
pySPEDAS

Release 1.3

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.

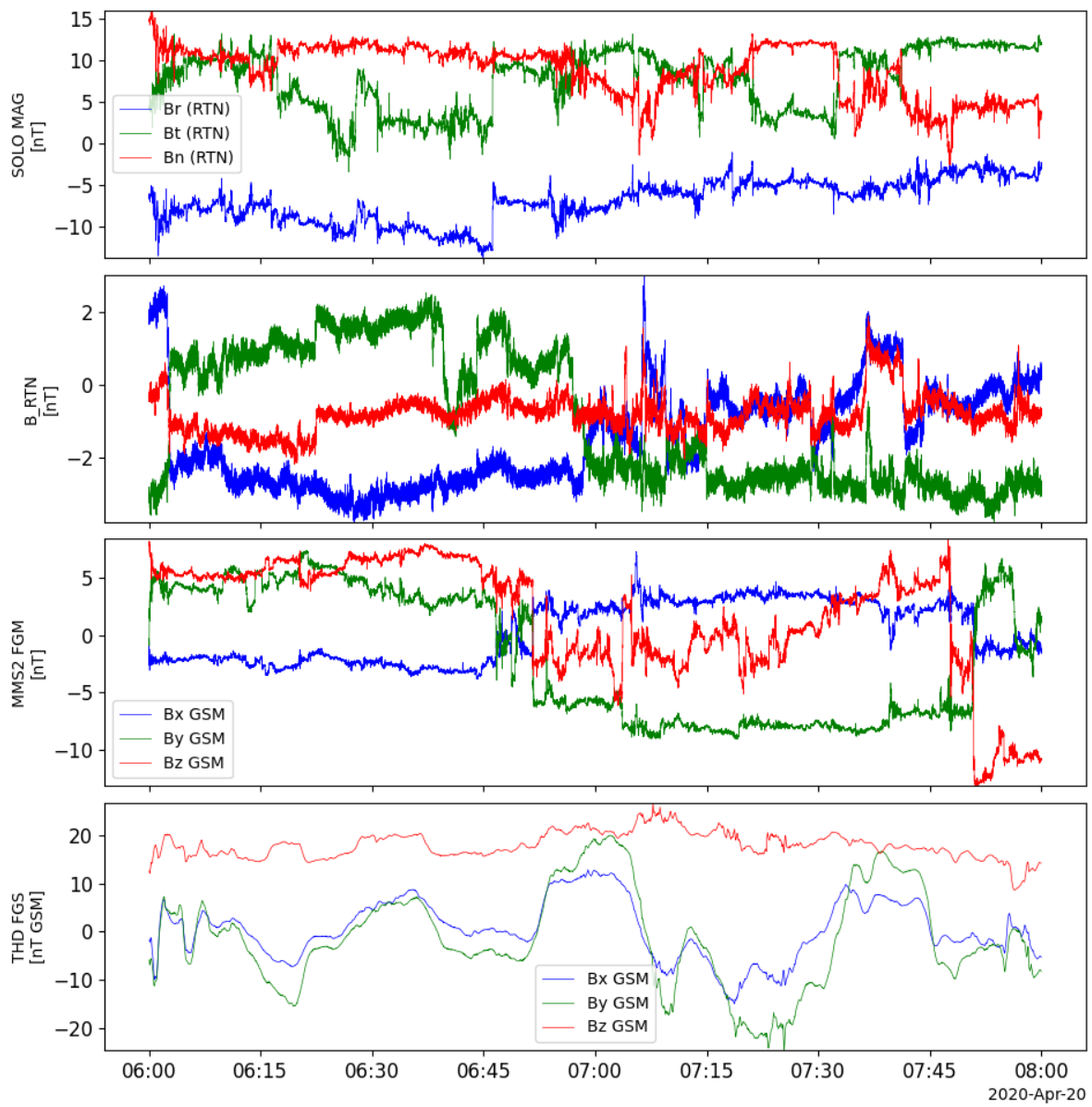
pySPEDAS and `pyTplot` make creating multi-mission, multi-instrument figures simple, e.g., to create a figure showing magnetometer data from [Solar Orbiter](#), [Parker Solar Probe](#), [MMS](#), and [THEMIS](#),

```
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 pyspedas package using PyPI:

```
pip install pyspedas
```

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

```
pip install pyspedas --upgrade
```

1.3 Local Data Directories

By default, the data are stored in your pyspedas 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 pyplot, e.g.,

```
from pyplot 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 pyplot. e.g.,

```
from pyplot 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

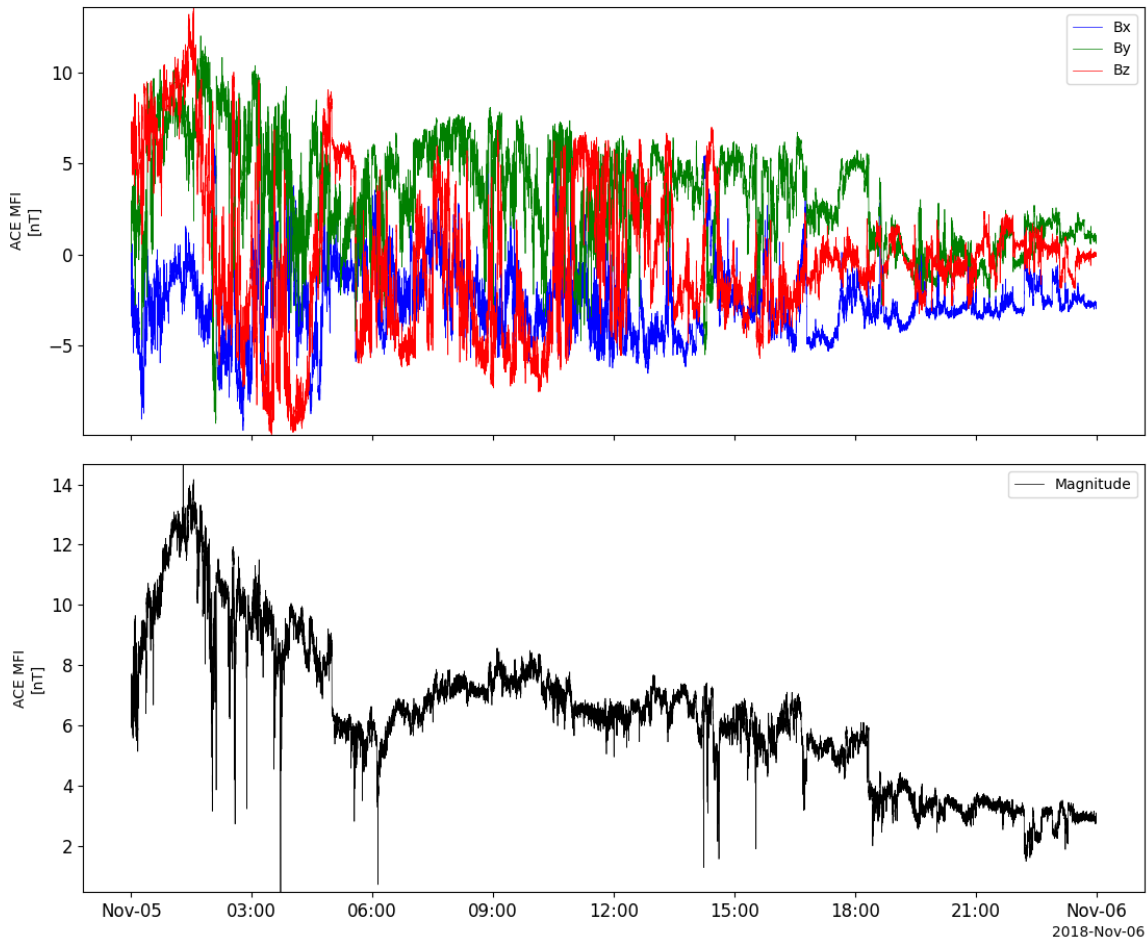
- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) –
Data type; Valid options: h0: 16-Second Level 2 Data h1: 4-Minute Level 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

Return type List of *tplot* variables created.

Example

```
import pyspedas
from pyplot import tplot
mfi_vars = 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)

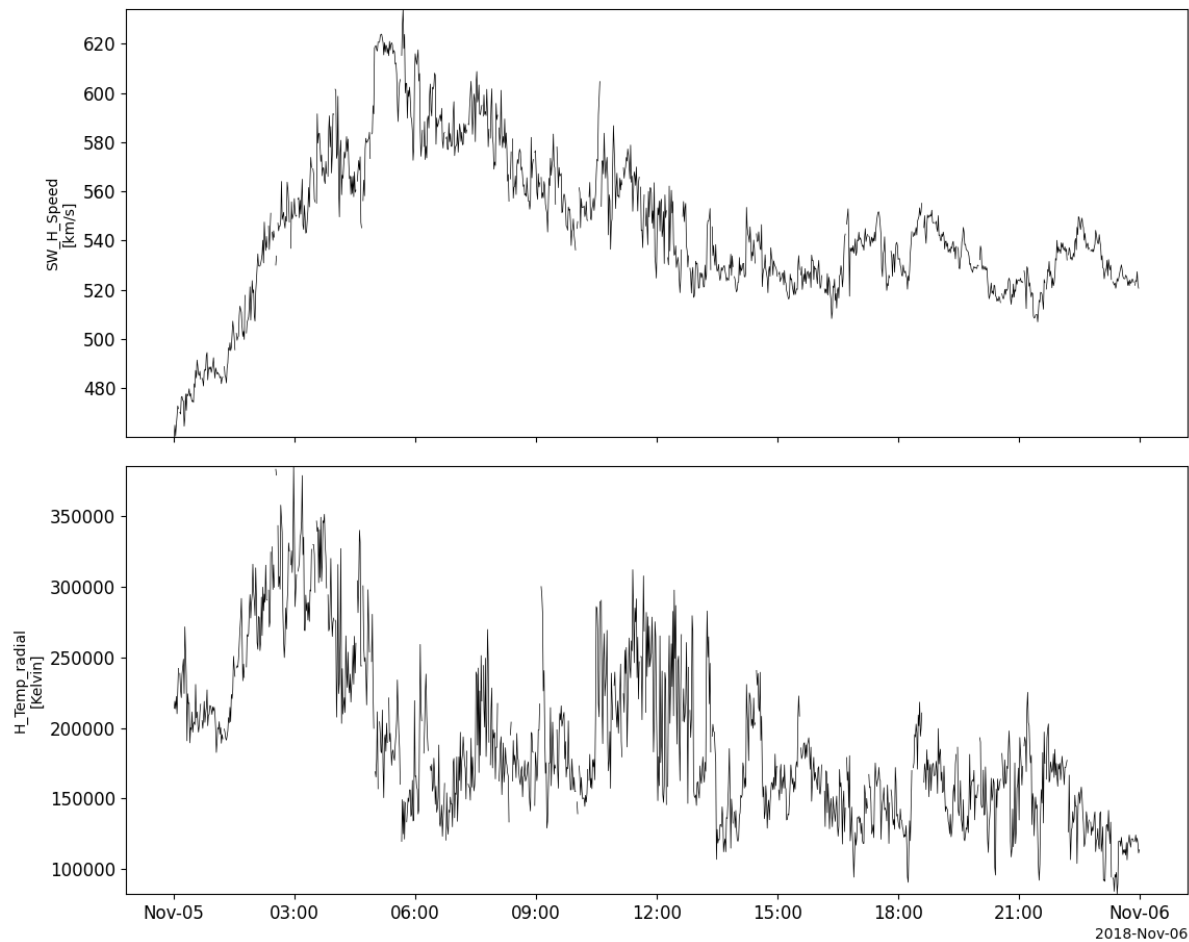
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpot import tplot
swe_vars = pyspedas.ace.swe(trange=['2018-11-5', '2018-11-6'])
tplot(['Vp', '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

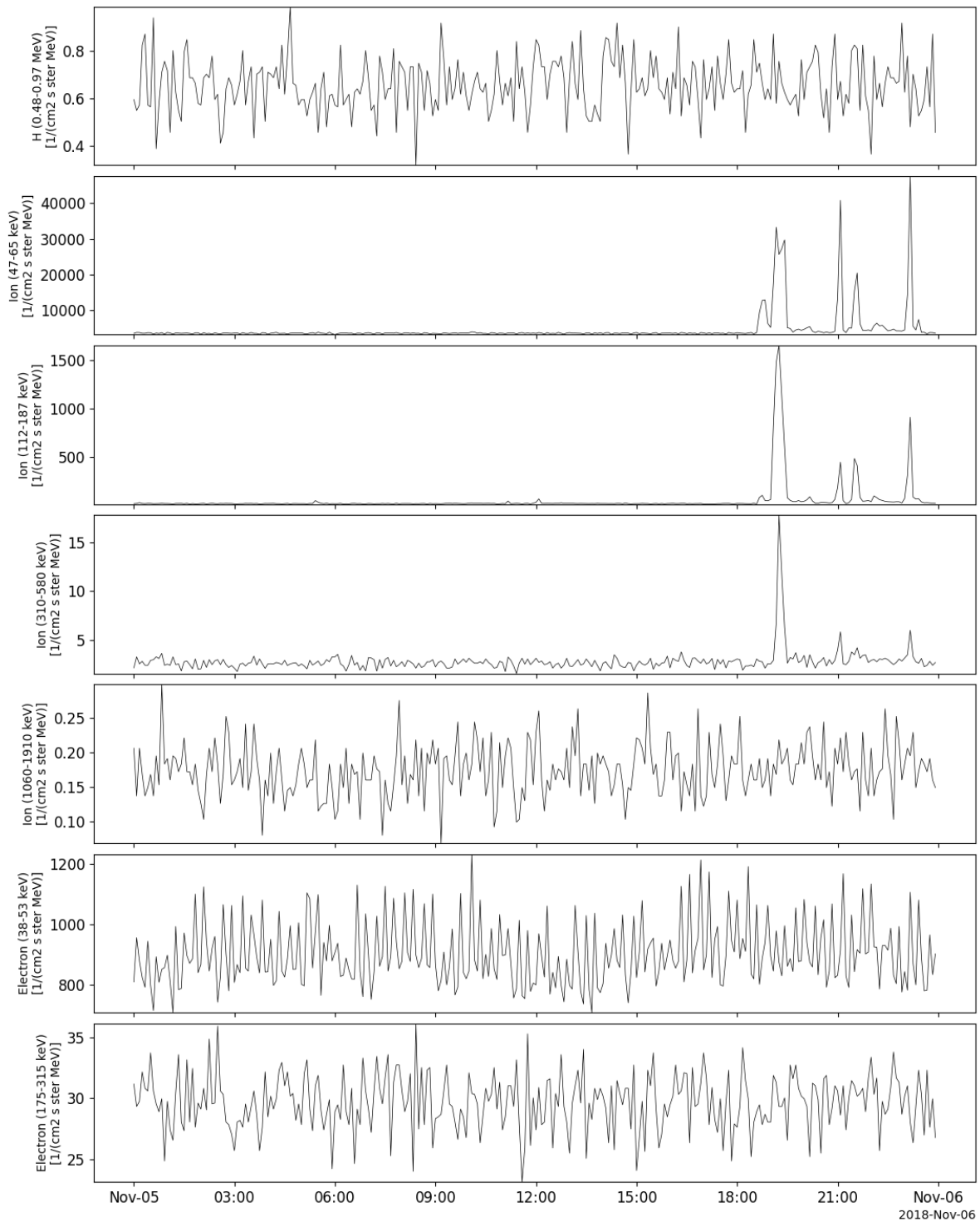
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format 'YYYY-MM-DD','YYYY-MM-DD'] or to specify more or less than a day ['YYYY-MM-DD/hh:mm:ss','YYYY-MM-DD/hh:mm:ss']
- **datatype** (*str*) –
Data type; Valid options: h1: 5-Minute Level 2 Data h2: 1-Hour Level 2 Data 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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
epam_vars = pyspedas.ace.epam(trange=['2018-11-5', '2018-11-6'])
tplot(['H_lo', 'Ion_very_lo', 'Ion_lo', 'Ion_mid', 'Ion_hi', 'Electron_lo', 'Electron_hi
↪'])
```



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)

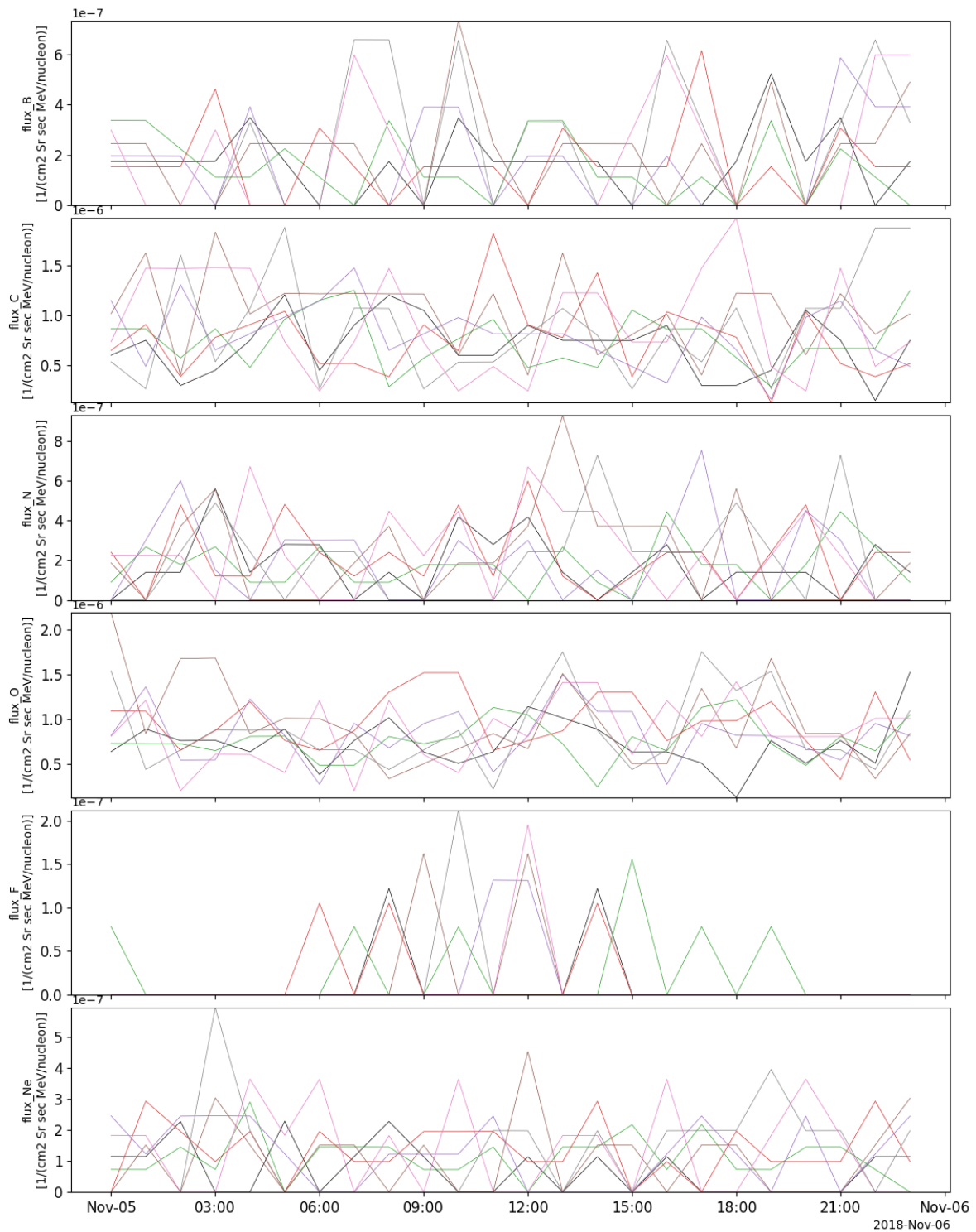
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
cris_vars = pyspedas.ace.cris(trange=['2018-11-5', '2018-11-6'])
tplot(['flux_B', 'flux_C', 'flux_N', 'flux_O', 'flux_F', 'flux_Ne'])
```



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)

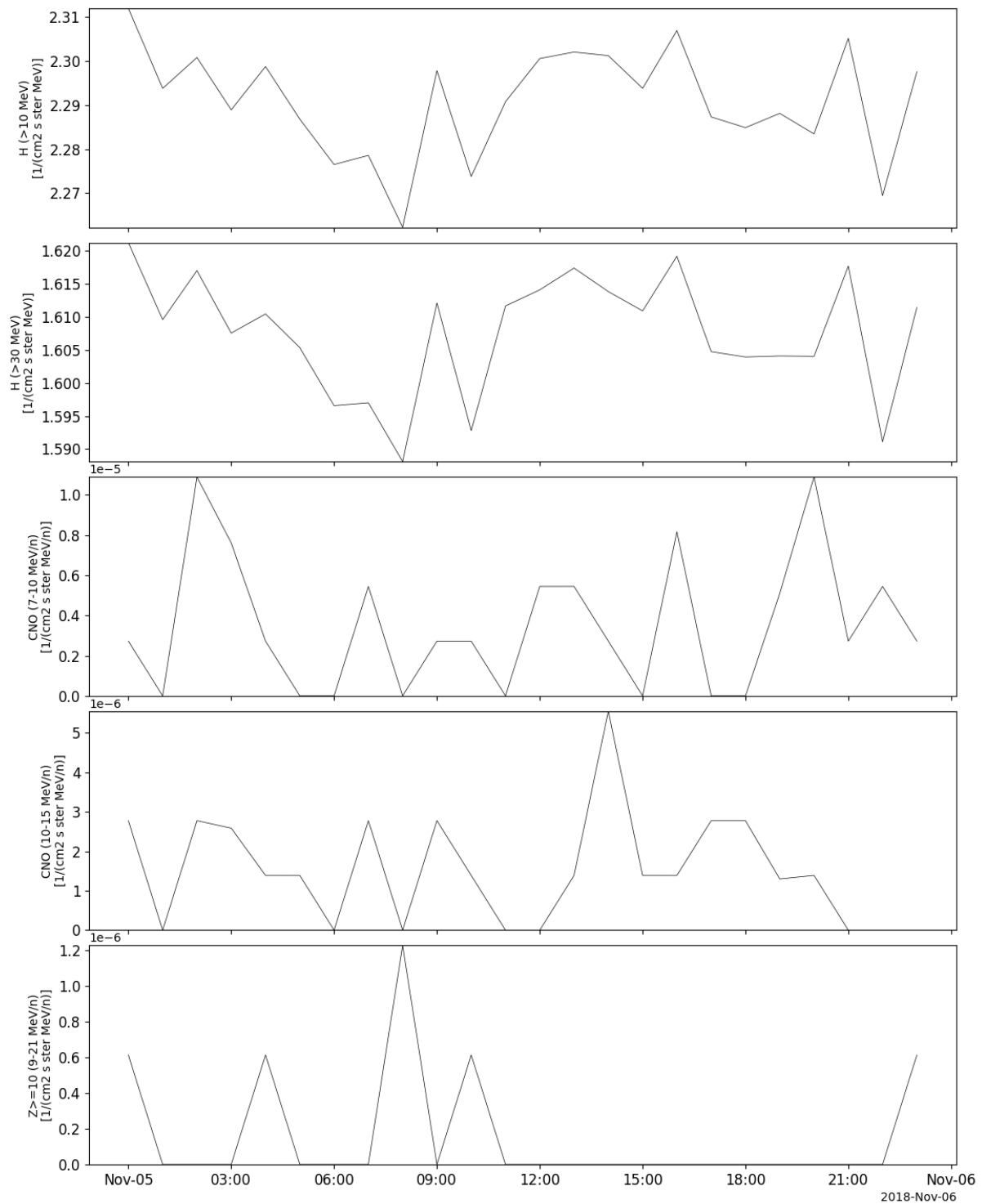
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
sis_vars = pyspedas.ace.sis(trange=['2018-11-5', '2018-11-6'])
tplot(['H_lo', 'H_hi', 'CNO_lo', 'CNO_hi', 'Z_ge_10'])
```



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)

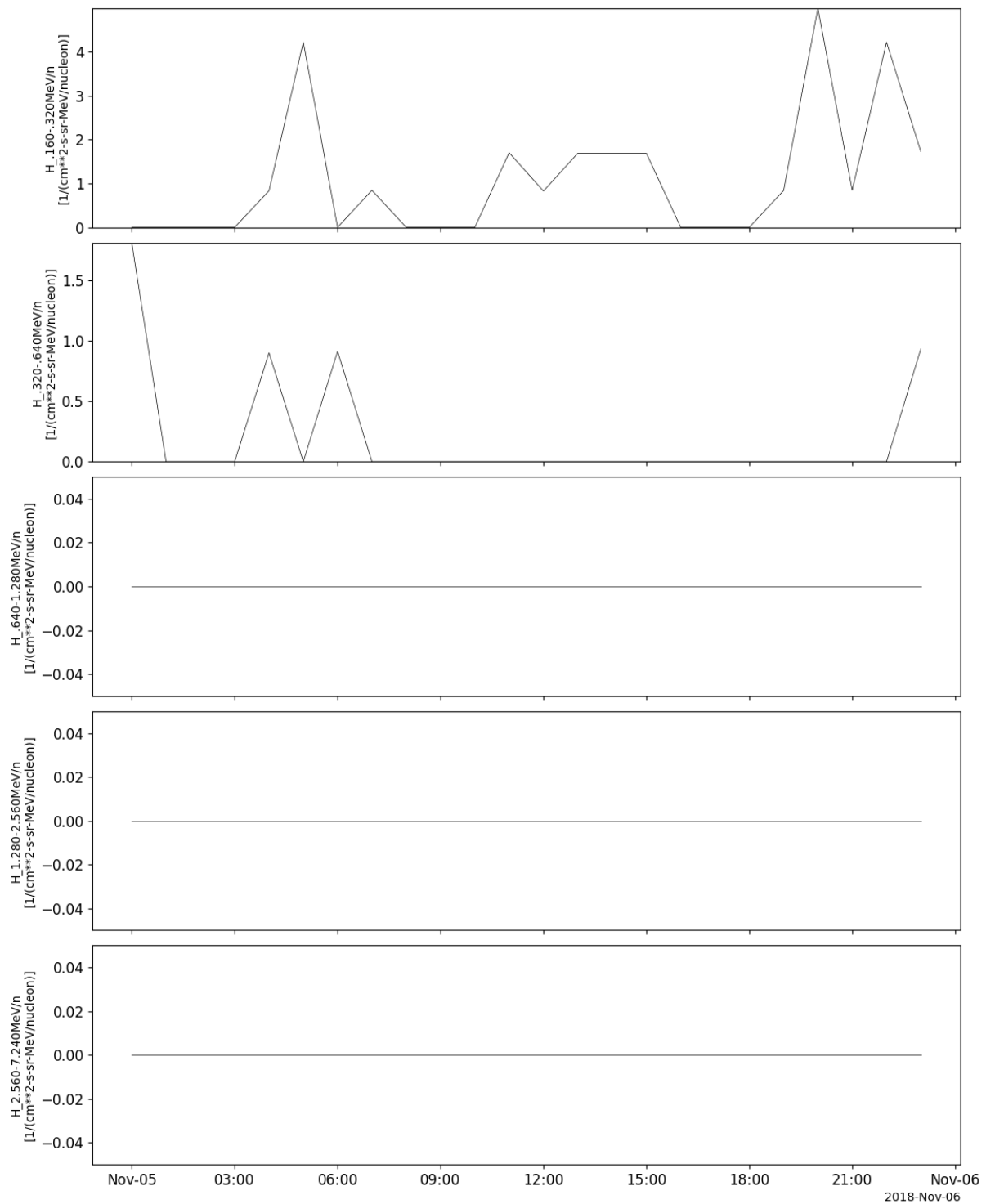
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
uleis_vars = pyspedas.ace.uleis(trange=['2018-11-5', '2018-11-6'])
tplot(['H_S1', 'H_S2', 'H_S3', 'H_S4', 'H_S5'])
```



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)

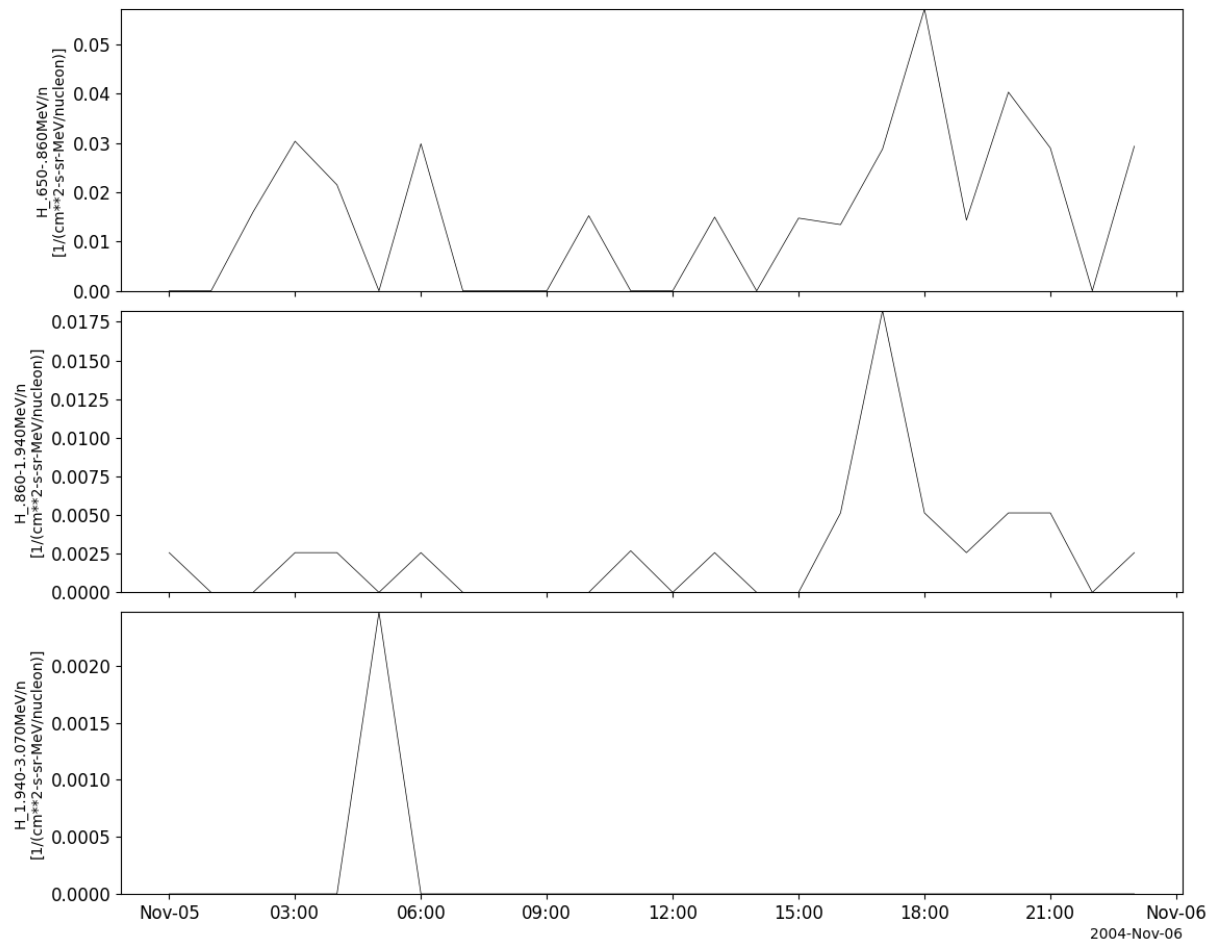
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
sepica_vars = pyspedas.ace.sepica(trange=['2004-11-5', '2004-11-6'])
tplot(['H1', 'H2', 'H3'])
```



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`) –

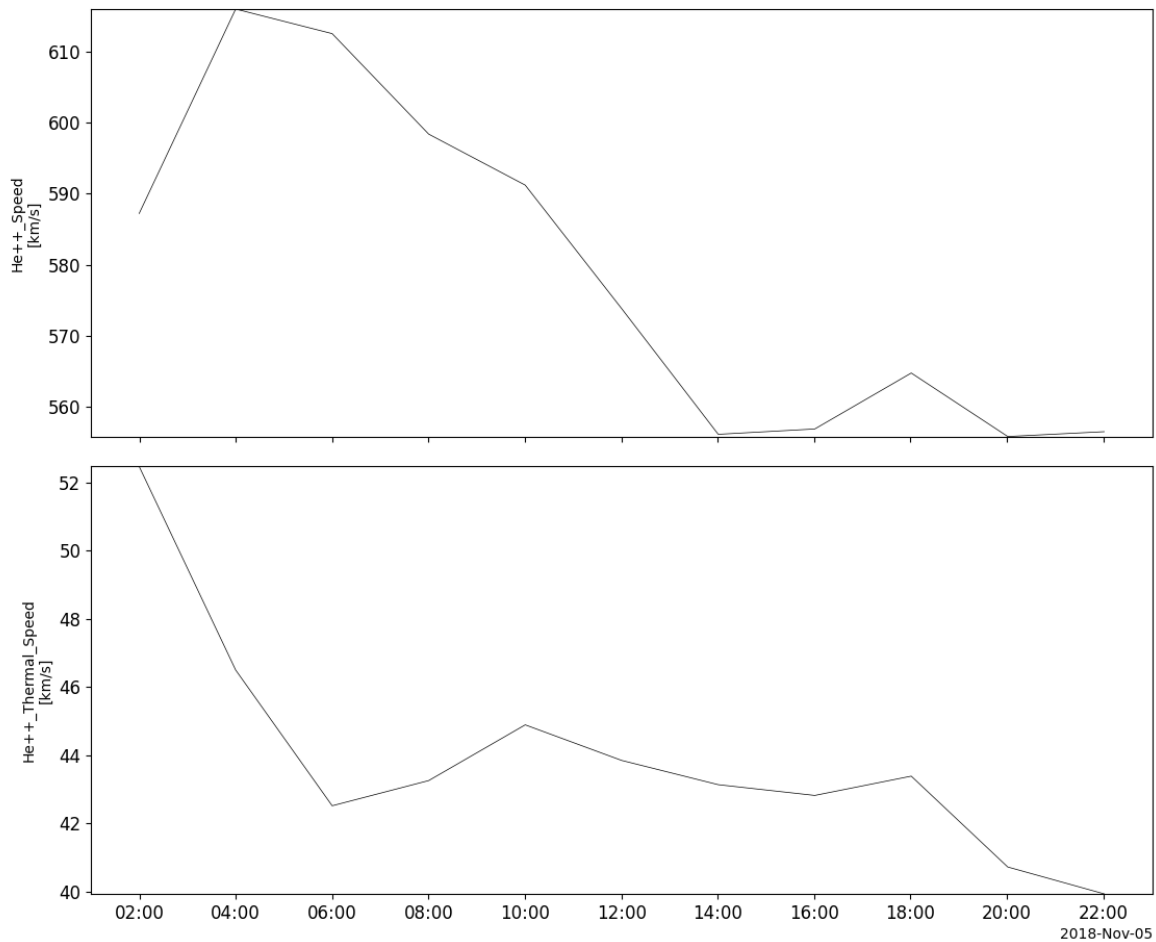
Data type; Valid options: sw2_h3: (default) SWICS 2.0 Solar Wind 2-Hour Level 2 Data
 swi_h2: SWICS 1.1 Solar Wind 1-Hour Level 2 Data swi_h3: SWICS 1.1 Solar Wind 2-Hour Level 2 Data swi_h4: SWICS 1.1 Solar Wind 1-Day Level 2 Data swi_h5: SWICS 1.1 Solar Wind 2-Hour Level 2 Q-state distributions swi_h6: 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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
swi_vars = pyspedas.ace.swics(trange=['2018-11-5', '2018-11-6'])
tplot(['vHe2', 'vthHe2'])
```



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

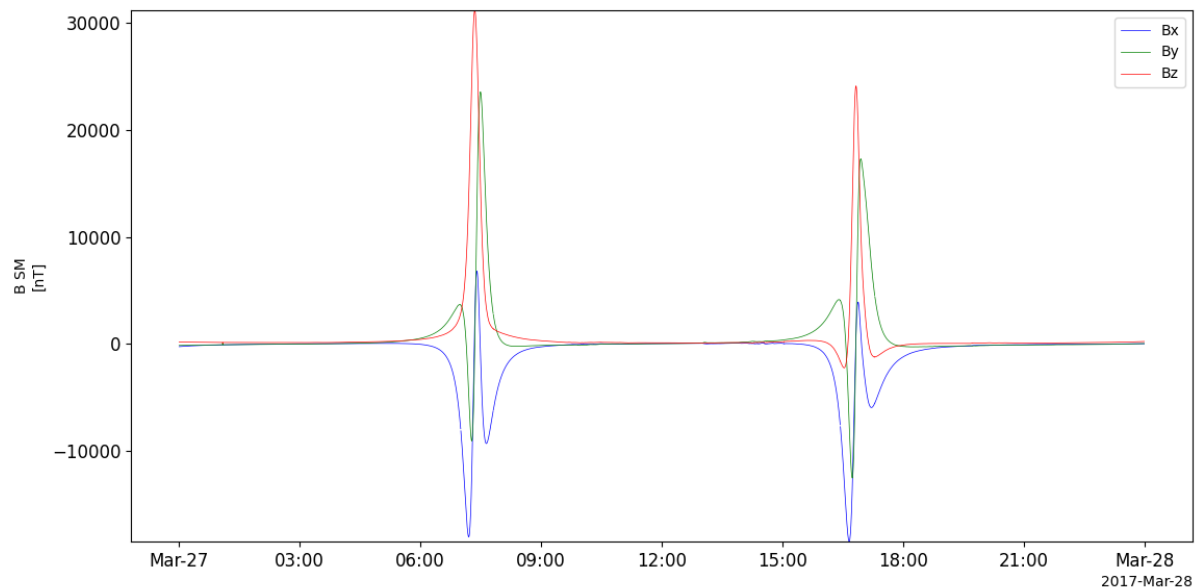
- **trange** – list of str time range of interest [starttime, endtime] with the format 'YYYY-MM-DD','YYYY-MM-DD'] or to specify more or less than a day ['YYYY-MM-DD/hh:mm:ss','YYYY-MM-DD/hh:mm:ss']
- **datatype** – str Data type; Valid options:

- **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.

