
pySPEDAS

Release 1.2

The pySPEDAS Community

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FIRST STEPS

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pySPEDAS is an implementation of the Space Physics Environment Data Analysis Software (SPEDAS) framework in Python.

The SPEDAS framework is written in IDL and contains data loading, data analysis and data plotting tools for various scientific missions (NASA, NOAA, etc.) and ground magnetometers.

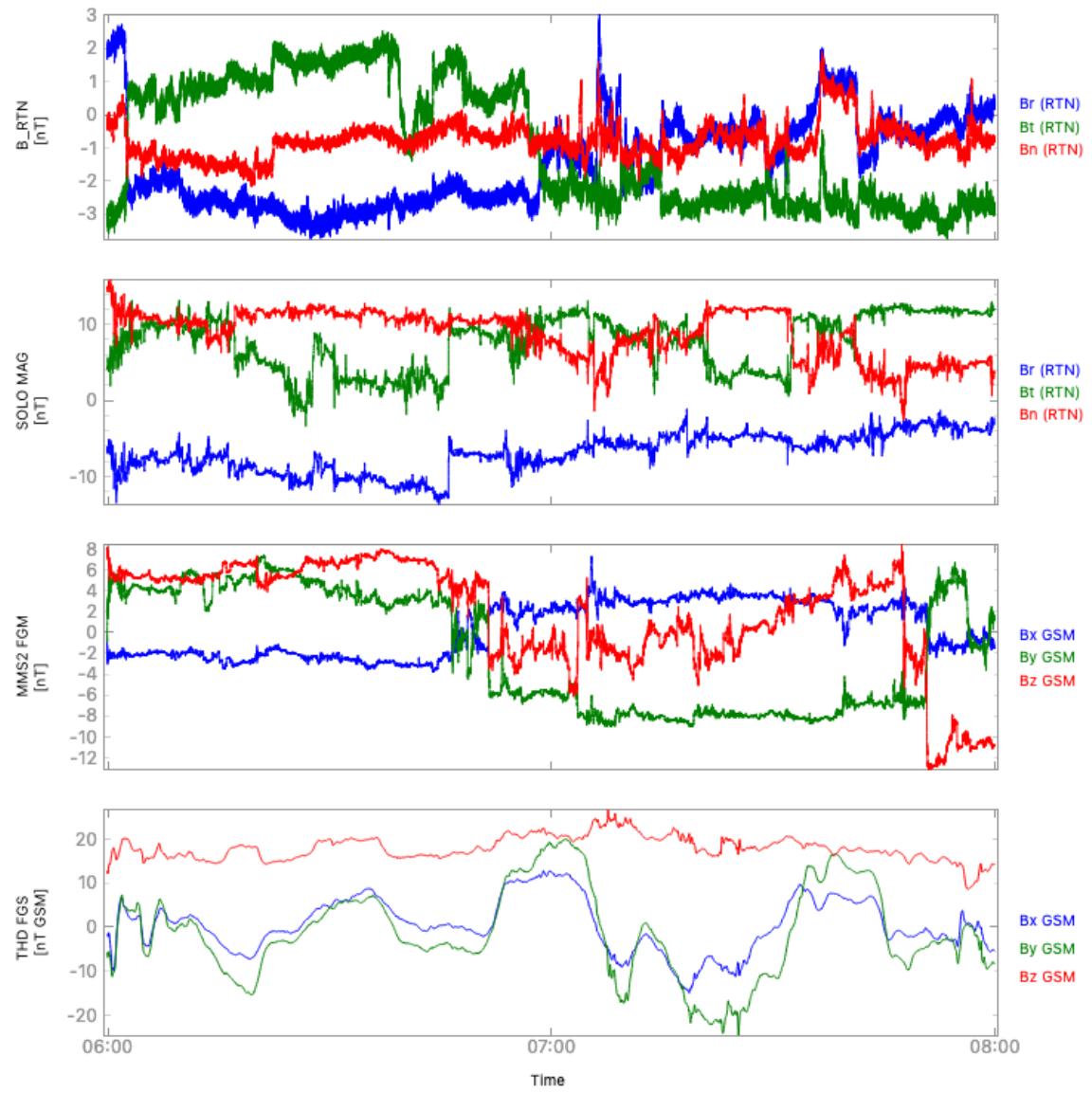
pySPEDAS and [pyTplot](#) make creating multi-mission, multi-instrument figures simple, e.g., to create a figure showing magnetometer data from Solar Orbiter, Parker Solar Probe, MMS, and THEMIS,

```
import pyspedas
from pytplot import tplot

time_range = ['2020-04-20/06:00', '2020-04-20/08:00']

pyspedas.solo.mag(trange=time_range, time_clip=True)
pyspedas.psp.fields(trange=time_range, time_clip=True)
pyspedas.mms.fgm(trange=time_range, time_clip=True, probe=2)
pyspedas.themis.fgm(trange=time_range, time_clip=True, probe='d')

tplot(['B_RTN', 'psp_fld_l2_mag_RTN', 'mms2_fgm_b_gsm_srvy_l2_bvec', 'thd_fgs_gsm'])
```



GETTING STARTED

pySPEDAS supports Windows, macOS and Linux.

1.1 Requirements

Python 3.7 or later is required.

We recommend Anaconda, which comes with a suite of packages useful for scientific data analysis. Step-by-step instructions for installing Anaconda can be found at: [Windows](#), [macOS](#), [Linux](#)

1.2 Installation

To get started, install the pypedas package using PyPI:

```
pip install pypedas
```

To upgrade to the latest version of pySPEDAS, include the ‘–upgrade’ option when calling pip, e.g.,

```
pip install pypedas --upgrade
```

1.3 Local Data Directories

By default, the data are stored in your pypedas directory in a folder named ‘pydata’. The recommended way of setting your local data directory is to set the **SPEDAS_DATA_DIR** environment variable. **SPEDAS_DATA_DIR** acts as a root data directory for all missions, and will also be used by IDL (if you’re running a recent copy of the bleeding edge).

Mission specific data directories (e.g., **MMS_DATA_DIR** for MMS, **THM_DATA_DIR** for THEMIS) can also be set, and these will override **SPEDAS_DATA_DIR**.

1.4 Loading and Plotting Data

You can load data into tplot variables by calling `pyspedas.mission.instrument()`, e.g.,

```
import pyspedas
pyspedas.mms.fgm()
```

The load routines support several keywords to control which data products are loaded (datatype, level, etc).

To plot the tplot variables that were loaded, use `tplot` from `pytplot`, e.g.,

```
from pytplot import tplot
tplot(['mms1_fgm_b_gse_srvy_l2_btot', 'mms1_fgm_b_gse_srvy_l2_bvec'])
```

1.5 Accessing the Data and Timestamps

Once the data are loaded into tplot variables, you can access them using the `get_data` function from `pytplot`. e.g.,

```
from pytplot import get_data

mag_data = get_data('mms1_fgm_b_gse_srvy_l2_bvec')

# get_data returns a namedtuple with 'times' and 'y':
mag_data.times # the unix times, stored as a numpy array
mag_data.y # the data values
```

Note: some types of data (spectrograms, DFs) have higher dimensions; e.g., spectra have a ‘v’ with the y-axis values for the data stored in ‘y’, and some data can have several dimensions: ‘v1’, ‘v2’, and ‘v3’

LOAD ROUTINES

2.1 Advanced Composition Explorer (ACE)

The routines in this module can be used to load data from the Advanced Composition Explorer (ACE) mission.

2.1.1 Magnetometer (MFI)

```
pyspedas.ace.mfi(trange=['2018-11-5', '2018-11-6'], datatype='h3', suffix='', get_support_data=False,  
varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,  
time_clip=False)
```

This function loads data from the Fluxgate Magnetometer

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) –
Data type; Valid options: h0: 16-Second Level 2 Data h1: 4-Minute Level 2 Data h2: 1-Hour Level 2 Data h3: (default) 1-Second Level 2 Data k0: 5-Minute Key Parameters [PRELIM] k1: 16-Second Key Parameters [PRELIM] k2: 1-Hour Key Parameters [PRELIM]
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache

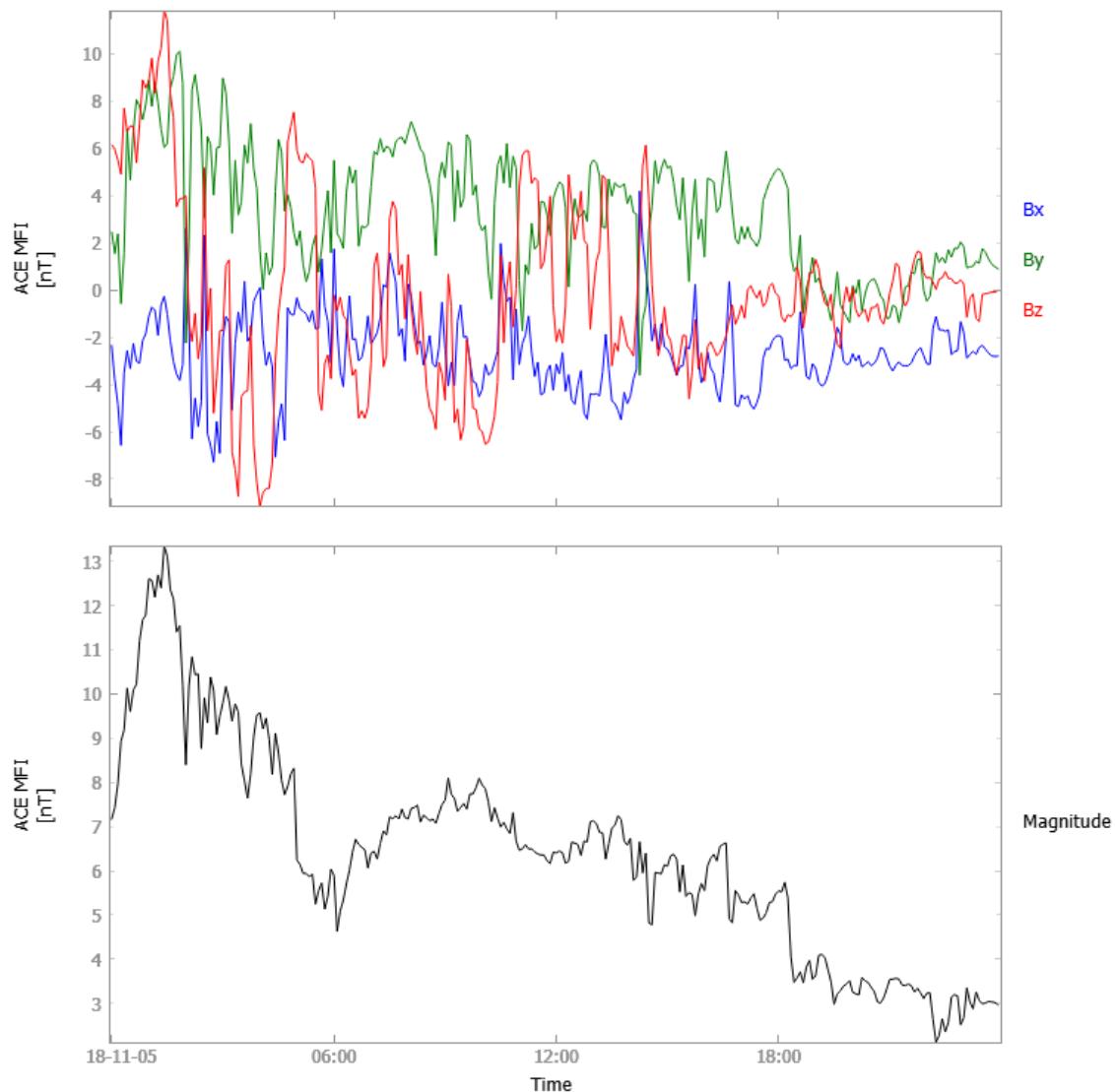
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the `trange` keyword

Returns

Return type List of `tplot` variables created.

Example

```
import pyspedas
from pyplot import tplot
pyspedas.ace.mfi(trange=['2018-11-5', '2018-11-6'])
tplot(['BGSEc', 'Magnitude'])
```



2.1.2 Solar Wind Electron, Proton and Alpha Monitor (SWEPAM)

```
pyspedas.ace.swe(trange=['2018-11-5', '2018-11-6'], datatype='h0', suffix='', get_support_data=False,
                   varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                   time_clip=False)
```

This function loads data from the Solar Wind Electron, Proton and Alpha Monitor (SWEPAM)

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) –

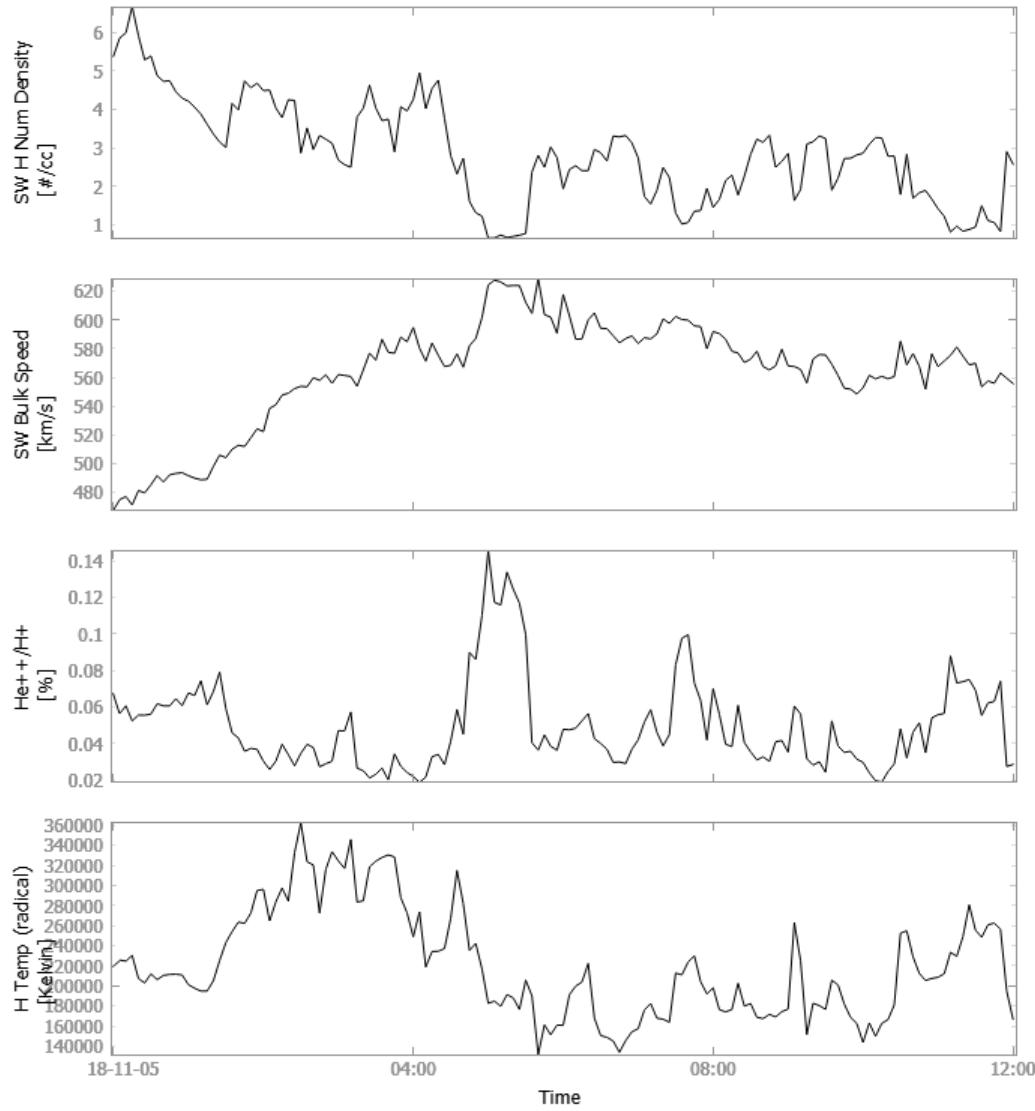
Data type; Valid options: h0: (default) 64-Second Level 2 Data h2: 1-Hour Level 2 Data
k0: 5-Minute Key Parameters [PRELIM] k1: 1-Hour Key Parameters [PRELIM]
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

Example

```
import pyspedas
from pytplot import tplot
pyspedas.ace.swe(trange=['2018-11-5', '2018-11-5/12:00'], time_clip=True)
tplot(['Np', 'Vp', 'He_ratio', 'Tpr'])
```



2.1.3 Electron, Proton, and Alpha-particle Monitor (EPAM)

```
pyspedas.ace.epam(trange=['2018-11-5', '2018-11-6'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Electron Proton Alpha Monitor (EPAM)

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) –

Data type; Valid options: h1: 5-Minute Level 2 Data h2: 1-Hour Level 2 Data h3: 12-

second Level 2 Data k0: (default) 5-Minute Key Parameters k1: 1-Hour Key Parameters

- **suffix (str)** – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data (bool)** – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat (str)** – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames (list of str)** – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly (bool)** – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot (bool)** – Return the data in hash tables instead of creating tplot variables
- **no_update (bool)** – If set, only load data from your local cache
- **time_clip (bool)** – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.1.4 Cosmic Ray Isotope Spectrometer (CRIS)

```
pyspedas.ace.cris(trange=['2018-11-5', '2018-11-6'], datatype='h2', suffix='', get_support_data=False,
                    varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                    time_clip=False)
```

This function loads data from the Cosmic Ray Isotope Spectrometer (CRIS)

Parameters

- **trange (list of str)** – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype (str)** –
Data type; Valid options: h2: (default) 1-Hour Level 2 Data h3: Daily-averaged Level 2 Data
- **suffix (str)** – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data (bool)** – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat (str)** – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames (list of str)** – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly (bool)** – Set this flag to download the CDF files, but not load them into tplot variables

- **notplot (bool)** – Return the data in hash tables instead of creating tplot variables
- **no_update (bool)** – If set, only load data from your local cache
- **time_clip (bool)** – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.1.5 Solar Isotope Spectrometer (SIS)

```
pyspedas.ace.sis(trange=['2018-11-5', '2018-11-6'], datatype='k0', suffix='', get_support_data=False,  
varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,  
time_clip=False)
```

This function loads data from the Solar Isotope Spectrometer (SIS)

Parameters

- **trange (list of str)** – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype (str)** –
Data type; Valid options: h1: (default) 256-sec Level 2 Data h2: 1-Hour Level 2 Data k0:
1-Hour Key Parameters
- **suffix (str)** – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data (bool)** – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat (str)** – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames (list of str)** – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly (bool)** – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot (bool)** – Return the data in hash tables instead of creating tplot variables
- **no_update (bool)** – If set, only load data from your local cache
- **time_clip (bool)** – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.1.6 Ultra Low Energy Isotope Spectrometer (ULEIS)

```
pyspedas.ace.uleis(trange=['2018-11-5', '2018-11-6'], datatype='h2', suffix='', get_support_data=False,
                     varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                     time_clip=False)
```

This function loads data from the Ultra Low Energy Isotope Spectrometer (ULEIS)

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) –
Data type; Valid options: h2: 1-Hour Level 2 Data
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.1.7 Solar Energetic Particle Ionic Charge Analyzer (SEPICA)

```
pyspedas.ace.sepica(trange=['2004-11-5', '2004-11-6'], datatype='h2', suffix='', get_support_data=False,
                     varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                     time_clip=False)
```

This function loads data from the Solar Energetic Particle Ionic Charge Analyzer (SEPICA)

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) –
Data type; Valid options: h2: 1-Hour Level 2 Data
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.1.8 Solar Wind Ion Composition Spectrometer (SWICS)

```
pyspedas.ace.swics(trange=['2018-11-5', '2018-11-6'], datatype='sw2_h3', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Solar Wind Ion Composition Spectrometer (SWICS)

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) –
Data type; Valid options: sw2_h3: (default) SWICS 2.0 Solar Wind 2-Hour Level 2 Data
swi_h2: SWICS 1.1 Solar Wind 1-Hour Level 2 Data
swi_h3: SWICS 1.1 Solar Wind 2-Hour Level 2 Data
swi_h4: SWICS 1.1 Solar Wind 1-Day Level 2 Data
swi_h5: SWICS 1.1 Solar Wind 2-Hour Level 2 Q-state distributions
swi_h6: Solar Wind Protons 12-min Level 2 Data
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables

- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.2 Arase (ERG)

The routines in this module can be used to load data from the Arase mission.

2.2.1 Magnetic Field Experiment (MGF)

```
pyspedas.erg.mgf(trange=['2017-03-27', '2017-03-28'], datatype='8sec', level='l2', suffix='',
                   get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                   notplot=False, no_update=False, uname=None, passwd=None, time_clip=False, ror=True,
                   coord='dsi', version=None)
```

This function loads data from the MGF experiment from the Arase mission

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **level** – str Data level; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword
- **ror** – bool If set, print PI info and rules of the road
- **coord** – str “sm”, “dsi”, “gse”, “gsm”, “sgi”
- **version** – str Set this value to specify the version of cdf files (such as “v03.03”, “v03.04”, ...)

