Depend 2 mms1\_dis\_theta\_fast  
Depend 3 mms1\_dis\_energy\_fast  
Virtual Variable  
Function alternate\_view  
Components  
Fill all with selected value  
mms1\_dis\_dist\_fast  
Valid Min Fill all with selected value -1.0E30  
Valid Max Fill all with selected value 1.0E30

Ready Show Messages

**Note:** plotting of multi-dimensional variables are enabled by the SPDF team adding virtual variables. Please make higher level products, so we don't have to do this!



# Thank you!

- We have many more examples at:
  - [https://spdf.gsfc.nasa.gov/istp\\_guide/variables.html](https://spdf.gsfc.nasa.gov/istp_guide/variables.html)
- Please contribute to the metadata standards:
  - [https://github.com/IHDE-Alliance/ISTP\\_metadata](https://github.com/IHDE-Alliance/ISTP_metadata)