Example

```
import pyspedas
from pytpot import tplot
pyspedas.erg.mgf(trange=['2017-03-27', '2017-03-28'])
tplot('erg_mgf_l2_mag_8sec_sm')
```



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)
```

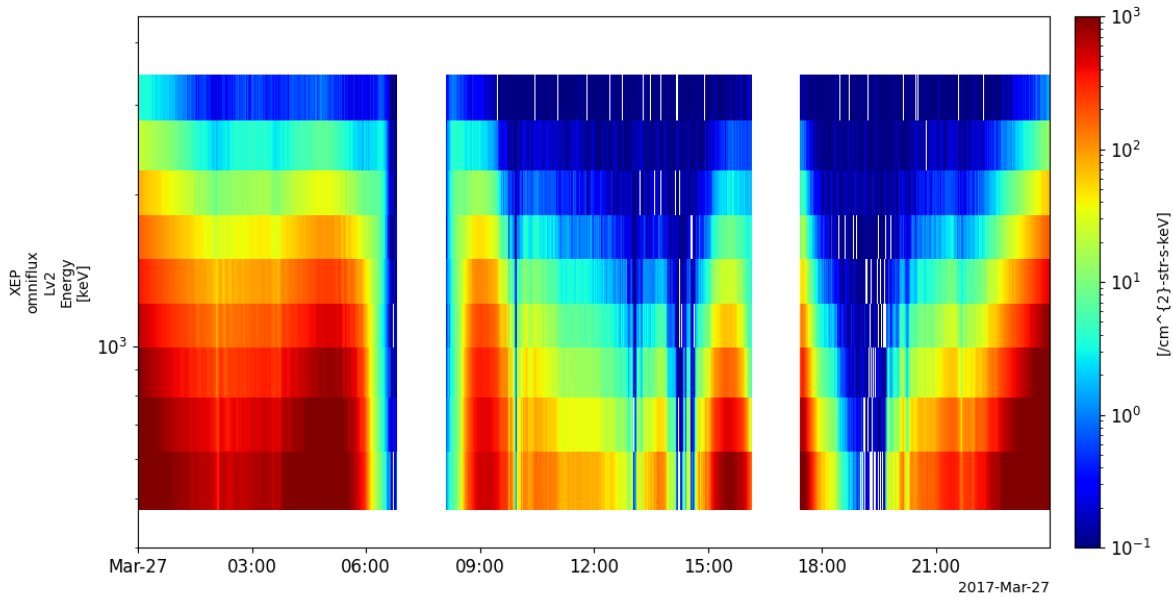
This function loads data from the XEP-e experiment from the Arase mission

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.

```
import pyspedas  
from pytpot import tplot  
pyspedas.erg.xep(trange=['2017-03-27', '2017-03-28'])  
tplot('erg_xep_l2_FED0_SSD')
```



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, unname=None, passwd=None, time_clip=False, ror=True,
                  version=None)
```

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

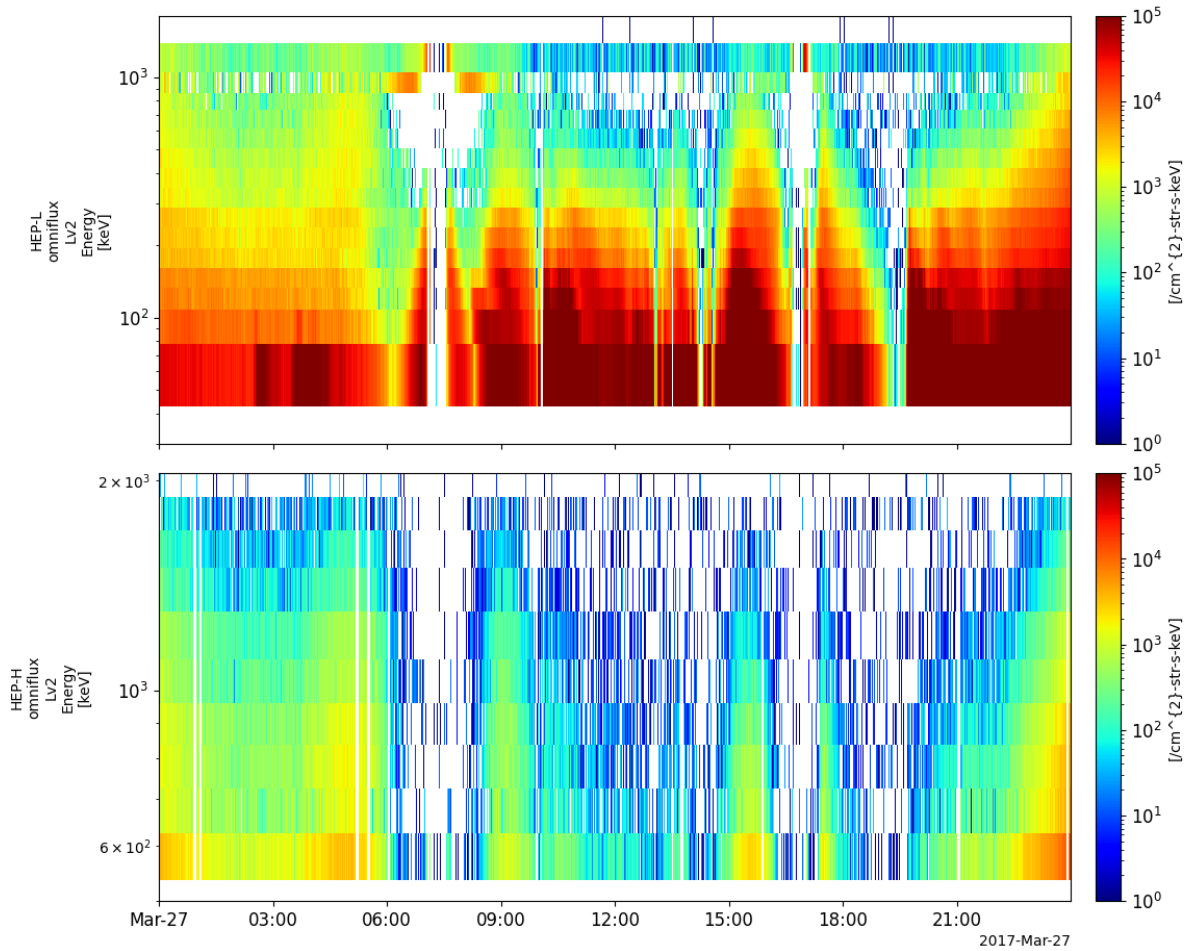
Parameters

- **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.

```
import pyspedas
from pyplot import tplot
pyspedas.erg.hep(trange=['2017-03-27', '2017-03-28'])
tplot(['erg_hep_l2_FED0_L', 'erg_hep_l2_FED0_H'])
```



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)
```

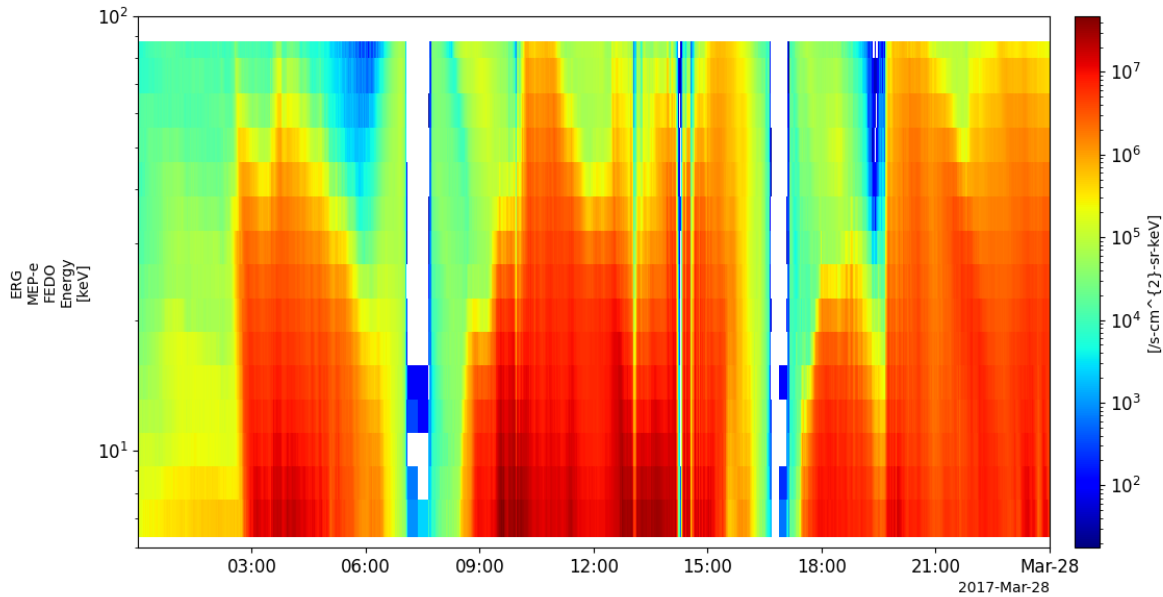
This function loads data from the MEP-e experiment from the Arase mission

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.

```
import pyspedas
from pytpot import tplot
pyspedas.erg.mepe(trange=['2017-03-27', '2017-03-28'])
tplot('erg_mepe_l2_omniflux_FED0')
```



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

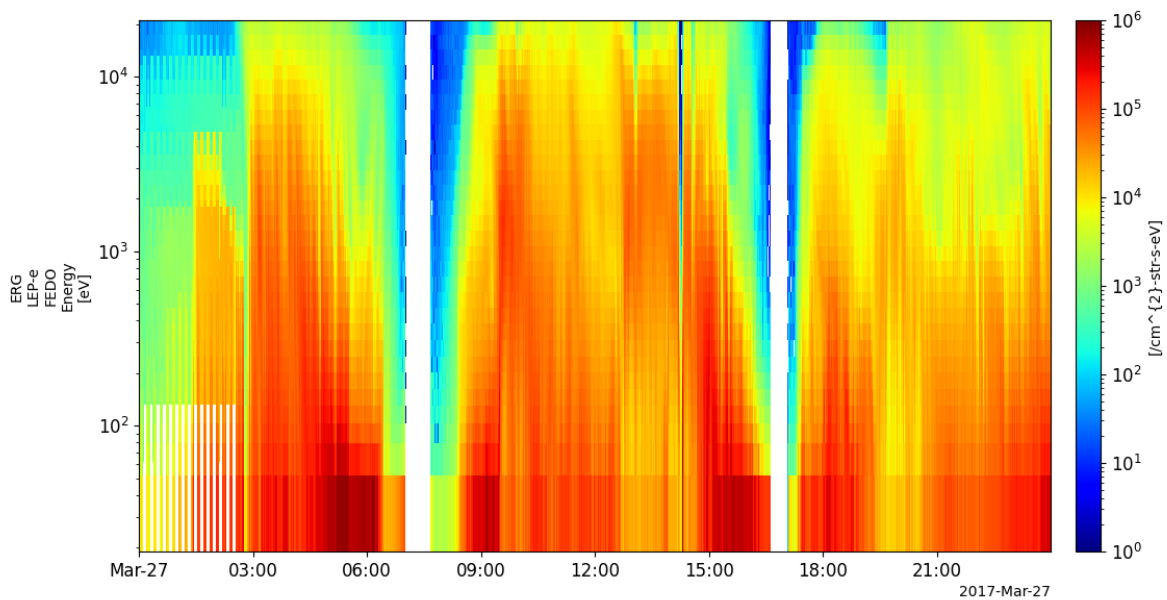
Parameters

- **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.

```
import pyspedas
from pytpplot import tplot
pyspedas.erg.lepe(trange=['2017-03-27', '2017-03-28'])
tplot('erg_lepe_l2_omniflux_FED0')
```



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

```
pyspedas.erg.mepi_nml(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-i experiment from the Arase mission

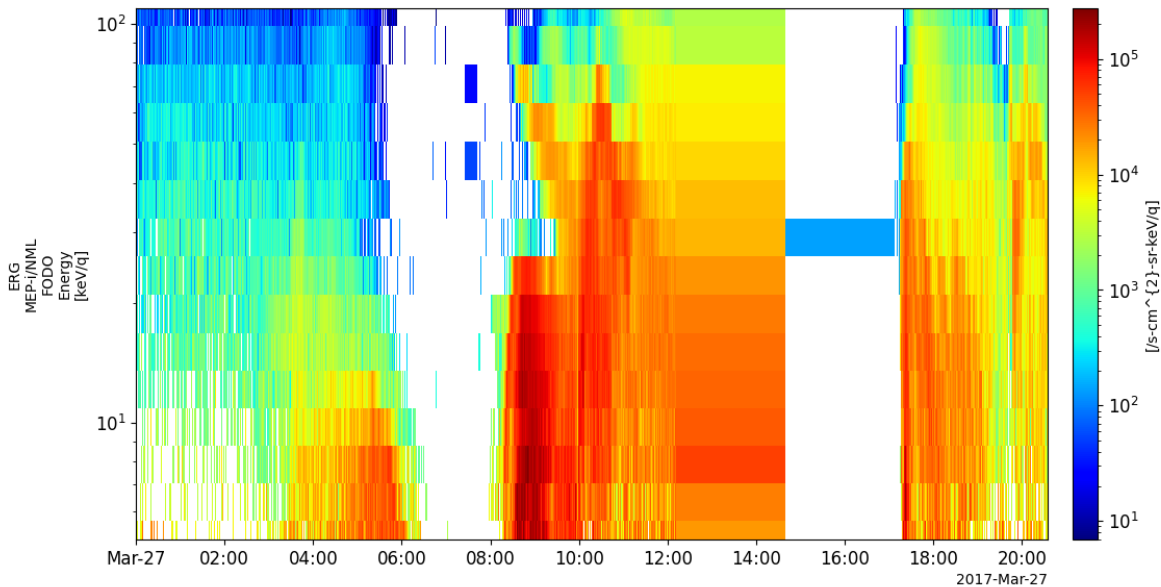
Parameters

- **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

Returns List of tplot variables created.

```
import pyspedas
from pytplo import tplot
pyspedas.erg.mepi_nml(trange=['2017-03-27', '2017-03-28'])
tplot('erg_mepi_l2_omniflux_FOD0')
```



```
pyspedas.erg.mepi_tof(trange=['2017-03-27', '2017-03-28'], datatype='flux', 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-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

Returns List of tplot variables created.

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)
```

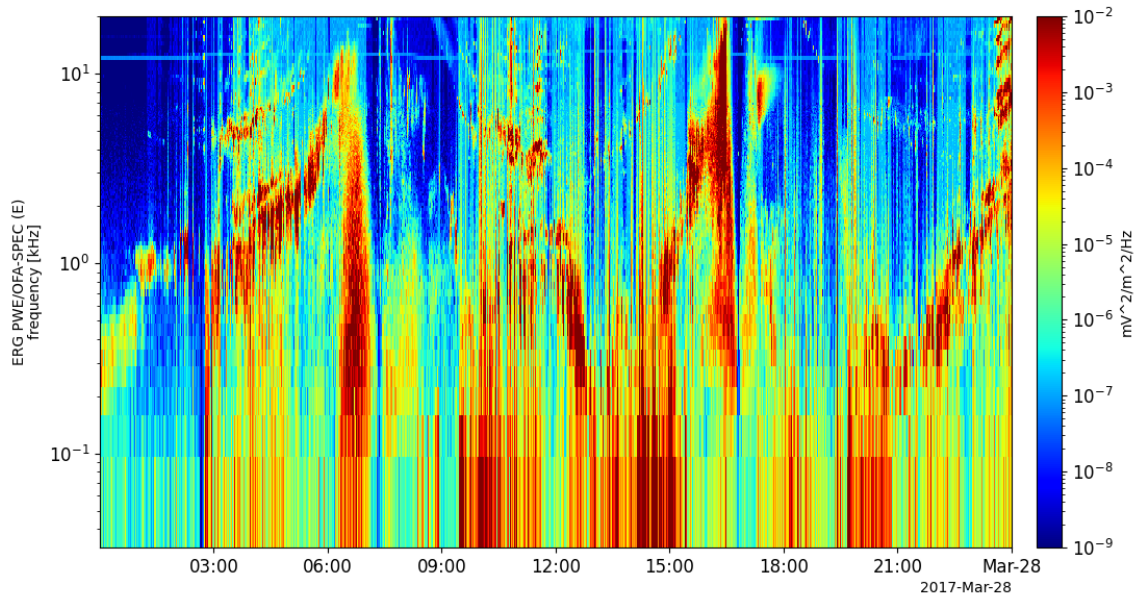
This function loads data from the PWE experiment from the Arase mission

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.

```
import pyspedas
from pytpot import tplot
pyspedas.erg.pwe_ofa(trange=['2017-03-27', '2017-03-28'])
tplot('erg_pwe_ofa_l2_spec_E_spectra_132')
```



```
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)
```

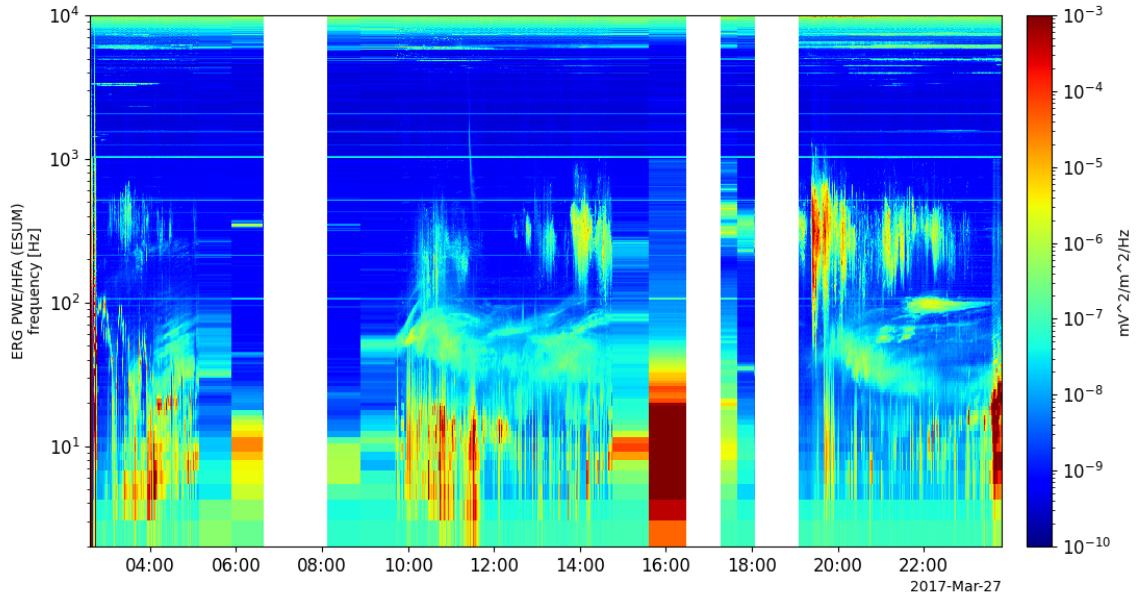
This function loads data from the PWE experiment from the Arase mission

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.

```
import pyspedas
from pytpplot import tplot
pyspedas.erg.pwe_hfa(trange=['2017-03-27', '2017-03-28'])
tplot('erg_pwe_hfa_l2_low_spectra_esum')
```



```
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)
```

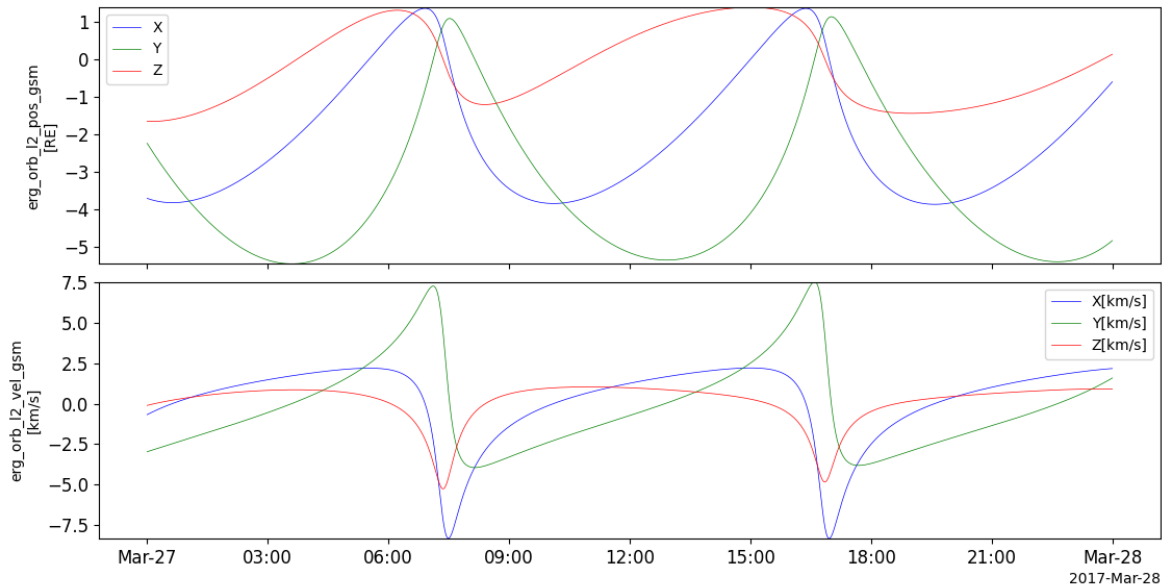
This function loads orbit data from the Arase mission

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.

```
import pyspedas
from pytpplot import tplot
pyspedas.erg.orb(trange=['2017-03-27', '2017-03-28'])
tplot(['erg_orb_l2_pos_gsm', 'erg_orb_l2_vel_gsm'])
```



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='I', 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

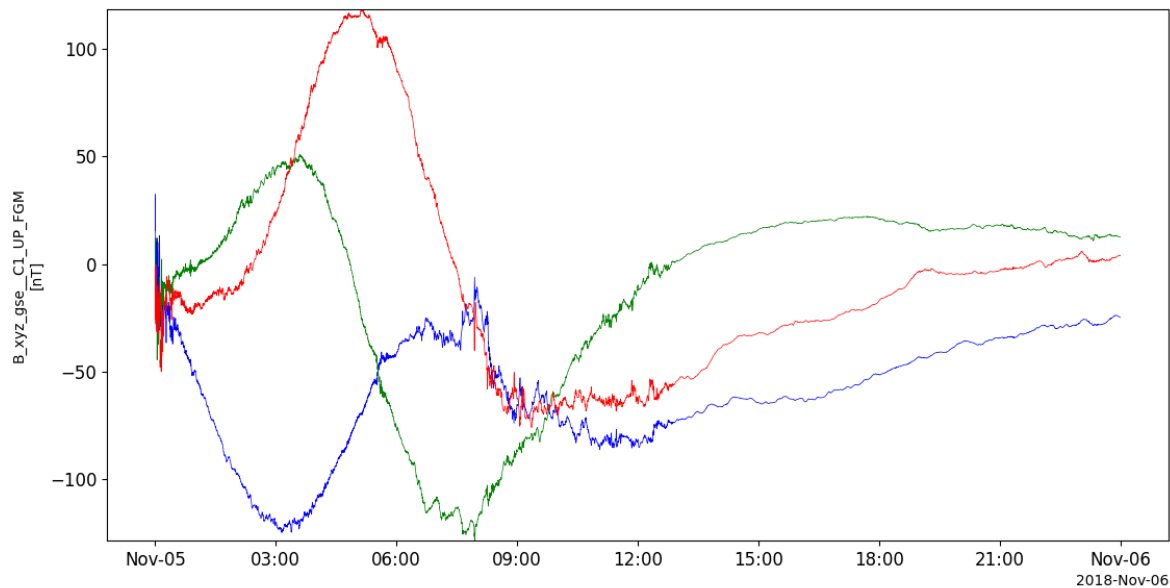
- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given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

Example

```
import pyspedas
from pytpplot import tplot
fgm_vars = pyspedas.cluster.fgm(trange=['2018-11-5', '2018-11-6'])
tplot('B_xyz_gse_C1_UP_FGM')
```



2.3.2 Active Spacecraft Potential Control experiment (ASPOC)

```
pyspedas.cluster.aspoc(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 Active Spacecraft Potential Control experiment

Parameters

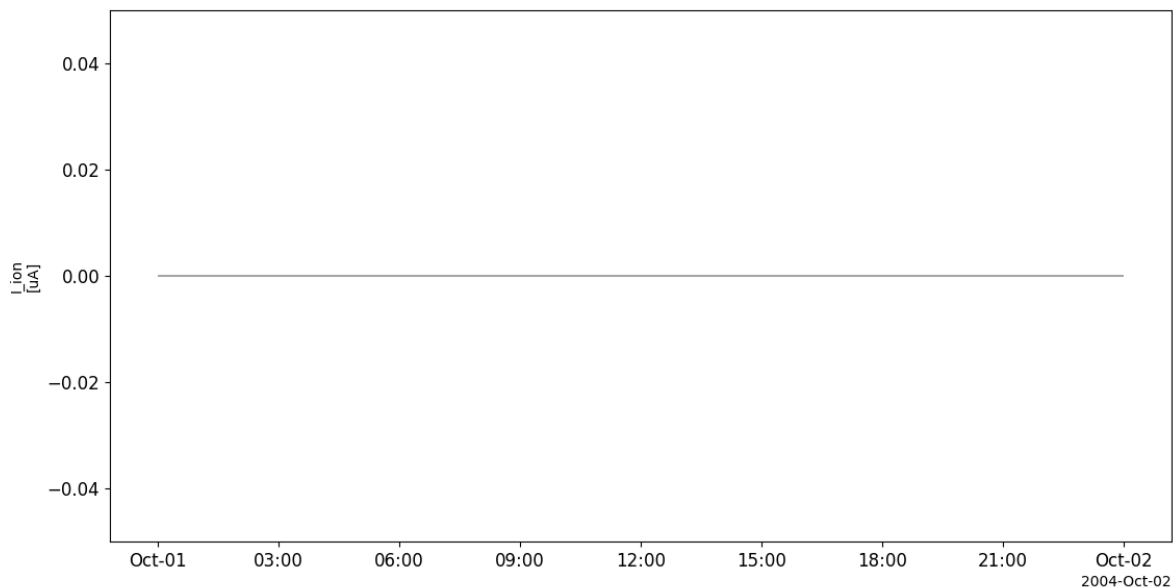
- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given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

Example

```
import pyspedas
from pytplot import tplot
asp_vars = pyspedas.cluster.aspoc(trange=['2004-10-01', '2004-10-2'])
tplot('I_ion__C1_PP_ASP')
```



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

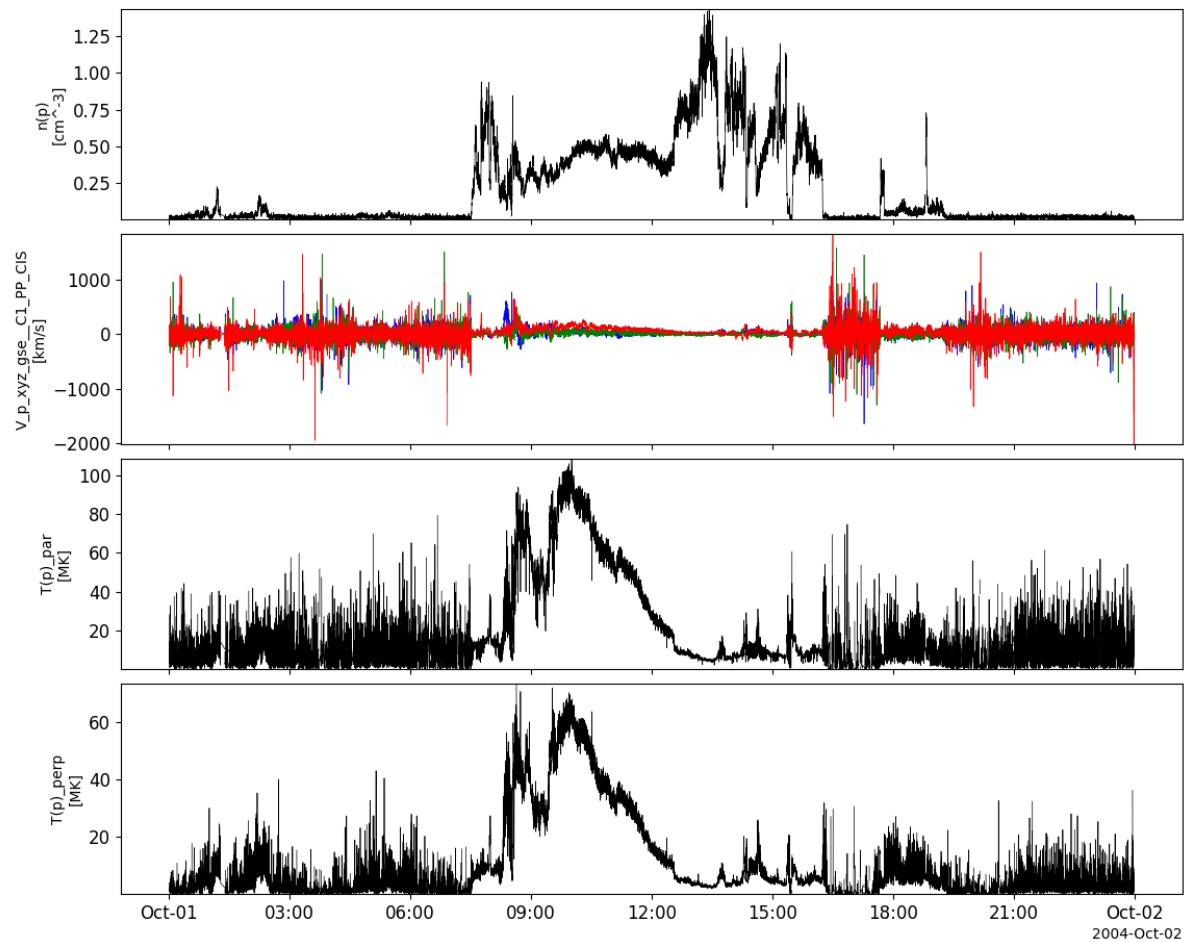
Parameters

- **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.

Example