Returns List of tplot variables created.

2.2.2 Extremely High-energy electrons (XEP-e)

```
pyspedas.erg.xep(trange=['2017-06-01', '2017-06-02'], datatype='omniflux', level='l2', suffix='',
                    get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                    notplot=False, no_update=False, uname=None, passwd=None, time_clip=False, ror=True)
```

This function loads data from the XEP-e experiment from the Arase mission

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **level** – str Data level; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword
- **ror** – bool If set, print PI info and rules of the road

Returns List of tplot variables created.

2.2.3 High-energy Particles – electrons (HEP-e)

```
pyspedas.erg.hep(trange=['2017-03-27', '2017-03-28'], datatype='omniflux', level='l2', suffix='',
                    get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                    notplot=False, no_update=False, uname=None, passwd=None, time_clip=False, ror=True,
                    version=None)
```

This function loads data from the HEP experiment from the Arase mission

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **level** – str Data level; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword
- **ror** – bool If set, print PI info and rules of the road
- **version** – str Set this value to specify the version of cdf files (such as “v01_02”, “v01_03”, ...)

Returns List of tplot variables created.

2.2.4 Medium-energy Particles - electrons (MEP-e)

```
pyspedas.erg.mepe(trange=['2017-03-27', '2017-03-28'], datatype='omniflux', level='l2', suffix='',
                    get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                    notplot=False, no_update=False, uname=None, passwd=None, time_clip=False, ror=True)
```

This function loads data from the MEP-e experiment from the Arase mission

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **level** – str Data level; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

- **ror** – bool If set, print PI info and rules of the road

Returns List of tplot variables created.

2.2.5 Low-energy Particles – electrons (LEP-e)

```
pyspedas.erg.lepe(trange=['2017-04-04', '2017-04-05'], datatype='omniflux', level='l2', suffix='',
                     get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                     notplot=False, no_update=False, uname=None, passwd=None, time_clip=False, ror=True,
                     version=None, only_fedu=False, et_diagram=False)
```

This function loads data from the LEP-e experiment from the Arase mission

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **level** – str Data level; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword
- **ror** – bool If set, print PI info and rules of the road
- **version** – str Set this value to specify the version of cdf files (such as “v02_02”)
- **only_fedu** – bool If set, not make **erg_lepe_l3_pa_enech_??(??:01,01,..32)_FEDU** Tplot Variables
- **et_diagram** – bool If set, make **erg_lepe_l3_pa_pabin_??(??:01,01,..16)_FEDU** Tplot Variables

Returns List of tplot variables created.

2.2.6 Medium-energy Particles – ion (MEP-i)

2.2.7 Low-energy Particles – ion (LEP-i)

```
pyspedas.erg.lepi(trange=['2017-07-01', '2017-07-02'], datatype='omniflux', level='l2', suffix='',
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,
    notplot=False, no_update=False, uname=None, passwd=None, time_clip=False, ror=True,
    version=None)
```

This function loads data from the LEP-i experiment from the Arase mission

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **level** – str Data level; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword
- **ror** – bool If set, print PI info and rules of the road
- **version** – str Set this value to specify the version of cdf files (such as “v03_00”)

Returns List of tplot variables created.

2.2.8 Plasma Wave Experiment (PWE)

```
pyspedas.erg.pwe_ofa(trange=['2017-04-01', '2017-04-02'], datatype='spec', level='l2', suffix='',
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,
    notplot=False, no_update=False, uname=None, passwd=None, time_clip=False,
    ror=True)
```

This function loads data from the PWE experiment from the Arase mission

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:

- **level** – str Data level; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword
- **ror** – bool If set, print PI info and rules of the road

Returns List of tplot variables created.

```
pyspedas.erg.pwe_hfa(trange=['2017-04-01', '2017-04-02'], datatype='spec', mode='low', level='l2', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, uname=None, passwd=None, time_clip=False,
                      ror=True)
```

This function loads data from the PWE experiment from the Arase mission

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **level** – str Data level; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword
- **ror** – bool If set, print PI info and rules of the road

Returns List of tplot variables created.

```
pyspedas.erg.pwe_efd(trange=['2017-04-01', '2017-04-02'], datatype='E_spin', level='l2', suffix='', coord='dsi',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, uname=None, passwd=None, time_clip=False,
                      ror=True)
```

This function loads data from the PWE experiment from the Arase mission

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **level** – str Data level; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword
- **ror** – bool If set, print PI info and rules of the road

Returns List of tplot variables created.

2.2.9 Orbit data

```
pyspedas.erg.orb(trange=['2017-03-27', '2017-03-28'], datatype='def', level='l2', model='op', suffix='',
                  get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                  notplot=False, no_update=False, uname=None, passwd=None, time_clip=False,
                  version=None, ror=True)
```

This function loads orbit data from the Arase mission

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **level** – str Data level; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword
- **version** – str Set this value to specify the version of cdf files (such as “v03”)

Returns List of tplot variables created.

2.3 Cluster

The routines in this module can be used to load data from the Cluster mission.

2.3.1 Fluxgate Magnetometer (FGM)

```
pyspedas.cluster.fgm(trange=['2018-11-5', '2018-11-6'], probe='1', datatype='up', suffix='',  
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
                      notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Fluxgate Magnetometer

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache

- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.3.2 Active Spacecraft Potential Control experiment (ASPOC)

```
pyspedas.cluster.aspoc(trange=['2018-11-5', '2018-11-6'], probe='I', datatype='pp', suffix='',
                        get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                        notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Active Spacecraft Potential Control experiment

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.3.3 Cluster Ion Spectroscopy experiment (CIS)

```
pyspedas.cluster.cis(trange=['2018-11-5', '2018-11-6'], probe='I', datatype='pp', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Cluster Ion Spectroscopy experiment

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.3.4 Digital Wave Processing instrument (DWP)

```
pyspedas.cluster.dwp(trange=['2018-11-5', '2018-11-6'], probe='1', datatype='pp', suffix='',  
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
                      notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Digital Wave Processing instrument

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.3.5 Electron Drift Instrument (EDI)

```
pyspedas.cluster.edi(trange=['2018-11-5', '2018-11-6'], probe='I', datatype='pp', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Electron Drift Instrument

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.3.6 Electric Field and Wave experiment (EFW)

```
pyspedas.cluster.efw(trange=['2018-11-5', '2018-11-6'], probe='I', datatype='pp', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Electric Field and Wave experiment

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.

- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.3.7 Plasma Electron and Current Experiment (PEACE)

```
pyspedas.cluster.peace(trange=['2016-11-5', '2016-11-6'], probe='I', datatype='pp', suffix='',  
get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Plasma Electron and Current Experiment

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.3.8 Research with Adaptive Particle Imaging Detectors (RAPID)

```
pyspedas.cluster.rapid(trange=['2016-11-5', '2016-11-6'], probe='I', datatype='pp', suffix='',
                        get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                        notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Research with Adaptive Particle Imaging Detectors

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.3.9 Spatio-Temporal Analysis of Field Fluctuation experiment (STAFF)

```
pyspedas.cluster.staff(trange=['2012-11-5', '2012-11-6'], probe='I', datatype='pp', suffix='',
                        get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                        notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Spatio-Temporal Analysis of Field Fluctuation experiment

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.

- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.3.10 Wide Band Data receiver (WBD)

```
pyspedas.cluster.wbd(trange=['2012-11-6', '2012-11-7'], probe='I', datatype='waveform', suffix='',  
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
                      notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Wide Band Data receiver

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.3.11 Waves of High Frequency and Sounder for Probing of Density by Relaxation (WHISPER)

```
pyspedas.cluster.whi(trange=['2012-11-5', '2012-11-6'], probe='I', datatype='pp', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Waves of High Frequency and Sounder for Probing of Density by Relaxation instrument

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.4 Colorado Student Space Weather Experiment (CSSWE)

The routines in this module can be used to load data from the CSSWE mission.

2.4.1 Relativistic Electron and Proton Telescope integrated little experiment (REP-Tile)

```
pyspedas.csswe.reptile(trange=['2013-11-5', '2013-11-6'], datatype='flux', level='l2', suffix='',
                        get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                        notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Relativistic Electron and Proton Telescope integrated little experiment (REP-Tile)

Parameters

- **trange** (list of str) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]

- **datatype** (`str`) –
Data type; Valid options: ‘counts’ for L1 data ‘flux’ for L2 data
- **level** (`str`) – Data level; options: ‘l1’, ‘l2’ (default: l2)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.5 Deep Space Climate Observatory (DSCOVR)

The routines in this module can be used to load data from the DSCOVR mission.

2.5.1 Magnetometer

```
pyspedas.dscovr.mag(trange=['2018-10-16', '2018-10-17'], datatype='h0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads DSCOVR Fluxgate Magnetometer data

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) –
Data type; Valid options: ‘h0’: 1-sec Definitive Data (default)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.

- **varformat (str)** – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames (list of str)** – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly (bool)** – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot (bool)** – Return the data in hash tables instead of creating tplot variables
- **no_update (bool)** – If set, only load data from your local cache
- **time_clip (bool)** – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.5.2 Faraday cup

```
pyspedas.dscovr.fc(trange=['2018-10-16', '2018-10-17'], datatype='h1', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads DSCOVR Faraday Cup data

Parameters

- **trange (list of str)** – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype (str)** –
Data type; Valid options: ‘h1’: 1-minute Isotropic Maxwellian parameters for solar wind protons (default)
- **suffix (str)** – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data (bool)** – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat (str)** – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames (list of str)** – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly (bool)** – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot (bool)** – Return the data in hash tables instead of creating tplot variables
- **no_update (bool)** – If set, only load data from your local cache
- **time_clip (bool)** – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.5.3 Orbit data

```
pyspedas.dscovr.orb(trange=['2018-10-16', '2018-10-17'], datatype='orbit', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads DSCOVR Ephemeris data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.5.4 Attitude data

```
pyspedas.dscovr.att(trange=['2018-10-16', '2018-10-17'], datatype='orbit', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads DSCOVR Attitude data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.

- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns**Return type** List of tplot variables created.

2.5.5 All data

```
pyspedas.dscovr.all(trange=['2018-10-16', '2018-10-17'], downloadonly=False, suffix='', no_update=False, time_clip=False)
```

This function loads all DSCOVR data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns**Return type** List of tplot variables created.

2.6 Equator-S

The routines in this module can be used to load data from the Equator-S mission.

2.6.1 Fluxgate magnetometer (MAM)

```
pyspedas.equator_s.mam(trange=['1998-04-06', '1998-04-07'], datatype='pp', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Fluxgate magnetometer

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:

- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.6.2 Electron beam sensing instrument (EDI)

```
pyspedas.equator_s.edi(trange=['1998-04-06', '1998-04-07'], datatype='pp', suffix='',
                        get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                        notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Electron beam sensing instrument

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,’YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,’YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache

- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.6.3 Electrostatic analyzer (3DA)

```
pyspedas.equator_s.esa(trange=['1998-04-06', '1998-04-07'], datatype='pp', suffix='',
                        get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                        notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Electrostatic analyzer (3DA)

NOTE: as of Dec 2019, no 3DA data are available via the SPDF archive.

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.6.4 Solid state detector (EPI)

```
pyspedas.equator_s.epi(trange=['1998-04-06', '1998-04-07'], datatype='pp', suffix='',
                         get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                         notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Solid state detector

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.6.5 Time-of-flight spectrometer (ICI)

```
pyspedas.equator_s.ici(trange=['1998-04-06', '1998-04-07'], datatype='pp', suffix='',
                         get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                         notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Time-of-flight spectrometer

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.6.6 Ion emitter (PCD)

```
pyspedas.equator_s.pcd(trange=['1998-04-06', '1998-04-07'], datatype='pp', suffix='',
                        get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                        notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Ion emitter

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.6.7 Scintillating fiber detector (SFD)

```
pyspedas.equator_s.sfd(trange=['1998-01-26', '1998-01-27'], datatype='sp', suffix='', get_support_data=False,  
varformat=None, varnames=[], downloadonly=False, notplot=False,  
no_update=False, time_clip=False)
```

This function loads data from the Scintillating fiber detector

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.7 Fast Auroral Snapshot Explorer (FAST)

The routines in this module can be used to load data from the FAST mission.

2.7.1 Fluxgate Magnetometer (DCB)

```
pyspedas.fast.dcb(trange=['2001-09-05', '2001-09-06'], datatype='', level='k0', suffix='',
                    get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                    notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Fluxgate Magnetometer

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.7.2 Search-coil Magnetometer (ACB)

```
pyspedas.fast.acb(trange=['1998-01-05', '1998-01-06'], datatype='', level='k0', suffix='',
                    get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                    notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Search-coil Magnetometer

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.7.3 Electrostatic Analyzers (ESA)

```
pyspedas.fast.esa(trange=['1998-09-05', '1998-09-06'], datatype='ies', level='l2', suffix='',  
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
    notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Electrostatic Analyzers (ESA)

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.7.4 Time-of-flight Energy Angle Mass Spectrograph (TEAMS)

```
pyspedas.fast.teams(trange=['1998-09-05', '1998-09-06'], datatype='', level='k0', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Time-of-flight Energy Angle Mass Spectrograph (TEAMS)

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.8 Geotail

The routines in this module can be used to load data from the Geotail mission.

2.8.1 Magnetic Field Experiment (MGF)

```
pyspedas.geotail.mgf(trange=['2018-11-5', '2018-11-6'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the MGF instrument

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.8.2 Electric Field Detector (EFD)

```
pyspedas.geotail.efd(trange=['2018-11-5', '2018-11-6'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the EFD instrument

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.8.3 Low Energy Particle experiment (LEP)

```
pyspedas.geotail.lep(trange=['2018-11-5', '2018-11-6'], datatype='k0', suffix='', get_support_data=False,
                      varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                      time_clip=False)
```

This function loads data from the LEP instrument

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.8.4 Comprehensive Plasma Instrumentation (CPI)

```
pyspedas.geotail.cpi(trange=['2018-11-5', '2018-11-6'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the CPI instrument

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.8.5 Energetic Particles and Ion Composition Instrument (EPIC)

```
pyspedas.geotail.epic(trange=['2018-11-5', '2018-11-6'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the EPIC instrument

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.8.6 Plasma Wave Instrument (PWI)

```
pyspedas.geotail.pwi(trange=['2018-11-5', '2018-11-6'], datatype='k0', suffix='', get_support_data=False,
                      varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                      time_clip=False)
```

This function loads data from the PWI instrument

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.9 Geostationary Operational Environmental Satellite (GOES)

The routines in this module can be used to load data from the GOES mission.

2.9.1 Magnetometer (FGM)

```
pyspedas.goes.fgm(trange=['2013-11-5', '2013-11-6'], probe='15', datatype='1min', suffix='',  
downloadonly=False, no_update=False, time_clip=False)
```

This function loads data from the GOES Magnetometer

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str/int or list of strs/ints`) – GOES spacecraft #, e.g., probe=15
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.10 Imager for Magnetopause-to-Aurora Global Exploration (IMAGE)

The routines in this module can be used to load data from the IMAGE ission.

2.10.1 Low-Energy Neutral Atom (LENA) imager

```
pyspedas.image.lenा( trange=['2004-11-5', '2004-11-6'], datatype='k0', suffix='', get_support_data=False,  
varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,  
time_clip=False)
```

This function loads IMAGE LENA data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:

- **suffix (str)** – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data (bool)** – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat (str)** – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames (list of str)** – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly (bool)** – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot (bool)** – Return the data in hash tables instead of creating tplot variables
- **no_update (bool)** – If set, only load data from your local cache
- **time_clip (bool)** – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.10.2 Medium-Energy Neutral Atom (MENA) imager

```
pyspedas.image.mena(trange=['2004-11-5', '2004-11-6'], datatype='k0', suffix='', get_support_data=False,
                      varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                      time_clip=False)
```

This function loads IMAGE MENA data

Parameters

- **trange (list of str)** – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype (str)** – Data type; Valid options:
- **suffix (str)** – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data (bool)** – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat (str)** – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames (list of str)** – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly (bool)** – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot (bool)** – Return the data in hash tables instead of creating tplot variables
- **no_update (bool)** – If set, only load data from your local cache

- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.10.3 High-Energy Neutral Atom (HENA) imager

```
pyspedas.image.hena(trange=['2004-11-5', '2004-11-6'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads IMAGE HENA data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.10.4 Radio Plasma Imaging (RPI)

```
pyspedas.image.rpi(trange=['2004-11-5', '2004-11-6'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads IMAGE RPI data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]

- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.10.5 Extreme Ultraviolet Imager (EUV)

```
pyspedas.image.euv(trange=['2004-11-5', '2004-11-6'], datatype='k0', suffix='', get_support_data=False,
                     varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                     time_clip=False)
```

This function loads IMAGE EUV data

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache

- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.10.6 Far Ultraviolet Imager (FUV)

```
pyspedas.image.fuv(trange=['2004-11-5', '2004-11-6'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads IMAGE FUV data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.10.7 Orbit data

```
pyspedas.image.orbit(trange=['2004-11-5', '2004-11-6'], datatype='def_or', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads IMAGE orbit data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]

- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.11 Mars Atmosphere and Volatile Evolution (MAVEN)

The routines in this module can be used to load data from the MAVEN mission.

2.11.1 Magnetometer (MAG)

```
pyspedas.maven.mag(trange=['2016-01-01', '2016-01-02'], level='l2', datatype='ss', varformat=None,
                     get_support_data=False, auto_yes=True, downloadonly=False, varnames=[])
```

2.11.2 Solar Wind Electron Analyzer (SWEA)

```
pyspedas.maven.swea(trange=['2016-01-01', '2016-01-02'], level='l2', datatype='svyspec', varformat=None,
                      get_support_data=False, auto_yes=True, downloadonly=False, varnames=[])
```

2.11.3 Solar Wind Ion Analyzer (SWIA)

```
pyspedas.maven.swia(trange=['2016-01-01', '2016-01-02'], level='l2', datatype='onboardsvyspec',
                     varformat=None, get_support_data=False, auto_yes=True, downloadonly=False,
                     varnames=[])
```

2.11.4 SupraThermal And Thermal Ion Composition (STATIC)

```
pyspedas.maven.sta(trange=['2016-01-01', '2016-01-02'], level='l2', datatype='2a', varformat=None,  
get_support_data=False, auto_yes=True, downloadonly=False, varnames=[])
```

2.11.5 Solar Energetic Particle (SEP)

```
pyspedas.maven.sep(trange=['2016-01-01', '2016-01-02'], level='l2', datatype='s2-cal-svy-full',  
varformat=None, get_support_data=False, auto_yes=True, downloadonly=False,  
varnames=[])
```

2.11.6 Langmuir Probe and Waves (LPW)

```
pyspedas.maven.lpw(trange=['2016-01-01', '2016-01-02'], level='l2', datatype='lpiv', varformat=None,  
get_support_data=False, auto_yes=True, downloadonly=False, varnames=[])
```

2.11.7 Extreme Ultraviolet Monitor (EUV)

```
pyspedas.maven.euv(trange=['2016-01-01', '2016-01-02'], level='l2', datatype='bands', varformat=None,  
get_support_data=False, auto_yes=True, downloadonly=False, varnames=[])
```

2.12 Magnetic Induction Coil Array (MICA)

The routines in this module can be used to load data from the Magnetic Induction Coil Array (MICA).

```
pyspedas.mica.induction(site=None, trange=['2019-02-01', '2019-02-02'], suffix='', get_support_data=False,  
varformat=None, varnames=[], downloadonly=False, notplot=False,  
no_update=False, time_clip=False)
```

This function loads data from the Magnetic Induction Coil Array (MICA)

Parameters

- **site (str)** – abbreviated name of station. sites include: NAL, LYR, LOR, ISR, SDY, IQA, SNK, MCM, SPA, JBS, NEV, HAL, PG2[3,4,5]
- **trange (list of str)** – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **suffix (str)** – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data (bool)** – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat (str)** – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames (list of str)** – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly (bool)** – Set this flag to download the CDF files, but not load them into tplot variables

- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.13 Magnetospheric Multiscale (MMS)

The routines in this module can be used to load data from the Magnetospheric Multiscale (MMS) mission.