```
import pyspedas
from pytpplot import tplot
cis_vars = pyspedas.cluster.cis(trange=['2004-10-01', '2004-10-2'])
tplot(['N_p__C1_PP_CIS', 'V_p_xyz_gse__C1_PP_CIS', 'T_p_par__C1_PP_CIS', 'T_p_perp__C1_
↪PP_CIS'])
```



2.3.4 Digital Wave Processing instrument (DWP)

```
pyspedas.cluster.dwp(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 Digital Wave Processing instrument

Parameters

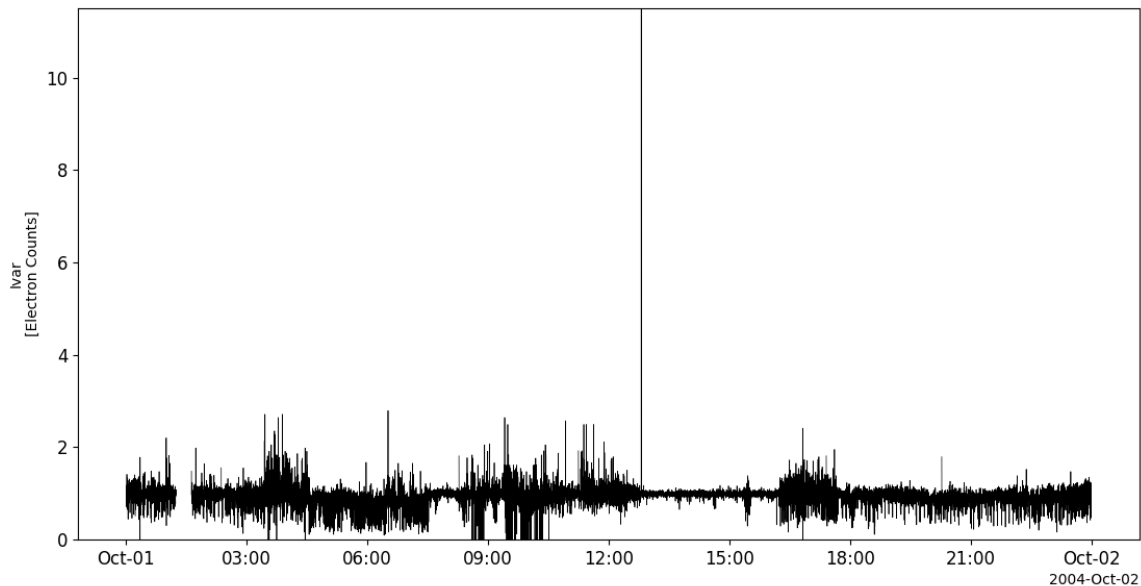
- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given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

Example

```
import pyspedas
from pytpplot import tplot
dwp_vars = pyspedas.cluster.dwp(trange=['2004-10-01', '2004-10-2'])
tplot('Correl_Ivar__C1_PP_DWP')
```



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

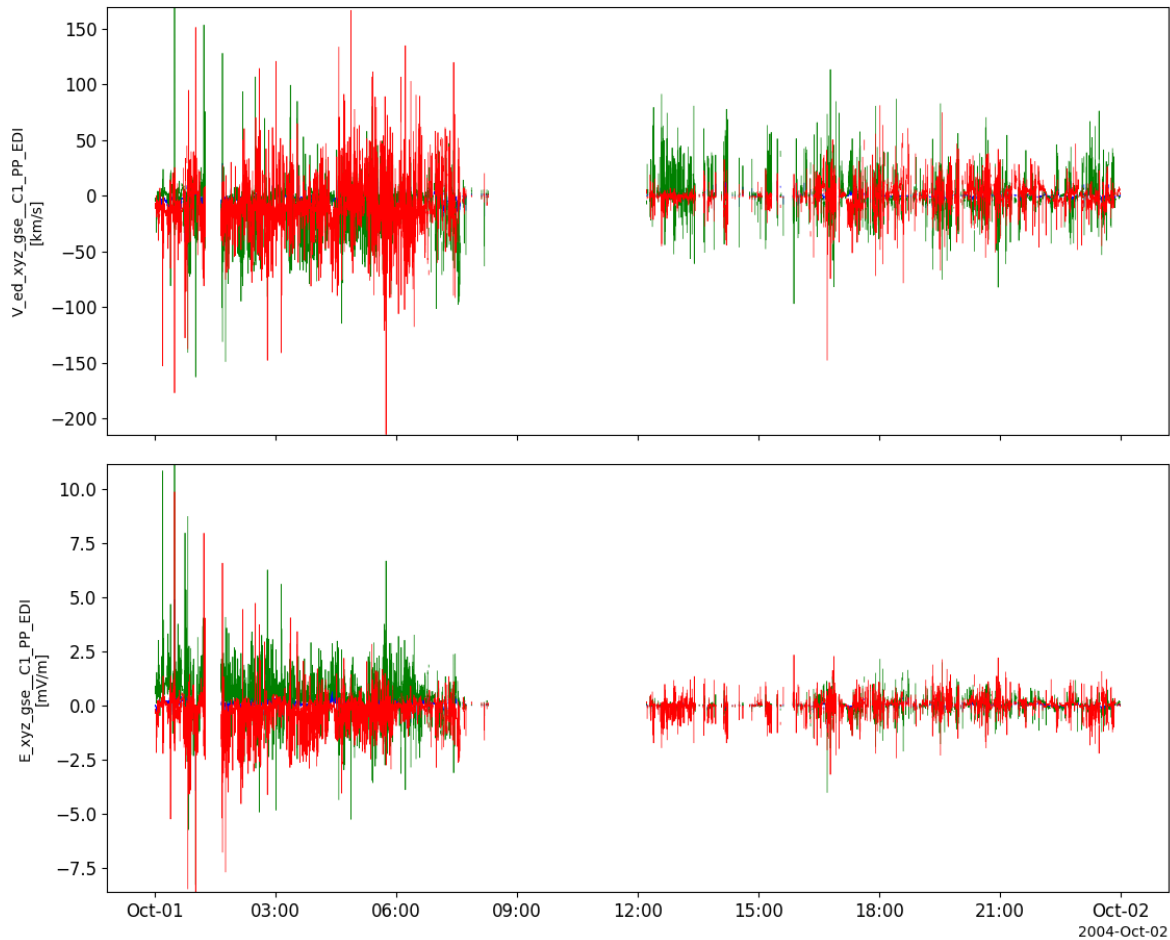
Parameters

- **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.

Example

```
import pyspedas
from pytplot import tplot
edi_vars = pyspedas.cluster.edi(trange=['2004-10-01', '2004-10-2'])
tplot(['V_ed_xyz_gse__C1_PP_EDI', 'E_xyz_gse__C1_PP_EDI'])
```

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

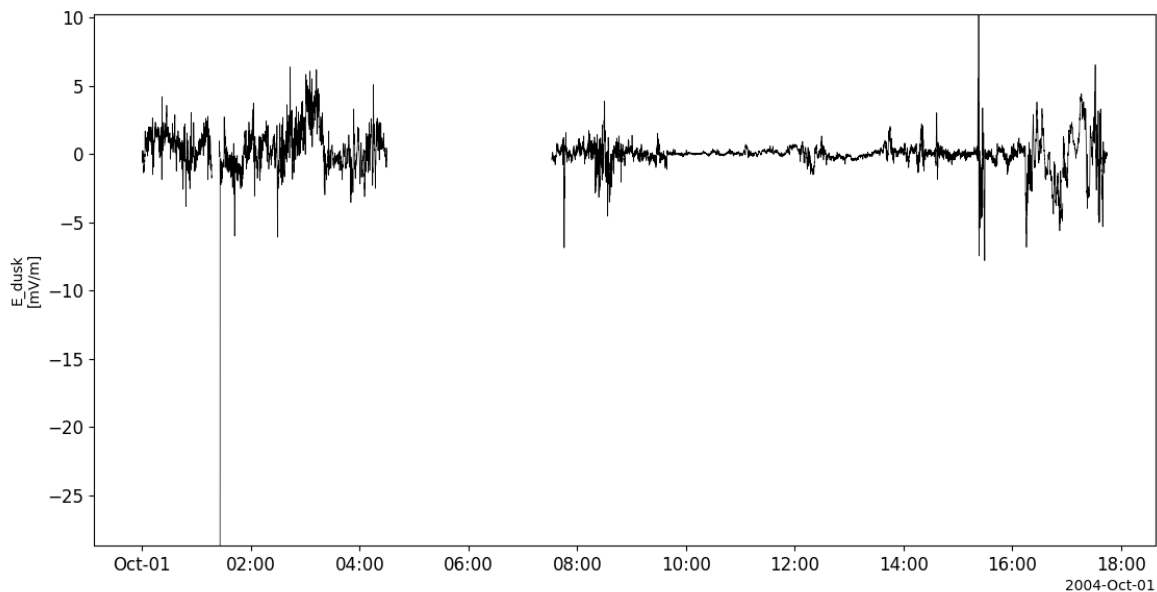
- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given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

Example

```
import pyspedas
from pytpplot import tplot
efw_vars = pyspedas.cluster.efw(trange=['2004-10-01', '2004-10-2'])
tplot('E_dusk__C1_PP_EFW')
```



2.3.7 Plasma Electron and Current Experiment (PEACE)

```
pyspedas.cluster.peace(trange=['2016-11-5', '2016-11-6'], 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 Plasma Electron and Current Experiment

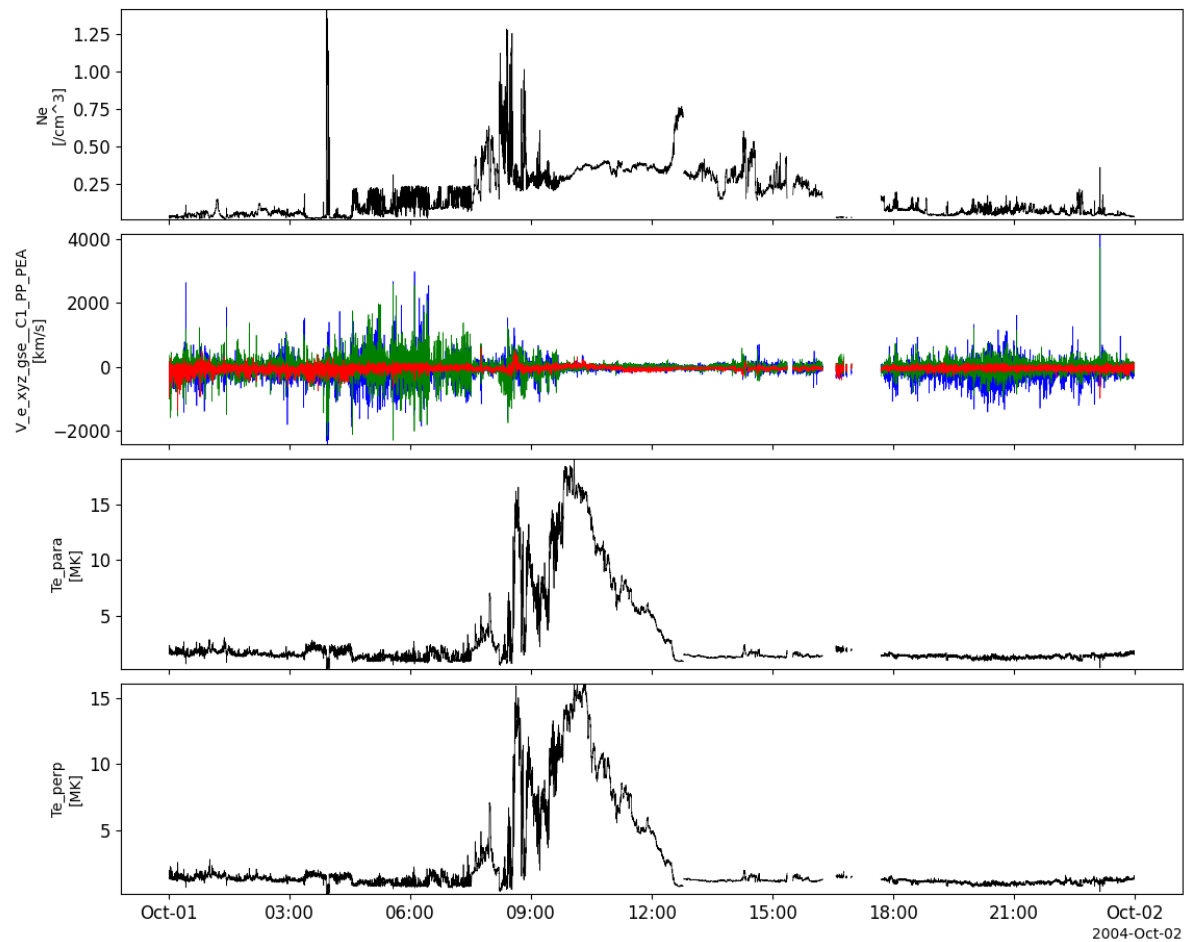
Parameters

- **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.

Example

```
import pyspedas
from pytpplot import tplot
peace_vars = pyspedas.cluster.peace(trange=['2004-10-01', '2004-10-2'])
tplot(['N_e_den__C1_PP_PEA', 'V_e_xyz_gse__C1_PP_PEA', 'T_e_par__C1_PP_PEA', 'T_e_perp__C1_PP_PEA'])
```



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

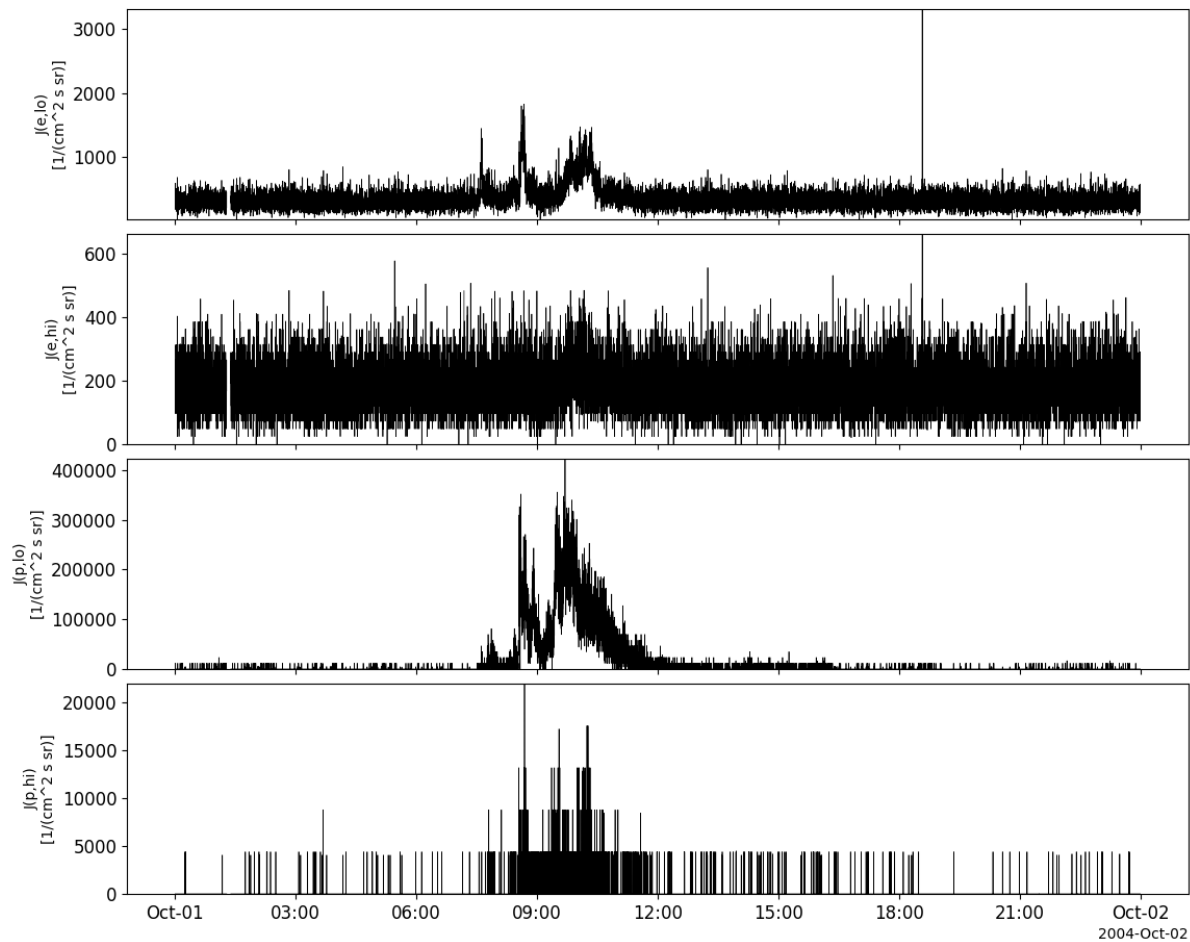
- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given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

Example

```
import pyspedas
from pytpplot import tplot
rap_vars = pyspedas.cluster.rapid(trange=['2004-10-01', '2004-10-2'])
tplot(['J_e_lo__C1_PP_RAP', 'J_e_hi__C1_PP_RAP', 'J_p_lo__C1_PP_RAP', 'J_p_hi__C1_PP_RAP'
→'])
```



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

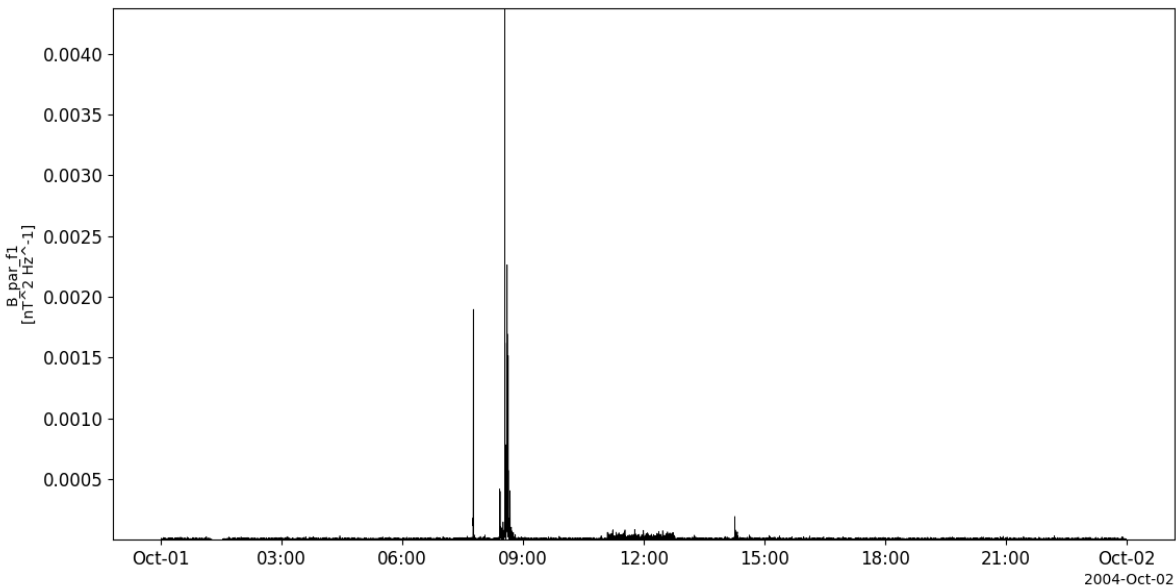
- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** – str Data type; Valid options:
- **suffix** – str The tplot variable names will be given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

Example

```
import pyspedas
from pytpot import tplot
sta_vars = pyspedas.cluster.staff(trange=['2004-10-01', '2004-10-02'])
tplot('B_par_f1__C1_PP_STA')
```



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

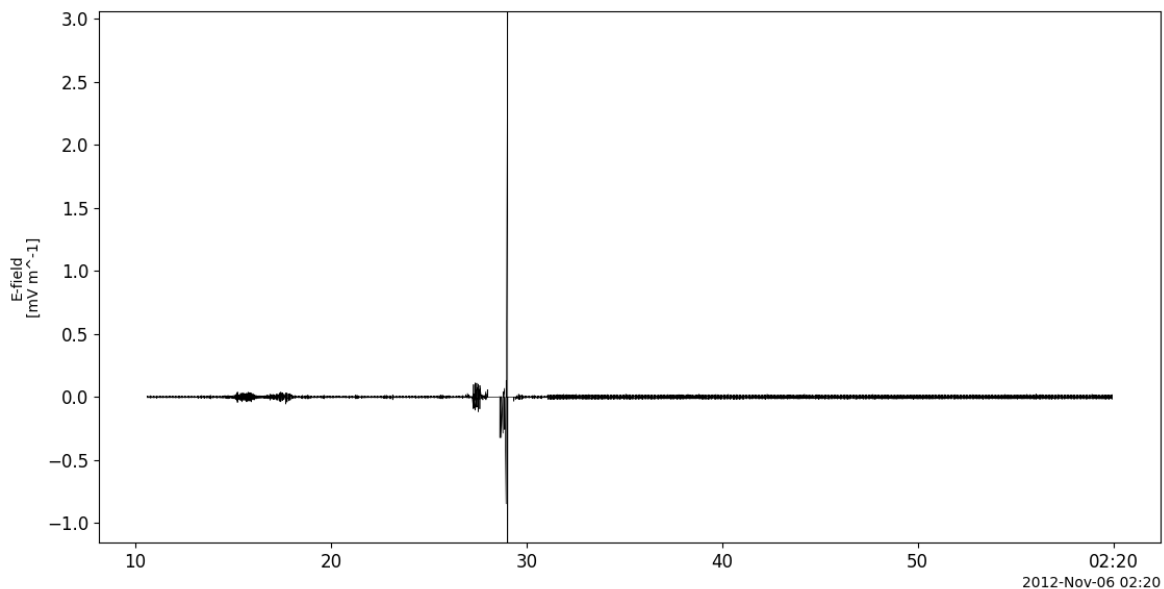
Parameters

- **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.

Example

```
import pyspedas
from pytpplot import tplot
wbd_vars = pyspedas.cluster.wbd(trange=['2012-11-06/02:10', '2012-11-06/02:20'])
tplot('WBD_Elec')
```



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

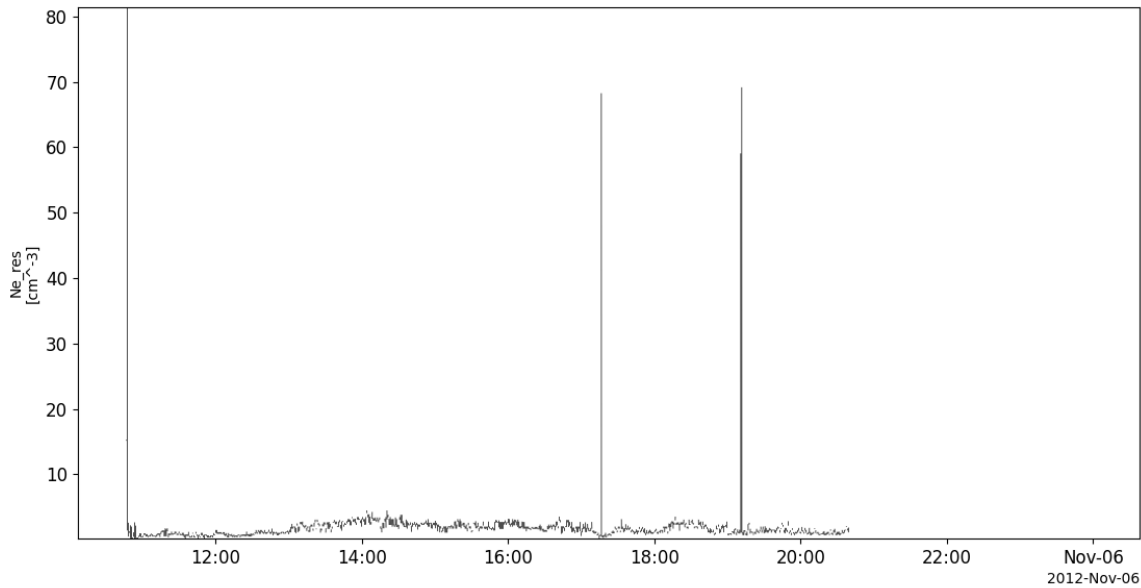
Parameters

- **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.

Example

```
import pyspedas
from pytplot import tplot
whi_vars = pyspedas.cluster.whi()
tplot('N_e_res__C1_PP_WHI')
```



2.4 Colorado Student Space Weather Experiment (CSSWE)

The routines in this module can be used to load data from the Colorado Student Space Weather Experiment (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

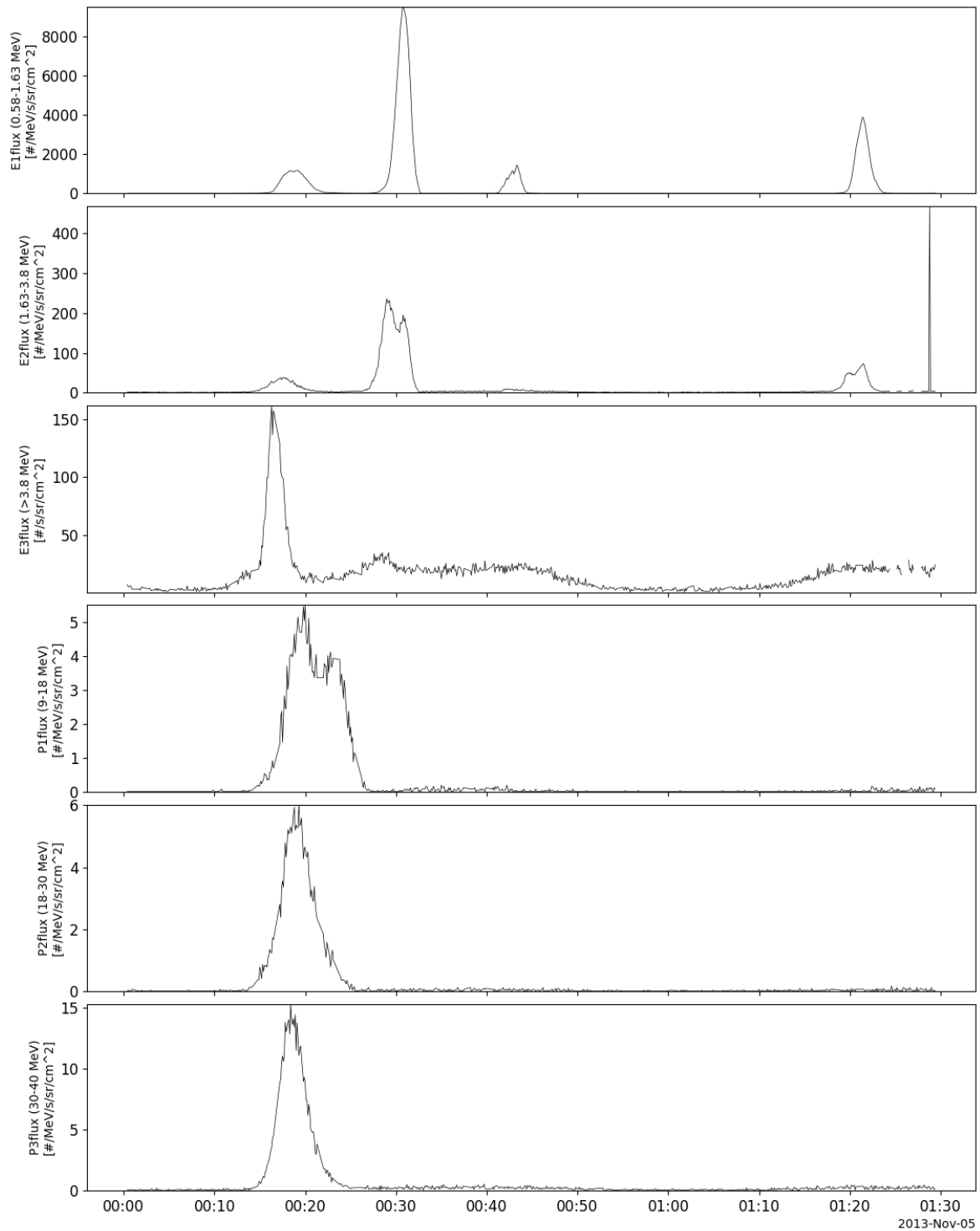
- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) –
Data type; Valid options: ‘counts’ for L1 data ‘flux’ for L2 data
- **level** (`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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
reptile_vars = pyspedas.csswe.reptile(trange=['2013-11-5', '2013-11-6'])
tplot(['E1flux', 'E2flux', 'E3flux', 'P1flux', 'P2flux', 'P3flux'])
```



2.5 Deep Space Climate Observatory (DSCOVR)

The routines in this module can be used to load data from the Deep Space Climate Observatory (DSCOVR) mission.

2.5.1 Magnetometer (MAG)

```
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

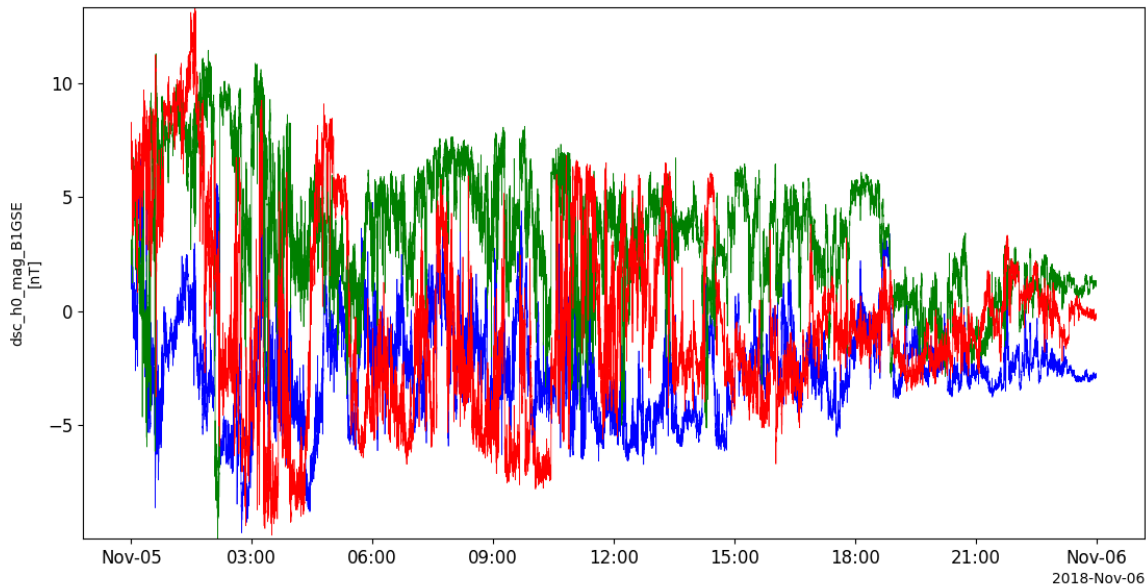
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpot import tplot
mag_vars = pyspedas.dscovr.mag(trange=['2018-11-5', '2018-11-6'])
tplot('dsc_h0_mag_B1GSE')
```



2.5.2 Faraday cup (FC)

```
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 DSCOVF Faraday Cup data

Parameters

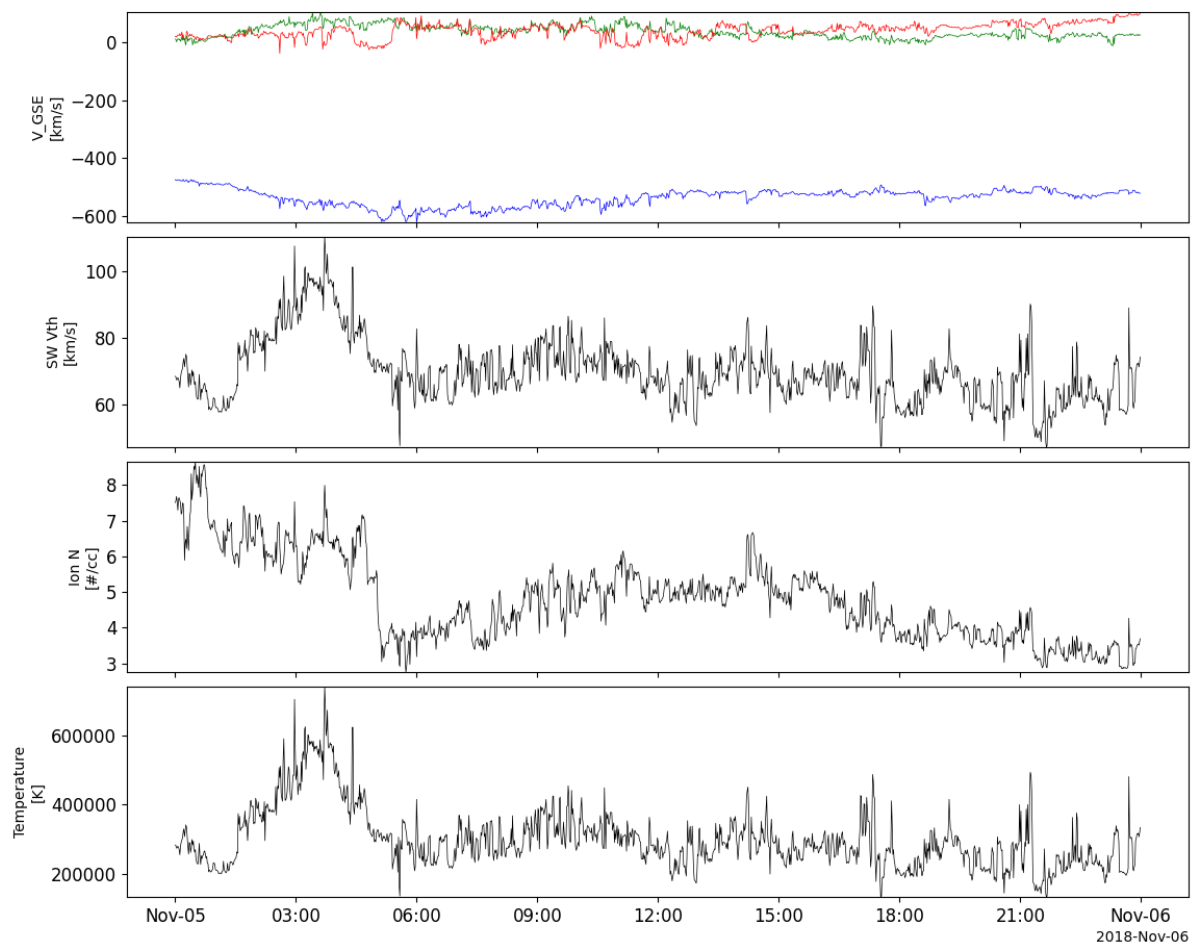
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) –
Data type; Valid options: ‘h1’: 1-minute Isotropic Maxwellian parameters 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

Return type List of *tplot* variables created.

Example

```
import pyspedas
from pyplot import tplot
fc_vars = pyspedas.dscovr.fc(trange=['2018-11-5', '2018-11-6'])
tplot(['dsc_h1_fc_V_GSE', 'dsc_h1_fc_THERMAL_SPD', 'dsc_h1_fc_Np', 'dsc_h1_fc_THERMAL_
→TEMP'])
```



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 DSCOV R Ephemeris data

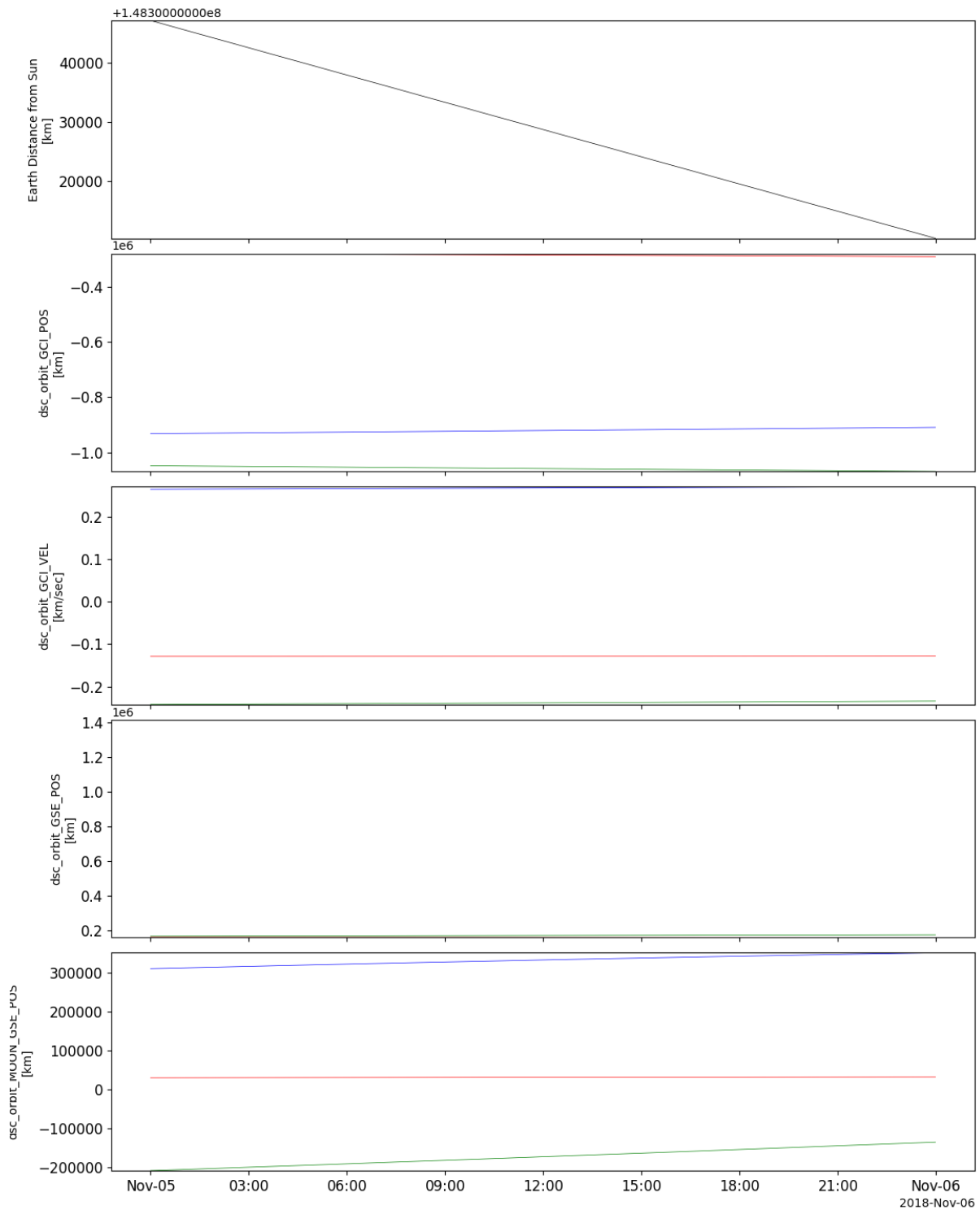
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pyplot import tplot
orb_vars = pyspedas.dscovr.orb(trange=['2018-11-5', '2018-11-6'])
tplot(['dsc_orbit_SUN_R', 'dsc_orbit_GCI_POS', 'dsc_orbit_GCI_VEL', 'dsc_orbit_GSE_POS',
↪ 'dsc_orbit_MOON_GSE_POS'])
```



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

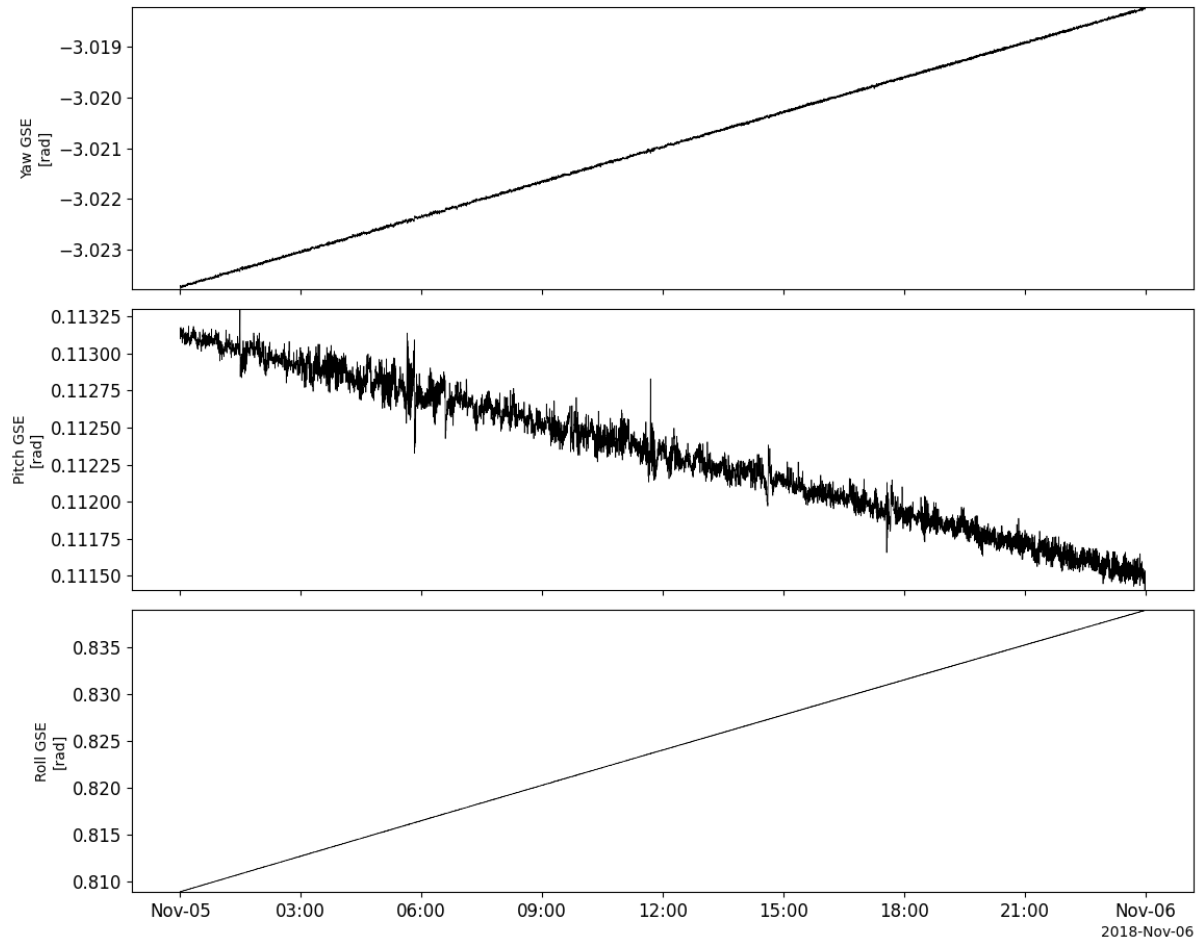
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pyplot import tplot
att_vars = pyspedas.dscovr.att(trange=['2018-11-5', '2018-11-6'])
tplot(['dsc_att_GSE_Yaw', 'dsc_att_GSE_Pitch', 'dsc_att_GSE_Roll'])
```



2.5.5 Load all data at once

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

This function loads all DSCOV 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

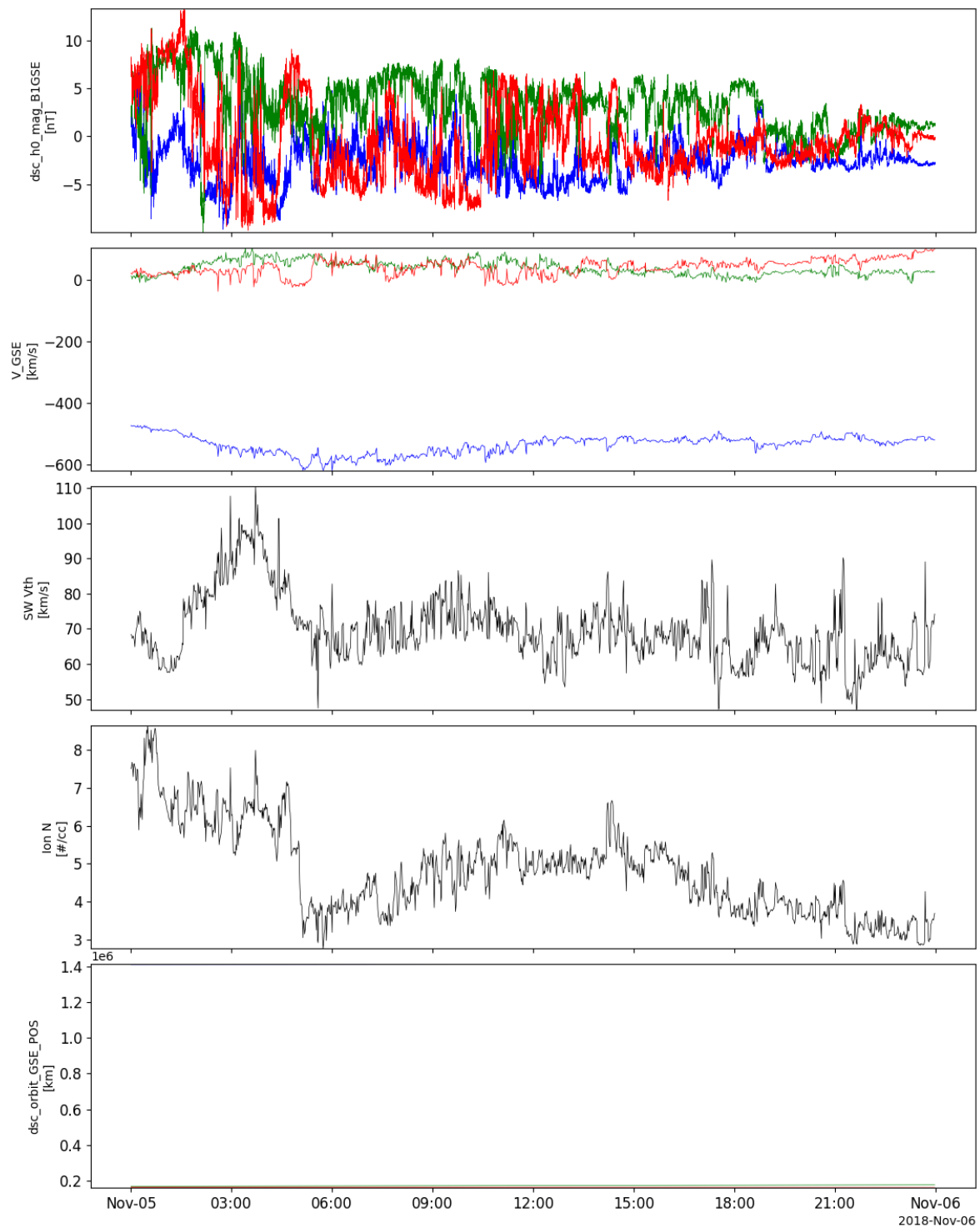
variables

- **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

Return type List of `tplot` variables created.

Example

```
import pyspedas
from pyplot import tplot
all_vars = pyspedas.dscovr.all(trange=['2018-11-5', '2018-11-6'])
tplot(['dsc_h0_mag_B1GSE', 'dsc_h1_fc_V_GSE', 'dsc_h1_fc_THERMAL_SPD', 'dsc_h1_fc_Np',
      ↪ 'dsc_orbit_GSE_POS'])
```



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

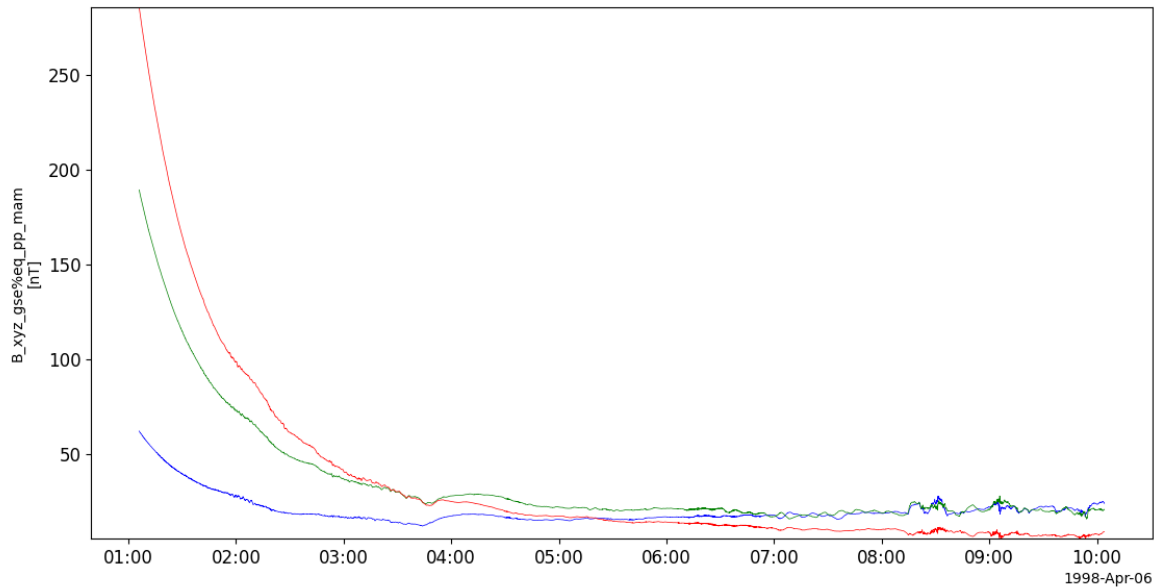
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
mam_vars = pyspedas.equator_s.mam(trange=['1998-04-06', '1998-04-07'])
tplot('B_xyz_gse%eq_pp_mam')
```



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

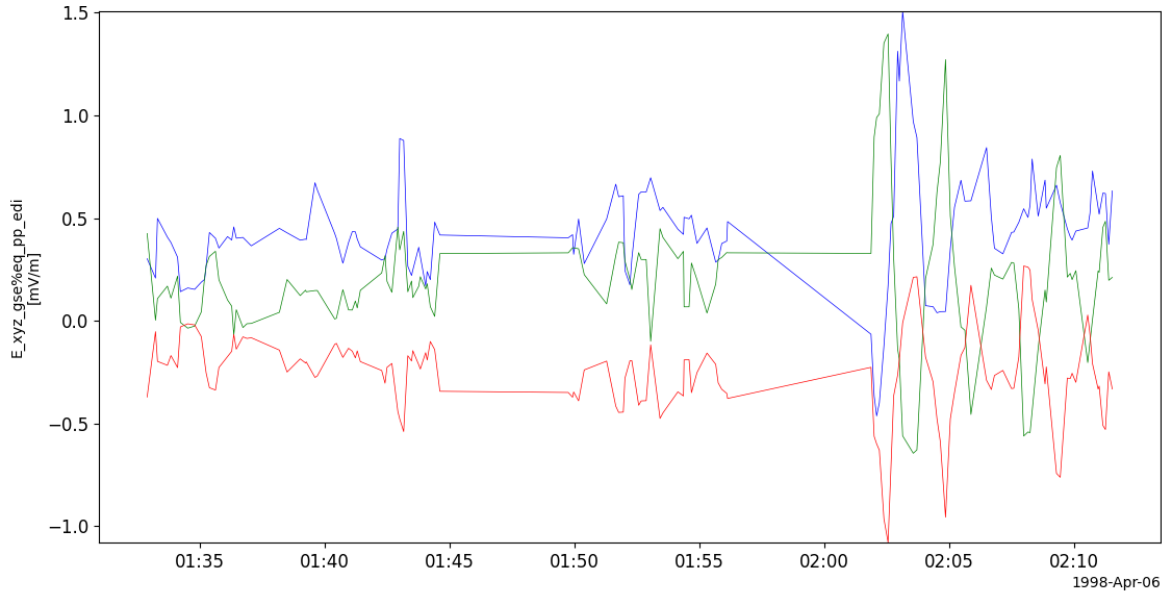
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
edi_vars = pyspedas.equator_s.edi(trange=['1998-04-06', '1998-04-07'])
tplot('E_xyz_gse%eq_pp_edi')
```



2.6.3 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

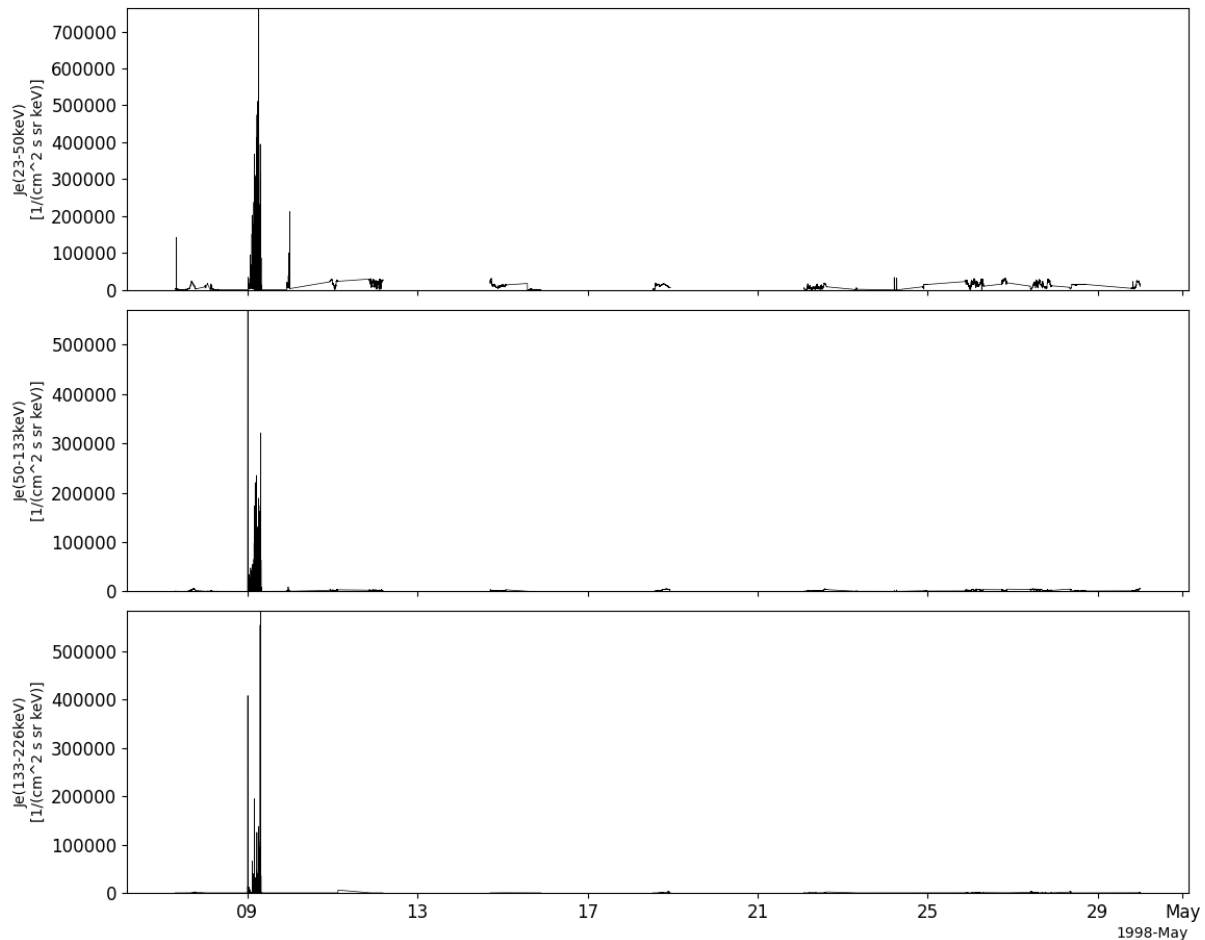
- **trange** (list of str) – time range of interest [starttime, endtime] with the format 'YYYY-MM-DD', 'YYYY-MM-DD' or to specify more or less than a day ['YYYY-MM-DD/hh:mm:ss', 'YYYY-MM-DD/hh:mm:ss']
- **datatype** (str) – Data type; Valid options:
- **suffix** (str) – The tplot variable names will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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
epi_vars = pyspedas.equator_s.epi(trange=['1998-04-06', '1998-04-30'])
tplot(['J_e_1%eq_pp_epi', 'J_e_2%eq_pp_epi', 'J_e_3%eq_pp_epi'])
```



2.6.4 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

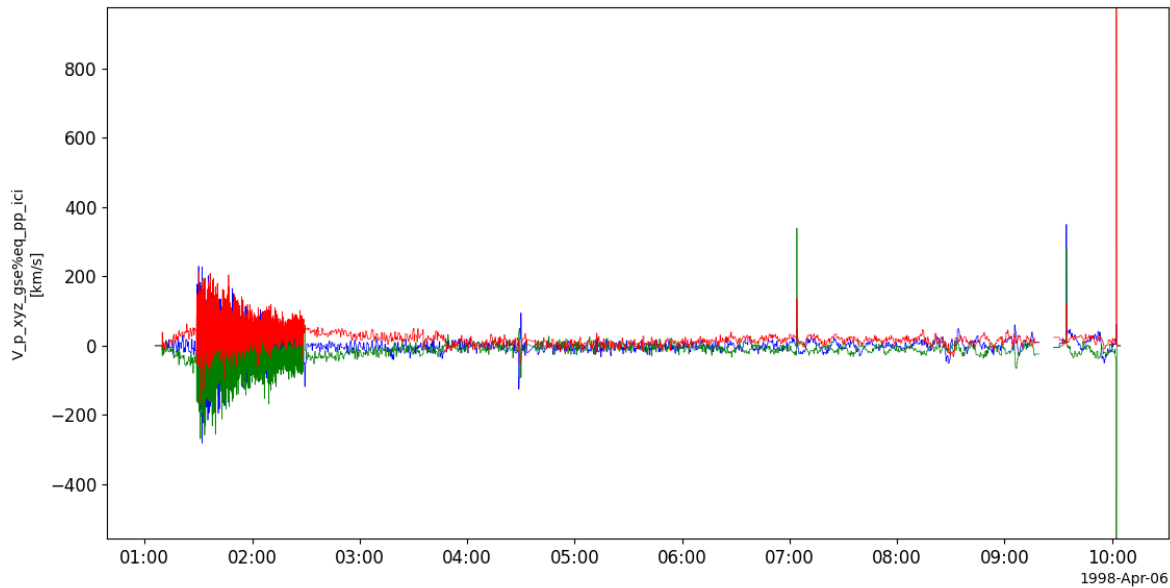
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
ici_vars = pyspedas.equator_s.ici(trange=['1998-04-06', '1998-04-07'])
tplot('V_p_xyz_gse%eq_pp_ici')
```



2.6.5 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

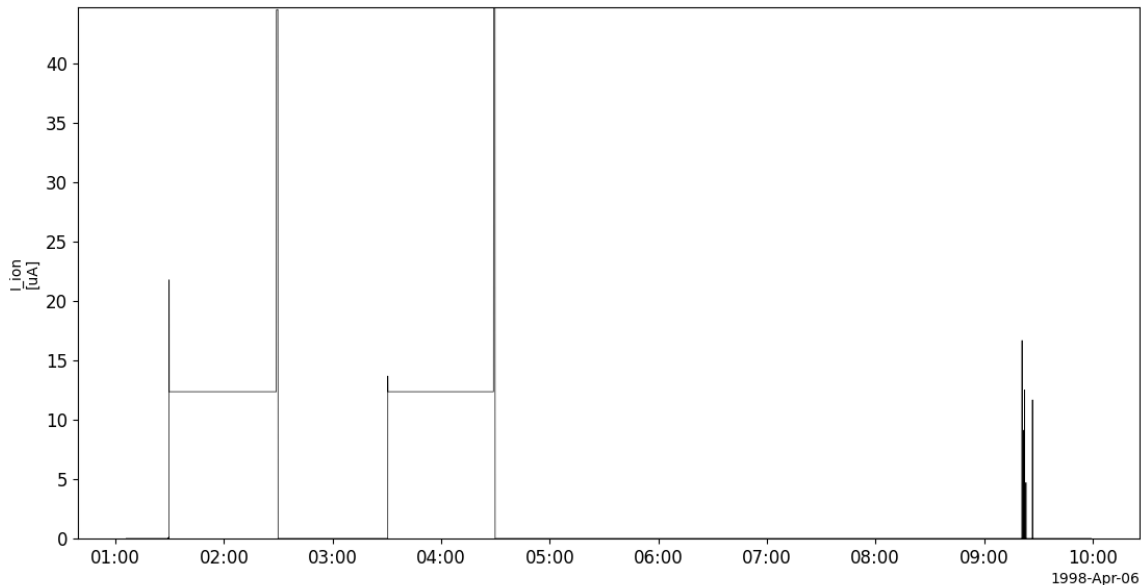
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
pcd_vars = pyspedas.equator_s.pcd(trange=['1998-04-06', '1998-04-07'])
tplot('I_ion%eq_pp_pcd')
```



2.6.6 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

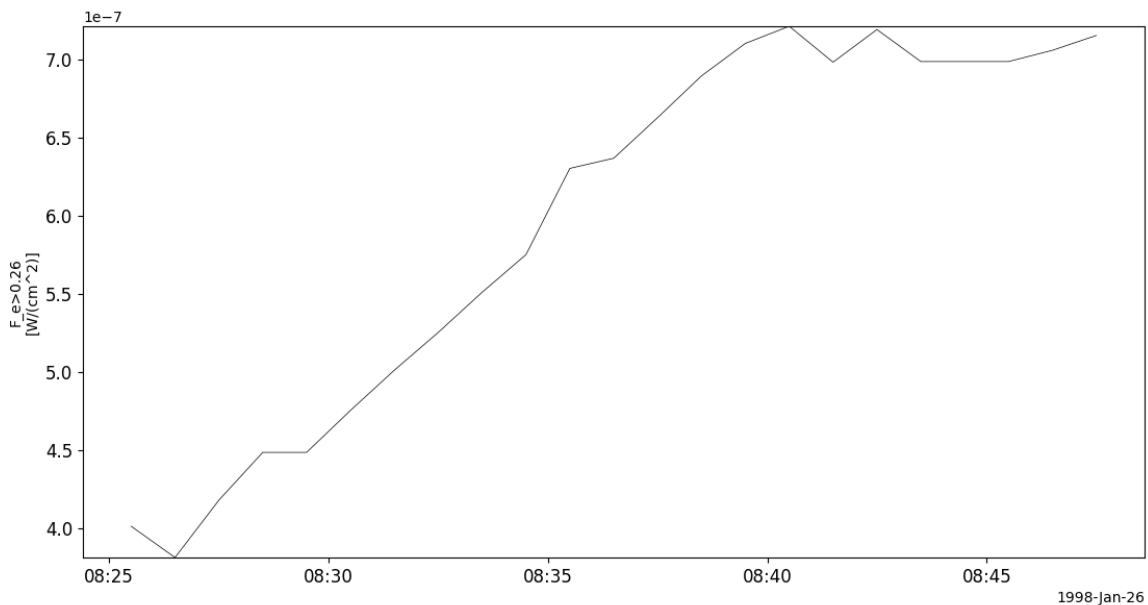
- **trange** (list of str) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (str) – Data type; Valid options:
- **suffix** (str) – The tplot variable names will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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
sfd_vars = pyspedas.equator_s.sfd()
tplot('F_e>0.26%eq_sp_sfd')
```



2.7 Fast Auroral Snapshot Explorer (FAST)

The routines in this module can be used to load data from the Fast Auroral Snapshot Explorer (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

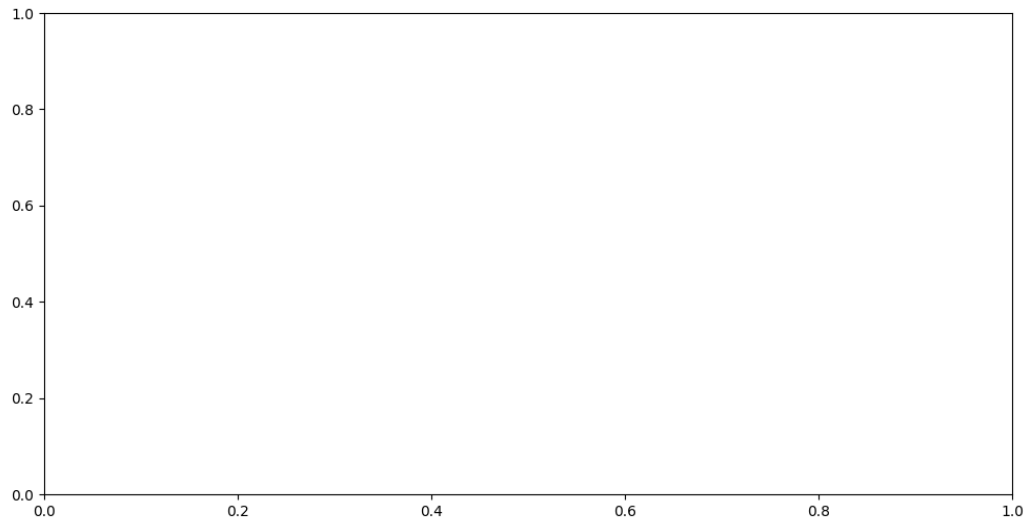
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
dcb_vars = pyspedas.fast.dcb(trange=['1998-09-05', '1998-09-06'])
tplot('')
```



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

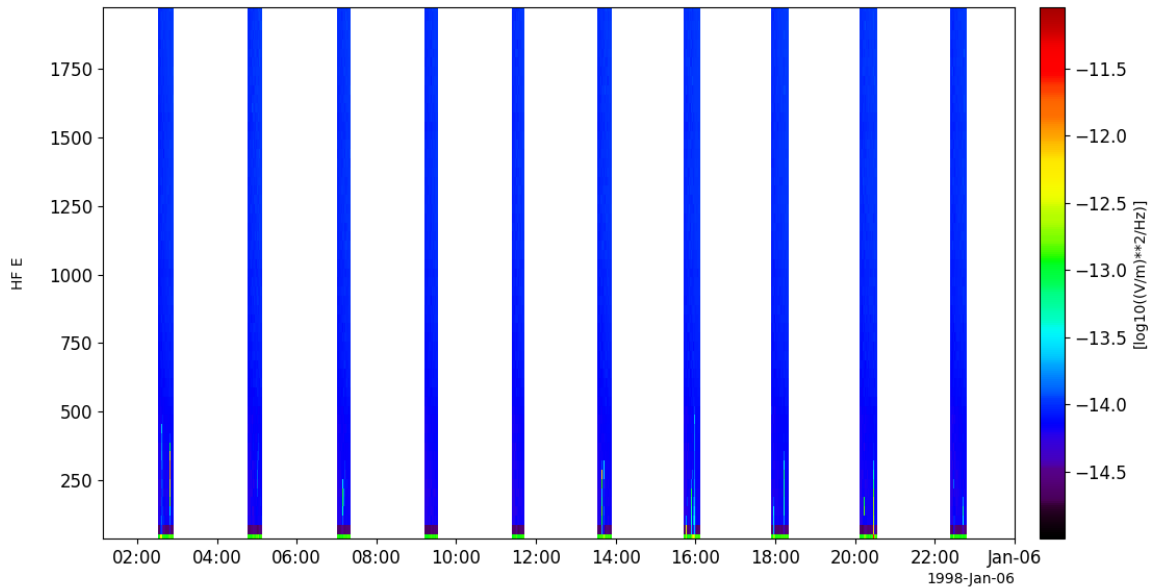
Parameters

- **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 plot 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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
acb_vars = pyspedas.fast.acb()
tplot('HF_E_SPEC')
```



2.7.3 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

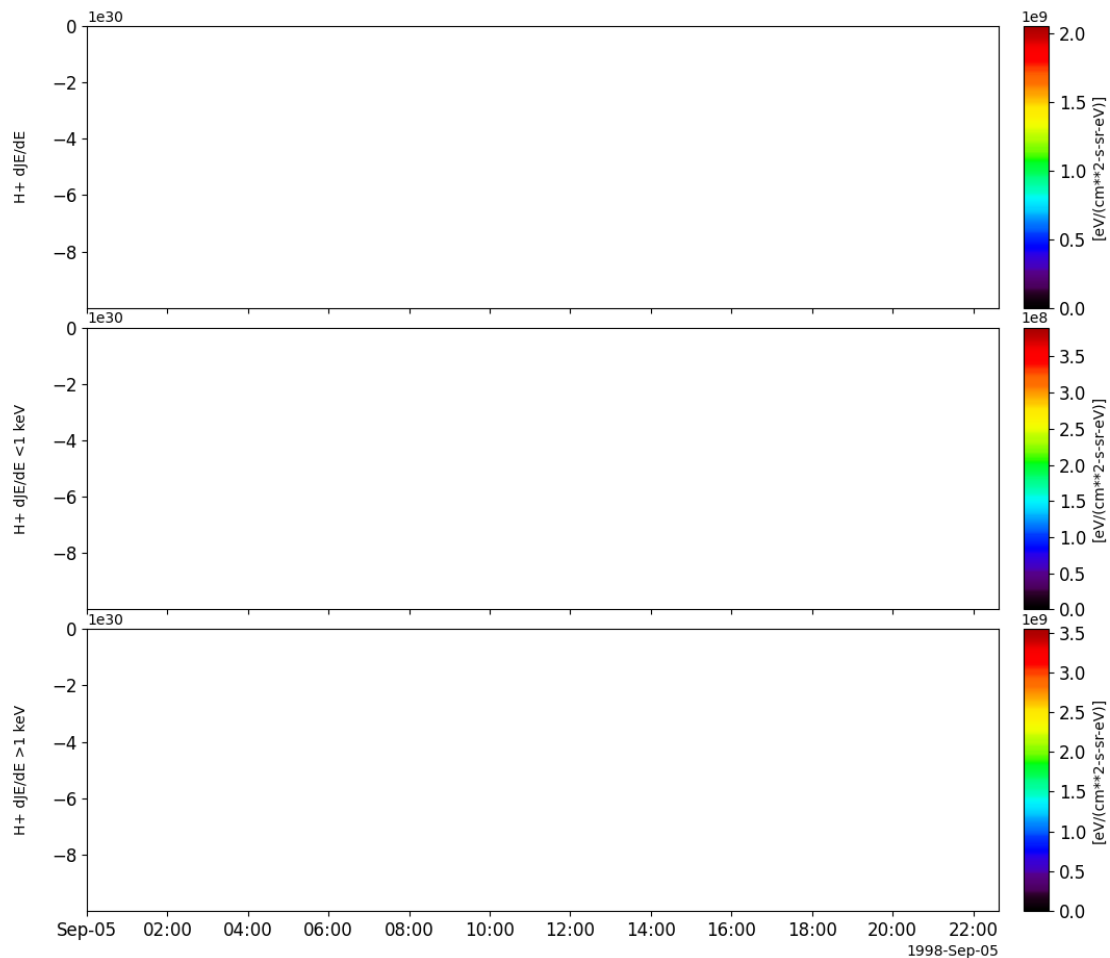
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **suffix** (*str*) – The tplot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
teams_vars = pyspedas.fast.teams(trange=['1998-09-05', '1998-09-06'])
tplot(['H+', 'H+_low', 'H+_high'])
```