2.13.1 Fluxgate Magnetometer (FGM)

`pyspedas.mms.fgm(*args, **kwargs)`

This function loads FGM data into tplot variables

Parameters

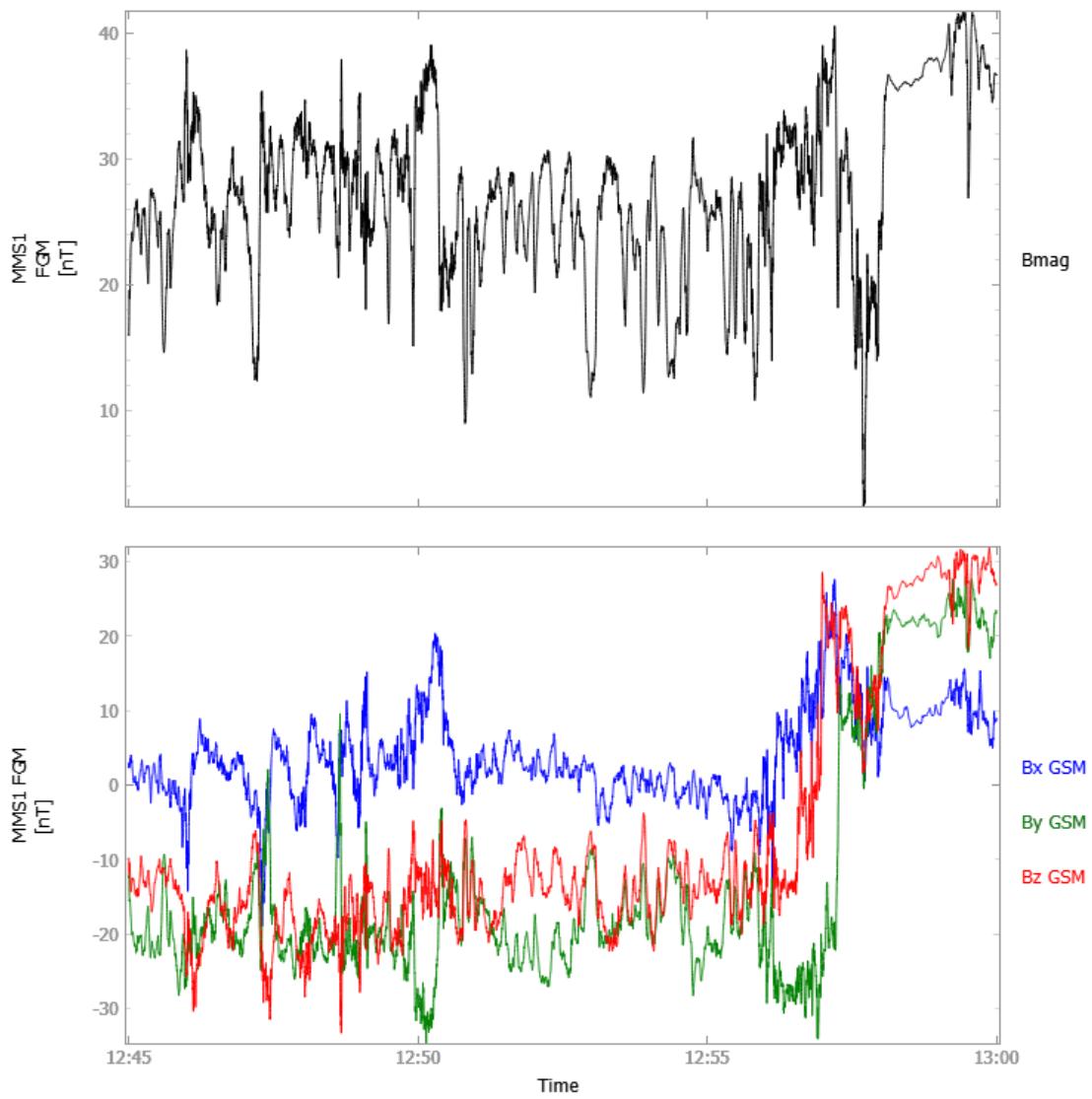
- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – list of probes, valid values for MMS probes are [‘1’,‘2’,‘3’,‘4’].
- **data_rate** (`str or list of str`) – instrument data rates for FGM include ‘brst’ ‘fast’ ‘slow’ ‘srvy’. The default is ‘srvy’.
- **level** (`str`) – indicates level of data processing. the default if no level is specified is ‘l2’
- **datatype** (`str or list of str`) – no datatype for FGM instrument (all science data are loaded)
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **time_clip** (`bool`) – Data will be clipped to the exact trange specified by the trange keyword.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **notplot** (`bool`) – If True, then data are returned in a hash table instead of being stored in tplot variables (useful for debugging, and access to multi-dimensional data products)
- **available** (`bool`) – If True, simply return the available data files (without downloading) for the requested paramters
- **no_update** (`bool`) – Set this flag to preserve the original data. if not set and newer data is found the existing data will be overwritten
- **cdf_version** (`str`) – Specify a specific CDF version # to load (e.g., `cdf_version='4.3.0'`)

- **min_version (str)** – Specify a minimum CDF version # to load
- **latest_version (bool)** – Only grab the latest CDF version in the requested time interval
- **major_version (bool)** – Only open the latest major CDF version (e.g., X in vX.Y.Z) in the requested time interval
- **keep_flagged (bool)** – If True, don't remove flagged data (flagged data are set to NaNs by default, this keyword turns this off)
- **always_prompt (bool)** – Set this keyword to always prompt for the user's username and password; useful if you accidentally save an incorrect password, or if your SDC password has changed
- **spdf (bool)** – If True, download the data from the SPDF instead of the SDC
- **get_fgm_ephemeris (bool)** – Keep the ephemeris variables in the FGM files

Returns List of tplot variables created.

FGM Example

```
import pyspedas
from pyptplot import tplot
pyspedas.mms.fgm(trange=['2015-10-16/12:45', '2015-10-16/13:00'], time_clip=True)
tplot(['mms1_fgm_b_gsm_srvy_l2_btot', 'mms1_fgm_b_gsm_srvy_l2_bvec'])
```



2.13.2 Search-coil Magnetometer (SCM)

`pyspedas.mms.scm(*args, **kwargs)`

This function loads SCM data into tplot variables

Parameters

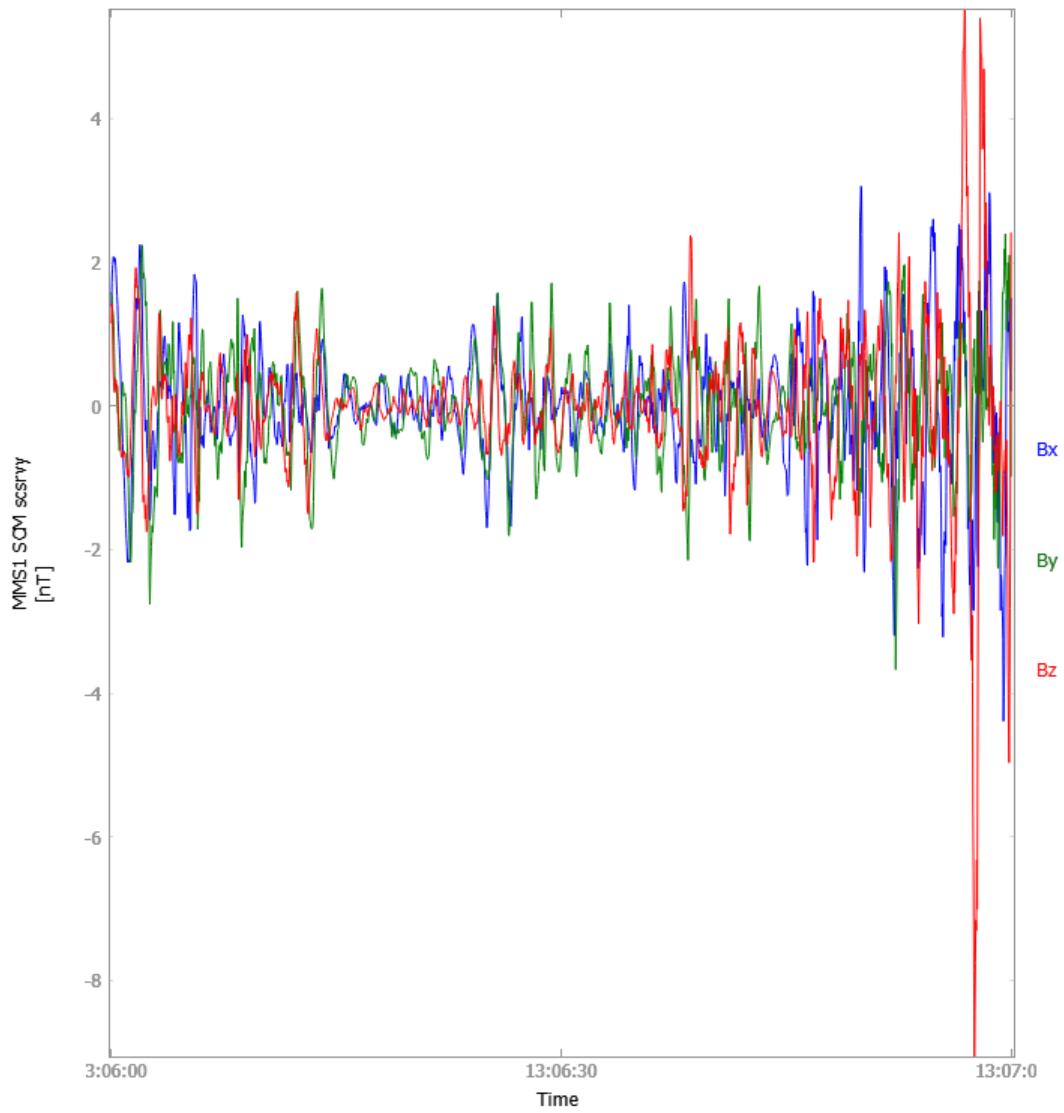
- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – list of probes, valid values for MMS probes are [‘1’,‘2’,‘3’,‘4’].
- **data_rate** (`str or list of str`) – instrument data rates for SCM include [‘brst’ ‘fast’ ‘slow’ ‘srvy’]. The default is ‘srvy’.
- **level** (`str`) – indicates level of data processing. the default if no level is specified is ‘l2’

- **datatype** (`str` or `list` of `str`) – Valid datatypes for SCM are: ['scsrvy', 'cal', 'scb', 'scf', 'schb', 'scm', 'scs'] If no value is given the default is scsrvy for srvy data, and scb for brst data.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **time_clip** (`bool`) – Data will be clipped to the exact trange specified by the trange keyword.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **notplot** (`bool`) – If True, then data are returned in a hash table instead of being stored in tplot variables (useful for debugging, and access to multi-dimensional data products)
- **available** (`bool`) – If True, simply return the available data files (without downloading) for the requested paramters
- **no_update** (`bool`) – Set this flag to preserve the original data. if not set and newer data is found the existing data will be overwritten
- **cdf_version** (`str`) – Specify a specific CDF version # to load (e.g., `cdf_version='4.3.0'`)
- **min_version** (`str`) – Specify a minimum CDF version # to load
- **latest_version** (`bool`) – Only grab the latest CDF version in the requested time interval
- **major_version** (`bool`) – Only open the latest major CDF version (e.g., X in vX.Y.Z) in the requested time interval
- **always_prompt** (`bool`) – Set this keyword to always prompt for the user’s username and password; useful if you accidentally save an incorrect password, or if your SDC password has changed
- **spdf** (`bool`) – If True, download the data from the SPDF instead of the SDC

Returns List of tplot variables created.

SCM Example

```
import pyspedas
from pytplot import tplot
pyspedas.mms.scm(trange=['2015-10-16/13:06', '2015-10-16/13:07'], time_clip=True)
tplot('mms1_scm_acb_gse_scsrvy_srvy_12')
```



2.13.3 Level 3 FGM+SCM Data (FSM)

`pyspedas.mms.fsm(*args, **kwargs)`

This function loads FSM data into tplot variables

Parameters

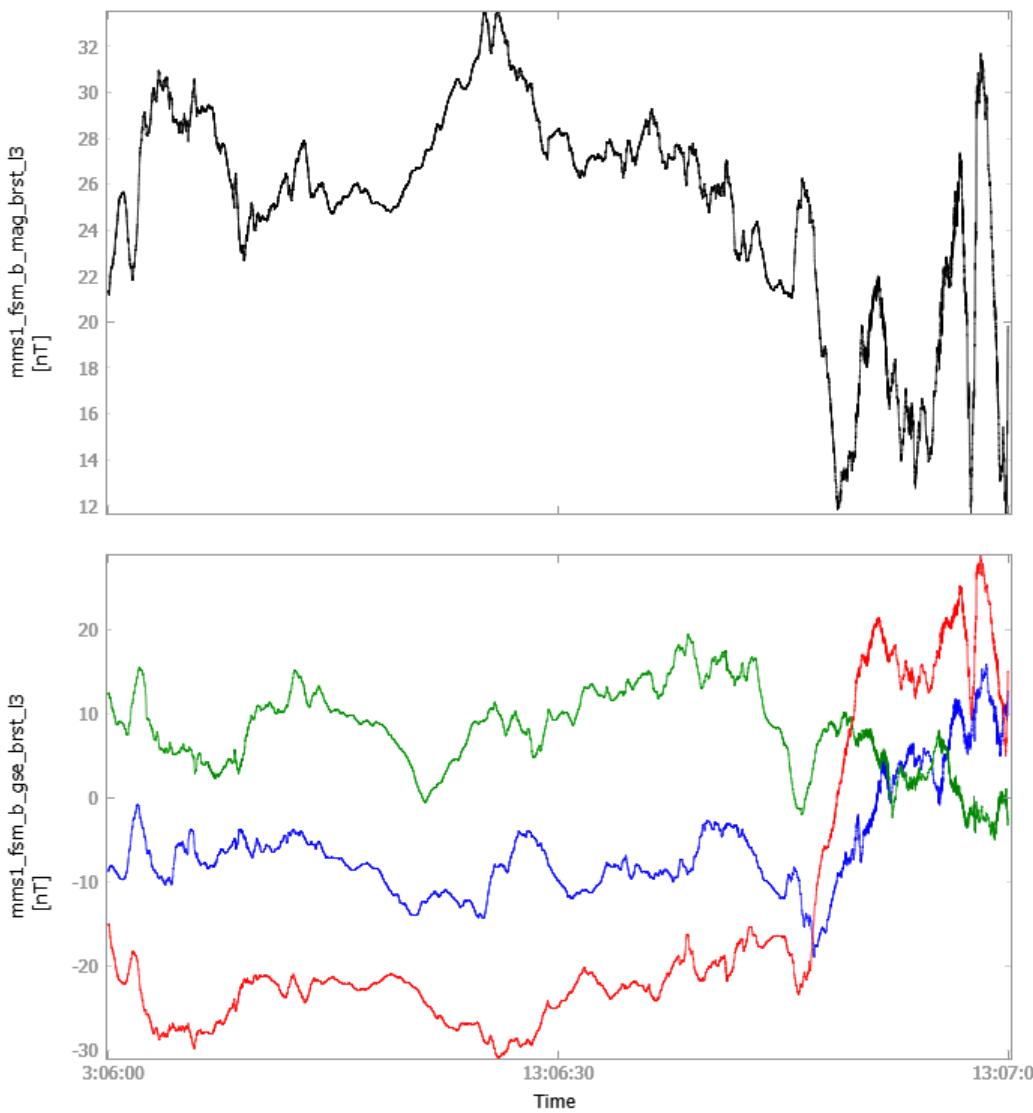
- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – list of probes, valid values for MMS probes are [‘1’,‘2’,‘3’,‘4’].
- **data_rate** (`str or list of str`) – the current instrument data rate for FSM is ‘brst’
- **level** (`str`) – indicates level of data processing. the default if no level is specified is ‘l2’

- **datatype** (`str` or `list` of `str`) – Valid datatype for FSM is: 8khz
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **time_clip** (`bool`) – Data will be clipped to the exact trange specified by the trange keyword.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **notplot** (`bool`) – If True, then data are returned in a hash table instead of being stored in tplot variables (useful for debugging, and access to multi-dimensional data products)
- **available** (`bool`) – If True, simply return the available data files (without downloading) for the requested paramters
- **no_update** (`bool`) – Set this flag to preserve the original data. if not set and newer data is found the existing data will be overwritten
- **cdf_version** (`str`) – Specify a specific CDF version # to load (e.g., `cdf_version='4.3.0'`)
- **min_version** (`str`) – Specify a minimum CDF version # to load
- **latest_version** (`bool`) – Only grab the latest CDF version in the requested time interval
- **major_version** (`bool`) – Only open the latest major CDF version (e.g., X in vX.Y.Z) in the requested time interval
- **always_prompt** (`bool`) – Set this keyword to always prompt for the user’s username and password; useful if you accidentally save an incorrect password, or if your SDC password has changed
- **spdf** (`bool`) – If True, download the data from the SPDF instead of the SDC

Returns List of tplot variables created.

FSM Example

```
import pyspedas
from pytplot import tplot
pyspedas.mms.fsm(trange=['2015-10-16/13:06', '2015-10-16/13:07'], time_clip=True)
tplot(['mms1_fsm_b_mag_brst_13', 'mms1_fsm_b_gse_brst_13'])
```



2.13.4 Electric field Double Probe (EDP)

`pyspedas.mms.edp(*args, **kwargs)`

This function loads EDP data into tplot variables

Parameters

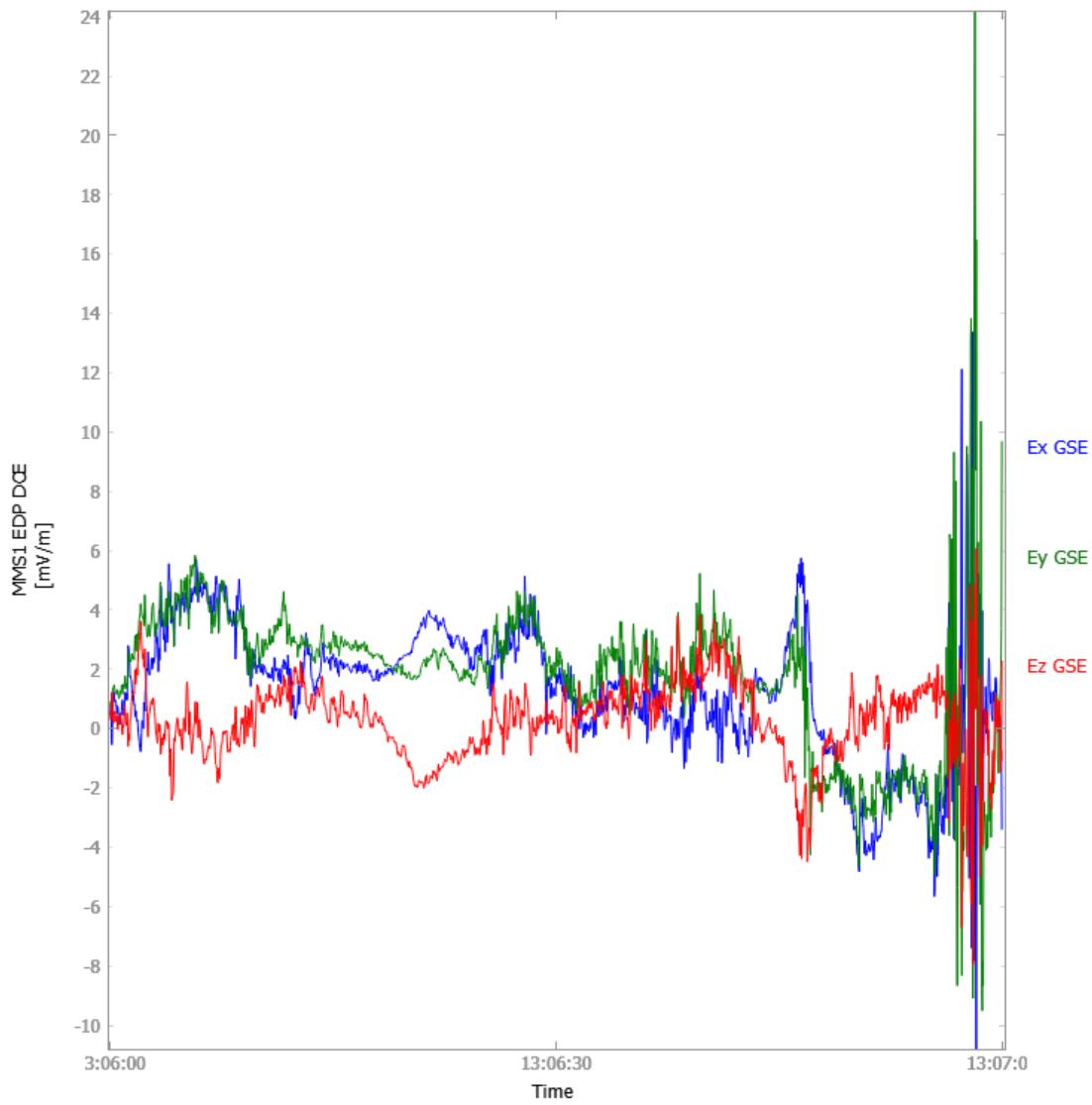
- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – list of probes, valid values for MMS probes are [‘1’,‘2’,‘3’,‘4’].
- **data_rate** (`str or list of str`) – instrument data rates for EDP include [‘brst’, ‘fast’, ‘slow’, ‘srvy’]. The default is ‘fast’.
- **level** (`str`) – indicates level of data processing. the default if no level is specified is ‘l2’

- **datatype** (`str` or `list` of `str`) – Valid datatypes for EDP are: ['dce', 'dcv', 'ace', 'hmfe']; default is 'dce'
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **time_clip** (`bool`) – Data will be clipped to the exact trange specified by the trange keyword.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **notplot** (`bool`) – If True, then data are returned in a hash table instead of being stored in tplot variables (useful for debugging, and access to multi-dimensional data products)
- **available** (`bool`) – If True, simply return the available data files (without downloading) for the requested paramters
- **no_update** (`bool`) – Set this flag to preserve the original data. if not set and newer data is found the existing data will be overwritten
- **cdf_version** (`str`) – Specify a specific CDF version # to load (e.g., `cdf_version='4.3.0'`)
- **min_version** (`str`) – Specify a minimum CDF version # to load
- **latest_version** (`bool`) – Only grab the latest CDF version in the requested time interval
- **major_version** (`bool`) – Only open the latest major CDF version (e.g., X in vX.Y.Z) in the requested time interval
- **always_prompt** (`bool`) – Set this keyword to always prompt for the user’s username and password; useful if you accidentally save an incorrect password, or if your SDC password has changed
- **spdf** (`bool`) – If True, download the data from the SPDF instead of the SDC

Returns List of tplot variables created.