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

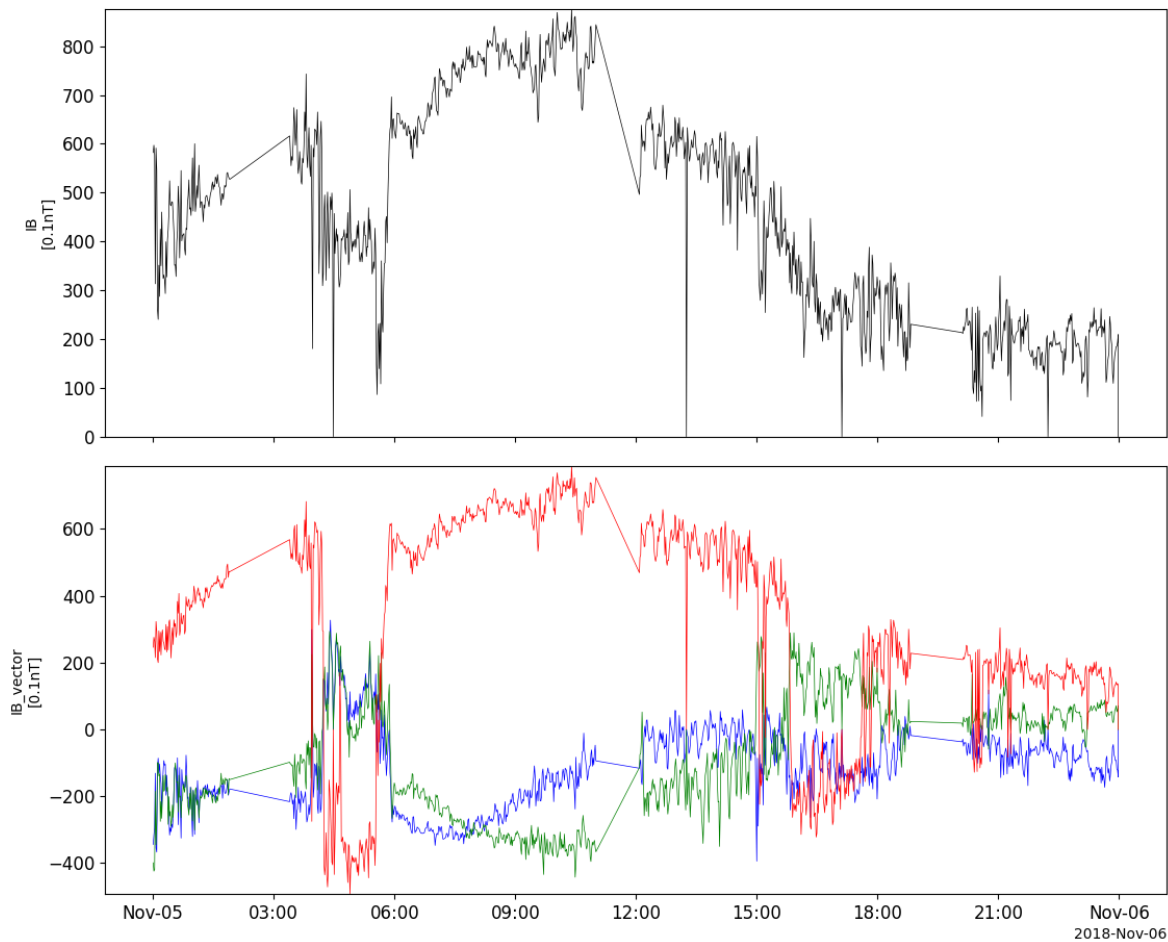
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpot import tplot
mgf_vars = pyspedas.geotail.mgf(trange=['2018-11-5', '2018-11-6'])
tplot(['IB', 'IB_vector'])
```



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

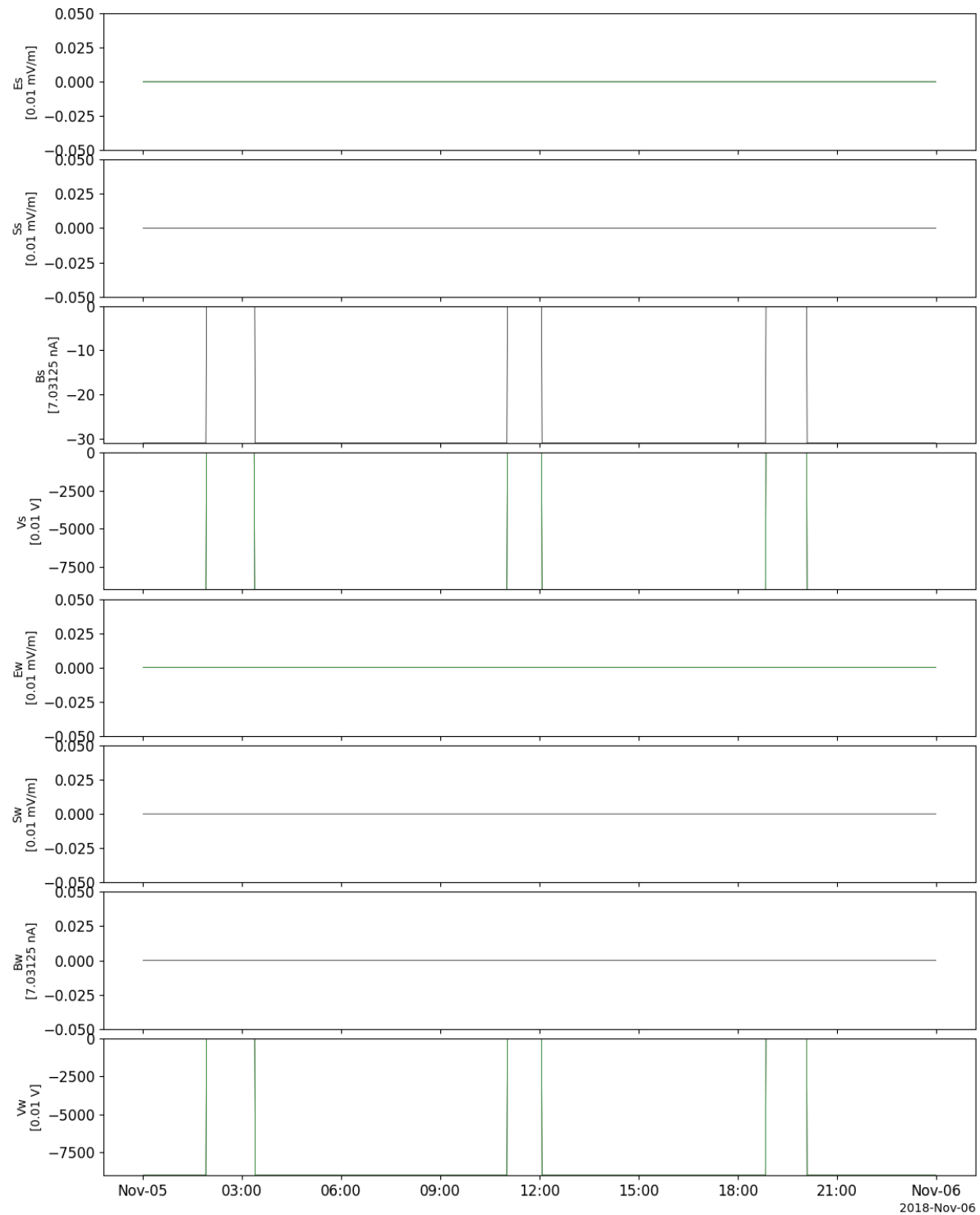
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **suffix** (*str*) – The tplot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytplot import tplot
efd_vars = pyspedas.geotail.efd(trange=['2018-11-5', '2018-11-6'])
tplot(['Es', 'Ss', 'Bs', 'Vs', 'Ew', 'Sw', 'Bw', 'Vw'])
```



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

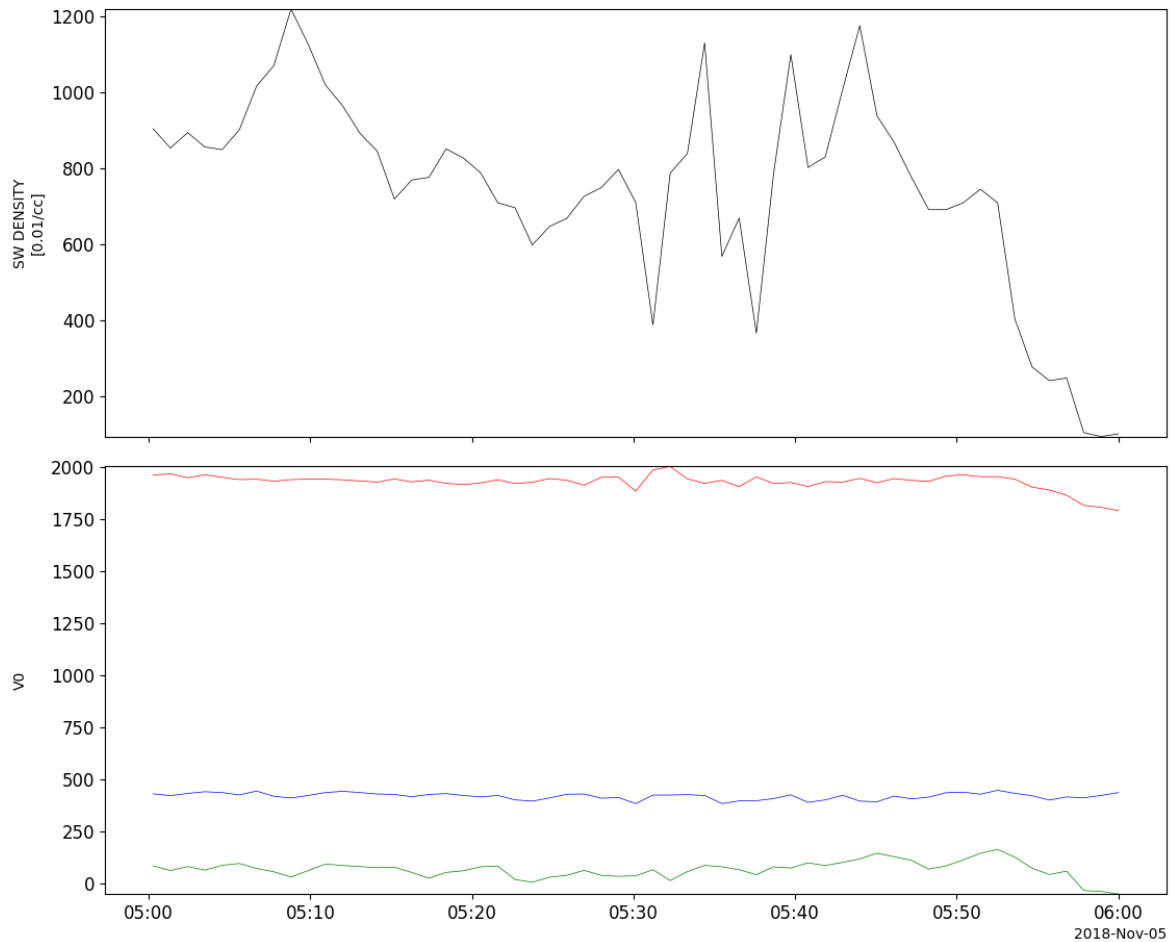
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
lep_vars = pyspedas.geotail.lep(trange=['2018-11-5/05:00', '2018-11-5/06:00'], time_
    ↪ clip=True)
tplot(['N0', 'V0'])
```



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

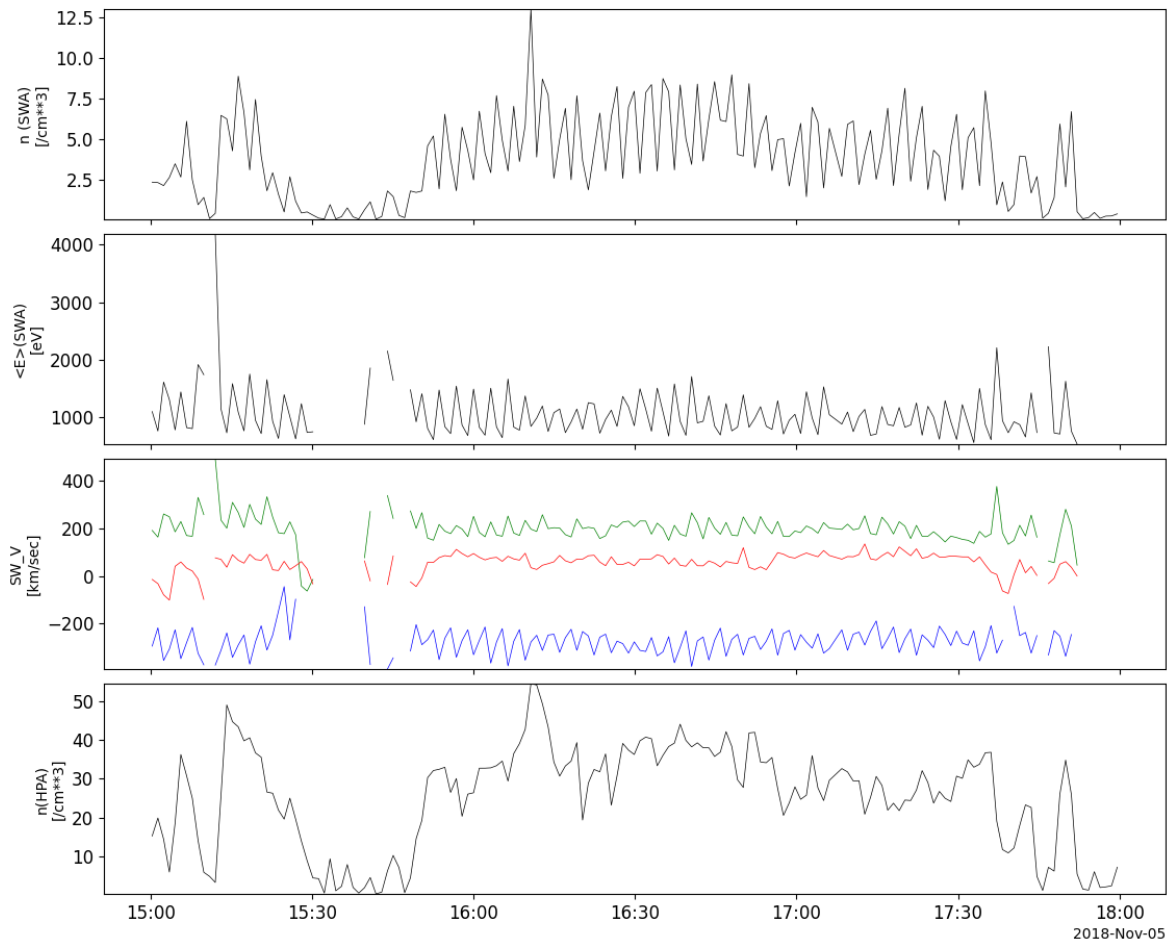
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **suffix** (*str*) – The plot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
cpi_vars = pyspedas.geotail.cpi(trange=['2018-11-5/15:00', '2018-11-5/18:00'], time_
→clip=True)
tplot(['SW_P_Den', 'SW_P_AVGE', 'SW_V', 'HP_P_Den'])
```



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

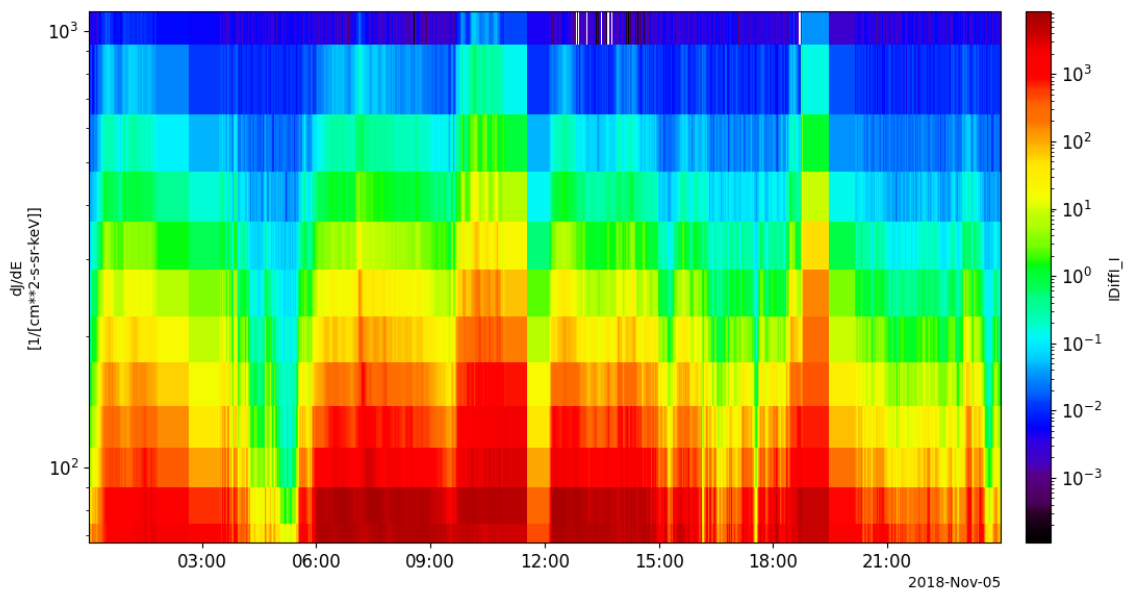
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **suffix** (*str*) – The plot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
epic_vars = pyspedas.geotail.epic(trange=['2018-11-5', '2018-11-6'])
tplot('IDiffI_I')
```



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

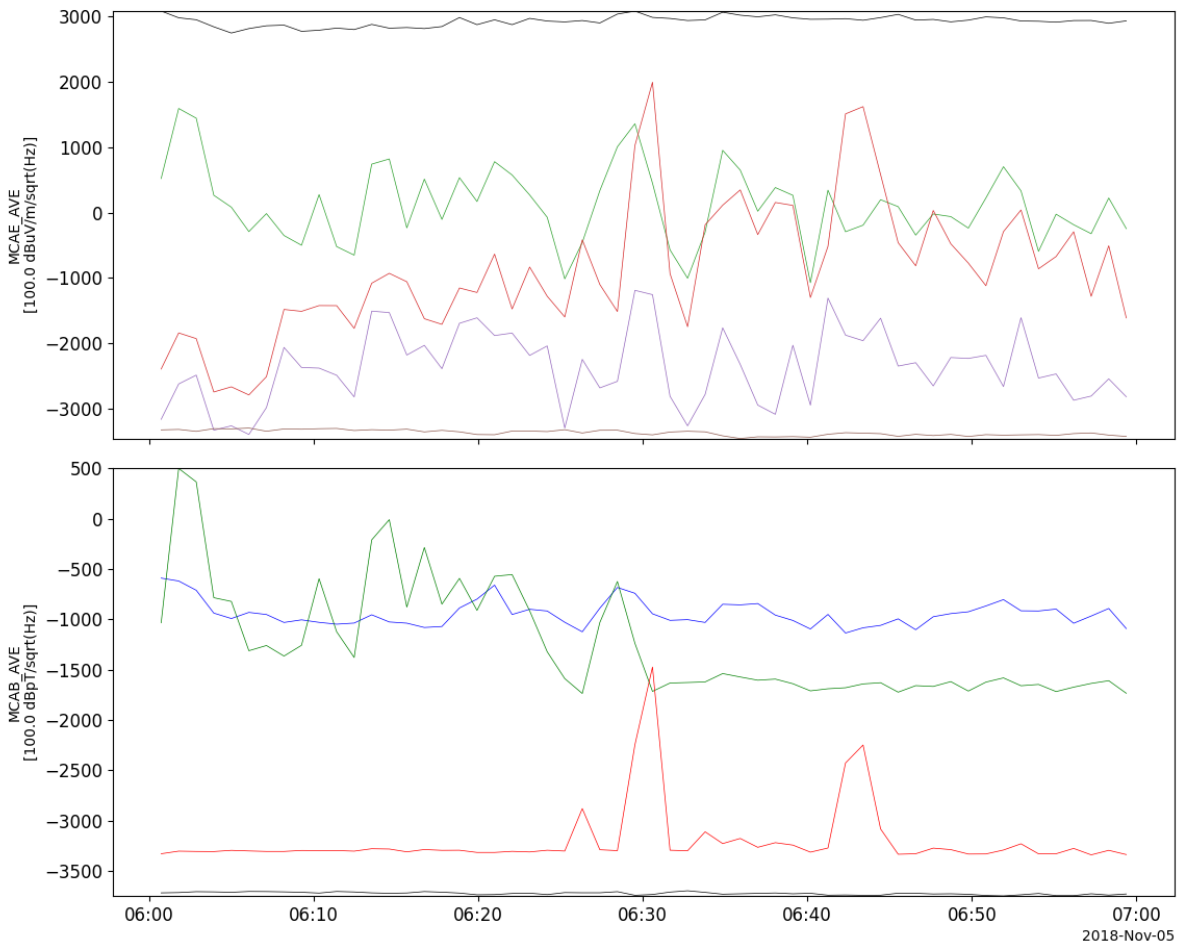
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas  
from pytpplot import tplot  
pwi_vars = pyspedas.geotail.pwi(trange=['2018-11-5/06:00', '2018-11-5/07:00'], time_  
    ↪ clip=True)  
tplot(['MCAE_AVE', 'MCAB_AVE'])
```



2.9 Geostationary Operational Environmental Satellite (GOES)

The routines in this module can be used to load data from the Geostationary Operational Environmental Satellite (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

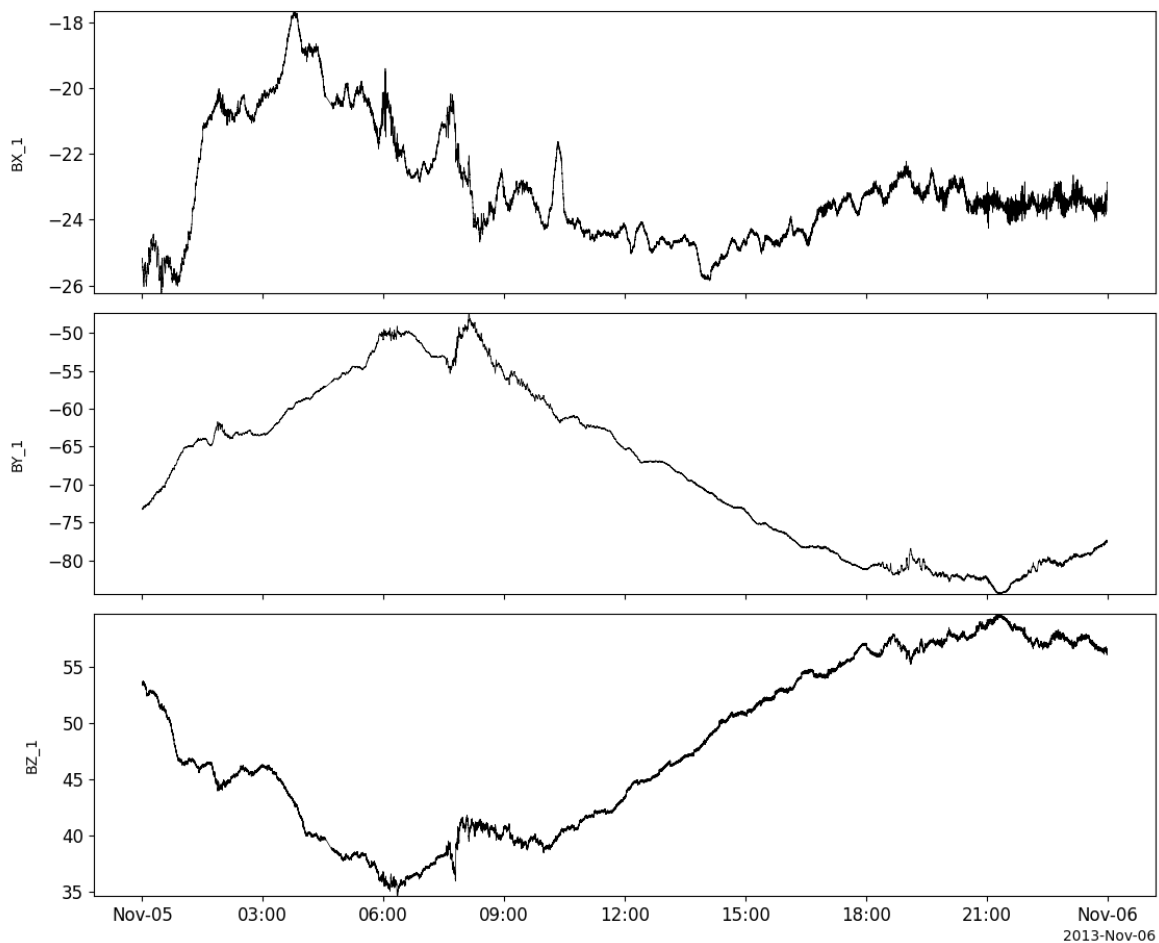
- **trange** (list of str) – time range of interest [starttime, endtime] with the format 'YYYY-MM-DD', 'YYYY-MM-DD'] or to specify more or less than a day ['YYYY-MM-DD/hh:mm:ss', 'YYYY-MM-DD/hh:mm:ss']
- **probe** (str/int or list of str/int) – GOES spacecraft #, e.g., probe=15

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pyplot import tplot
mag_vars = pyspedas.goes.fgm(trange=['2013-11-5', '2013-11-6'], datatype='512ms')
tplot(['BX_1', 'BY_1', 'BZ_1'])
```



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.lena(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 key-word

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

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

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

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

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

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

Return type List of tplot variables created.

2.11 Kyoto Dst

The routines in this module can be used to load Kyoto Dst data from the World Data Center for Geomagnetism, Kyoto.

2.11.1 Load the data

```
pyspedas.kyoto.dst(trange=None, time_clip=True, remote_data_dir='http://wdc.kugi.kyoto-u.ac.jp/', suffix="")
```

Loads Dst data from the Kyoto servers.

Parameters

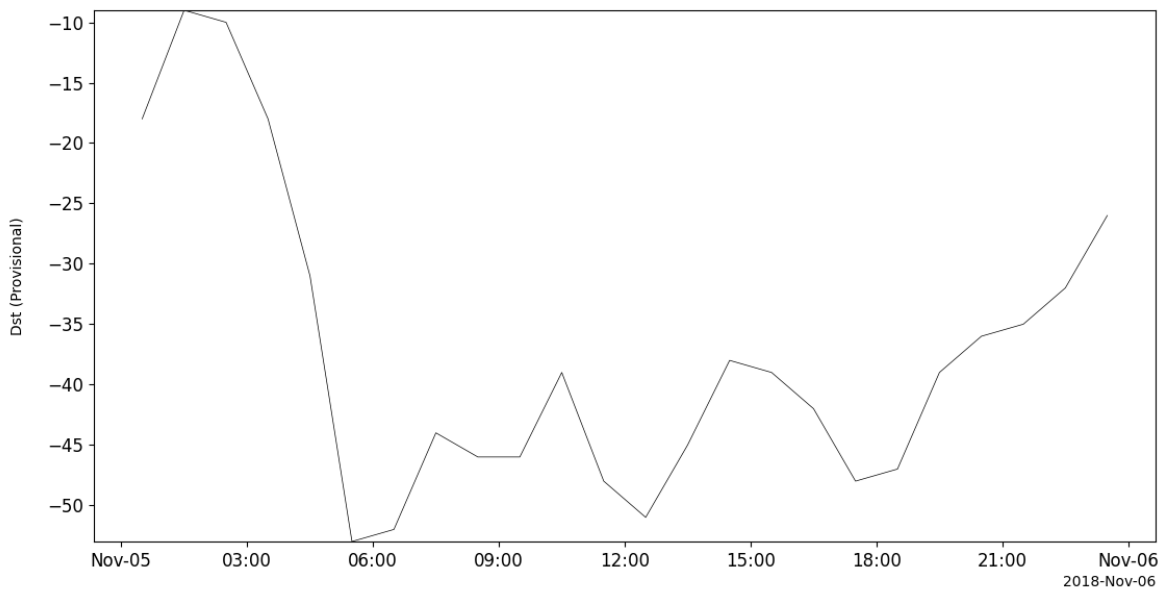
- **trange** (*list* of *str*) – Time range to load
- **time_clip** (*bool*) – If set, time the data to the requested trange
- **remote_data_dir** (*str*) – Remote data server at Kyoto
- **suffix** (*str*) – Suffix to append to the output variable’s name

The DST data are provided by the World Data Center for Geomagnetism, Kyoto, and are not for re-distribution (<http://wdc.kugi.kyoto-u.ac.jp/>). Furthermore, we thank the geomagnetic observatories (Kakioka [JMA], Honolulu and San Juan [USGS], Hermanus [RSA], Alibag [IIG]), NiCT, INTER-MAGNET, and many others for their cooperation to make the Dst index available.

Return type Name of the tplot variable created.

Example

```
import pyspedas
from pytpplot import tplot
dst_vars = pyspedas.kyoto.dst(trange=['2018-11-5', '2018-11-6'])
tplot('kyoto_dst')
```



2.12 Mars Atmosphere and Volatile Evolution (MAVEN)

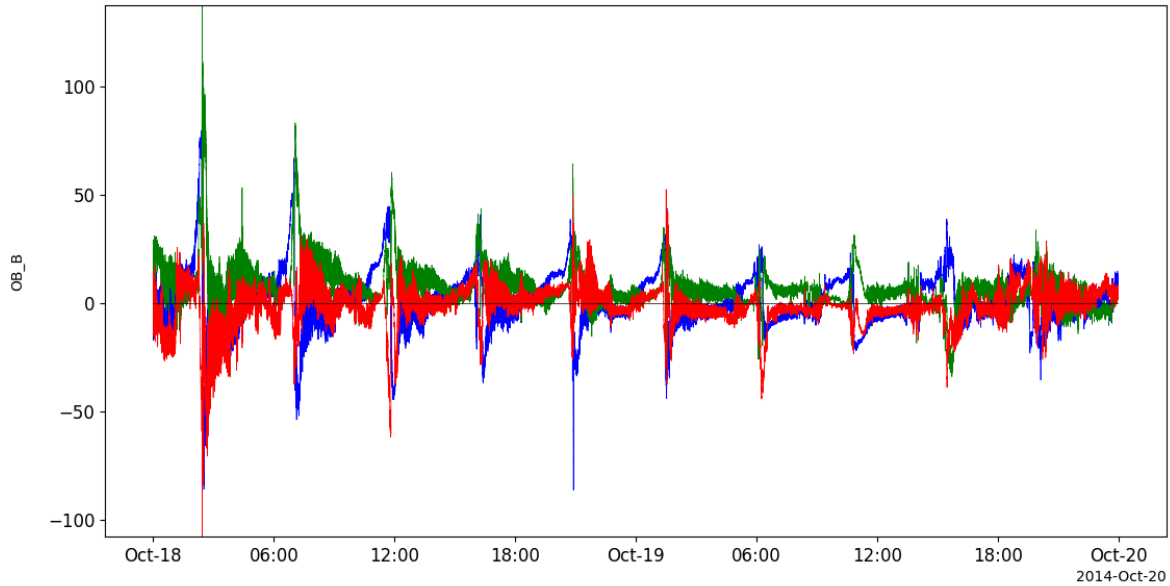
The routines in this module can be used to load data from the Mars Atmosphere and Volatile Evolution (MAVEN) mission.

2.12.1 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=[])
```

Example

```
import pyspedas
from pyplot import tplot
mag_vars = pyspedas.maven.mag(trange=['2014-10-18', '2014-10-19'])
tplot('OB_B')
```