EDP Example

```
import pyspedas
from pytplot import tplot
pyspedas.mms.edp(trange=['2015-10-16/13:06', '2015-10-16/13:07'], time_clip=True)
tplot('mms1_edp_dce_gse_fast_12')
```



2.13.5 Electron Drift Instrument (EDI)

`pyspedas.mms.edi(*args, **kwargs)`

This function loads EDI data into tplot variables

Parameters

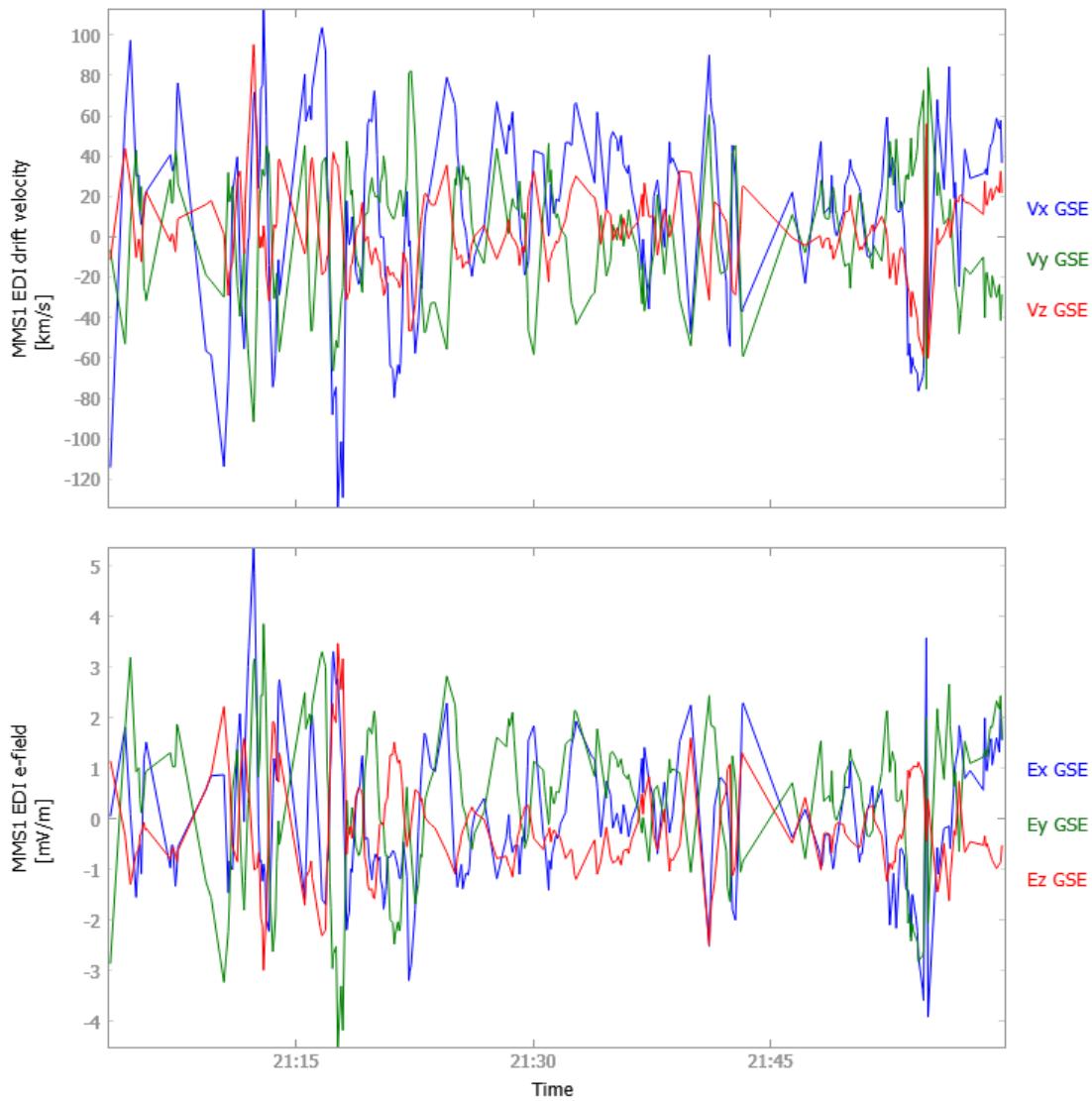
- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – list of probes, valid values for MMS probes are [‘1’,‘2’,‘3’,‘4’].
- **data_rate** (`str or list of str`) – instrument data rates for EDI include [‘brst’, ‘fast’, ‘slow’, ‘srvy’]. The default is ‘srvy’.
- **level** (`str`) – indicates level of data processing. the default if no level is specified is ‘l2’

- **datatype** (`str` or `list` of `str`) – Valid datatypes for EDI are: ['efield', 'amb']; default is 'efield'
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **time_clip** (`bool`) – Data will be clipped to the exact trange specified by the trange keyword.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **notplot** (`bool`) – If True, then data are returned in a hash table instead of being stored in tplot variables (useful for debugging, and access to multi-dimensional data products)
- **available** (`bool`) – If True, simply return the available data files (without downloading) for the requested paramters
- **no_update** (`bool`) – Set this flag to preserve the original data. if not set and newer data is found the existing data will be overwritten
- **cdf_version** (`str`) – Specify a specific CDF version # to load (e.g., `cdf_version='4.3.0'`)
- **min_version** (`str`) – Specify a minimum CDF version # to load
- **latest_version** (`bool`) – Only grab the latest CDF version in the requested time interval
- **major_version** (`bool`) – Only open the latest major CDF version (e.g., X in vX.Y.Z) in the requested time interval
- **always_prompt** (`bool`) – Set this keyword to always prompt for the user’s username and password; useful if you accidentally save an incorrect password, or if your SDC password has changed
- **spdf** (`bool`) – If True, download the data from the SPDF instead of the SDC

Returns List of tplot variables created.

EDI Example

```
import pyspedas
from pytplot import tplot
pyspedas.mms.edi(trange=['2016-10-16/21:00', '2016-10-16/22:00'], time_clip=True)
tplot(['mms1_edi_vdrift_gse_srvy_l2', 'mms1_edi_e_gse_srvy_l2'])
```



2.13.6 Fly's Eye Energetic Particle Sensor (FEEPS)

`pyspedas.mms.feeeps(*args, **kwargs)`

This function loads FEEPS data into tplot variables

Parameters

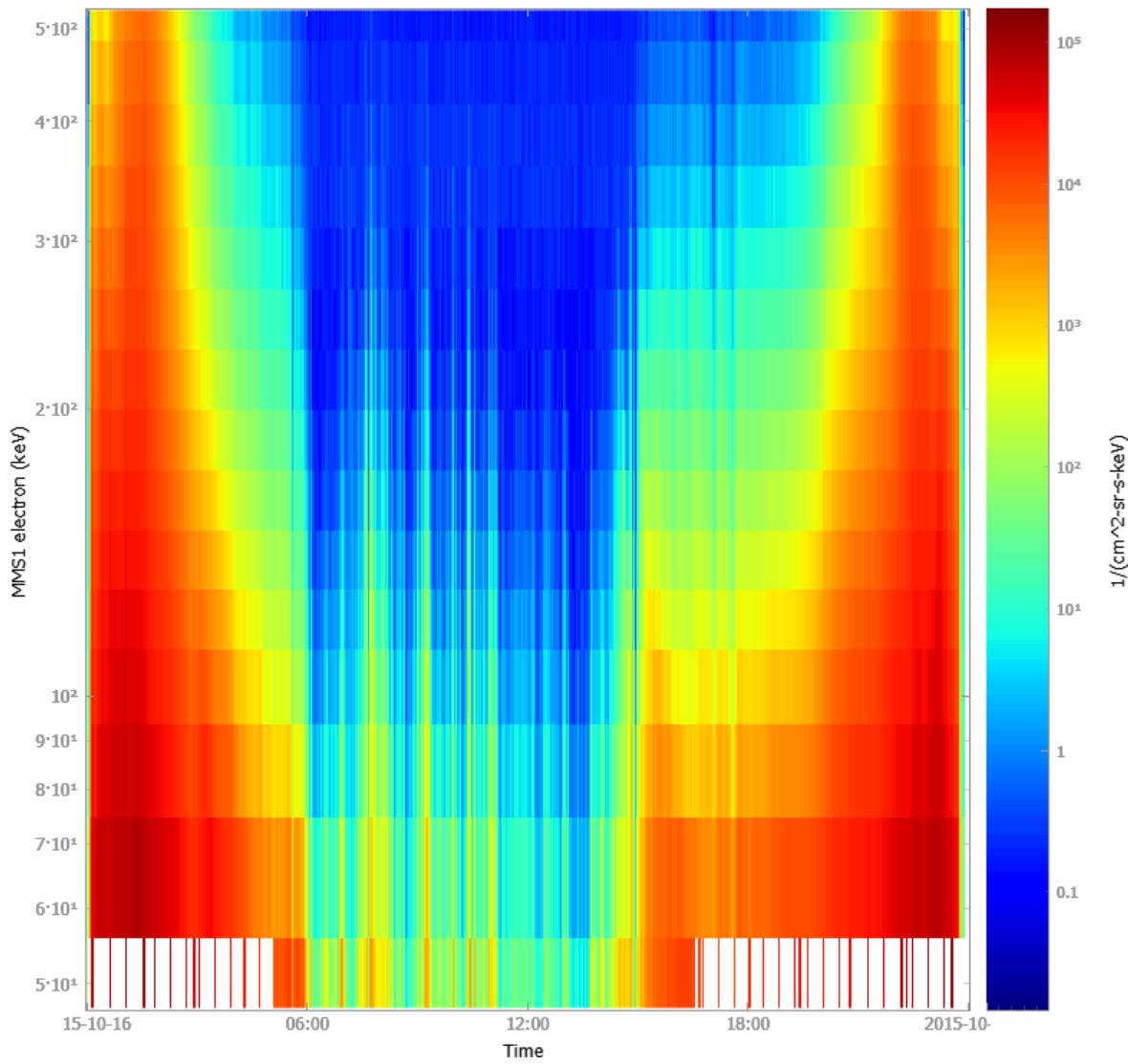
- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – list of probes, valid values for MMS probes are [‘1’,‘2’,‘3’,‘4’].
- **data_rate** (`str or list of str`) – instrument data rates for FEEPS include [‘brst’, ‘srvy’]. The default is ‘srvy’.
- **level** (`str`) – indicates level of data processing. the default if no level is specified is ‘l2’

- **datatype** (`str` or `list` of `str`) –
Valid datatypes for FEEPS are: L2, L1b: ['electron', 'ion'] L1a: ['electron-bottom', 'electron-top', 'ion-bottom', 'ion-top']
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **time_clip** (`bool`) – Data will be clipped to the exact trange specified by the trange keyword.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **notplot** (`bool`) – If True, then data are returned in a hash table instead of being stored in tplot variables (useful for debugging, and access to multi-dimensional data products)
- **available** (`bool`) – If True, simply return the available data files (without downloading) for the requested paramters
- **no_update** (`bool`) – Set this flag to preserve the original data. if not set and newer data is found the existing data will be overwritten
- **cdf_version** (`str`) – Specify a specific CDF version # to load (e.g., `cdf_version='4.3.0'`)
- **min_version** (`str`) – Specify a minimum CDF version # to load
- **latest_version** (`bool`) – Only grab the latest CDF version in the requested time interval
- **major_version** (`bool`) – Only open the latest major CDF version (e.g., X in vX.Y.Z) in the requested time interval
- **always_prompt** (`bool`) – Set this keyword to always prompt for the user’s username and password; useful if you accidentally save an incorrect password, or if your SDC password has changed
- **spdf** (`bool`) – If True, download the data from the SPDF instead of the SDC

Returns List of tplot variables created.

FEEPS Example

```
import pyspedas
from pytplot import tplot
pyspedas.mms.feeps(trange=['2015-10-16', '2015-10-17'])
tplot('mms1_epd_feeps_srvy_12_electron_intensity_omni_spin')
```



2.13.7 Energetic Ion Spectrometer (EIS)

`pyspedas.mms.eis(*args, **kwargs)`

This function loads EIS data into tplot variables

Parameters

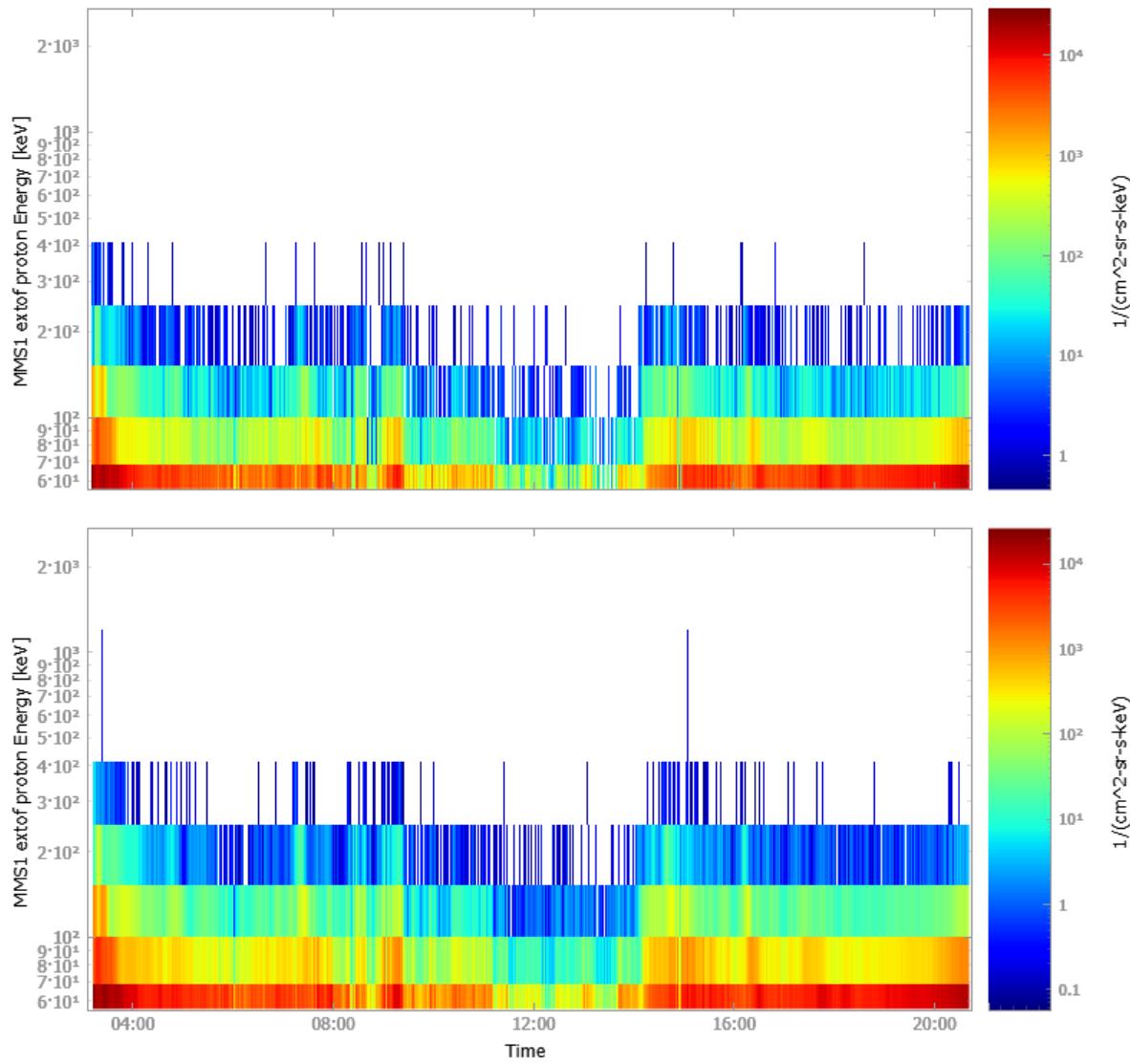
- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – list of probes, valid values for MMS probes are [‘1’,‘2’,‘3’,‘4’].
- **data_rate** (`str or list of str`) – instrument data rates for EIS include [‘brst’, ‘srvy’]. The default is ‘srvy’.
- **level** (`str`) – indicates level of data processing. the default if no level is specified is ‘l2’

- **datatype** (`str` or `list` of `str`) – Valid datatypes for EIS are: ['extof', 'phxtof', and 'electronenergy']; default is 'extof'
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **time_clip** (`bool`) – Data will be clipped to the exact trange specified by the trange keyword.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **notplot** (`bool`) – If True, then data are returned in a hash table instead of being stored in tplot variables (useful for debugging, and access to multi-dimensional data products)
- **available** (`bool`) – If True, simply return the available data files (without downloading) for the requested paramters
- **no_update** (`bool`) – Set this flag to preserve the original data. if not set and newer data is found the existing data will be overwritten
- **cdf_version** (`str`) – Specify a specific CDF version # to load (e.g., `cdf_version='4.3.0'`)
- **min_version** (`str`) – Specify a minimum CDF version # to load
- **latest_version** (`bool`) – Only grab the latest CDF version in the requested time interval
- **major_version** (`bool`) – Only open the latest major CDF version (e.g., X in vX.Y.Z) in the requested time interval
- **always_prompt** (`bool`) – Set this keyword to always prompt for the user’s username and password; useful if you accidentally save an incorrect password, or if your SDC password has changed
- **spdf** (`bool`) – If True, download the data from the SPDF instead of the SDC

Returns List of tplot variables created.