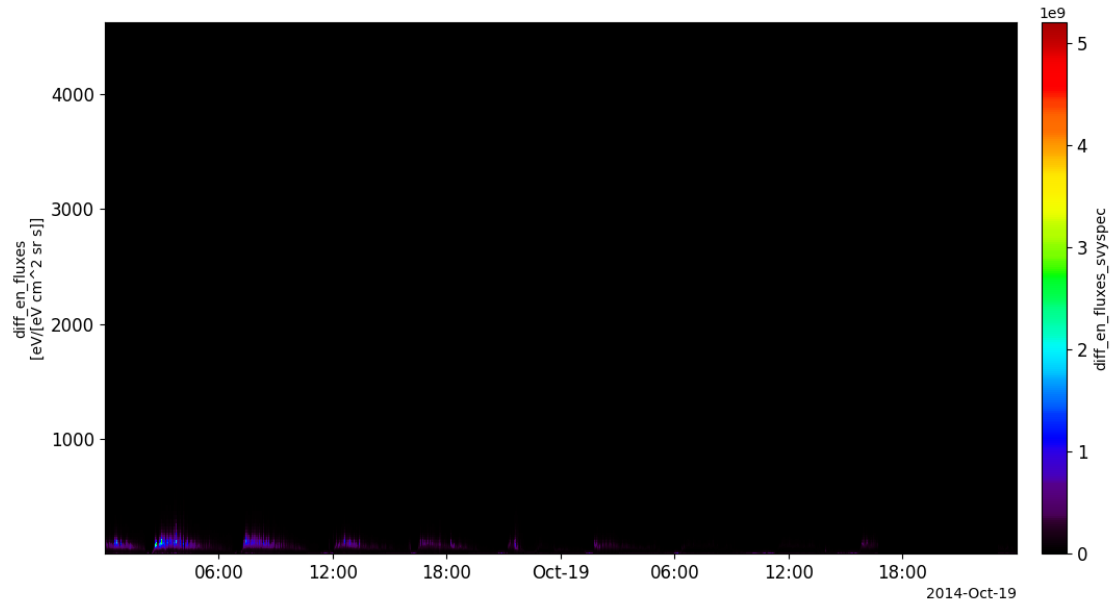


2.12.2 Solar Wind Electron Analyzer (SWEA)

```
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=[])
```

Example

```
import pyspedas
from pyplot import tplot
swe_vars = pyspedas.maven.swea(trange=['2014-10-18', '2014-10-19'])
tplot('diff_en_fluxes_svyspec')
```

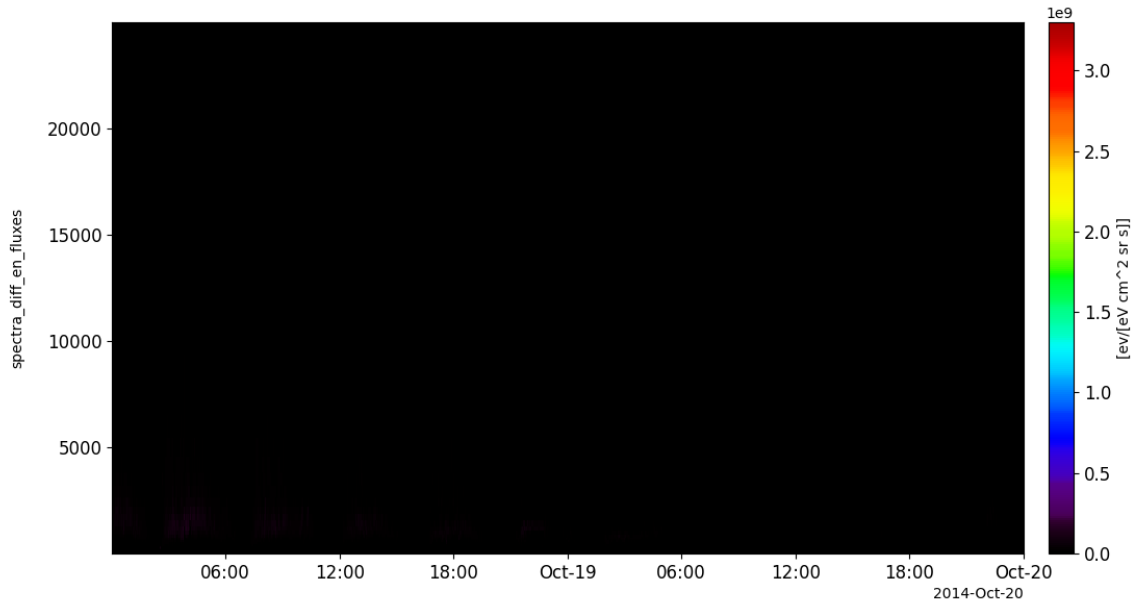


2.12.3 Solar Wind Ion Analyzer (SWIA)

```
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=[])
```

Example

```
import pyspedas  
from pyplot import tplot  
swi_vars = pyspedas.maven.swia(trange=['2014-10-18', '2014-10-19'])  
tplot('spectra_diff_en_fluxes_onboardsvyspec')
```

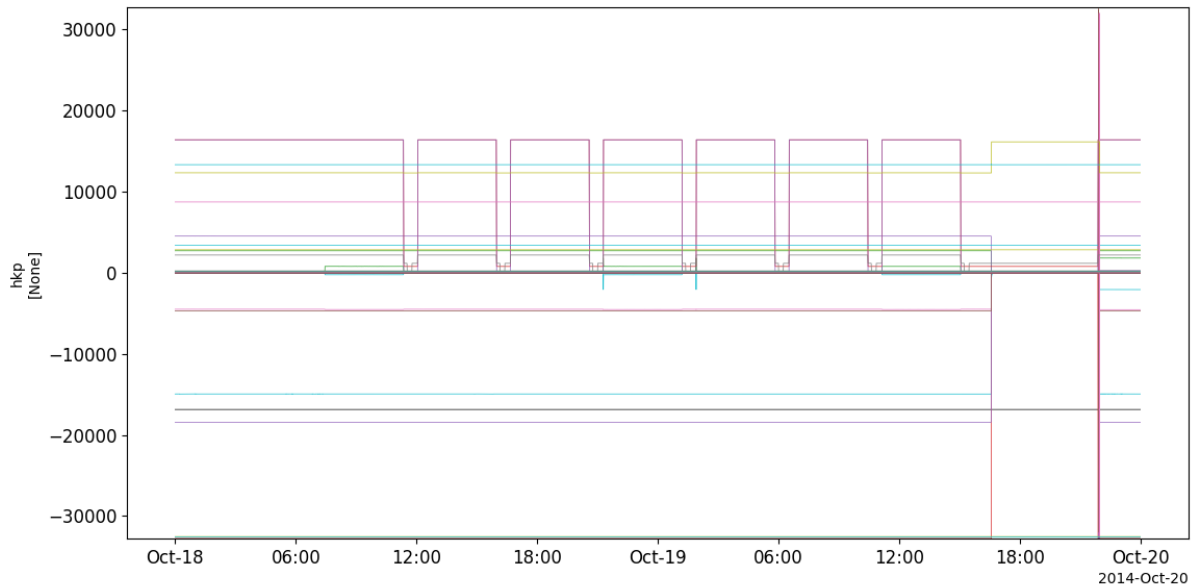


2.12.4 SupraThermal And Thermal Ion Composition (STATIC)

```
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=[])
```

Example

```
import pyspedas
from pyplot import tplot
sta_vars = pyspedas.maven.sta(trange=['2014-10-18', '2014-10-19'])
tplot('hkp_2a-hkp')
```

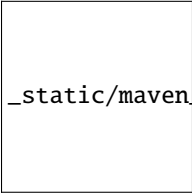


2.12.5 Solar Energetic Particle (SEP)

```
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=[])
```

Example

```
import pyspedas  
from pyplot import tplot  
sep_vars = pyspedas.maven.sep(trange=['2014-10-18', '2014-10-19'])  
tplot('f_ion_flux_tot_s2-cal-svy-full')
```



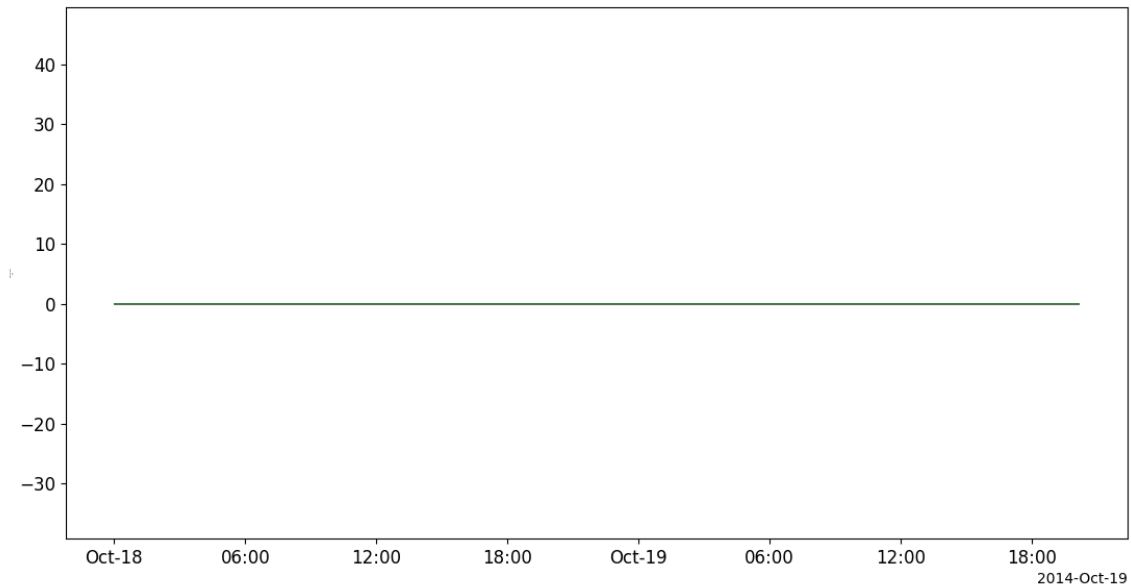
_static/maven_sep.png

2.12.6 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=[])
```

Example

```
import pyspedas  
from pyplot import tplot  
lpw_vars = pyspedas.maven.lpw(trange=['2014-10-18', '2014-10-19'])  
tplot('mvn_lpw_lp_iv_l2_lpiv')
```

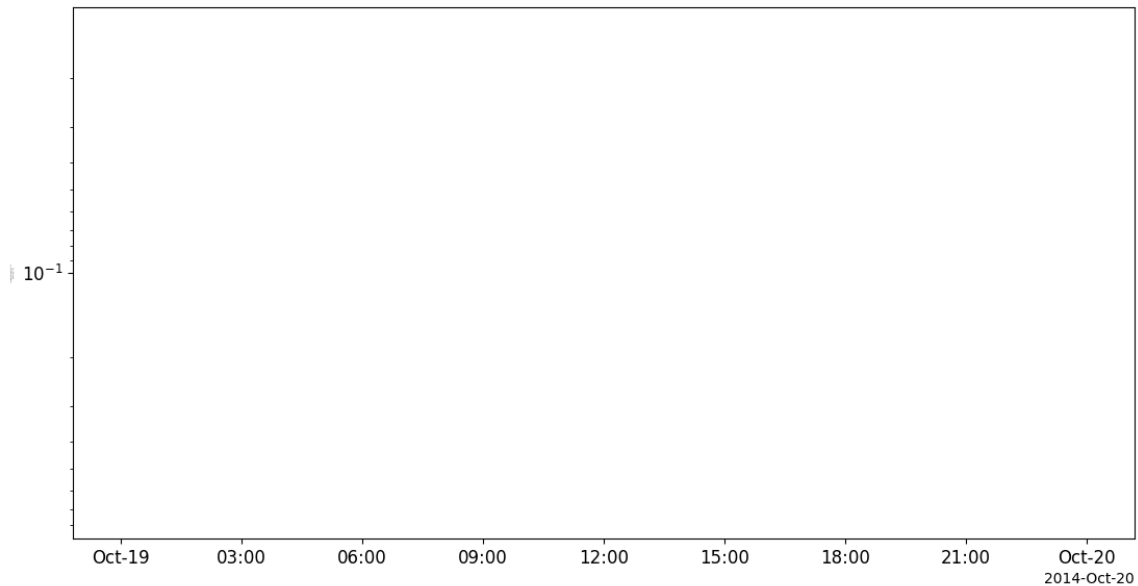



2.12.7 Extreme Ultraviolet Monitor (EUV)

```
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=[])
```

Example

```
import pyspedas
from pyplot import tplot
euv_vars = pyspedas.maven.euv(trange=['2014-10-18', '2014-10-19'])
tplot('mvn_euv_calib_bands_bands')
```



2.13 Magnetic Induction Coil Array (MICA)

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

2.13.1 Induction data

```
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)

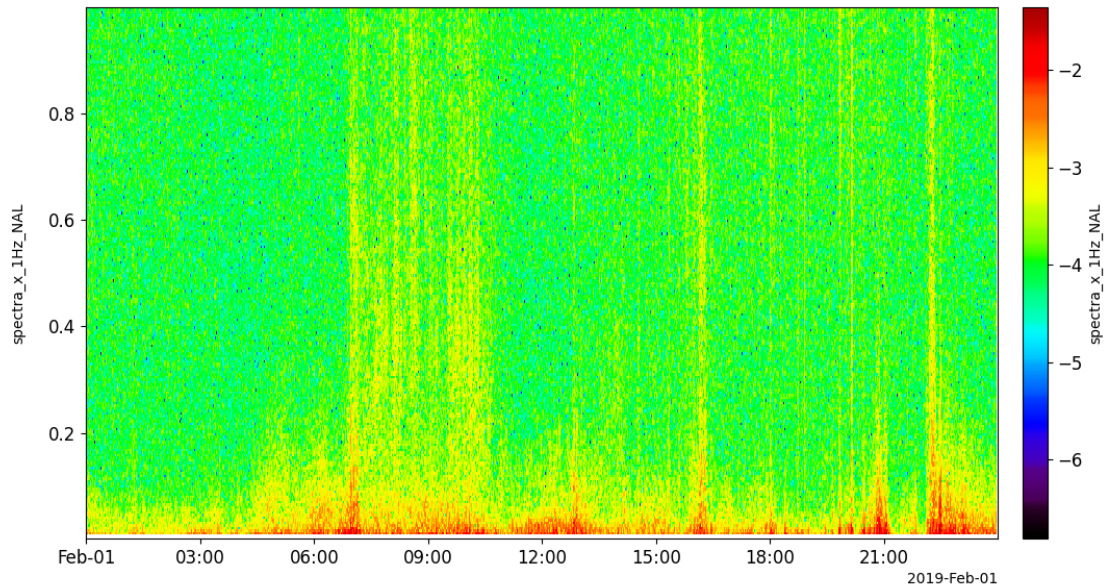
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas  
from pytpplot import tplot  
nal_vars = pyspedas.mica.induction(site='NAL', trange=['2019-02-01', '2019-02-02'])  
tplot('spectra_x_1Hz_NAL')
```



2.14 Magnetospheric Multiscale (MMS)

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

2.14.1 Fluxgate Magnetometer (FGM)

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

This function loads FGM data into tplot variables

Parameters

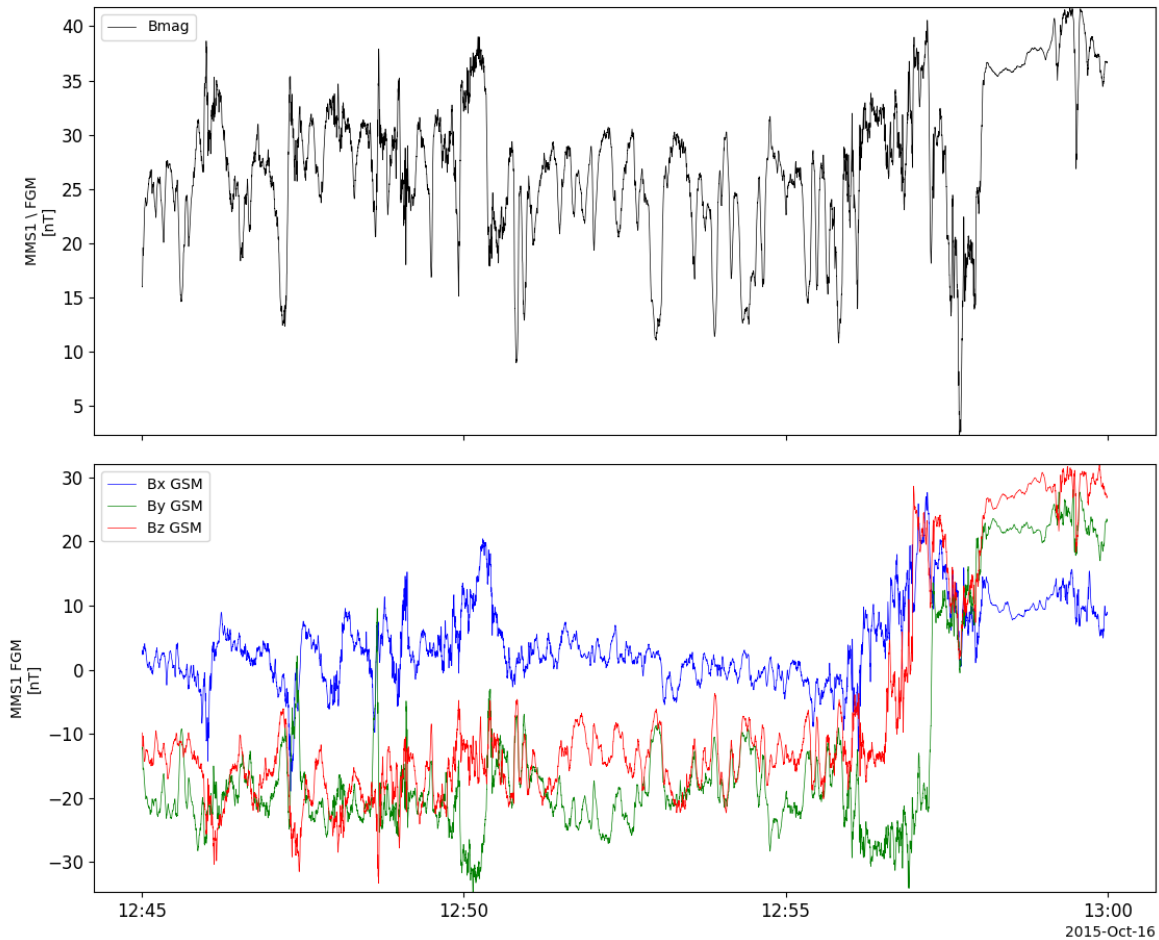
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (*str* or *list* of *str*) – list of probes, valid values for MMS probes are [‘1’, ‘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 parameters
- **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 pytpplot 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_bt看', 'mms1_fgm_b_gsm_srvy_l2_bvec'])
```



2.14.2 Search-coil Magnetometer (SCM)

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

This function loads SCM data into tplot variables

Parameters

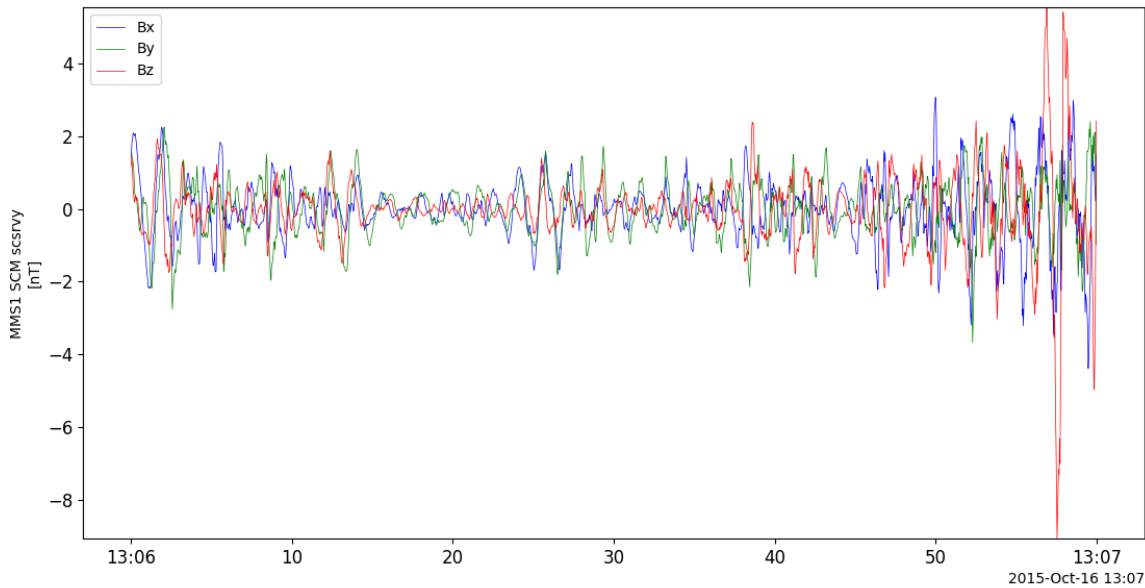
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (*str* or *list* of *str*) – list of probes, valid values for MMS probes are [‘1’, ‘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 pytpplot 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')
```



2.14.3 Level 3 FGM+SCM Data (FSM)

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

This function loads FSM data into tplot variables

Parameters

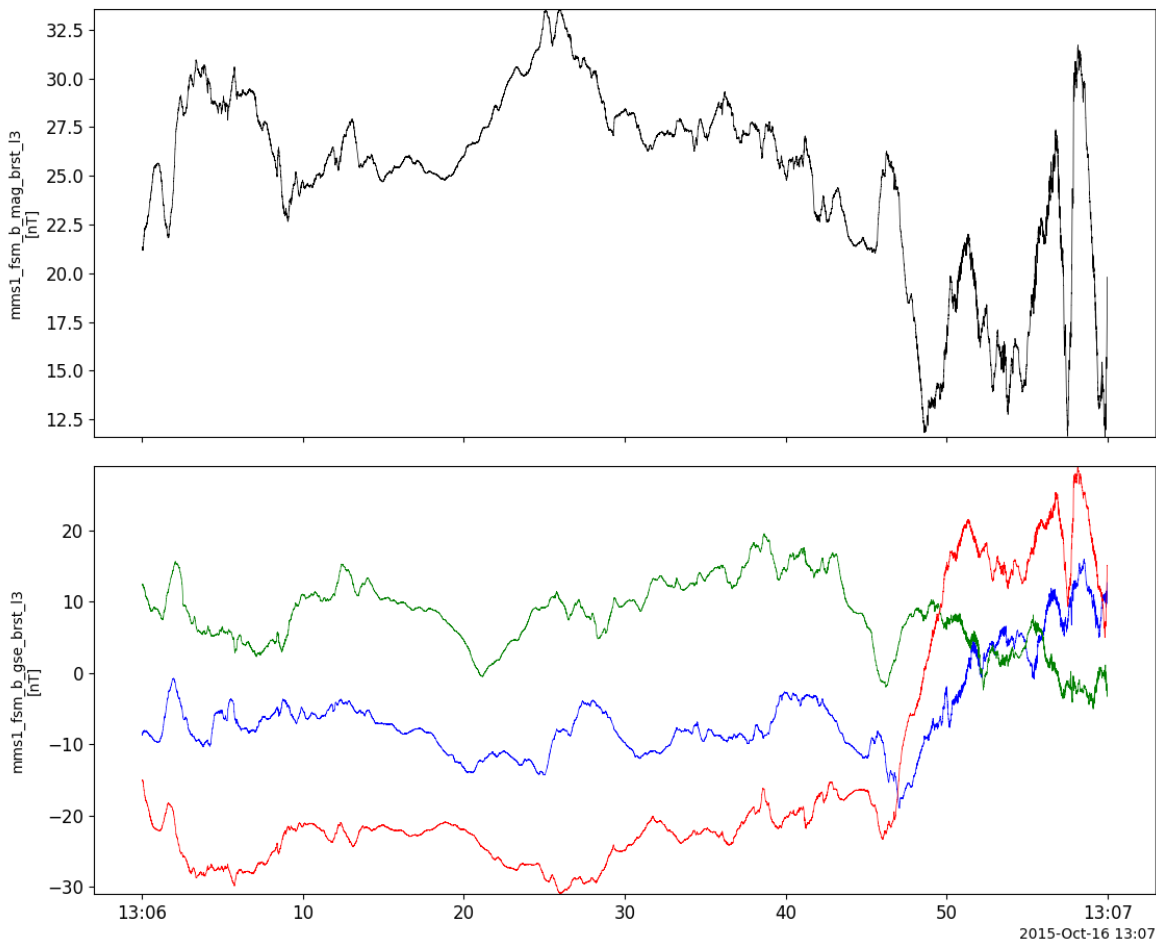
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (*str* or *list* of *str*) – list of probes, valid values for MMS probes are [‘1’, ‘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 parameters

- **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 pytpplot 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_l3', 'mms1_fsm_b_gse_brst_l3'])
```

2.14.4 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”

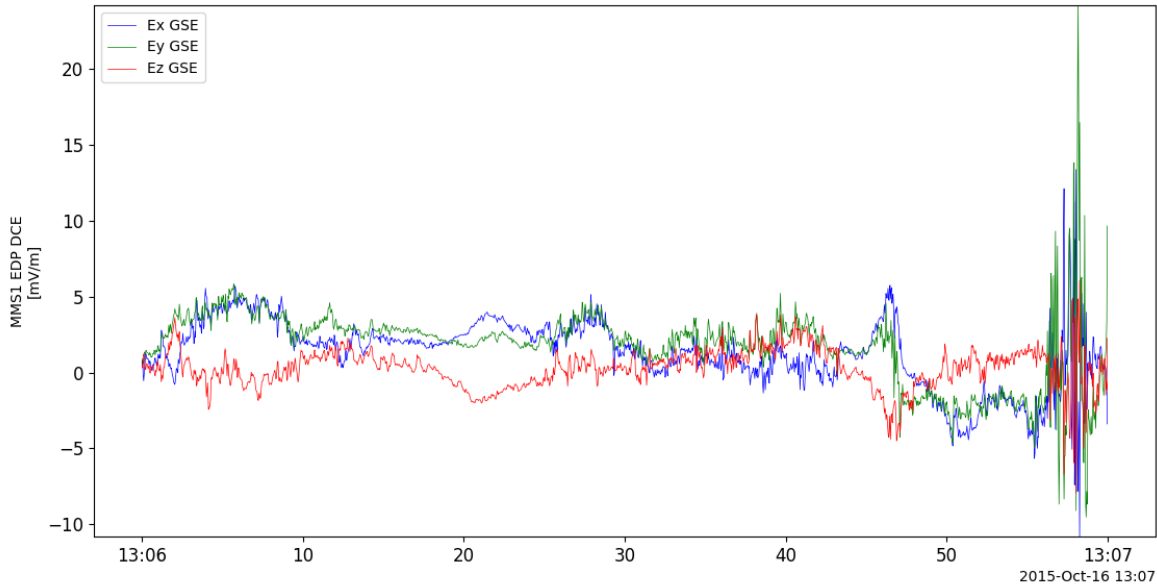
attribute of “data”.

- **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 pytplo 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')
```



2.14.5 Electron Drift Instrument (EDI)

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

This function loads EDI data into tplot variables

Parameters

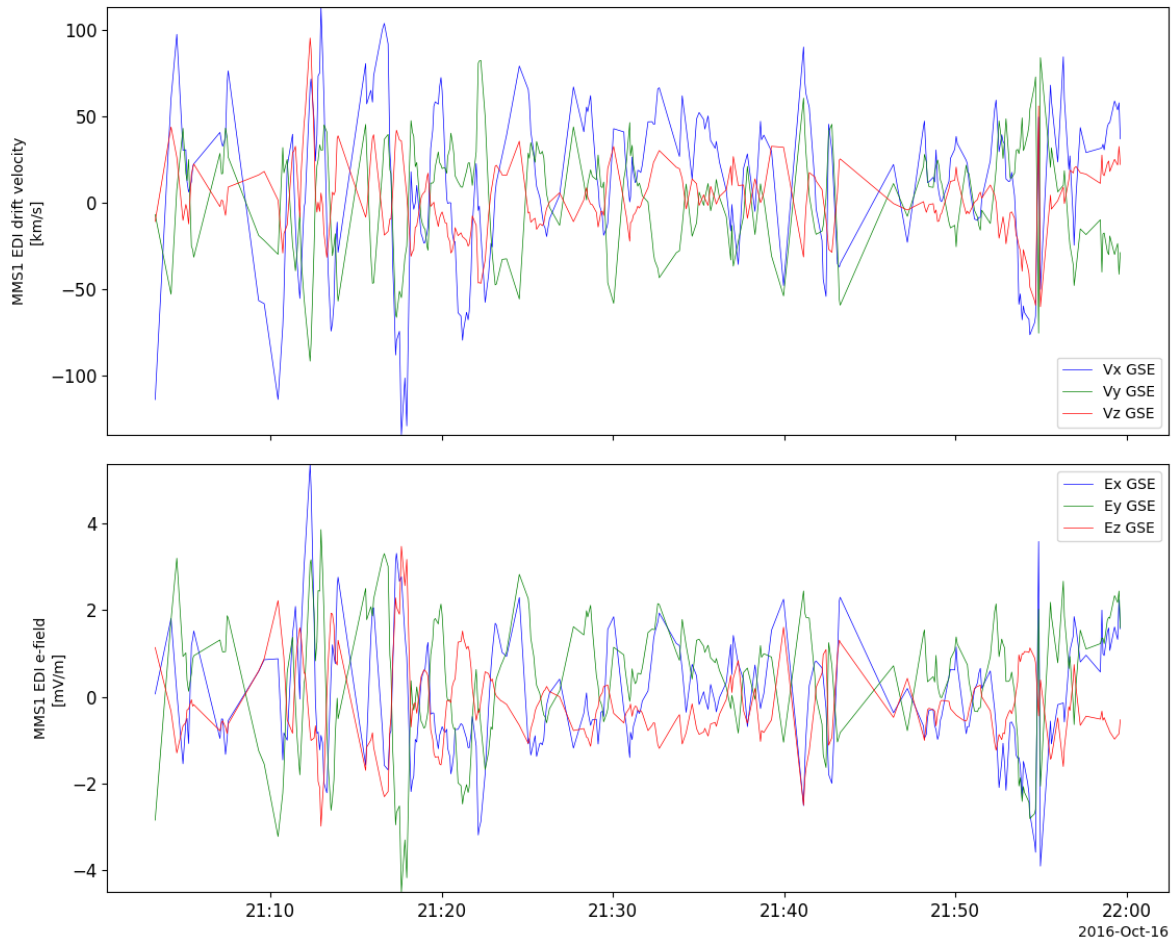
- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (`str` or `list` of `str`) – list of probes, valid values for MMS probes are [‘1’, ‘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 parameters
- **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 pytpplot 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'])
```



2.14.6 Fly's Eye Energetic Particle Sensor (FEEPS)

`pyspedas.mms.feeps(*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*) –

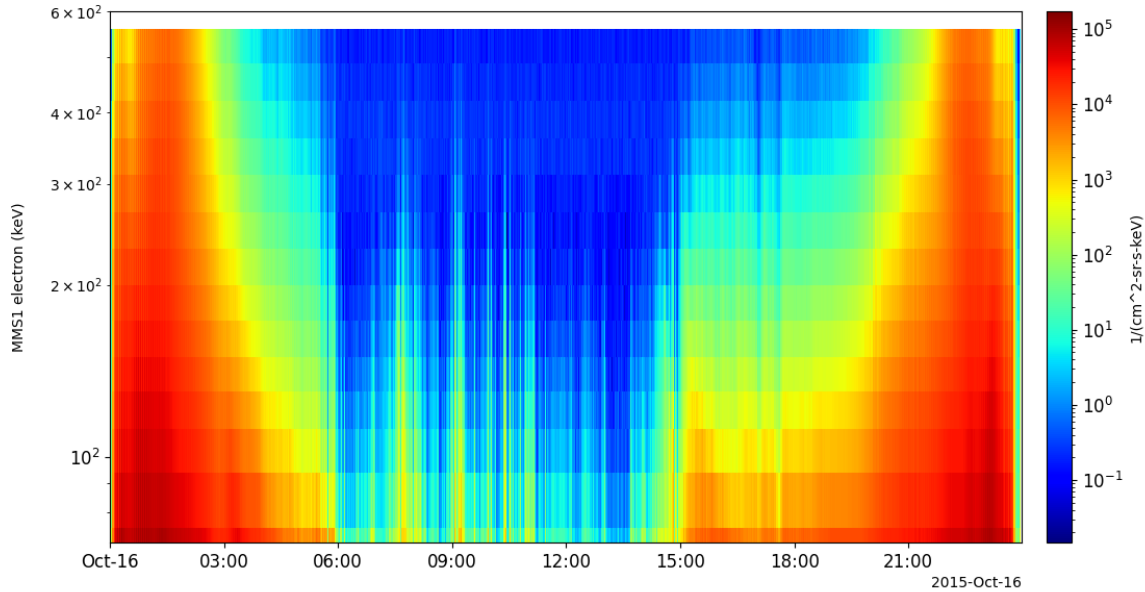
Valid datatypes for FEEPS are: L2, L1b: ['electron', 'ion'] L1a: ['electron-bottom', 'electron-top', 'ion-bottom', 'ion-top']

- **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 pytpplot import tplot
pyspedas.mms.feeps(trange=['2015-10-16', '2015-10-17'])
tplot('mms1_epd_feeps_srvy_l2_electron_intensity_omni_spin')
```



2.14.7 Energetic Ion Spectrometer (EIS)

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

This function loads EIS data into tplot variables

Parameters

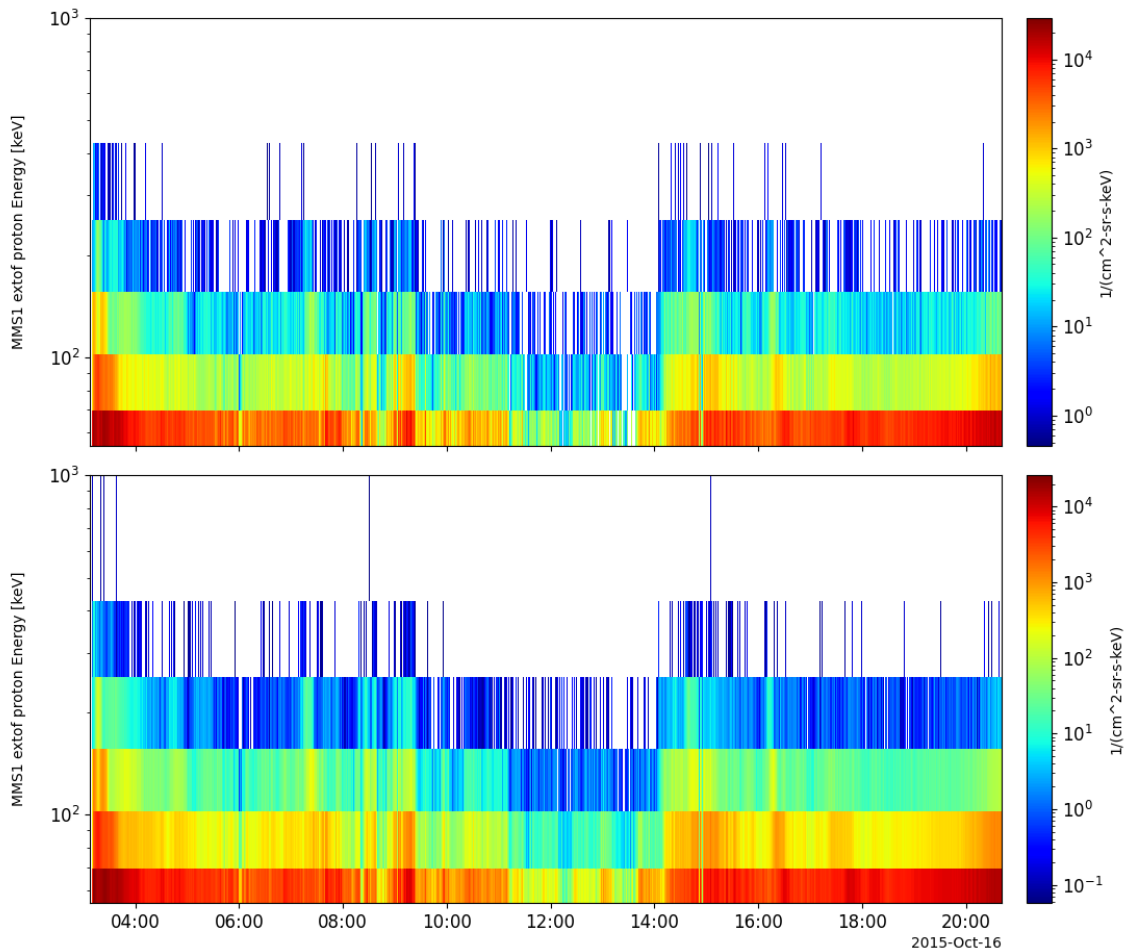
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (*str* or *list* of *str*) – list of probes, valid values for MMS probes are [‘1’, ‘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 parameters
- **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 pytpplot import tplot
pyspedas.mms.eis(trange=['2015-10-16', '2015-10-17'])
tplot(['mms1_epd_eis_srvy_l2_extof_proton_flux_omni', 'mms1_epd_eis_srvy_l2_extof_proton_
↪ flux_omni_spin'])
```

2.14.8 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’, ‘siti’. 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”

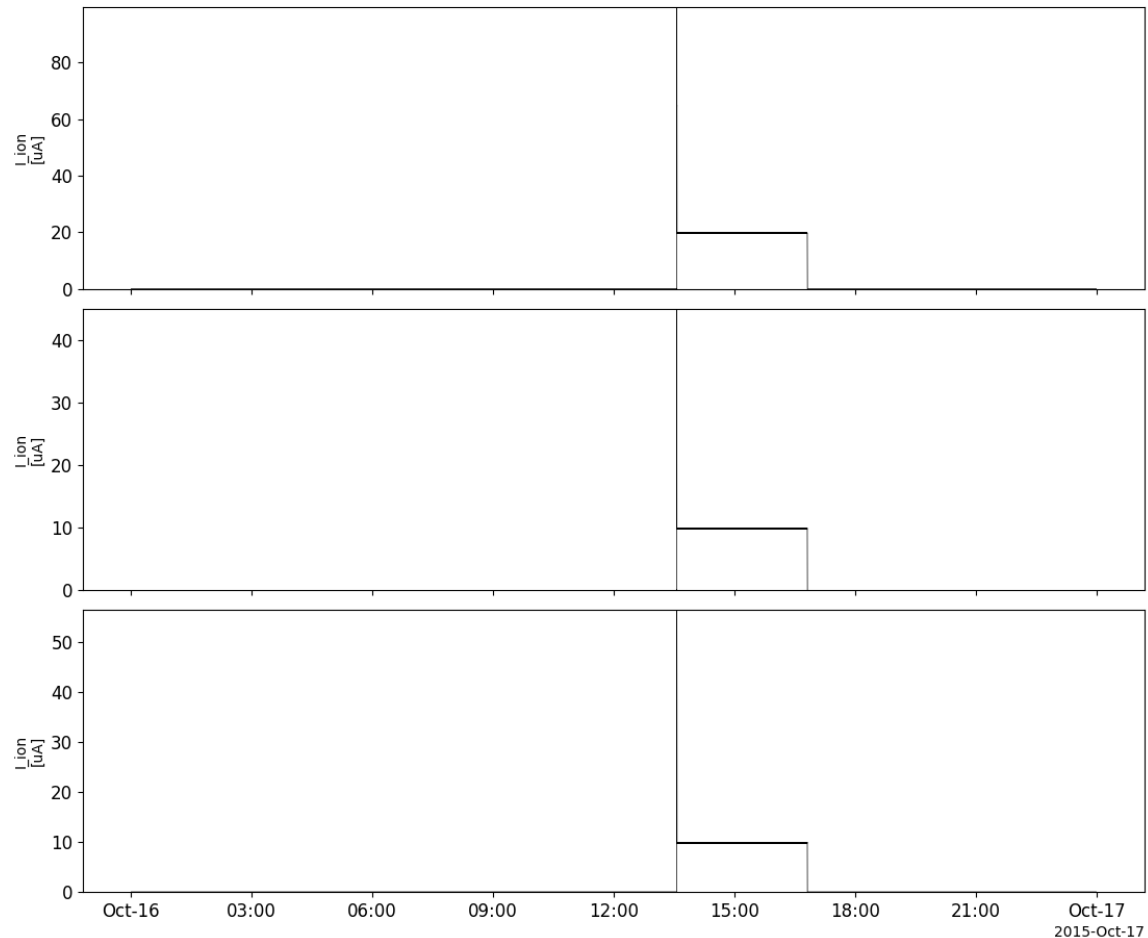
attribute of “data”.

- **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 pyplot import tplot
pyspedas.mms.aspoc(trange=['2015-10-16', '2015-10-17'])
tplot(['mms1_aspoc_ionc_l2', 'mms1_asp1_ionc_l2', 'mms1_asp2_ionc_l2'])
```



2.14.9 Fast Plasma Investigation (FPI)

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

This function loads FPI data into tplot variables

Parameters

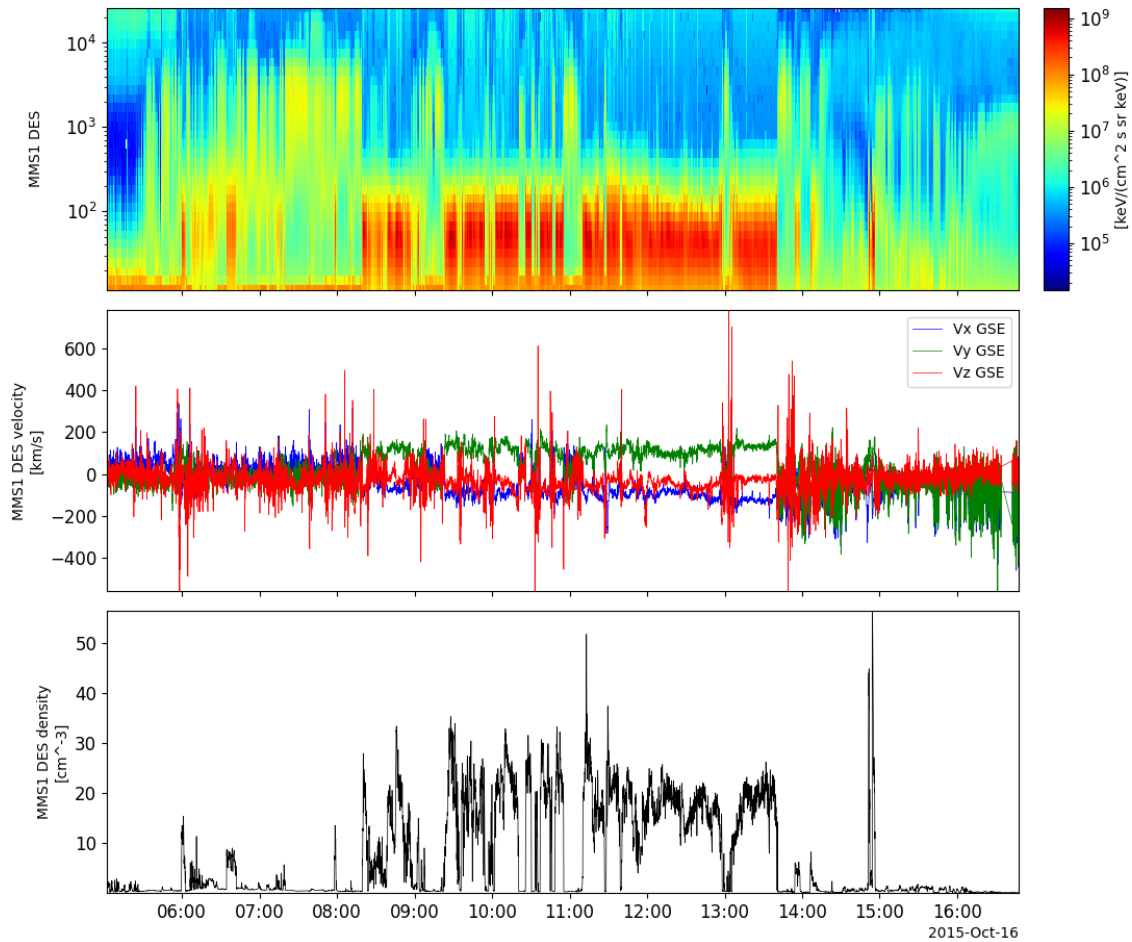
- **trange** (list of str) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (str or list of str) – list of probes, valid values for MMS probes are [‘1’, ‘2’, ‘3’, ‘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 accidently 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 pyplot 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'])
```



2.14.10 Hot Plasma Composition Analyzer (HPCA)

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

This function loads HPCA data into tplot variables

Parameters

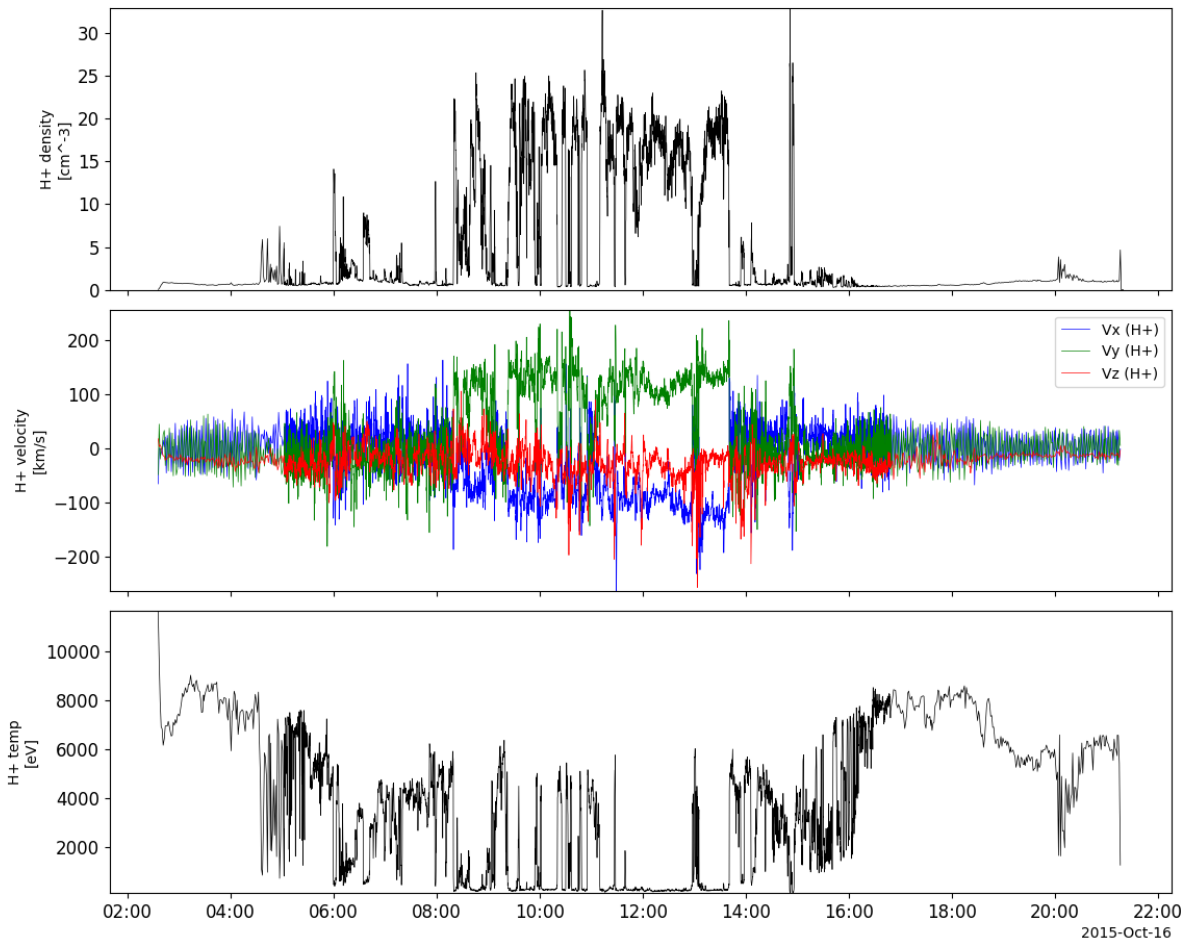
- **trange** (list of str) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (str or list of str) – list of probes, valid values for MMS probes are [‘1’, ‘2’, ‘3’, ‘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 pytpot 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'])
```



2.14.11 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

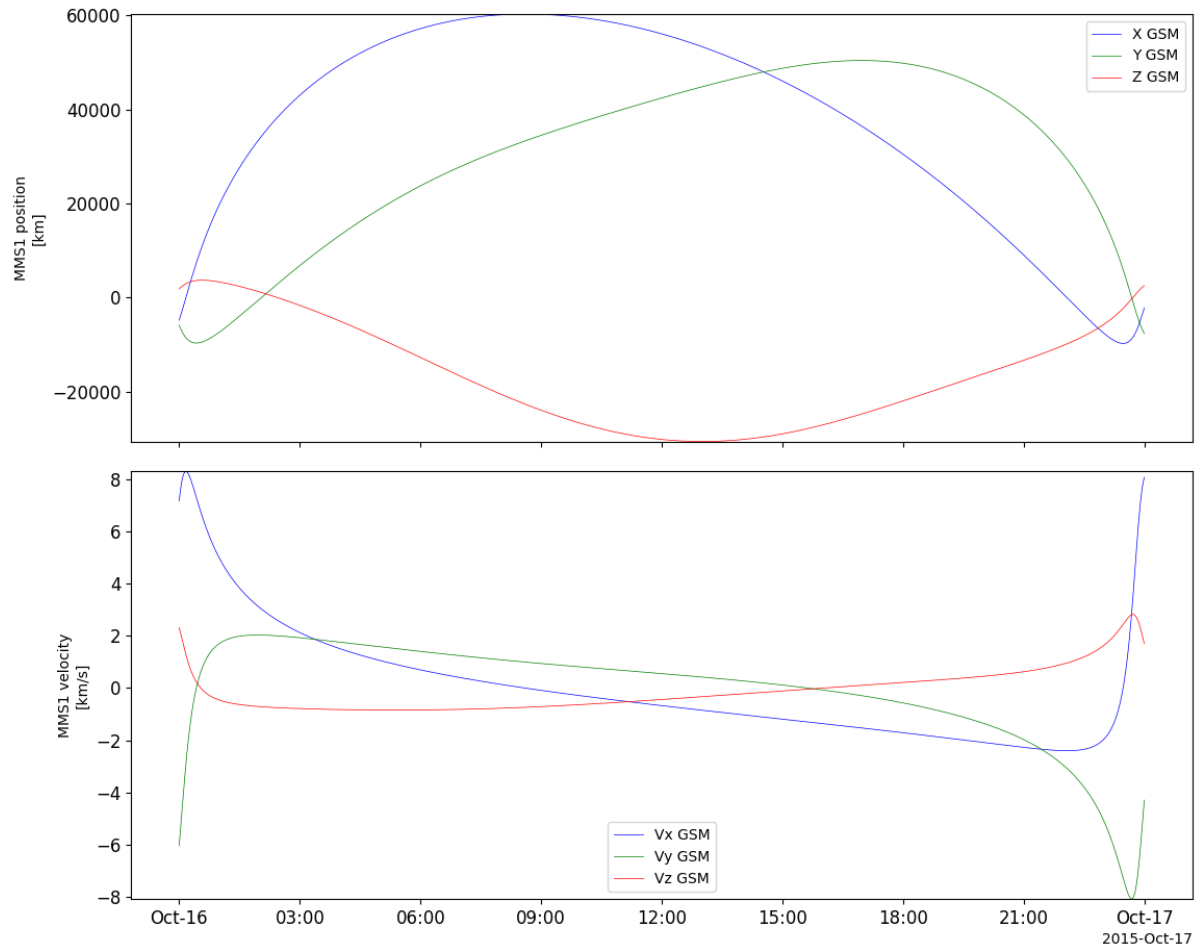
Notes

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 pyplot 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

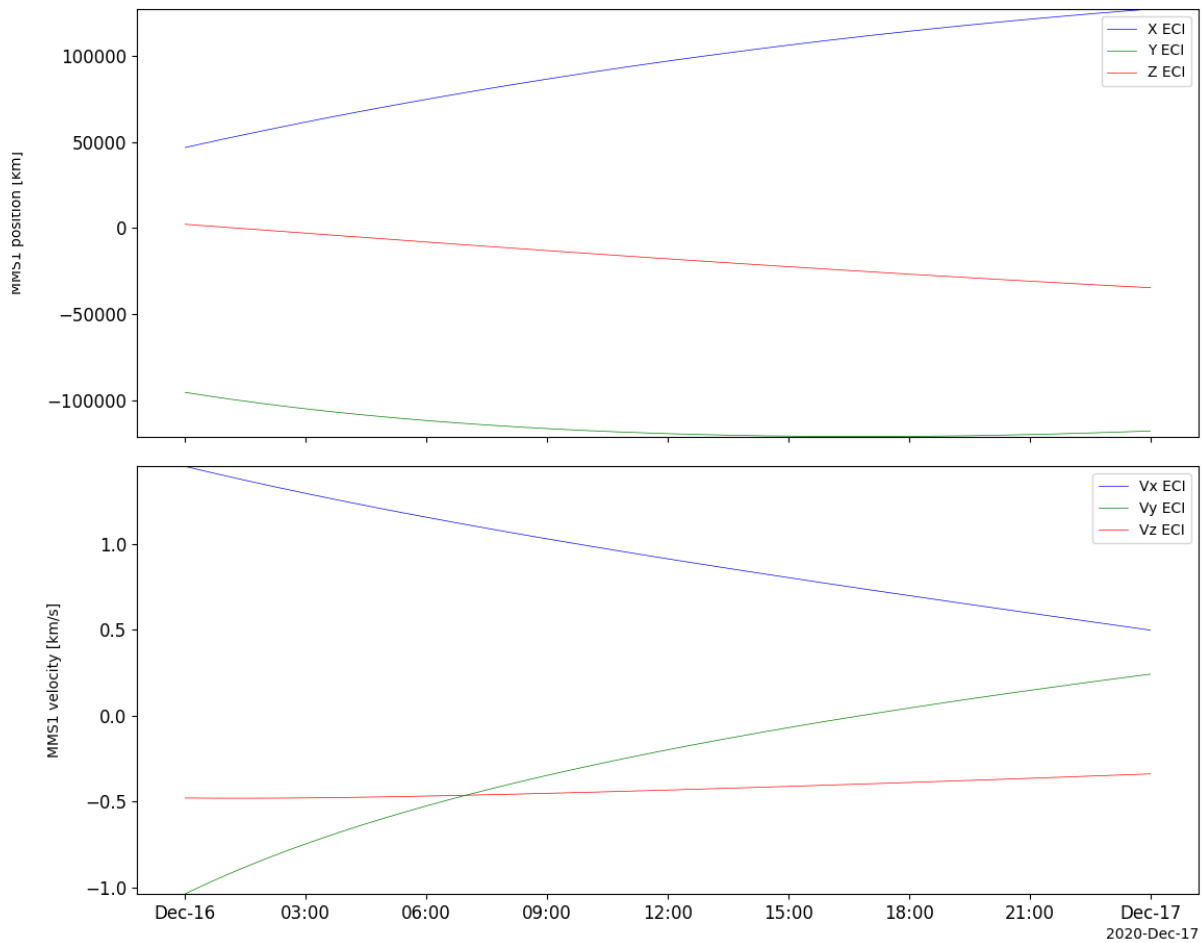
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (*str* or *list* of *str*) – list of probes, valid values for MMS probes are [‘1’, ‘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 pyplot import tplot
pyspedas.mms.state(trange=['2020-12-16', '2020-12-17'])
tplot(['mms1_defeph_pos', 'mms1_defeph_vel'])
```



2.15 OMNI data

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

```
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

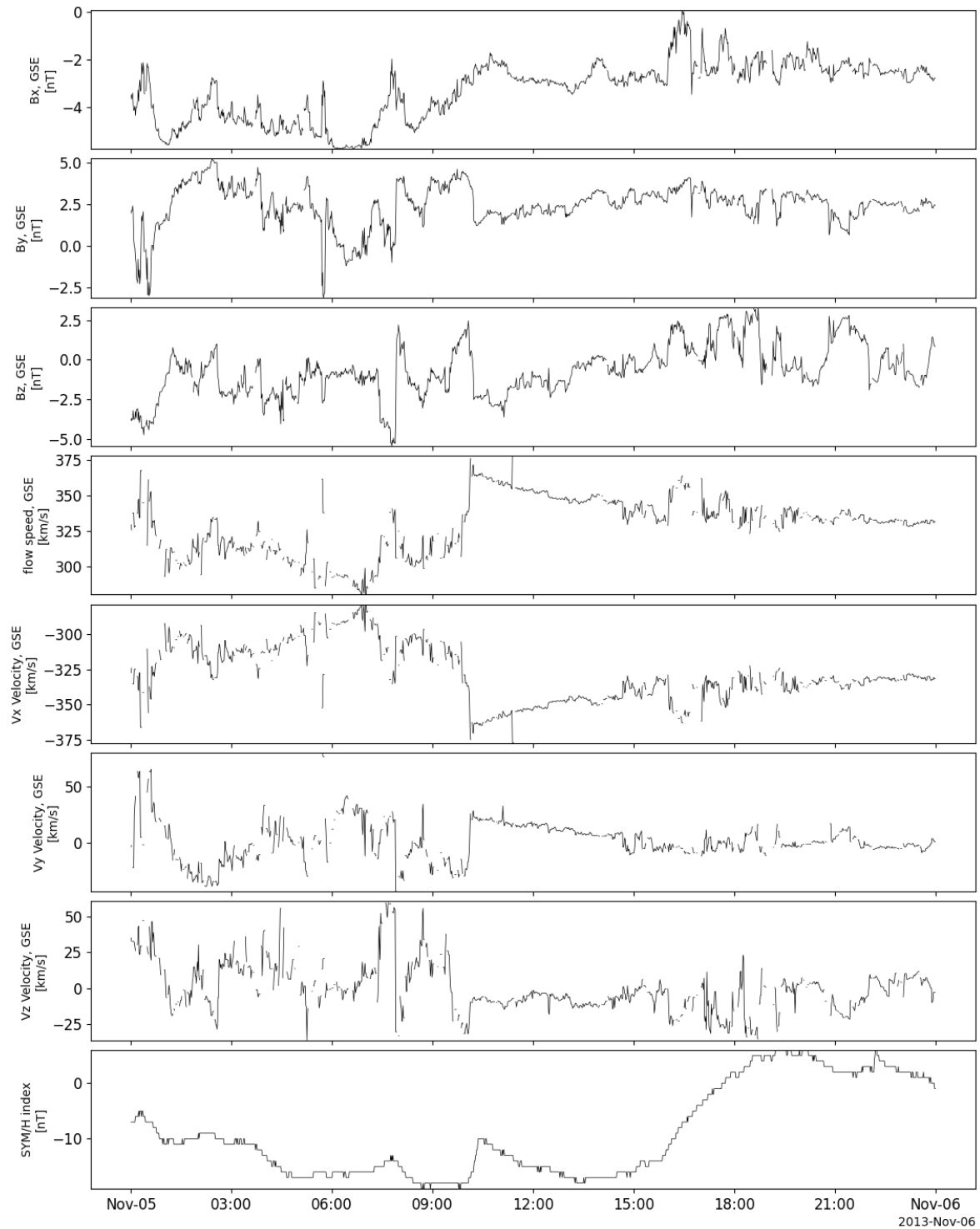
Parameters

- **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 key-word

Return type List of tplot variables created.

2.15.1 Example

```
import pyspedas
from pytpplot import tplot
omni_vars = pyspedas.omni.data(trange=['2013-11-5', '2013-11-6'])
tplot(['BX_GSE', 'BY_GSE', 'BZ_GSE', 'flow_speed', 'Vx', 'Vy', 'Vz', 'SYM_H'])
```



2.16 Polar Orbiting Environmental Satellites (POES) Mission

The routines in this module can be used to load data from the Polar Orbiting Environmental Satellites (POES) Mission mission.

2.16.1 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

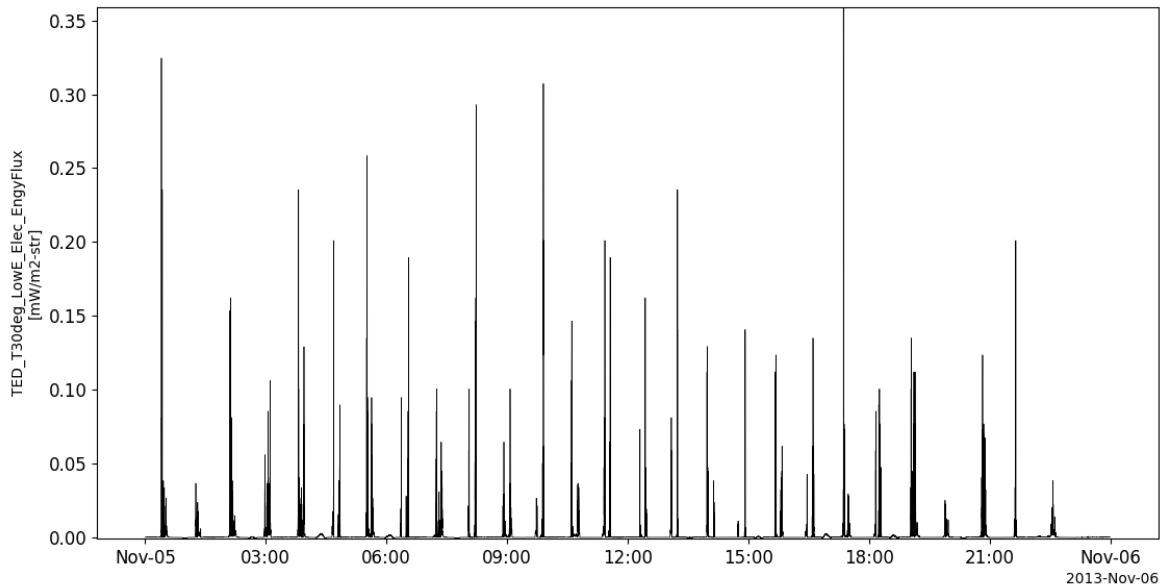
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
sem_vars = pyspedas.poes.sem(trange=['2013-11-5', '2013-11-6'])
tplot('ted_ele_tel30_low_eflux')
```



2.17 Polar

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

2.17.1 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

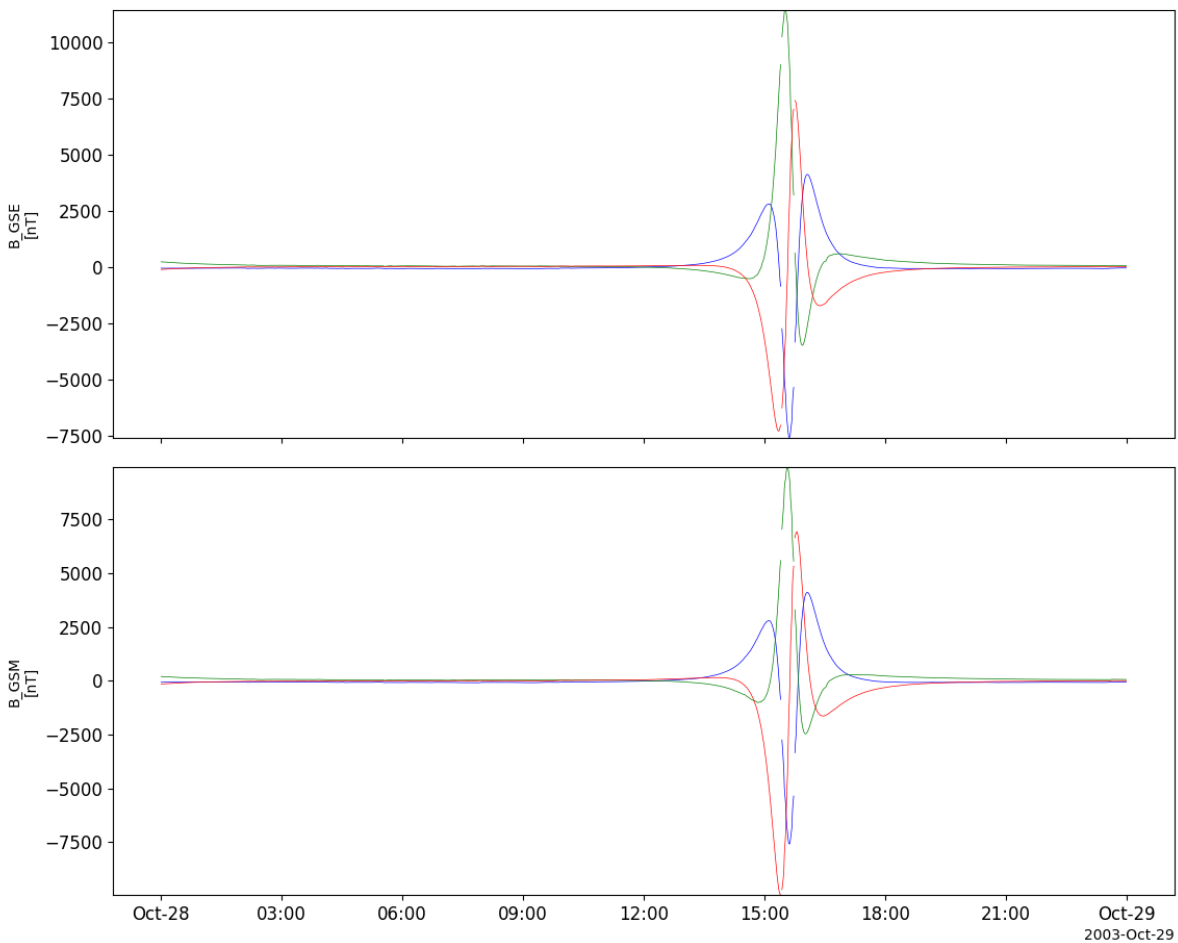
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **suffix** (*str*) – The tplot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
mfe_vars = pyspedas.polar.mfe(trange=['2003-10-28', '2003-10-29'])
tplot(['B_GSE', 'B_GSM'])
```



2.17.2 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

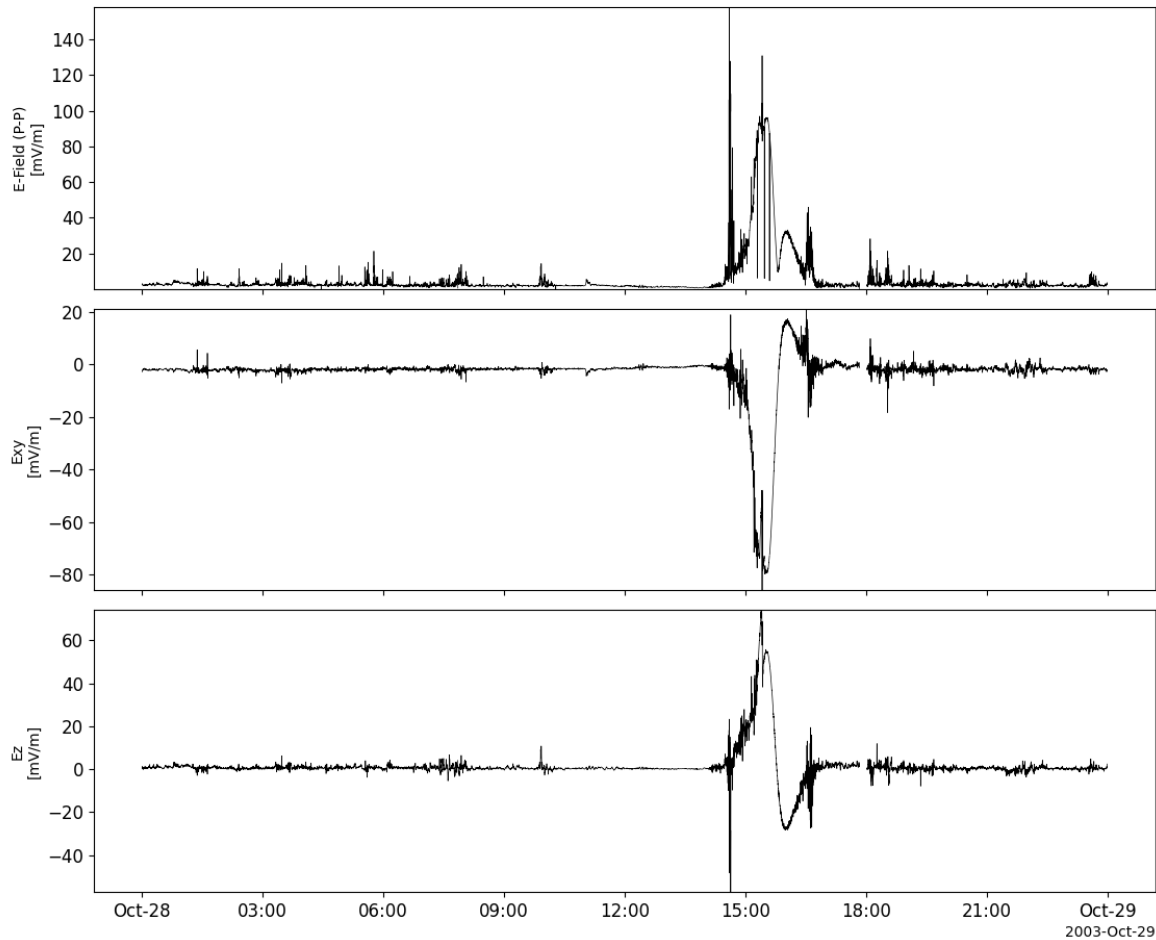
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
efi_vars = pyspedas.polar.efi(trange=['2003-10-28', '2003-10-29'])
tplot(['ESPIN', 'EXY12G', 'EZ12G'])
```