EIS Example

```
import pyspedas
from pytplot import tplot
pyspedas.mms.eis(trange=['2015-10-16', '2015-10-17'])
tplot(['mms1_epd_eis_srvy_12_extof_proton_flux_omni', 'mms1_epd_eis_srvy_12_extof_proton_
flux_omni_spin'])
```



2.13.8 Active Spacecraft Potential Control (ASPOC)

`pyspedas.mms.aspoc(*args, **kwargs)`

This function loads ASPOC data into tplot variables

Parameters

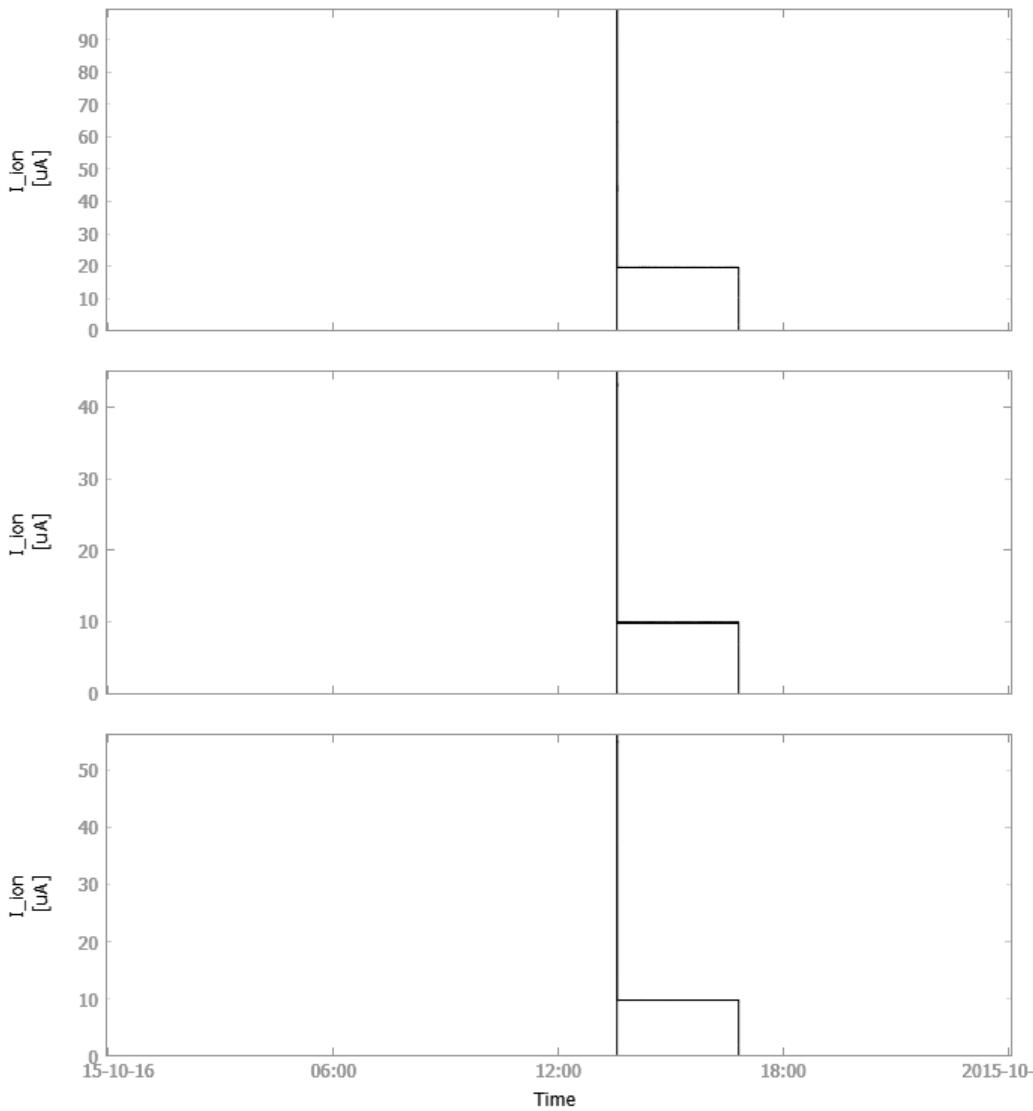
- **trange** (`list of str`) – time range of interest [`starttime, endtime`] with the format `'YYYY-MM-DD','YYYY-MM-DD'` or to specify more or less than a day `'YYYY-MM-DD/hh:mm:ss','YYYY-MM-DD/hh:mm:ss'`
- **probe** (`str or list of str`) – list of probes, valid values for MMS probes are `['1','2','3','4']`.
- **data_rate** (`str or list of str`) – instrument data rates for ASPOC include `'srvy', 'sitl'`. The default is `'srvy'`.
- **level** (`str`) – indicates level of data processing. the default if no level is specified is `'l2'`

- **datatype** (`str` or `list` of `str`) – Valid datatypes for ASPOC are: ['asp1', 'asp2', 'aspoc']; default is 'aspoc'
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **time_clip** (`bool`) – Data will be clipped to the exact trange specified by the trange keyword.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **notplot** (`bool`) – If True, then data are returned in a hash table instead of being stored in tplot variables (useful for debugging, and access to multi-dimensional data products)
- **available** (`bool`) – If True, simply return the available data files (without downloading) for the requested paramters
- **no_update** (`bool`) – Set this flag to preserve the original data. if not set and newer data is found the existing data will be overwritten
- **cdf_version** (`str`) – Specify a specific CDF version # to load (e.g., `cdf_version='4.3.0'`)
- **min_version** (`str`) – Specify a minimum CDF version # to load
- **latest_version** (`bool`) – Only grab the latest CDF version in the requested time interval
- **major_version** (`bool`) – Only open the latest major CDF version (e.g., X in vX.Y.Z) in the requested time interval
- **always_prompt** (`bool`) – Set this keyword to always prompt for the user’s username and password; useful if you accidentally save an incorrect password, or if your SDC password has changed
- **spdf** (`bool`) – If True, download the data from the SPDF instead of the SDC

Returns List of tplot variables created.

ASPOC Example

```
import pyspedas
from pytplot import tplot
pyspedas.mms.aspoc(trange=['2015-10-16', '2015-10-17'])
tplot(['mms1_aspoc_ionc_12', 'mms1_asp1_ionc_12', 'mms1_asp2_ionc_12'])
```



2.13.9 Fast Plasma Investigation (FPI)

`pyspedas.mms.fpi(*args, **kwargs)`

This function loads FPI data into tplot variables

Parameters

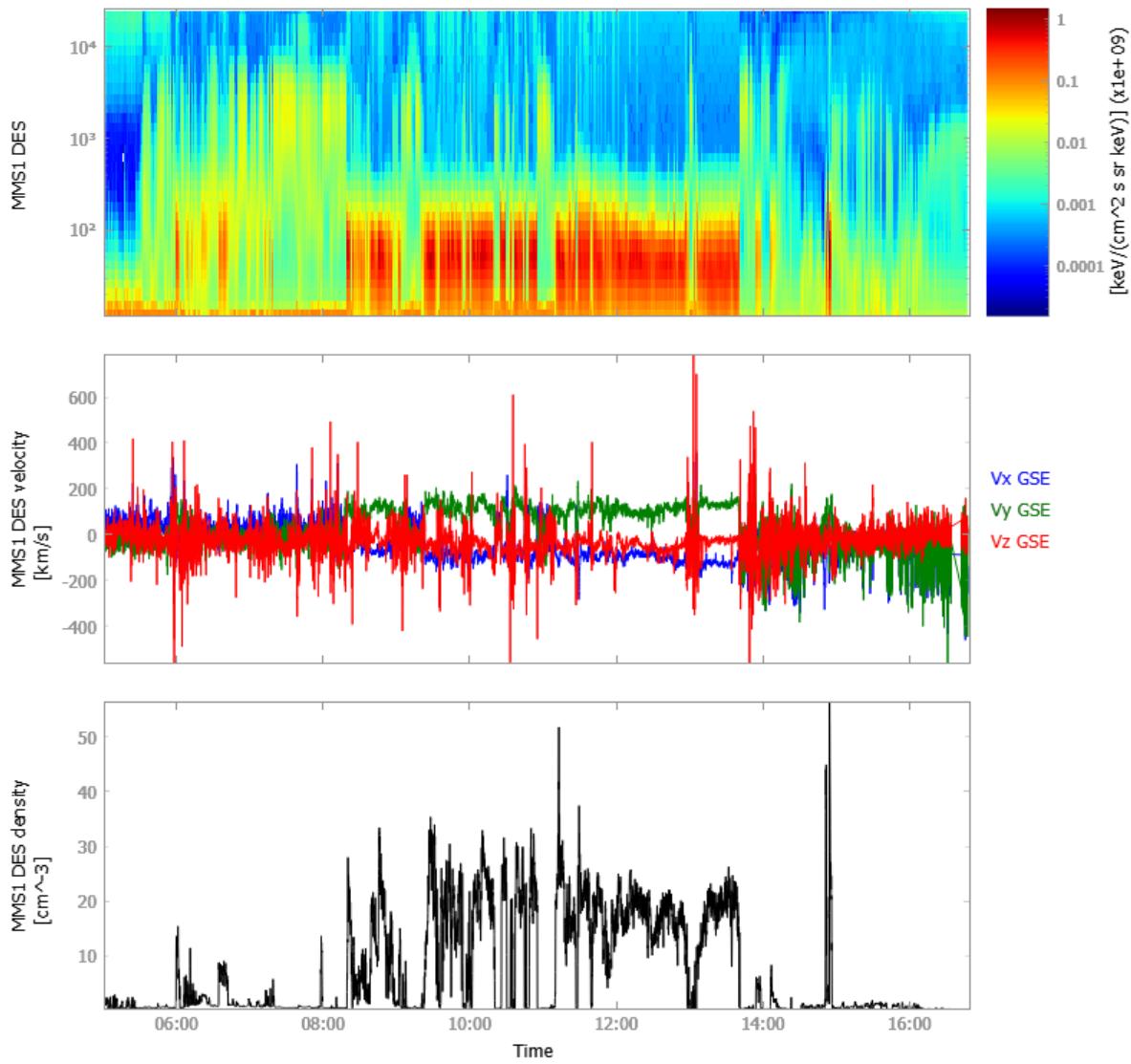
- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – list of probes, valid values for MMS probes are [‘1’,‘2’,‘3’,‘4’].
- **data_rate** (`str or list of str`) – instrument data rates for FPI include ‘brst’, ‘fast’. The default is ‘srvy’.
- **level** (`str`) – indicates level of data processing. the default if no level is specified is ‘l2’

- **datatype** (`str` or `list` of `str`) –
Valid datatypes for FPI are: ‘des-moms’, ‘dis-moms’ (default) ‘des-dist’, ‘dis-dist’
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **time_clip** (`bool`) – Data will be clipped to the exact trange specified by the trange keyword.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **center_measurement** (`bool`) – If True, the CDF epoch variables are time-shifted to the middle of the accumulation interval by their DELTA_PLUS_VAR and DELTA_MINUS_VAR variable attributes
- **notplot** (`bool`) – If True, then data are returned in a hash table instead of being stored in tplot variables (useful for debugging, and access to multi-dimensional data products)
- **available** (`bool`) – If True, simply return the available data files (without downloading) for the requested paramters
- **no_update** (`bool`) – Set this flag to preserve the original data. if not set and newer data is found the existing data will be overwritten
- **cdf_version** (`str`) – Specify a specific CDF version # to load (e.g., `cdf_version='4.3.0'`)
- **min_version** (`str`) – Specify a minimum CDF version # to load
- **latest_version** (`bool`) – Only grab the latest CDF version in the requested time interval
- **major_version** (`bool`) – Only open the latest major CDF version (e.g., X in vX.Y.Z) in the requested time interval
- **always_prompt** (`bool`) – Set this keyword to always prompt for the user’s username and password; useful if you accidentally save an incorrect password, or if your SDC password has changed
- **spdf** (`bool`) – If True, download the data from the SPDF instead of the SDC

Returns List of tplot variables created.

FPI Example

```
import pyspedas
from pytplot import tplot
pyspedas.mms.fpi(trange=['2015-10-16', '2015-10-17'], datatype='des-moms')
tplot(['mms1_des_energyspectr_omni_fast', 'mms1_des_bulkv_gse_fast', 'mms1_des_
numberdensity_fast'])
```



2.13.10 Hot Plasma Composition Analyzer (HPCA)

`pyspedas.mms.h pca(*args, **kwargs)`

This function loads HPCA data into tplot variables

Parameters

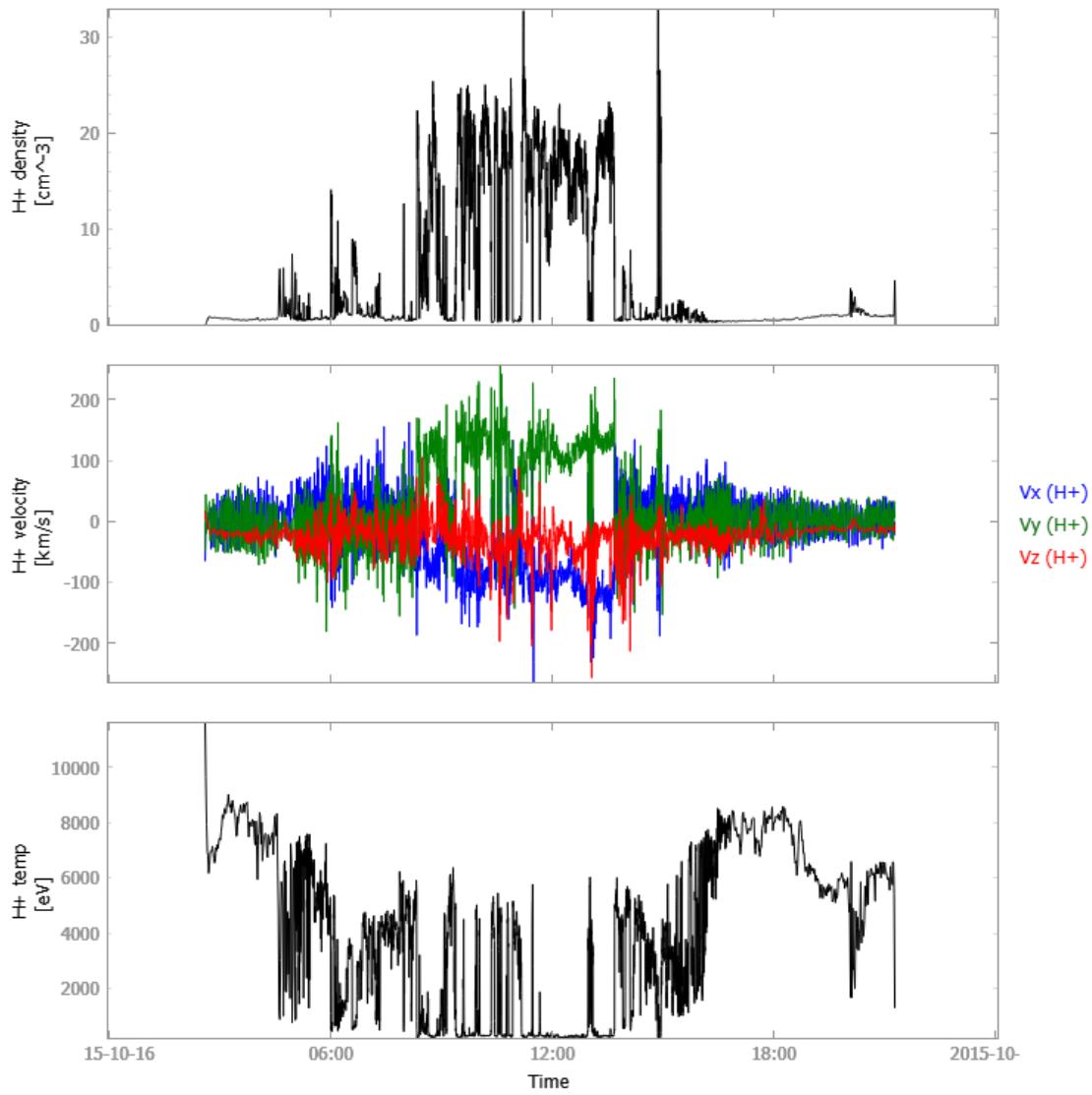
- **trange** (`list of str`) – time range of interest [`starttime`, `endtime`] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – list of probes, valid values for MMS probes are [‘1’,‘2’,‘3’,‘4’].
- **data_rate** (`str or list of str`) – instrument data rates for HPCA include ‘brst’, ‘srvy’. The default is ‘srvy’.
- **level** (`str`) – indicates level of data processing. the default if no level is specified is ‘l2’

- **datatype** (`str` or `list` of `str`) – Valid datatypes for HPCA are ‘moments’ and ‘ion’; the default is ‘moments’
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **time_clip** (`bool`) – Data will be clipped to the exact trange specified by the trange keyword.
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **center_measurement** (`bool`) – If True, the CDF epoch variables are time-shifted to the middle of the accumulation interval by their DELTA_PLUS_VAR and DELTA_MINUS_VAR variable attributes
- **notplot** (`bool`) – If True, then data are returned in a hash table instead of being stored in tplot variables (useful for debugging, and access to multi-dimensional data products)
- **available** (`bool`) – If True, simply return the available data files (without downloading) for the requested paramters
- **no_update** (`bool`) – Set this flag to preserve the original data. if not set and newer data is found the existing data will be overwritten
- **cdf_version** (`str`) – Specify a specific CDF version # to load (e.g., `cdf_version='4.3.0'`)
- **min_version** (`str`) – Specify a minimum CDF version # to load
- **latest_version** (`bool`) – Only grab the latest CDF version in the requested time interval
- **major_version** (`bool`) – Only open the latest major CDF version (e.g., X in vX.Y.Z) in the requested time interval
- **always_prompt** (`bool`) – Set this keyword to always prompt for the user’s username and password; useful if you accidentally save an incorrect password, or if your SDC password has changed
- **spdf** (`bool`) – If True, download the data from the SPDF instead of the SDC

Returns List of tplot variables created.

HPCA Example

```
import pyspedas
from pytplot import tplot
pyspedas.mms.hPCA(trange=['2015-10-16', '2015-10-17'], datatype='moments')
tplot(['mms1_hPCA_hplus_number_density', 'mms1_hPCA_hplus_ion_bulk_velocity', 'mms1_hPCA_
↪hplus_scalar_temperature'])
```



2.13.11 Magnetic Ephemeris Coordinates (MEC)

`pyspedas.mms.mec(*args, **kwargs)`

This function loads MEC data into tplot variables

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – list of probes, valid values for MMS probes are [‘1’,‘2’,‘3’,‘4’].
- **data_rate** (`str or list of str`) – instrument data rates for MEC include [‘brst’, ‘srvy’]. The default is ‘srvy’.
- **level** (`str`) – indicates level of data processing. the default if no level is specified is ‘l2’

- **datatype** (`str` or `list` of `str`) – Valid datatypes for MEC are: ['ephts04d', 'epht89q', 'epht89d']; default is 'epht89q'
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **time_clip** (`bool`) – Data will be clipped to the exact trange specified by the trange keyword.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **notplot** (`bool`) – If True, then data are returned in a hash table instead of being stored in tplot variables (useful for debugging, and access to multi-dimensional data products)
- **available** (`bool`) – If True, simply return the available data files (without downloading) for the requested paramters
- **no_update** (`bool`) – Set this flag to preserve the original data. if not set and newer data is found the existing data will be overwritten
- **cdf_version** (`str`) – Specify a specific CDF version # to load (e.g., `cdf_version='4.3.0'`)
- **min_version** (`str`) – Specify a minimum CDF version # to load
- **latest_version** (`bool`) – Only grab the latest CDF version in the requested time interval
- **major_version** (`bool`) – Only open the latest major CDF version (e.g., X in vX.Y.Z) in the requested time interval
- **always_prompt** (`bool`) – Set this keyword to always prompt for the user’s username and password; useful if you accidentally save an incorrect password, or if your SDC password has changed
- **spdf** (`bool`) – If True, download the data from the SPDF instead of the SDC

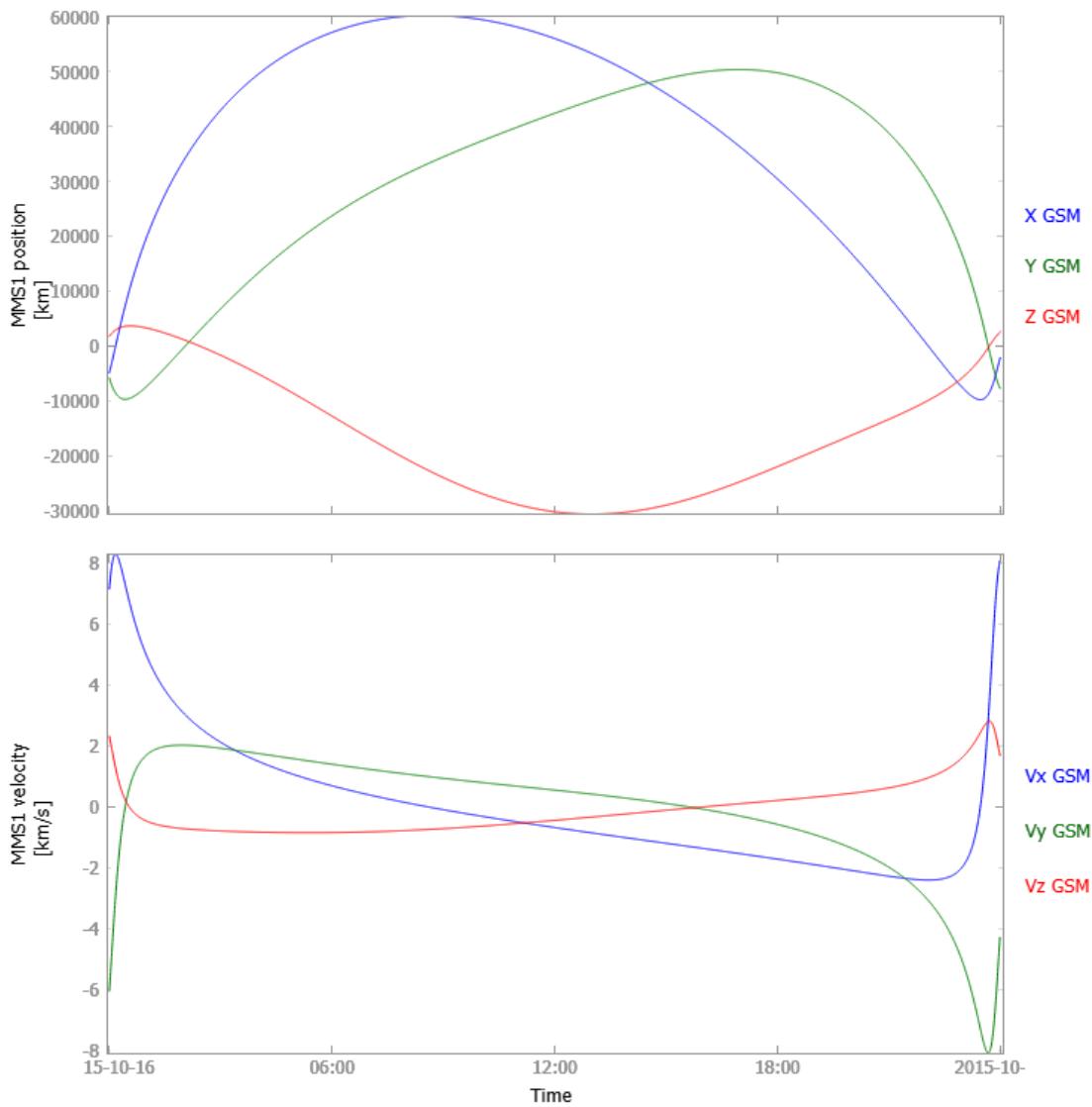
Notes

The default datatype was changed to ‘epht89q’ on 15Nov2021. There are sometimes issues with creating the Tsyganenko 04 data products, which leads to the ‘epht04d’ files not being available. The ‘epht89d’ files contain the same ephemeris data - the only difference are the data products that rely on the field model.

Returns List of tplot variables created.

MEC Example

```
import pyspedas
from pytplot import tplot
pyspedas.mms.mec(trange=['2015-10-16', '2015-10-17'])
tplot(['mms1_mec_r_gsm', 'mms1_mec_v_gsm'])
```



`pyspedas.mms.state(*args, **kwargs)`

This function loads the state (ephemeris and attitude) data from the ASCII files into tplot variables

Parameters

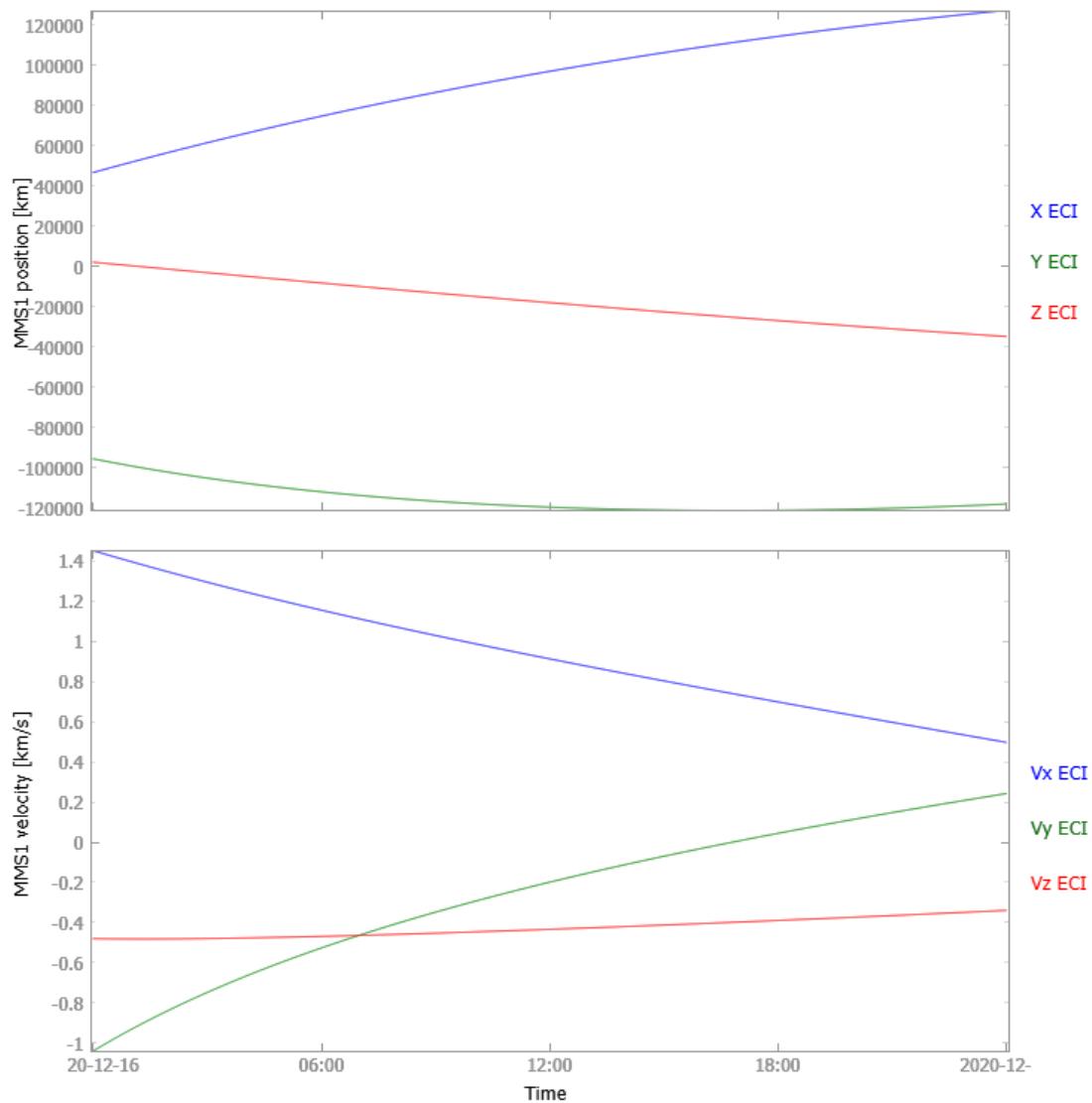
- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – list of probes, valid values for MMS probes are [‘1’,‘2’,‘3’,‘4’].
- **level** (`str`) – indicates level of data (options: ‘def’ (definitive), ‘pred’ (predicted); default: def)
- **datatypes** (`str or list of str`) – no datatype for state data (options: ‘pos’, ‘vel’, ‘spinras’, ‘spindec’)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.

- **no_update** (`bool`) – Set this flag to preserve the original data. if not set and newer data is found the existing data will be overwritten

Returns List of tplot variables created.

State Example

```
import pyspedas
from pytplot import tplot
pyspedas.mms.state(trange=['2020-12-16', '2020-12-17'])
tplot(['mms1_defeph_pos', 'mms1_defeph_vel'])
```



2.14 OMNI

The routines in this module can be used to load OMNI (Combined 1AU IP Data; Magnetic and Solar Indices) data.

```
pyspedas.omni.data(trange=['2013-11-5', '2013-11-6'], datatype='1min', level='hro2', suffix='',
                     get_support_data=False, get_ignore_data=False, varformat=None, varnames=[],
                     downloadonly=False, notplot=False, no_update=False, time_clip=True)
```

This function loads OMNI (Combined 1AU IP Data; Magnetic and Solar Indices) data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,’YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,’YYYY-MM-DD/hh:mm:ss’]
- **level** (`str`) – Data level; valid options: hro, hro2
- **datatype** (`str`) – Data type; valid options: 1min, 5min, hourly (1 hour)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.15 Polar Orbiting Environmental Satellites (POES)

The routines in this module can be used to load data from the POES mission.

2.15.1 Space Environment Monitor (SEM)

```
pyspedas.poes.sem(trange=['2018-11-5', '2018-11-6'], probe=['noaa19'], datatype='*', suffix='',  
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
    notplot=False, no_update=False, time_clip=False)
```

This function loads POES Space Environment Monitor (SEM) data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.16 Polar

The routines in this module can be used to load data from the Polar mission.

2.16.1 Magnetic Field Experiment (MFE)

```
pyspedas.polar.mfe(trange=['2003-10-28', '2003-10-29'], datatype='k0', suffix='', get_support_data=False,  
    varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,  
    time_clip=False)
```

This function loads data from the Magnetic Field Experiment

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]

- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.16.2 Electric Fields Instrument (EFI)

```
pyspedas.polar.efi(trange=['2003-10-28', '2003-10-29'], datatype='k0', suffix='', get_support_data=False,
                     varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                     time_clip=False)
```

This function loads data from the Electric Fields Instrument

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache

- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.16.3 Plasma Wave Instrument (PWI)

```
pyspedas.polar.pwi(trange=['1997-01-03', '1997-01-04'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Plasma Wave Instrument

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.16.4 Hot Plasma Analyzer Experiment (HYDRA)

```
pyspedas.polar.hydra(trange=['2003-10-28', '2003-10-29'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Hot Plasma Analyzer Experiment

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]

- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.16.5 Thermal Ion Dynamics Experiment (TIDE)

```
pyspedas.polar.tide(trange=['1997-01-03', '1997-01-04'], datatype='k0', suffix='', get_support_data=False,
                      varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                      time_clip=False)
```

This function loads data from the Thermal Ion Dynamics Experiment / Plasma Source Investigation

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache

- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the `trange` keyword

Returns

Return type List of tplot variables created.

2.16.6 Toroidal Imaging Mass Angle Spectrograph (TIMAS)

```
pyspedas.polar.timas(trange=['1997-01-03', '1997-01-04'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Toroidal Imaging Mass Angle Spectrograph

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the `trange` keyword

Returns

Return type List of tplot variables created.

2.16.7 Charge and Mass Magnetospheric Ion Composition Experiment (CAMSICE)

```
pyspedas.polar.camsice(trange=['2003-10-28', '2003-10-29'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Charge and Mass Magnetospheric Ion Composition Experiment

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]

- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.16.8 Comprehensive Energetic Particle-Pitch Angle Distribution (CEPPAD)

```
pyspedas.polar.ceppad(trange=['2003-10-28', '2003-10-29'], datatype='k0', suffix='', get_support_data=False,
                       varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                       time_clip=False)
```

This function loads data from the Comprehensive Energetic Particle-Pitch Angle Distribution

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache

- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.16.9 Ultraviolet Imager (UVI)

```
pyspedas.polar.uvi(trange=['2003-10-28', '2003-10-29'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Ultraviolet Imager

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.16.10 Visible Imaging System (VIS)

```
pyspedas.polar.vis(trange=['2003-10-28', '2003-10-29'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Visible Imaging System

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]

- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.16.11 Polar Ionospheric X-ray Imaging Experiment (PIXIE)

```
pyspedas.polar.pixie(trange=['1997-01-03', '1997-01-04'], datatype='k0', suffix='', get_support_data=False,
                      varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                      time_clip=False)
```

This function loads data from the Polar Ionospheric X-ray Imaging Experiment

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache

- **time_clip (bool)** – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.16.12 Orbit data

```
pyspedas.polar.orbit(trange=['2003-10-28', '2003-10-29'], datatype='k0', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads Polar orbit data

Parameters

- **trange (list of str)** – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype (str)** – Data type; Valid options:
- **suffix (str)** – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data (bool)** – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat (str)** – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames (list of str)** – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly (bool)** – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot (bool)** – Return the data in hash tables instead of creating tplot variables
- **no_update (bool)** – If set, only load data from your local cache
- **time_clip (bool)** – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.17 Parker Solar Probe (PSP)

The routines in this module can be used to load data from the Parker Solar Probe mission.

2.17.1 Electromagnetic Fields Investigation (FIELDS)

```
pyspedas.psp.fields(trange=['2018-11-5', '2018-11-6'], datatype='mag_rtn', level='l2', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=False)
```

This function loads Parker Solar Probe FIELDS data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.17.2 Solar Probe Cup (SPC)

```
pyspedas.psp.spc(trange=['2018-11-5', '2018-11-6'], datatype='l3i', level='l3', suffix='',
                   get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                   notplot=False, no_update=False, time_clip=False)
```

This function loads Parker Solar Probe Solar Probe Cup data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.17.3 SWEAP/SPAN-e

```
pyspedas.psp.spe(trange=['2018-11-5', '2018-11-6'], datatype='spa_sfI_32e', level='l2', suffix='',  
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
    notplot=False, no_update=False, time_clip=False)
```

This function loads Parker Solar Probe SWEAP/SPAN-e data

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.17.4 SWEAP/SPAN-i

```
pyspedas.psp.spi(trange=['2018-11-5', '2018-11-6'], datatype='spi_sf0a_mom_inst', level='l3', suffix='',
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,
    notplot=False, no_update=False, time_clip=False)
```

This function loads Parker Solar Probe SWEAP/SPAN-i data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.17.5 ISIS/EPI-Hi

```
pyspedas.psp.epihi(trange=['2018-11-5', '2018-11-6'], datatype='let1_rates1h', level='l2', suffix='',
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,
    notplot=False, no_update=False, time_clip=False)
```

This function loads Parker Solar Probe ISoIS/EPI-Hi data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.17.6 ISIS/EPI-Lo

```
pyspedas.psp.epilo(trange=['2018-11-5', '2018-11-6'], datatype='pe', level='l2', suffix='',  
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
    notplot=False, no_update=False, time_clip=False)
```

This function loads Parker Solar Probe ISoIS/EPI-Lo data

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.17.7 ISIS/EPI (merged summary data)

```
pyspedas.psp.epi(trange=['2018-11-5', '2018-11-6'], datatype='summary', level='l2', suffix='',
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,
    notplot=False, no_update=False, time_clip=False)
```

This function loads Parker Solar Probe ISOLS/EPI (merged summary) data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.18 Solar Orbiter (SOLO)

The routines in this module can be used to load data from the Solar Orbiter mission.

2.18.1 Magnetometer (MAG)

```
pyspedas.solo.mag(trange=['2020-06-01', '2020-06-02'], datatype='rtn-normal', level='l2', suffix='',  
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
    notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Magnetometer (MAG)

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) –
Data type; Valid options: ‘rtn-normal’: RTN Coordinates in Normal Mode ‘rtn-normal-1-minute’: Same as above, but at 1-min resolution ‘rtn-burst’: RTN Coordinates in Burst Mode ‘srf-normal’: Spacecraft Reference Frame in Normal Mode ‘srf-burst’: Spacecraft Reference Frame in Burst Mode
- **level** (`str`) – Data level (default: l2)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.18.2 Energetic Particle Detector (EPD)

```
pyspedas.solo.epd(trange=['2020-06-14', '2020-06-15'], datatype='step', mode='hcad', level='l2', suffix='',  
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
    notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Energetic Particle Detector (EPD)

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]

- **datatype** (`str`) – Data type; Valid options:
- **mode** (`str`) – EPD mode; Valid options:
- **level** (`str`) – Data level (default: l2)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.18.3 Radio and Plasma Waves (RPW)

```
pyspedas.solo.rpw(trange=['2020-06-15', '2020-06-16'], datatype='hfr-surv', level='l2', suffix='',
                    get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                    notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Radio and Plasma Waves (RPW) instrument

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options: Level 1:
‘hfr-surv’, ‘lfr-surv-asm’, ‘lfr-surv-bp1’, ‘lfr-surv-bp2’, ‘lfr-surv-cwf’, ‘lfr-surv-swf’,
‘tds-surv-hist1d’, ‘tds-surv-hist2d’, ‘tds-surv-mamp’, ‘tds-surv-rswf’, ‘tds-surv-stat’,
‘tds-surv-tswf’, ‘tmr-surv’ (see below for definitions)

Level 2:

High Frequency Receiver (HFR): ‘hfr-surv’: High Frequency Receiver (HFR) Data in Survey Mode

Low Frequency Receiver (LFR): ‘lfr-surv-asm’: Averaged Spectral Matrix (ASM) Data in Survey Mode
‘lfr-surv-bp1’: Basic Parameters Set 1 (BP1) Data in Survey

Mode ‘lfr-surv-bp2’: Basic Parameter Set 2 (BP2) Data in Survey Mode
‘lfr-surv-cwf-b’: Continuous Magnetic Waveform (CWF-B) in Survey Mode
‘lfr-surv-cwf-e’: Continuous Electric Waveform (CWF-E) in Survey Mode
‘lfr-surv-swf-b’: Snapshot Magnetic Waveform (SWF-B) in Survey Mode
‘lfr-surv-swf-e’: Snapshot Electric Waveform (SWF-E) in Survey Mode

Time Domain Sampler (TDS): ‘tds-surv-hist1d’: Histogram Set 1 (HIST1D) Data in Survey Mode
‘tds-surv-hist2d’: Histogram Set 2 (HIST2D) Data in Survey Mode
‘tds-surv-mamp’: Maximum Amplitude (MAMP) Data in Survey Mode
‘tds-surv-rswf-b’: Regular Snapshot Waveform (RSWF) Magnetic Field Data in Survey Mode
‘tds-surv-rswf-e’: Regular Snapshot Waveform (RSWF) Electric Field Data in Survey Mode
‘tds-surv-stat’: Statistical (STAT) Data in Survey Mode
‘tds-surv-tswf-b’: Triggered Snapshot Magnetic Waveform (TSWF-B) in Survey Mode
‘tds-surv-tswf-e’: Triggered Snapshot Electric Waveform (TSWF-E) in Survey Mode

Level 3: ‘bia-density’: Plasma density derived from probe-to-spacecraft potential and electron plasma frequency
‘bia-density-10-seconds’: same as above, but median value over 10 s interval
‘bia-efield-10-seconds’: Electric field vector in SRF. Median value over 10 s interval
‘bia-scpot-10-seconds’: Spacecraft potential with respect to plasma. Median value over 10 s interval
‘tnr-fp’: Plasma frequency value derived by the plasma peak tracking (Thermal Noise Receiver (TNR))

- **level** (`str`) – Data level (default: l2)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.18.4 Solar Wind Plasma Analyser (SWA)

```
pyspedas.solo.swa(trange=['2020-07-22', '2020-07-23'], datatype='pas-eflux', level='l2', suffix='',
                    get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                    notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Solar Wind Plasma Analyser (SWA)

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **level** (`str`) – Data level (default: l2)
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.19 Solar Terrestrial Relations Observatory (STEREO)

The routines in this module can be used to load data from the STEREO mission.

2.19.1 Magnetometer (MAG)

```
pyspedas.stereo.mag(trange=['2013-11-5', '2013-11-6'], probe='a', datatype='8hz', suffix='',
                     get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                     notplot=False, no_update=False, time_clip=False)
```

This function loads data from the magnetometer

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options: 8hz, 32hz
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.19.2 PLAsma and SupraThermal Ion Composition (PLASTIC)

```
pyspedas.stereo.plastic(trange=['2013-11-5', '2013-11-6'], probe='a', datatype='1min', level='l2', suffix='',  
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
    notplot=False, no_update=False, time_clip=False)
```

This function loads data from the PLASTIC instrument

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options: 1min
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables

- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.20 Time History of Events and Macroscale Interactions during Substorms (THEMIS)

The routines in this module can be used to load data from the Time History of Events and Macroscale Interactions during Substorms (THEMIS) mission.

2.20.1 Fluxgate Magnetometer (FGM)

```
pyspedas.themis.fgm(trange=['2007-03-23', '2007-03-24'], probe='c', level='l2', suffix='',
                      get_support_data=False, varformat=None, coord=None, varnames=[],
                      downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads Fluxgate magnetometer (FGM) data

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** – str or list of str Spacecraft probe letter(s) ('a', 'b', 'c', 'd' and/or 'e')
- **level** – str or list of str Data type; Valid options: 'l1', 'l2'
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **coord** – str Coordinate system
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables. If set, this function returns a list of the files downloaded.
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.20.2 Search Coil Magnetometer (SCM)

```
pyspedas.themis.scm(trange=['2007-03-23', '2007-03-24'], probe='c', level='l2', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=False)
```

This function loads Search-coil magnetometer (SCM) data

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** – str or list of str Spacecraft probe letter(s) ('a', 'b', 'c', 'd' and/or 'e')
- **level** – str Data type; Valid options: 'l1', 'l2'
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.20.3 Electric Field Instrument (EFI)

```
pyspedas.themis.efi(trange=['2007-03-23', '2007-03-24'], probe='c', level='l2', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=False)
```

This function loads Electric Field Instrument (EFI) data

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** – str or list of str Spacecraft probe letter(s) ('a', 'b', 'c', 'd' and/or 'e')
- **level** – str Data type; Valid options: 'l1', 'l2'
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.

- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.20.4 Electrostatic Analyzer (ESA)

```
pyspedas.themis.esa(trange=['2007-03-23', '2007-03-24'], probe='c', level='l2', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=False)
```

This function loads Electrostatic Analyzer (ESA) data

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** – str or list of str Spacecraft probe letter(s) ('a', 'b', 'c', 'd' and/or 'e')
- **level** – str Data type; Valid options: 'l1', 'l2'
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.20.5 Solid State Telescope (SST)

```
pyspedas.themis.sst(trange=['2007-03-23', '2007-03-24'], probe='c', level='l2', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=False)
```

This function loads Solid State Telescope (SST) data

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** – str or list of str Spacecraft probe letter(s) ('a', 'b', 'c', 'd' and/or 'e')
- **level** – str Data type; Valid options: 'l1', 'l2'
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.20.6 State

```
pyspedas.themis.state(trange=['2007-03-23', '2007-03-24'], probe='c', level='l1', suffix='',
                       get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                       notplot=False, no_update=False, time_clip=False)
```

This function loads THEMIS state data

Parameters

- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** – str or list of str Spacecraft probe letter(s) ('a', 'b', 'c', 'd' and/or 'e')
- **level** – str Data type; Valid options: 'l1'
- **suffix** – str The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** – bool Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.

- **varformat** – str The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** – list of str List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** – bool Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** – bool Return the data in hash tables instead of creating tplot variables
- **no_update** – bool If set, only load data from your local cache
- **time_clip** – bool Time clip the variables to exactly the range specified in the trange keyword

Returns List of tplot variables created.

2.21 Two Wide-Angle Imaging Neutral-Atom Spectrometers (TWINS)

The routines in this module can be used to load data from the TWINS mission.

2.21.1 Imager

```
pyspedas.twins.imager(trange=['2018-11-5', '2018-11-6'], probe='I', datatype='', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=False)
```

This function loads TWINS imager data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.21.2 Lyman-alpha Detector (LAD)

```
pyspedas.twins.lad(trange=['2018-11-5', '2018-11-6'], probe='I', datatype='', suffix='',
                     get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                     notplot=False, no_update=False, time_clip=False)
```

This function loads data from the LAD instrument

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.21.3 Ephemeris

```
pyspedas.twins.ephemeris(trange=['2018-11-5', '2018-11-6'], probe='I', datatype='or', suffix='',
                           get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                           notplot=False, no_update=False, time_clip=False)
```

This function loads TWINS ephemeris data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.22 Ulysses

The routines in this module can be used to load data from the Ulysses mission.

2.22.1 Magnetic field (VHM)

```
pyspedas.ulyses.vhm(trange=['2009-01-01', '2009-01-02'], datatype='lmin', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=True)
```

This function loads data from the VHM/FGM experiment from the Ulysses mission

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **level** (`str`) – Data level; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables

- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.22.2 Solar wind plasma (SWOOPS)

```
pyspedas.ulyses.swoops(trange=['2009-01-01', '2009-01-02'], datatype='bai_m0', suffix='',
                         get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                         notplot=False, no_update=False, time_clip=False)
```

This function loads data from the SWOOPS experiment from the Ulysses mission

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **level** (`str`) – Data level; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.22.3 Solar wind ion composition (SWICS)

```
pyspedas.ulyses.swics(trange=['2009-01-01', '2009-01-02'], datatype='scs_m1', suffix='',
                        get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                        notplot=False, no_update=False, time_clip=False)
```

This function loads data from the SWICS experiment from the Ulysses mission

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **level** (`str`) – Data level; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.22.4 Energetic particles (EPAC)

```
pyspedas.ulyses.epac(trange=['1996-01-01', '1996-01-02'], datatype='epac_m1', suffix='',
                        get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                        notplot=False, no_update=False, time_clip=False)
```

This function loads data from the EPAC experiment from the Ulysses mission

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **level** (`str`) – Data level; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.22.5 Low-energy ions and electrons (HI-SCALE)

```
pyspedas.ulyses.hiscale(trange=['2003-01-01', '2003-01-02'], datatype='lmde_m1', suffix='',  
                           get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
                           notplot=False, no_update=False, time_clip=False)
```

This function loads data from the HI-SCALE experiment from the Ulysses mission

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **level** (`str`) – Data level; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.22.6 Cosmic rays and solar particles (COSPIN)

```
pyspedas.ulyses.cospin(trange=['2003-01-01', '2003-01-02'], datatype='het', suffix='',
                         get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                         notplot=False, no_update=False, time_clip=False)
```

This function loads data from the COSPIN experiment from the Ulysses mission

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **level** (`str`) – Data level; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.22.7 Radio and plasma waves (URAP)

```
pyspedas.ulyses.urap(trange=['2003-01-01', '2003-01-02'], datatype='pfrp_m0', suffix='',
                         get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                         notplot=False, no_update=False, time_clip=False)
```

This function loads data from the URAP experiment from the Ulysses mission

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]

- **datatype** (`str`) – Data type; Valid options:
 - **level** (`str`) – Data level; Valid options:
 - **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
 - **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
 - **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
 - **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
 - **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
 - **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
 - **no_update** (`bool`) – If set, only load data from your local cache
 - **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.22.8 Solar X-rays and cosmic gamma-ray bursts (GRB)

```
pyspedas.ulysses.grb(trange=['2003-01-01', '2003-01-02'], datatype='grb_m0', suffix='',
                      get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                      notplot=False, no_update=False, time_clip=False)
```

This function loads data from the GRB experiment from the Ulysses mission

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **level** (`str`) – Data level; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables

- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.23 Van Allen Probes (RBSP)

The routines in this module can be used to load data from the Van Allen Probes mission.

2.23.1 Electric and Magnetic Field Instrument Suite and Integrated Science (EMFISIS)

```
pyspedas.rbsp.emfisis(trange=['2018-11-5', '2018-11-6'], probe='a', datatype='magnetometer', level='l3',
                       cadence='4sec', coord='sm', wavetype='waveform', suffix='', get_support_data=False,
                       varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                       time_clip=False)
```

This function loads data from the Electric and Magnetic Field Instrument Suite and Integrated Science (EMFISIS) instrument

For information on the EMFISIS data products, see: https://emfisis.physics.uiowa.edu/data/level_descriptions

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – Spacecraft probe name ('a' or 'b'); default: a
- **cadence** (`str`) – Data cadence (default: 4sec); other options: ‘1sec’, ‘hires’
- **coord** (`str`) – Data coordinate system (default: sm)
- **level** (`str`) – Data level; options: ‘l1’, ‘l2’, ‘l3’, l4’
- **datatype** (`str`) – Data type; valid options: Level 1:
‘magnetometer’ ‘hfr’ ‘housekeeping’ ‘sc-hk’ ‘spaceweather’ ‘wfr’ ‘wna’

Level 2: ‘magnetometer’ ‘wfr’ ‘hfr’ ‘housekeeping’

Level 3: ‘magnetometer’

Level 4: ‘density’ ‘wna-survey’

- **wavetype** (`str`) –

Type of level 2 waveform data; valid options: For WFR data: ‘waveform’ (default)
‘waveform-continuous-burst’ ‘spectral-matrix’ ‘spectral-matrix-diagonal’ ‘spectral-matrix-diagonal-merged’

For HFR data: ‘waveform’ ‘spectra’ ‘spectra-burst’ ‘spectra-merged’

For descriptions of these data, see: https://emfisis.physics.uiowa.edu/data/L2_products

- **suffix (str)** – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data (bool)** – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat (str)** – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames (list of str)** – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly (bool)** – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot (bool)** – Return the data in hash tables instead of creating tplot variables
- **no_update (bool)** – If set, only load data from your local cache
- **time_clip (bool)** – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.23.2 Electric Field and Waves Suite (EFW)

```
pyspedas.rbsp.efw(trange=['2015-11-5', '2015-11-6'], probe='a', datatype='spec', level='l3', suffix='',  
    get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
    notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Electric Field and Waves Suite (EFW)

Parameters

- **trange (list of str)** – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe (str or list of str)** – Spacecraft probe name (‘a’ or ‘b’); default: a
- **datatype (str)** – Data type; Valid options:
- **suffix (str)** – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data (bool)** – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat (str)** – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames (list of str)** – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly (bool)** – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot (bool)** – Return the data in hash tables instead of creating tplot variables

- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.23.3 Radiation Belt Storm Probes Ion Composition Experiment (RBSPICE)

```
pyspedas.rbsp.rbspice(trange=['2018-11-5', '2018-11-6'], probe='a', datatype='tofneh', level='l3', suffix='',
get_support_data=False, varformat=None, varnames=[], downloadonly=False,
notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Radiation Belt Storm Probes Ion Composition Experiment (RBSPICE) instrument

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str` or `list of str`) – Spacecraft probe name ('a' or 'b'); default: a
- **datatype** (`str`) – Data type (default: tofneh); Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.23.4 Energetic Particle, Composition, and Thermal Plasma Suite (ECT)

```
pyspedas.rbsp.mageis(trange=['2015-11-5', '2015-11-6'], probe='a', datatype='', level='l3', rel='rel04',  
suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Energetic Particle, Composition, and Thermal Plasma Suite (ECT)

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – Spacecraft probe name ('a' or 'b'); default: a
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

```
pyspedas.rbsp.hope(trange=['2015-11-5', '2015-11-6'], probe='a', datatype='moments', level='l3', rel='rel04',  
suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False,  
notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Energetic Particle, Composition, and Thermal Plasma Suite (ECT)

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – Spacecraft probe name ('a' or 'b'); default: a
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns**Return type** List of tplot variables created.

```
pyspedas.rbsp.rept(trange=['2015-11-5', '2015-11-6'], probe='a', datatype='', level='l3', rel='rel03', suffix='',
                     get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                     notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Energetic Particle, Composition, and Thermal Plasma Suite (ECT)

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str` or `list` of `str`) – Spacecraft probe name ('a' or 'b'); default: a
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns**Return type** List of tplot variables created.

2.23.5 Relativistic Proton Spectrometer (RPS)

```
pyspedas.rbsp.rps(trange=['2015-11-5', '2015-11-6'], probe='a', datatype='rps-lmin', level='l2', suffix='',
                     get_support_data=True, varformat=None, varnames=[], downloadonly=False,
                     notplot=False, no_update=False, time_clip=False)
```

This function loads data from the Relativistic Proton Spectrometer (RPS)

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str or list of str`) – Spacecraft probe name ('a' or 'b'); default: a
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.24 Wind

The routines in this module can be used to load data from the Wind mission.

2.24.1 Magnetic Field Investigation (MFI)

```
pyspedas.wind.mfi(trange=['2018-11-5', '2018-11-6'], datatype='h0', suffix='', get_support_data=False,
                     varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                     time_clip=False)
```

This function loads data from the Fluxgate Magnetometer

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.24.2 Solar Wind Experiment (SWE)

```
pyspedas.wind.swe(trange=['2018-11-5', '2018-11-6'], datatype='h5', suffix='', get_support_data=False,
                    varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                    time_clip=False)
```

This function loads data from the SWE instrument

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables

- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.24.3 Radio and Plasma Waves (WAVES)

```
pyspedas.wind.waves(trange=['2018-11-5', '2018-11-6'], datatype='h1', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads Radio/Plasma Wave (WAVES) data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.24.4 3D Plasma Analyzer (3DP)

```
pyspedas.wind.threedp(trange=['1999-11-5', '1999-11-6'], datatype='3dp_emfits_e0', suffix='',
                        get_support_data=False, varformat=None, varnames=[], downloadonly=False,
                        notplot=False, no_update=False, time_clip=False)
```

This function loads 3DP data

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list of str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.24.5 Solar Wind and Suprathermal Ion Composition Experiment (SMS)

```
pyspedas.wind.sms(trange=['1999-11-5', '1999-11-6'], datatype='k0', suffix='', get_support_data=False,
                   varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False,
                   time_clip=False)
```

This function loads data from the Solar Wind and Suprathermal Ion Composition Instrument

Parameters

- **trange** (`list of str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.

- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

2.24.6 Orbit data

```
pyspedas.wind.orbit(trange=['1999-11-5', '1999-11-6'], datatype='pre_or', suffix='', get_support_data=False, varformat=None, varnames=[], downloadonly=False, notplot=False, no_update=False, time_clip=False)
```

This function loads orbit data

Parameters

- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’,‘YYYY-MM-DD’ or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’,‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names will be given this suffix. By default, no suffix is added.
- **get_support_data** (`bool`) – Data with an attribute “VAR_TYPE” with a value of “support_data” will be loaded into tplot. By default, only loads in data with a “VAR_TYPE” attribute of “data”.
- **varformat** (`str`) – The file variable formats to load into tplot. Wildcard character “*” is accepted. By default, all variables are loaded in.
- **varnames** (`list` of `str`) – List of variable names to load (if not specified, all data variables are loaded)
- **downloadonly** (`bool`) – Set this flag to download the CDF files, but not load them into tplot variables
- **notplot** (`bool`) – Return the data in hash tables instead of creating tplot variables
- **no_update** (`bool`) – If set, only load data from your local cache
- **time_clip** (`bool`) – Time clip the variables to exactly the range specified in the trange keyword

Returns

Return type List of tplot variables created.

ANALYSIS TOOLS

3.1 Average data

```
pyspedas.avg_data(names, dt=None, width=60, noremainder=False, new_names=None, suffix=None,  
                    overwrite=None)
```

Get a new tplot variable with averaged data.

Parameters

- **names** (`str/list of str`) – List of pyplot names.
- **dt** (`float, optional`) – Time window in seconds for averaging data. It can be less than 1 sec.
- **width** (`int, optional`) – Number of values for the averaging window. Default is 60 points (usually this means 60 seconds). If dt is set, then width is ignored.
- **noremainder** (`boolean, optional`) – If True, the remainder (last part of data) will not be included. If False, the remainder will be included.
- **new_names** (`str/list of str, optional`) – List of new_names for pyplot variables. If not given, then a suffix is applied.
- **suffix** (`str, optional`) – A suffix to apply. Default is ‘-avg’.
- **overwrite** (`bool, optional`) – Replace the existing tplot name.

Returns

Return type None.

3.2 Clean spikes

```
pyspedas.clean_spikes(names, nsmooth=10, thresh=0.3, sub_avg=False, new_names=None, suffix=None,  
                        overwrite=None)
```

Clean spikes from data.

Parameters

- **names** (`str/list of str`) – List of pyplot names.
- **new_names** (`str/list of str, optional`) – List of new_names for pyplot variables. If not given, then a suffix is applied.
- **suffix** (`str, optional`) – A suffix to apply. Default is ‘-avg’.
- **overwrite** (`bool, optional`) – Replace the existing tplot name.

- **nsmooth** (`int`, *optional*) – the number of data points for smoothing
- **thresh** (`float`, *optional*) – threshold value
- **sub_avg** (`bool`, *optional*) – if set, subtract the average value of the data prior to checking for spikes

Returns

Return type `None`.

3.3 Cross products

```
pyspedas.tcrossp(v1, v2, newname=None, return_data=False)
```

3.4 Dot products

```
pyspedas.tdotp(variable1, variable2, newname=None)
```

Routine to calculate the dot product of two tplot variables containing arrays of vectors and storing the results in a tplot variable

3.5 Dynamic power spectra

```
pyspedas.tdpwrspe(varname, newname=None, nboxpoints=256, nshiftpoints=128, binsize=3, nohanning=False, noline=False, notperhz=False, notmvariance=False)
```

Compute power spectra for a tplot variable.

Parameters

- **varname** (`str`) – Name of pyplot variable.
- **newname** (`str`, *optional*) – Name of new pyplot variable to save data to.
- **nboxpoints** (`int`, *optional*) – The number of points to use for the hanning window. The default is 256.
- **nshiftpoints** (`int`, *optional*) – The number of points to shift for each spectrum. The default is 128.
- **binsize** (`int`, *optional*) – Size for binning of the data along the frequency domain. The default is 3.
- **nohanning** (`bool`, *optional*) – If True, no hanning window is applied to the input. The default is False.
- **noline** (`bool`, *optional*) – If True, no straight line is subtracted. The default is False.
- **notperhz** (`bool`, *optional*) – If True, the output units are the square of the input units. The default is False.
- **notmvariance** (`bool`, *optional*) – If True, replace output spectrum for any windows that have variable. cadence with NaNs. The default is False.

Returns Name of new pyplot variable.

Return type `str`

`pyspedas.dpwrspc(time, quantity, nboxpoints=256, nshiftpoints=128, binsize=3, nohanning=False, noline=False, notperhz=False, notmvariance=False, tm_sensitivity=None)`

Compute power spectra.

Parameters

- **time** (`list of float`) – Time array.
- **quantity** (`list of float`) – Data array.
- **nboxpoints** (`int, optional`) – The number of points to use for the hanning window. The default is 256.
- **nshiftpoints** (`int, optional`) – The number of points to shift for each spectrum. The default is 128.
- **binsize** (`int, optional`) – Size for binning of the data along the frequency domain. The default is 3.
- **nohanning** (`bool, optional`) – If True, no hanning window is applied to the input. The default is False.
- **noline** (`bool, optional`) – If True, no straight line is subtracted. The default is False.
- **notperhz** (`bool, optional`) – If True, the output units are the square of the input units. The default is False.
- **notmvariance** (`bool, optional`) – If True, replace output spectrum for any windows that have variable cadence with NaNs. The default is False.
- **tm_sensitivity** (`float, optional`) – If noTmVariance is set, this number controls how much of a dt anomaly is accepted. The default is None.

Returns

- **tdps** (`array of float`) – The time array for the dynamic power spectrum, the center time of the interval used for the spectrum.
- **fdps** (`array of float`) – The frequency array (units =1/time units).
- **dps** (`array of float`) – The power spectrum, (units of quantity)²/frequency_units.

3.6 Interpolation

`pyspedas.tinterpol(names, interp_to, method=None, newname=None, suffix=None)`

Interpolate data to times in interp_to.

Parameters

- **names** (`str/list of str`) – List of variables to interpolate.
- **interp_to** (`str`) –
String containing the variable containing the time stamps to interpolate to
- **method** (`str, optional`) – Interpolation method. Default is ‘linear’. Specifies the kind of interpolation as a string (‘linear’, ‘nearest’, ‘zero’, ‘slinear’, ‘quadratic’, ‘cubic’, ‘previous’, ‘next’) where ‘zero’, ‘slinear’, ‘quadratic’ and ‘cubic’ refer to a spline interpolation of zeroth, first, second or third order; ‘previous’ and ‘next’ simply return the previous or next value of the point) or as an integer specifying the order of the spline interpolator to use.
- **newname** (`str/list of str, optional`) – List of new_names for pyplot variables. If ‘’, then pyplot variables are replaced. If not given, then a suffix is applied.

- **suffix** (`str`, *optional*) – A suffix to apply. Default is ‘-itrp’.

Returns

Return type `None`.

3.7 Normalize vectors

`pyspedas.tnormalize(variable, newname=None, return_data=False)`

3.8 Subtract average

`pyspedas.subtract_average(names, new_names=None, suffix=None, overwrite=None, median=None)`

Subtracts the average or the median from data.

Parameters

- **names** (`str/list of str`) – List of pyplot names.
- **new_names** (`str/list of str`, *optional*) – List of new_names for pyplot variables. If not given, then a suffix is applied.
- **suffix** (`str`, *optional*) – A suffix to apply. Default is ‘-d’.
- **overwrite** (`bool`, *optional*) – If set, then pyplot variables are replaced.
- **median** (`float`, *optional*) – If it is 0 or not set, then it computes the mean. Otherwise, it computes the median.

Returns

Return type `None`.

3.9 Subtract median

`pyspedas.subtract_median(names, new_names=None, suffix=None, overwrite=None)`

Subtracts the median from data.

Parameters

- **names** (`str/list of str`) – List of pyplot names.
- **new_names** (`str/list of str`, *optional*) – List of new_names for pyplot variables. If not given, then a suffix is applied.
- **suffix** (`str`, *optional*) – A suffix to apply. Default is ‘-d’.
- **overwrite** (`bool`, *optional*) – If set, then pyplot variables are replaced.

Returns

Return type `None`.

3.10 Wave polarization

`pyspedas.twavpol(tvarname, prefix='', nopfft=-1, steplength=-1, bin_freq=-1)`

Apply wavpol to a pytplot variable.

Creates multiple pytplot variables: ‘_powspec’, ‘_degtol’, ‘_waveangle’, ‘_elliptict’, ‘_helict’, ‘_pspec3_x’, ‘_pspec3_y’, ‘_pspec3_z’

Parameters

- **tvarname** (`string`) – Name of pytplot variable.
- **prefix** (`string, optional`) – Prefix for pytplot variables created.
- **nopfft** (`int, optional`) – Number of points in FFT. The default is 256.
- **steplength** (`int, optional`) – The amount of overlap between successive FFT intervals. The default is -1 which means nopfft/2.
- **bin_freq** (`int, optional`) – Number of bins in frequency domain. The default is 3.

Returns result – Returns 1 if completed successfully. Returns 0 if it encountered problems and exited.

Return type `bool`

`pyspedas.analysis.twavpol.wavpol(ct, bx, by, bz, nopfft=256, steplength=-1, bin_freq=3)`

Perform polarisation analysis of Bx, By, Bz time series data.

Parameters

- **ct** (`list of float`) – Time.
- **b1** (`list of float`) – Bx field.
- **b2** (`list of float`) – By field.
- **b3** (`list of float`) – Bz field.
- **nopfft** (`int, optional`) – Number of points in FFT. The default is 256.
- **steplength** (`int, optional`) – The amount of overlap between successive FFT intervals. The default is -1 which means nopfft/2.
- **bin_freq** (`int, optional`) – Number of bins in frequency domain. The default is 3.

Returns

- **result** (`tuple with 9 items`)
- **timeline** (`list of float`) – Times.
- **freqline** (`list of float`) – Frequencies.
- **powspec** (`2-dim array of float`) – Wave power.
- **degtol** (`2-dim array of float`) – Degree of Polarisation.
- **waveangle** (`2-dim array of float`) – Wavenormal Angle.
- **elliptict** (`2-dim array of float`) – Ellipticity.
- **helict** (`2-dim array of float`) – Helicity.
- **pspec3** (`3-dim array of float`) – Power spectra.
- **err_flag** (`bool`) – Error flag. The default is 0. Returns 1 if there are large number of batches and aborts.

MAGNETIC FIELD MODELS

The routines in this module can be used to calculate Tsyganenko magnetic field models using Sheng Tian's implementation of the `geopack` library (<https://github.com/tsssss/geopack>).

4.1 Tsyganenko 89 (T89)

`pyspedas.geopack.tt89.tt89(pos_var_gsm, iopt=3, suffix='', igrf_only=False)`

tplot wrapper for the functional interface to Sheng Tian's implementation of the Tsyganenko 96 and IGRF model:

<https://github.com/tsssss/geopack>

pos_gsm_tvar: str tplot variable containing the position data (km) in GSM coordinates

Parameters

- **iopt** (int) –

Specifies the ground disturbance level:

iopt= 1 2 3 4 5 6 7 correspond to:

`kp= 0,0+ 1-,1,1+ 2-,2,2+ 3-,3,3+ 4-,4,4+ 5-,5,5+ >=6-`

- **suffix** (str) – Suffix to append to the tplot output variable

Returns

Return type Name of the tplot variable containing the model data

4.1.1 T89 Example

```
# load some spacecraft position data
import pyspedas
pyspedas.mms.mec(trange=['2015-10-16', '2015-10-17'])

# calculate the field using the T89 model
from pyspedas.geopack.tt89 import tt89
tt89('mms1_mec_r_gsm')
tplot('mms1_mec_r_gsm_bt89')
```

4.2 Tsyganenko 96 (T96)

`pyspedas.geopack.tt96(pos_var_gsm, parmod=None, suffix= '')`

tplot wrapper for the functional interface to Sheng Tian's implementation of the Tsyganenko 96 and IGRF model:

<https://github.com/tsssss/geopack>

pos_gsm_tvar: str tplot variable containing the position data (km) in GSM coordinates

Parameters

- **parmod** (ndarray) –
10-element array (vs. time), but only the first 4 elements are used
 - (1) solar wind pressure pdyn (nanopascals)
 - (2) dst (nanotesla)
 - (3) byimf (nanotesla)
 - (4) bzimf (nanotesla)
- **suffix** (str) – Suffix to append to the tplot output variable

Returns

Return type Name of the tplot variable containing the model data

4.2.1 T96 Example

```
# load some spacecraft position data
import pyspedas
pyspedas.mms.mec(trange=['2015-10-16', '2015-10-17'])

# calculate the field using the T96 model
from pyspedas.geopack.tt96 import tt96
tt96('mms1_mec_r_gsm', parmod=params)
tplot('mms1_mec_r_gsm_bt96')
```

4.3 Tsyganenko 2001 (T01)

`pyspedas.geopack.tt01.tt01(pos_var_gsm, parmod=None, suffix= '')`

tplot wrapper for the functional interface to Sheng Tian's implementation of the Tsyganenko 2001 and IGRF model:

<https://github.com/tsssss/geopack>

pos_gsm_tvar: str tplot variable containing the position data (km) in GSM coordinates

Parameters

- **parmod** (ndarray) –
10-element array (vs. time), but only the first 6 elements are used
 - (1) solar wind pressure pdyn (nanopascals),

- (2) dst (nanotesla)
- (3) byimf (nanotesla)
- (4) bzimf (nanotesla)
- (5) g1-index
- (6) g2-index (see Tsyganenko [2001] for an exact definition of these two indices)
- **suffix (str)** – Suffix to append to the tplot output variable

Returns**Return type** Name of the tplot variable containing the model data

4.3.1 T01 Example

```
# load some spacecraft position data
import pyspedas
pyspedas.mms.mec(trange=['2015-10-16', '2015-10-17'])

# calculate the field using the T01 model
from pyspedas.geopack.tt01 import tt01
tt01('mms1_mec_r_gsm', parmod=parmod)
tplot('mms1_mec_r_gsm_bt01')
```

4.4 Tsyganenko-Sitnov 2004 (TS04)

pyspedas.geopack.tts04.tts04(pos_var_gsm, parmod=None, suffix='')

tplot wrapper for the functional interface to Sheng Tian's implementation of the Tsyganenko-Sitnov (2004) storm-time geomagnetic field model

<https://github.com/tsssss/geopack>**pos_gsm_tvar: str** tplot variable containing the position data (km) in GSM coordinates**Parameters**

- **parmod (ndarray)** –
 - 10-element array (vs. time):**
 - (1) solar wind pressure pdyn (nanopascals),
 - (2) dst (nanotesla),
 - (3) byimf,
 - (4) bzimf (nanotesla) (5-10) indices w1 - w6, calculated as time integrals from the beginning of a storm
 - see the reference (3) below, for a detailed definition of those variables
- **suffix (str)** – Suffix to append to the tplot output variable

Returns**Return type** Name of the tplot variable containing the model data

4.4.1 TS04 Example

```
# load some spacecraft position data
import pyspedas
pyspedas.mms.mec(trange=['2015-10-16', '2015-10-17'])

# calculate the field using the TS04 model
from pyspedas.geopack.tts04 import tts04
tts04('mms1_mec_r_gsm', parmod=params)
tplot('mms1_mec_r_gsm_bts04')
```

4.5 Solar Wind Parameters

To generate the “parmod” variable using Dst and solar wind data, use the *get_tsy_params* routine.

```
pyspedas.geopack.get_tsy_params.get_tsy_params(dst_tvar, imf_tvar, Np_tvar, Vp_tvar, model,
                                                pressure_tvar=None, newname=None, speed=False,
                                                g_variables=None)
```

This procedure will interpolate inputs, generate Tsyganenko model parameters and store them in a tplot variable that can be passed directly to the model procedure.

dst_tvar: str tplot variable containing the Dst index

imf_tvar: str tplot variable containing the interplanetary magnetic field vector in GSM coordinates

Np_tvar: str tplot variable containing the solar wind ion density (cm⁻³)

Vp_tvar: str tplot variable containing the proton velocity

model: str Tsyganenko model; should be: ‘T89’, ‘T96’, ‘T01’, ‘TS04’

Parameters

- **newname** (str) – name of the output variable; default: ‘t96_par’, ‘t01_par’ or ‘ts04_par’, depending on the model
- **speed** (bool) – Flag to indicate *Vp_tvar* is speed, and not velocity (defaults to False)
- **pressure_tvar** (str) – Set this to specify a tplot variable containing solar wind dynamic pressure data. If not supplied, it will be calculated internally from proton density and proton speed.

Returns

- Name of the tplot variable containing the parameters.
 - The parameters are –
 - (1) solar wind pressure pdyn (nanopascals),
 - (2) dst (nanotesla),
 - (3) byimf,
 - (4) bzimf (nanotesla) (5-10) indices w1 - w6, calculated as time integrals from the beginning of a storm
- see the reference (3) below, for a detailed definition of those variables

4.5.1 get_tsy_params Example

```
# load Dst and solar wind data
import pyspedas
pyspedas.kyoto.dst(trange=['2015-10-16', '2015-10-17'])
pyspedas.omni.data(trange=['2015-10-16', '2015-10-17'])

# join the components of B into a single variable
# BX isn't used
from pytplot import join_vec
join_vec(['BX_GSE', 'BY_GSM', 'BZ_GSM'])

from pyspedas.geopack.get_tsy_params import get_tsy_params
params = get_tsy_params('kyoto_dst',
                        'BX_GSE-BY_GSM-BZ_GSM_joined',
                        'proton_density',
                        'flow_speed',
                        't96', # or 't01', 'ts04'
                        pressure_tvar='Pressure',
                        speed=True)
```


COORDINATE SYSTEMS

5.1 Transformations

```
pyspedas.cotrans.cotrans.cotrans(name_in=None, name_out=None, time_in=None, data_in=None,  
coord_in=None, coord_out=None)
```

Transform data from coord_in to coord_out.

Parameters

- **name_in** (`str`, *optional*) – Pytplot name for input data.
- **name_out** (`str`, *optional*) – Pytplot name for output data.
- **time_in** (`list of float`, *optional*) – Time array. Ignored if name_in is provided.
- **data_in** (`list of float`, *optional*) – Data in the coord_in system. Ignored if name_in is provided.
- **coord_in** (`str`) – Name of input coordinate system.
- **coord_out** (`str`) – Name of output coordinate system.

Returns Fills a new pytplot variable with data in the coord_out system.

Return type Returns 1 for successful completion.

5.2 LMN Coordinates

```
pyspedas.cotrans.gsm2lmn.gsm2lmn(times, Rxyz, Bxyz, swdata=None)
```

Transforms vector field from GSM to LMN (boundary-normal) coordinate system for the magnetopause using the Shue et al. (1998) magnetopause model

5.3 Getting/Setting the Coordinate System

```
pyspedas.cotrans.cotrans_get_coord.cotrans_get_coord(name)
```

This function returns the coordinate system of a tplot variable

Parameters **name** – str name of the tplot variable

Notes

The coordinate system is stored in the variable's metadata at: `metadata['data_att']['coord_sys']`

See `cotrans_set_coord` to update the coordinate system

Returns Coordinate system of the tplot variable or None if the coordinate system isn't set

`pyspedas.cotrans.cotrans_set_coord.cotrans_set_coord(name, coord)`

This function sets the coordinate system of a tplot variable

Parameters `name` – str name of the tplot variable

Notes

The coordinate system is stored in the variable's metadata at: `metadata['data_att']['coord_sys']`

See `cotrans_get_coord` to return the coordinate system

Returns True/False depending on if the operation was successful

Return type bool

5.4 Support Routines

`pyspedas.cotrans.cotrans_lib.get_time_parts(time_in)`

Split time into year, doy, hours, minutes, seconds.fsec.

Parameters `time_in` (list of float) – Time array.

Returns

- `iyear` (array of int) – Year.
- `idoy` (array of int) – Day of year.
- `ih` (array of int) – Hours.
- `im` (array of int) – Minutes.
- `isec` (array of float) – Seconds and milliseconds.

`pyspedas.cotrans.cotrans_lib.csundir_vect(time_in)`

Calculate the direction of the sun.

Parameters `time_in` (list of float) – Time array.

Returns

- `gst` (list of float) – Greenwich mean sideral time (radians).
- `slong` (list of float) – Longitude along ecliptic (radians).
- `sra` (list of float) – Right ascension (radians).
- `sdec` (list of float) – Declination of the sun (radians).
- `obliq` (list of float) – Inclination of Earth's axis (radians).

`pyspedas.cotrans.cotrans_lib.cdipdir(time_in=None, iyear=None, idoy=None)`

Compute dipole direction in GEO coordinates.

Parameters

- **time_in** (`float`)
- **iyear** (`int`)
- **idoy** (`int`)

Returns**Return type** `list` of `float`**Notes**

Compute geodipole axis direction from International Geomagnetic Reference Field (IGRF-13) model for time interval 1970 to 2020. For time out of interval, computation is made for nearest boundary. Same as SPEDAS cdipdir.

`pyspedas.cotrans.cotrans_lib.cdipdir_vect(time_in=None, iyear=None, idoy=None)`

Compute dipole direction in GEO coordinates.

Similar to cdipdir but for arrays.

Parameters

- **time_in** (`list` of `floats`)
- **iyear** (`list` of `int`)
- **idoy** (`list` of `int`)

Returns**Return type** `list` of `float`**Notes**

Same as SPEDAS cdipdir_vec.

`pyspedas.cotrans.cotrans_lib.tgeigse_vect(time_in, data_in)`

GEI to GSE transformation.

Parameters

- **time_in** (`list` of `float`) – Time array.
- **data_in** (`list` of `float`) – xgei, ygei, zgei cartesian GEI coordinates.

Returns

- **xgse** (`list` of `float`) – Cartesian GSE coordinates.
- **ygse** (`list` of `float`) – Cartesian GSE coordinates.
- **zgse** (`list` of `float`) – Cartesian GSE coordinates.

`pyspedas.cotrans.cotrans_lib.subgei2gse(time_in, data_in)`

Transform data from GEI to GSE.

Parameters

- **time_in** (`list` of `float`) – Time array.
- **data_in** (`list` of `float`) – Coordinates in GEI.

Returns Coordinates in GSE.

Return type Array of float

`pyspedas.cotrans.cotrans_lib.tgsegei_vect(time_in, data_in)`

GSE to GEI transformation.

Parameters

- **time_in** (list of float) – Time array.
- **data_in** (list of float) – xgei, ygei, zgei cartesian GEI coordinates.

Returns

- **xgei** (list of float) – Cartesian GEI coordinates.
- **ygei** (list of float) – Cartesian GEI coordinates.
- **zgei** (list of float) – Cartesian GEI coordinates.

`pyspedas.cotrans.cotrans_lib.subgse2gei(time_in, data_in)`

Transform data from GSE to GEI.

Parameters

- **time_in** (list of float) – Time array.
- **data_in** (list of float) – Coordinates in GSE.

Returns Coordinates in GEI.

Return type Array of float

`pyspedas.cotrans.cotrans_lib.tgsegsm_vect(time_in, data_in)`

Transform data from GSE to GSM.

Parameters

- **time_in** (list of float) – Time array.
- **data_in** (list of float) – xgse, ygse, zgse cartesian GSE coordinates.

Returns

- **xgsm** (list of float) – Cartesian GSM coordinates.
- **ygsm** (list of float) – Cartesian GSM coordinates.
- **zgsm** (list of float) – Cartesian GSM coordinates.

`pyspedas.cotrans.cotrans_lib.subgse2gsm(time_in, data_in)`

Transform data from GSE to GSM.

Parameters

- **time_in** (list of float) – Time array.
- **data_in** (list of float) – Coordinates in GSE.

Returns Coordinates in GSM.

Return type Array of float

`pyspedas.cotrans.cotrans_lib.tgsmgse_vect(time_in, data_in)`

Transform data from GSM to GSE.

Parameters

- **time_in** (list of float) – Time array.

- **data_in** (*list of float*) – xgsm, ygsm, zgsm GSM coordinates.

Returns

- **xgse** (*list of float*) – Cartesian GSE coordinates.
- **ygse** (*list of float*) – Cartesian GSE coordinates.
- **zgse** (*list of float*) – Cartesian GSE coordinates.

`pyspedas.cotrans.cotrans_lib.subgsm2gse(time_in, data_in)`

Transform data from GSM to GSE.

Parameters

- **time_in** (*list of float*) – Time array.
- **data_in** (*list of float*) – Coordinates in GSE.

Returns Coordinates in GSE.**Return type** Array of float

`pyspedas.cotrans.cotrans_lib.tgsmsm_vect(time_in, data_in)`

Transform data from GSM to SM.

Parameters

- **time_in** (*list of float*) – Time array.
- **data_in** (*list of float*) – xgsm, ygsm, zgsm GSM coordinates.

Returns

- **xsm** (*list of float*) – Cartesian SM coordinates.
- **ysm** (*list of float*) – Cartesian SM coordinates.
- **zsm** (*list of float*) – Cartesian SM coordinates.

`pyspedas.cotrans.cotrans_lib.subgsm2sm(time_in, data_in)`

Transform data from GSM to SM.

Parameters

- **time_in** (*list of float*) – Time array.
- **data_in** (*list of float*) – Coordinates in GSM.

Returns Coordinates in SM.**Return type** Array of float

`pyspedas.cotrans.cotrans_lib.tsmsgsm_vect(time_in, data_in)`

Transform data from SM to GSM.

Parameters

- **time_in** (*list of float*) – Time array.
- **data_in** (*list of float*) – xsm, ysm, zsm SM coordinates.

Returns

- **xsm** (*list of float*) – GSM coordinates.
- **ysm** (*list of float*) – GSM coordinates.
- **zsm** (*list of float*) – GSM coordinates.

`pyspedas.cotrans.cotrans_lib.subsm2gsm(time_in, data_in)`

Transform data from SM to GSM.

Parameters

- `time_in` (`list of float`) – Time array.
- `data_in` (`list of float`) – Coordinates in SM.

Returns Coordinates in GSM.

Return type Array of float

`pyspedas.cotrans.cotrans_lib.subgei2geo(time_in, data_in)`

Transform data from GEI to GEO.

Parameters

- `time_in` (`list of float`) – Time array.
- `data_in` (`list of float`) – Coordinates in GEI.

Returns Coordinates in GEO.

Return type Array of float

`pyspedas.cotrans.cotrans_lib.subgeo2gei(time_in, data_in)`

Transform data from GEO to GEI.

Parameters

- `time_in` (`list of float`) – Time array.
- `data_in` (`list of float`) – Coordinates in GEO.

Returns Coordinates in GEI.

Return type Array of float

`pyspedas.cotrans.cotrans_lib.subgeo2mag(time_in, data_in)`

Transform data from GEO to MAG.

Parameters

- `time_in` (`list of float`) – Time array.
- `data_in` (`list of float`) – Coordinates in GEO.

Returns Coordinates in MAG.

Return type Array of float

Notes

Adapted from spedas IDL file geo2mag.pro.

`pyspedas.cotrans.cotrans_lib.submag2geo(time_in, data_in)`

Transform data from MAG to GEO.

Parameters

- `time_in` (`list of float`) – Time array.
- `data_in` (`list of float`) – Coordinates in MAG.

Returns Coordinates in GEO.

Return type Array of float

Notes

Adapted from spedas IDL file mag2geo.pro.

`pyspedas.cotrans.cotrans_lib.ctv_mm_mult(m1, m2)`

Vectorized multiplication of two lists of 3x3 matrices.

Parameters

- **m1** (array of `float`) – Array (3, 3, n). List of n 3x3 matrices.
- **m2** (array of `float`) – Array (3, 3, n). List of n 3x3 matrices.

Returns Array (3, 3, n). List of n 3x3 matrices.

Return type Array of `float`

Notes

Adapted from spedas IDL file matrix_array_lib.pro.

`pyspedas.cotrans.cotrans_lib.j2000_matrix_vec(time_in)`

Get the conversion matrix for J2000 coordinates.

Gives a matrix that transforms from mean earth equator and equinox of J2000 into the true earth equator and equinox for the dates and times.

Parameters `time_in` (`list` of `float`) – Time array.

Returns Transformation matrix.

Return type Matrix of `float`

Notes

Adapted from spedas IDL file spd_make_j2000_matrix_vec.pro.

`pyspedas.cotrans.cotrans_lib.ctv_mx_vec_rot(m, v)`

Vectorized multiplication of n matrices by n vectors.

Parameters

- **m** (array of `float`) – Array (k, k, n). List of n kxk matrices. Unusually, it is 3x3 matrices, ie. k=3.
- **v** (array of `float`) – Array (n, k). List of n vectors.

Returns Array (n, k). List of n vectors.

Return type Array of `float`

Notes

Adapted from spedas IDL file matrix_array_lib.pro.

`pyspedas.cotrans.cotrans_lib.subgei2j2000(time_in, data_in)`

Transform data from GEI to J2000.

Parameters

- `time_in` (`list of float`) – Time array.
- `data_in` (`list of float`) – Coordinates in GEI.

Returns Coordinates in J2000.

Return type Array of float

`pyspedas.cotrans.cotrans_lib.subj20002gei(time_in, data_in)`

Transform data from J2000 to GEI.

Parameters

- `time_in` (`list of float`) – Time array.
- `data_in` (`list of float`) – Coordinates in J2000.

Returns Coordinates in GEI.

Return type Array of float

`pyspedas.cotrans.cotrans_lib.subcotrans(time_in, data_in, coord_in, coord_out)`

Transform data from coord_in to coord_out.

Calls the other sub functions in this file.

Parameters

- `time_in` (`list of float`) – Time array.
- `data_in` (`list of float`) – Coordinates in coord_in.
- `coord_in` (`string`) – One of GSE, GSM, SM, GEI, GEO, MAG, J2000.
- `coord_out` (`string`) – One of GSE, GSM, SM, GEI, GEO, MAG, J2000.

Returns Coordinates in coord_out.

Return type Array of float

UTILITIES

6.1 Time Conversions

6.1.1 Convert from unix time to a string

`pyspedas.time_string(float_time=None, fmt=None)`

Transform a list of float daytime values to a list of strings.

Parameters

- **float_time** (`float/list of floats, optional`) – Input time. The default is None, which returns the time now.
- **fmt** (`str, optional`) – Time format. The default is None, which uses ‘%Y-%m-%d %H:%M:%S.%f’.

Returns Datetimes as string.

Return type `list` of `str`

Example

```
from pyspedas import time_string
time_string(1444953600.0)
```

```
'2015-10-16 00:00:00.000000'
```

6.1.2 Convert from a string to unix time

`pyspedas.time_double(str_time=None)`

Transform a list of datetimes from string to decimal.

Same as `time_float`.

Parameters `str_time` (`str/list of str, optional`) – Input times. The default is None.

Returns Output times as floats.

Return type `list` of `float`

Example

```
from pyspedas import time_double  
time_double('2015-10-16/14:00')
```

```
1445004000.0
```

6.1.3 Convert from a string or unix time to a datetime object

pyspedas.time_datetime(*time=None, tz=None*)

Find python datetime.

Transform a list of float daytime values to a list of pythonic ‘datetime.datetime’ values.

Parameters **time** (float/list of floats or str/list of str, optional) – Input time. The default is None, which returns the time now.

Returns Datetimes as *datetime.datetime*.

Return type list of *datetime.datetime*

Example

```
from pyspedas import time_datetime  
time_datetime('2015-10-16/14:00')
```

```
datetime.datetime(2015, 10, 16, 14, 0, tzinfo=datetime.timezone.utc)
```

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