2.17.3 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

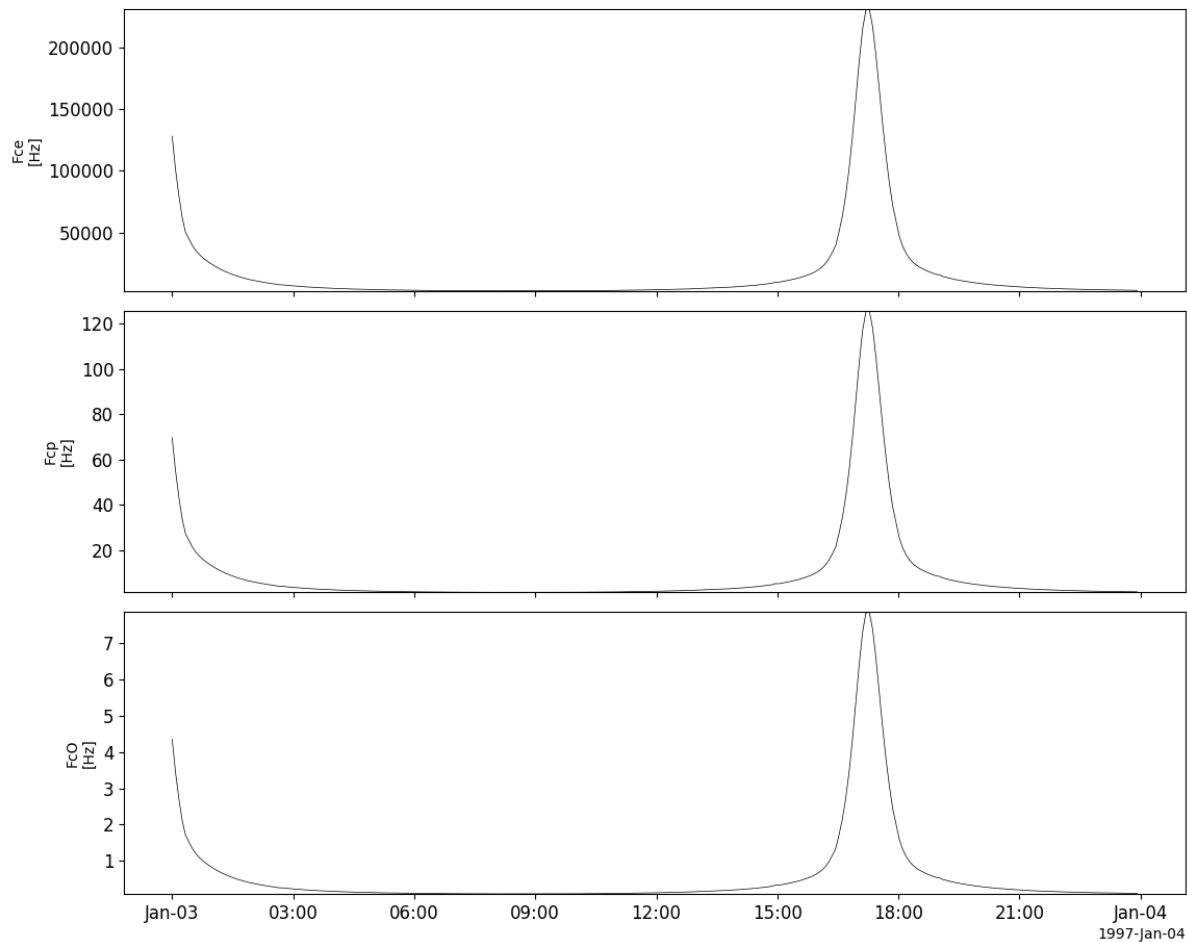
- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The plot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
pwi_vars = pyspedas.polar.pwi()
tplot(['Fce', 'Fcp', 'Fc0'])
```



2.17.4 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

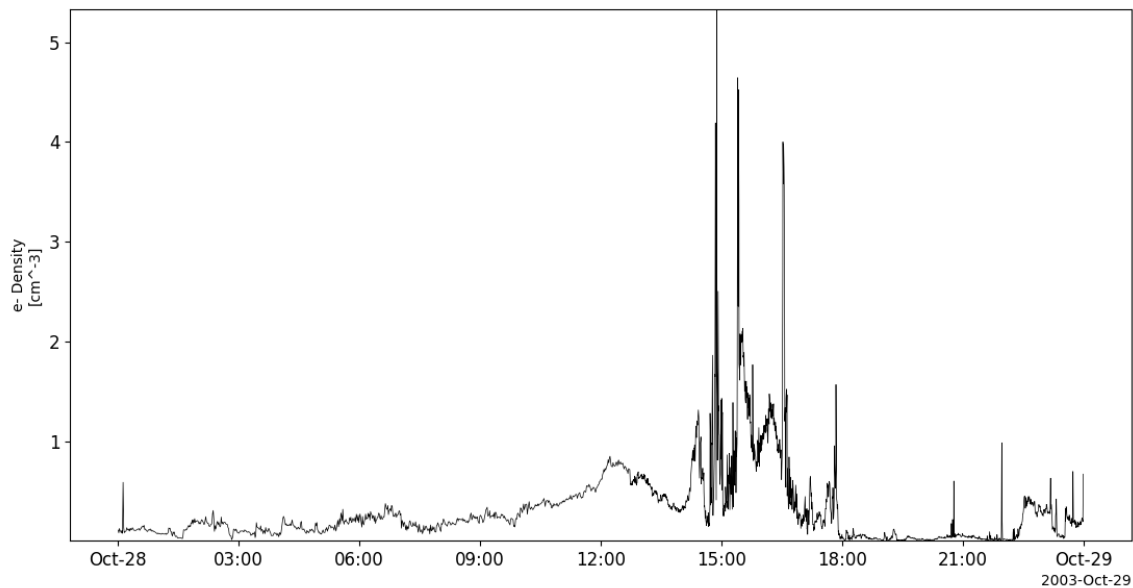
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **suffix** (*str*) – The tplot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
hydra_vars = pyspedas.polar.hydra(trange=['2003-10-28', '2003-10-29'])
tplot('ELE_DENSITY')
```



2.17.5 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

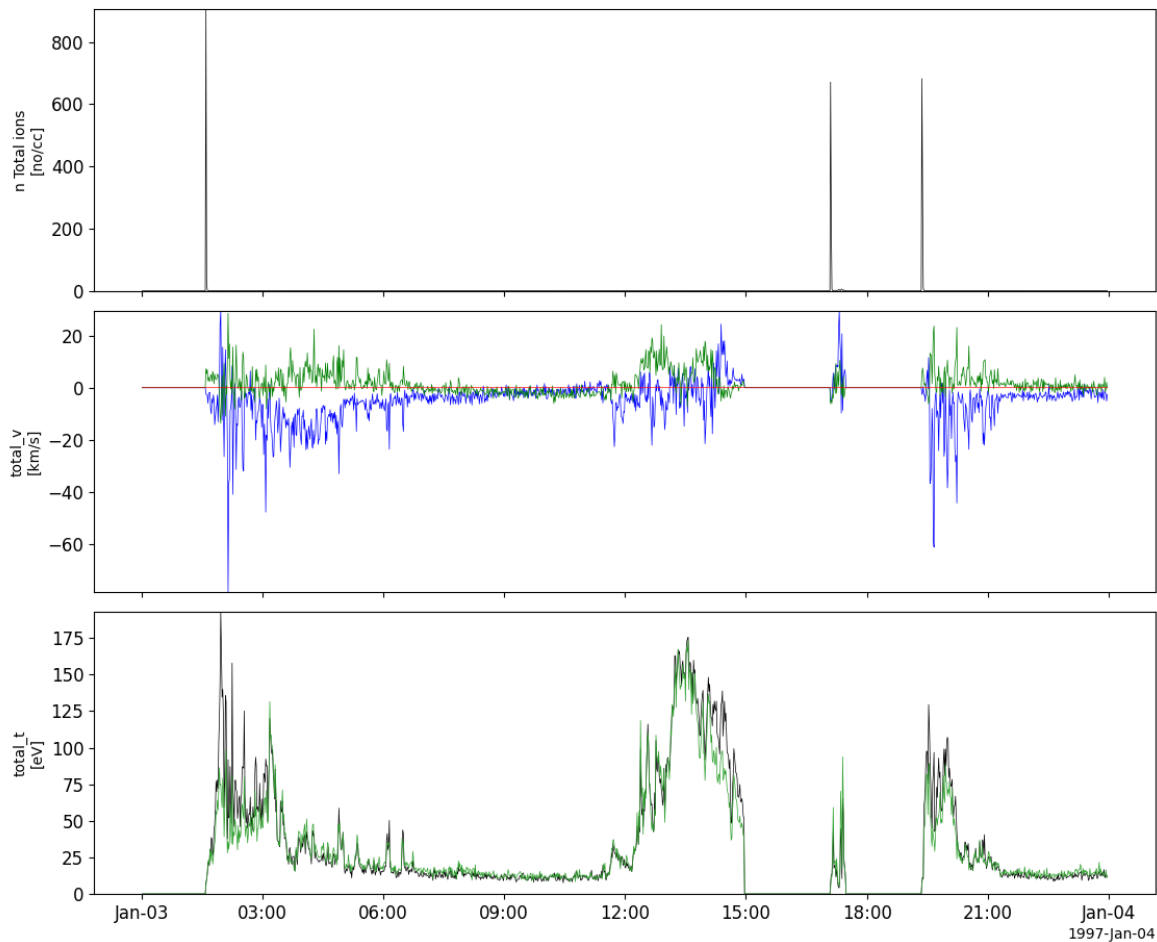
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
tide_vars = pyspedas.polar.tide()
tplot(['total_den', 'total_v', 'total_t'])
```



2.17.6 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

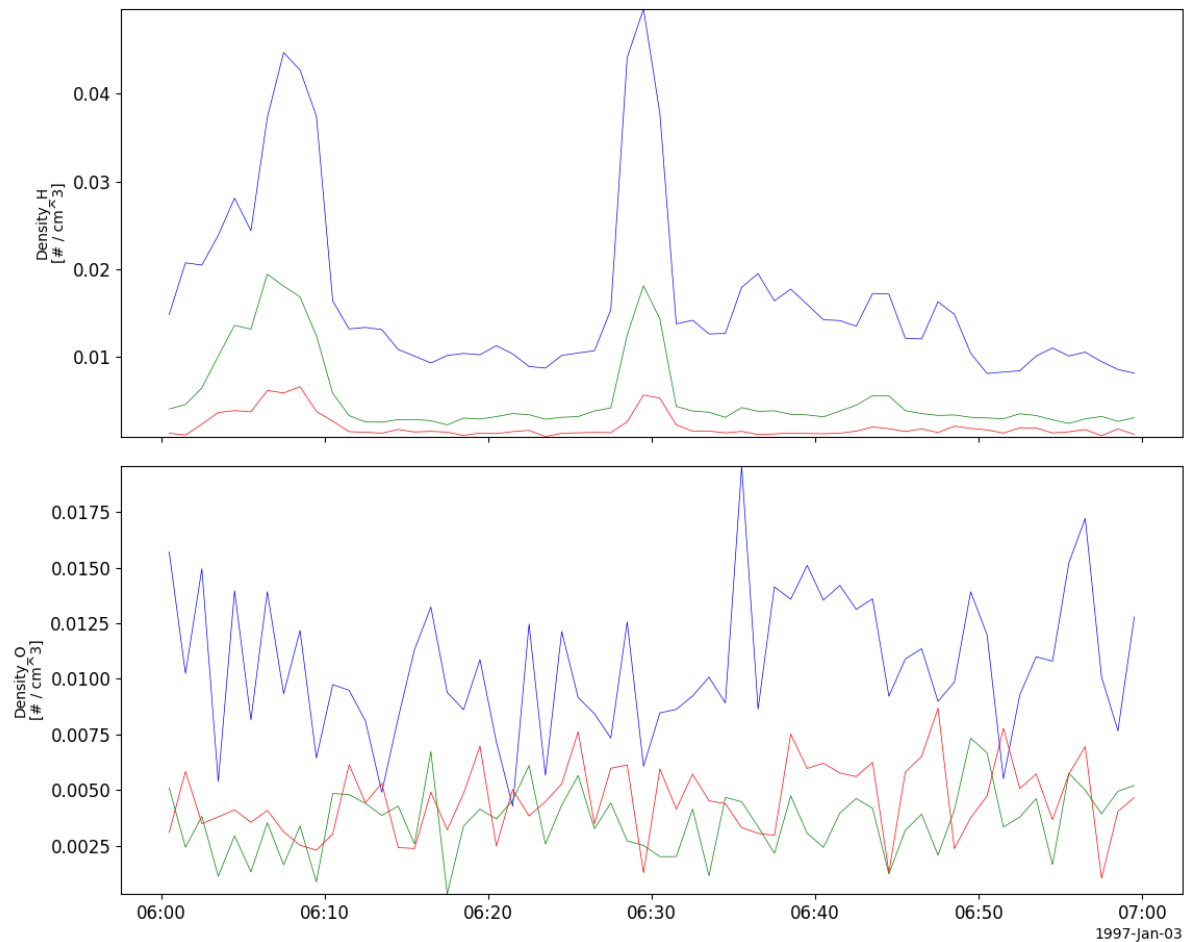
- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
timas_vars = pyspedas.polar.timas(trange=['1997-01-03/6:00', '1997-01-03/7:00'], time_
→clip=True)
tplot(['Density_H', 'Density_O'])
```



2.17.7 Charge and Mass Magnetospheric Ion Composition Experiment (CAMMICE)

```
pyspedas.polar.camnice(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

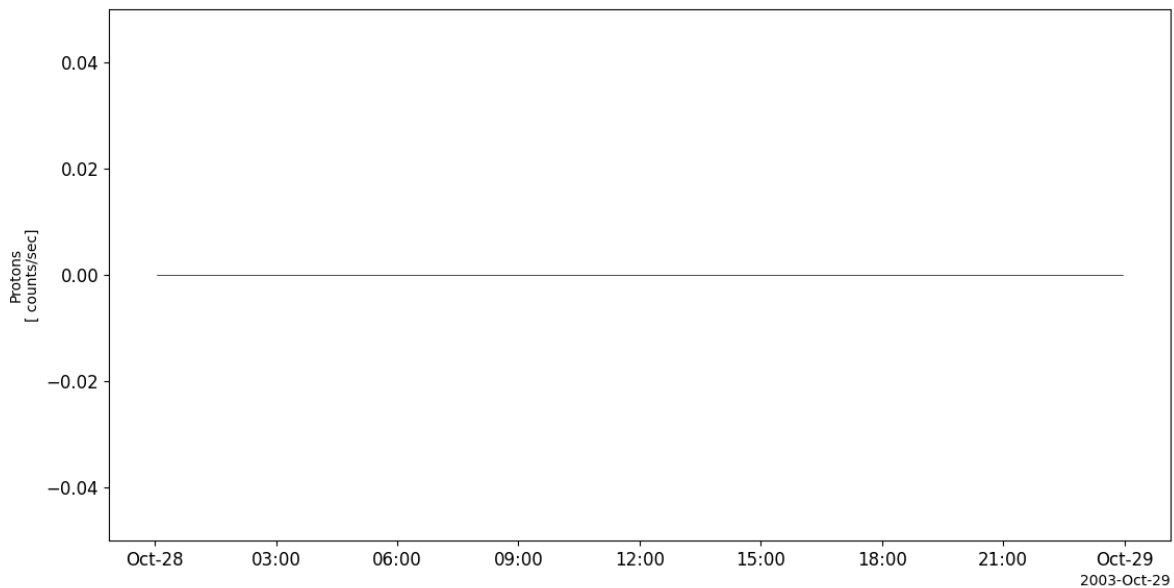
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format 'YYYY-MM-DD', 'YYYY-MM-DD'] or to specify more or less than a day ['YYYY-MM-DD/hh:mm:ss', 'YYYY-MM-DD/hh:mm:ss']
- **datatype** (*str*) – Data type; Valid options:
- **suffix** (*str*) – The plot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
cammice_vars = pyspedas.polar.cammice(trange=['2003-10-28', '2003-10-29'])
tplot('Protons')
```



2.17.8 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

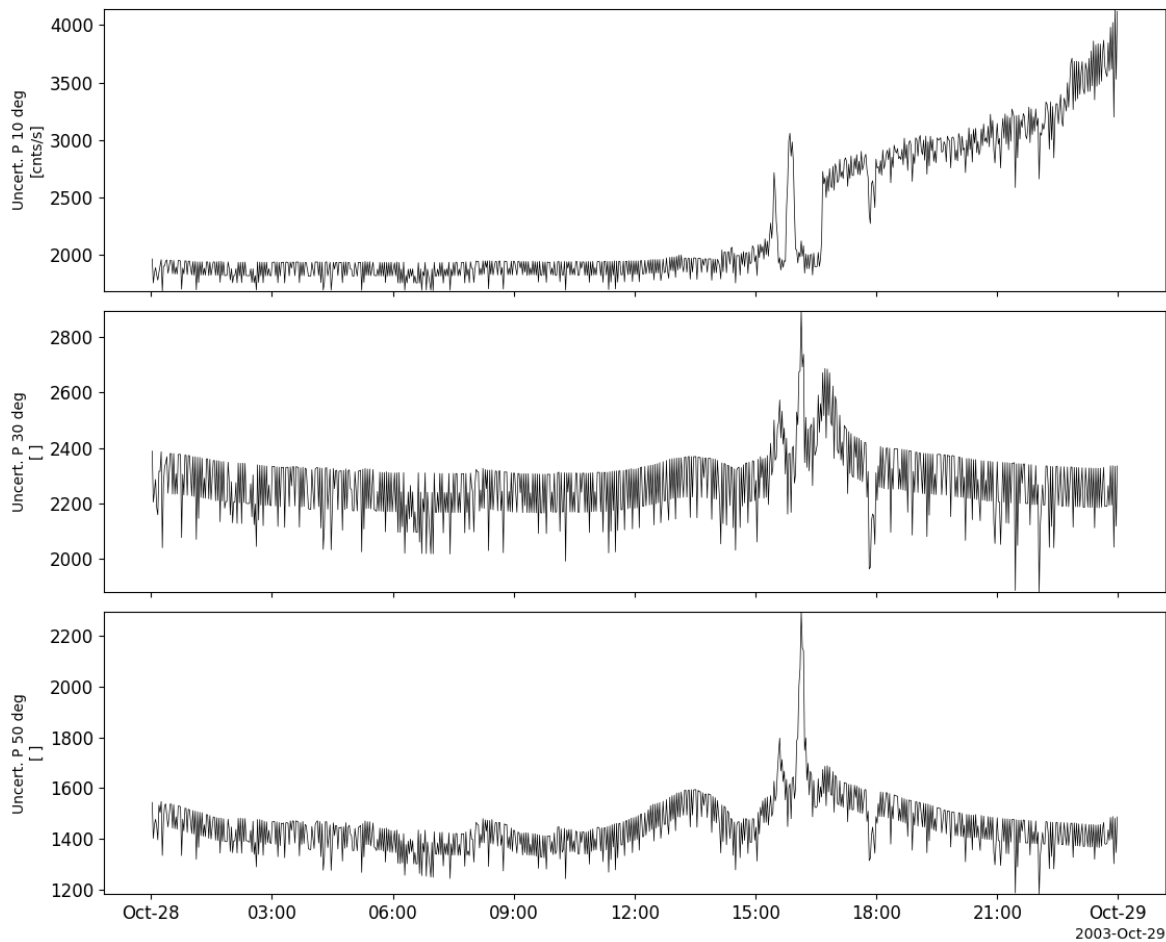
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
cep_vars = pyspedas.polar.ceppad(trange=['2003-10-28', '2003-10-29'])
tplot(['IPS_10_ERR', 'IPS_30_ERR', 'IPS_50_ERR'])
```



2.17.9 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

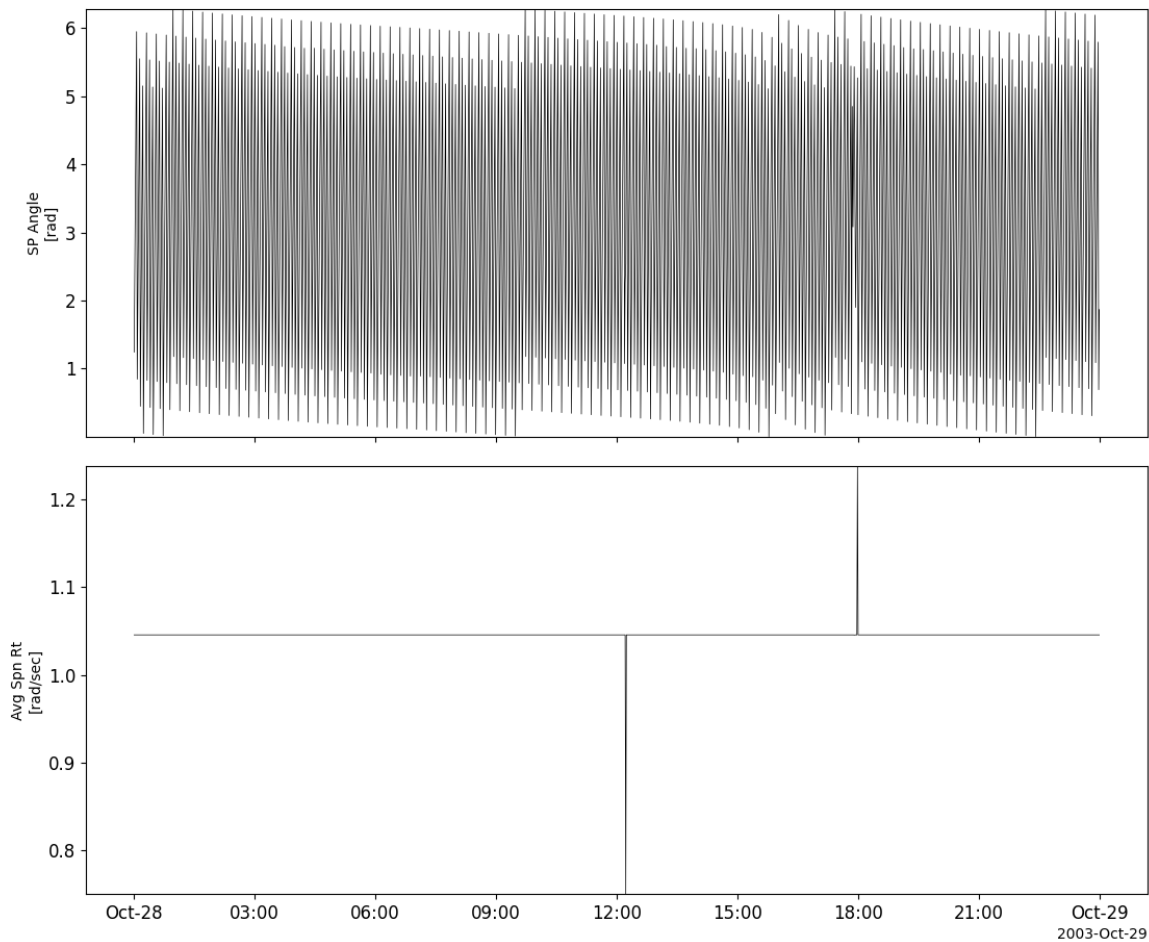
- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The tplot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
orb_vars = pyspedas.polar.orbit(trange=['2003-10-28', '2003-10-29'])
tplot(['SPIN_PHASE', 'AVG_SPIN_RATE'])
```



2.18 Parker Solar Probe (PSP)

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

2.18.1 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

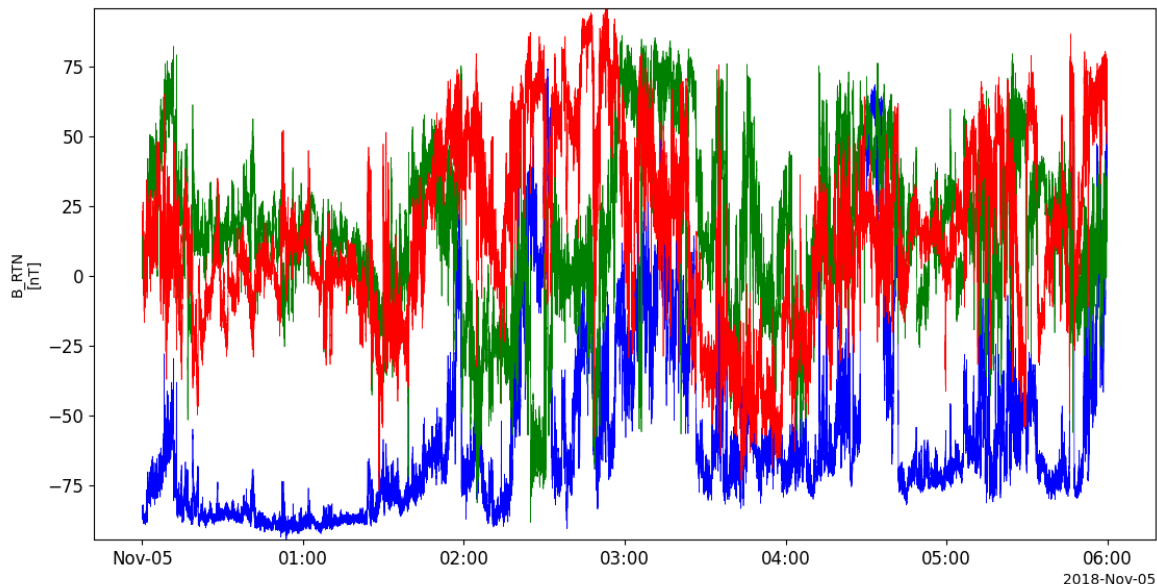
- **trange** (list of str) – time range of interest [starttime, endtime] with the format 'YYYY-MM-DD', 'YYYY-MM-DD' or to specify more or less than a day ['YYYY-MM-DD/hh:mm:ss', 'YYYY-MM-DD/hh:mm:ss']
- **datatype** (str) – Data type; Valid options:

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
fields_vars = pyspedas.psp.fields(trange=['2018-11-5', '2018-11-5/06:00'], datatype='mag_
↪ rtn', level='l2', time_clip=True)
tplot('psp_fld_l2_mag_RTN')
```



2.18.2 Solar Probe Cup

```
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

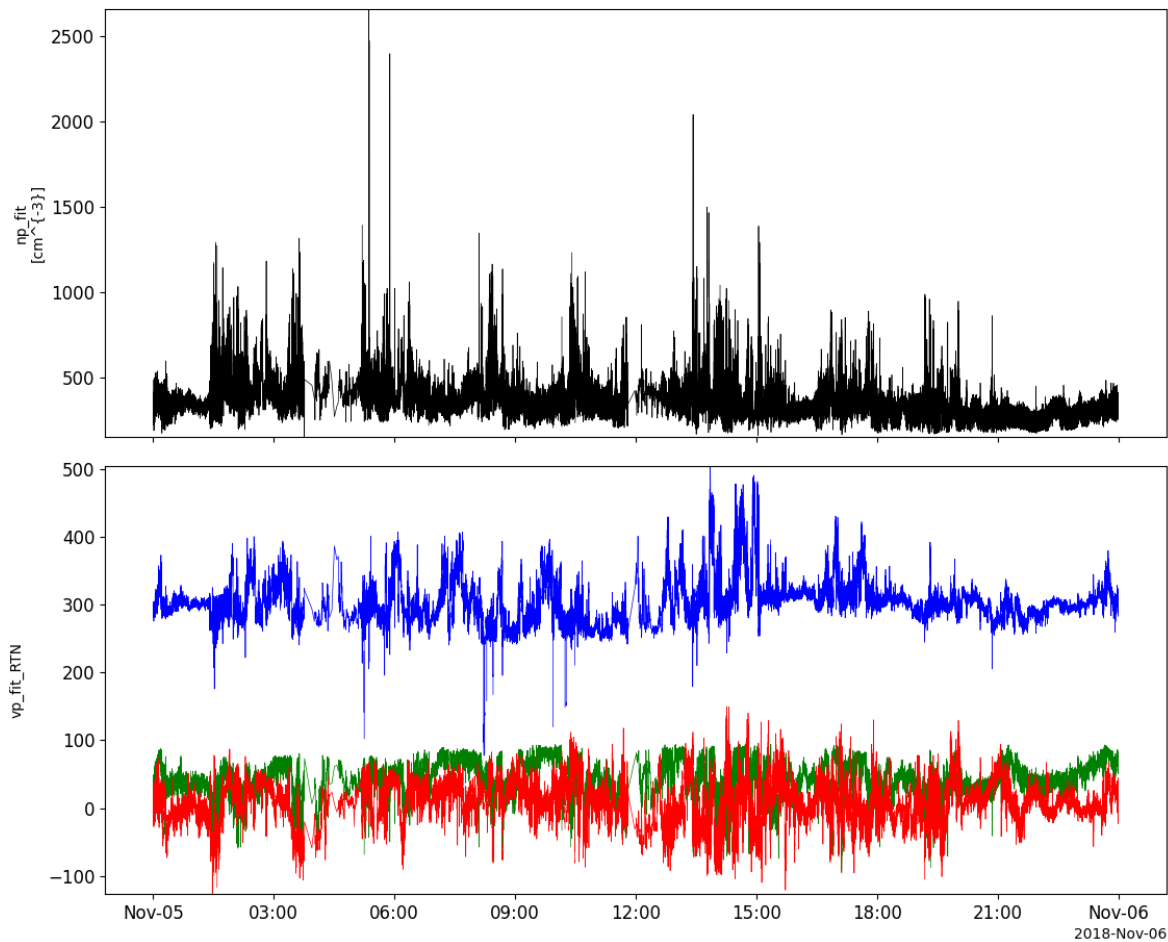
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
spc_vars = pyspedas.psp.spc(trange=['2018-11-5', '2018-11-6'], datatype='l3i', level='l3
→')
tplot(['np_fit', 'vp_fit_RTN'])
```



2.18.3 SWEAP/SPAN-e

```
pyspedas.psp.spe(trange=['2018-11-5', '2018-11-6'], datatype='spa_sf1_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

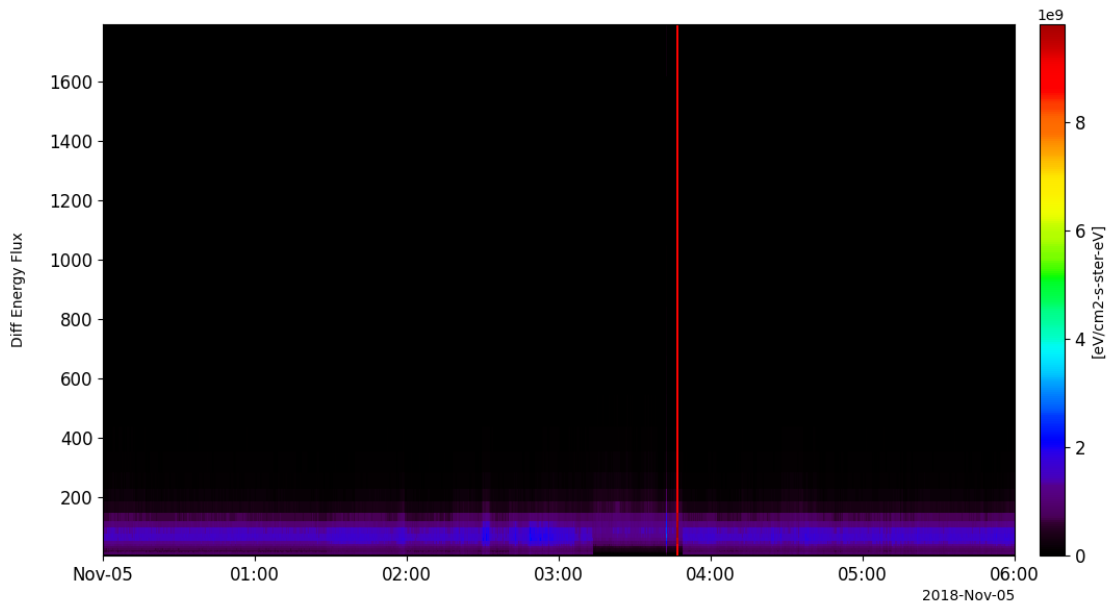
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **suffix** (*str*) – The tplot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytplot import tplot
spe_vars = pyspedas.psp.spe(trange=['2018-11-5', '2018-11-5/06:00'], datatype='spa_sf1_
    32e', level='l2', time_clip=True)
tplot('EFLUX')
```



2.18.4 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

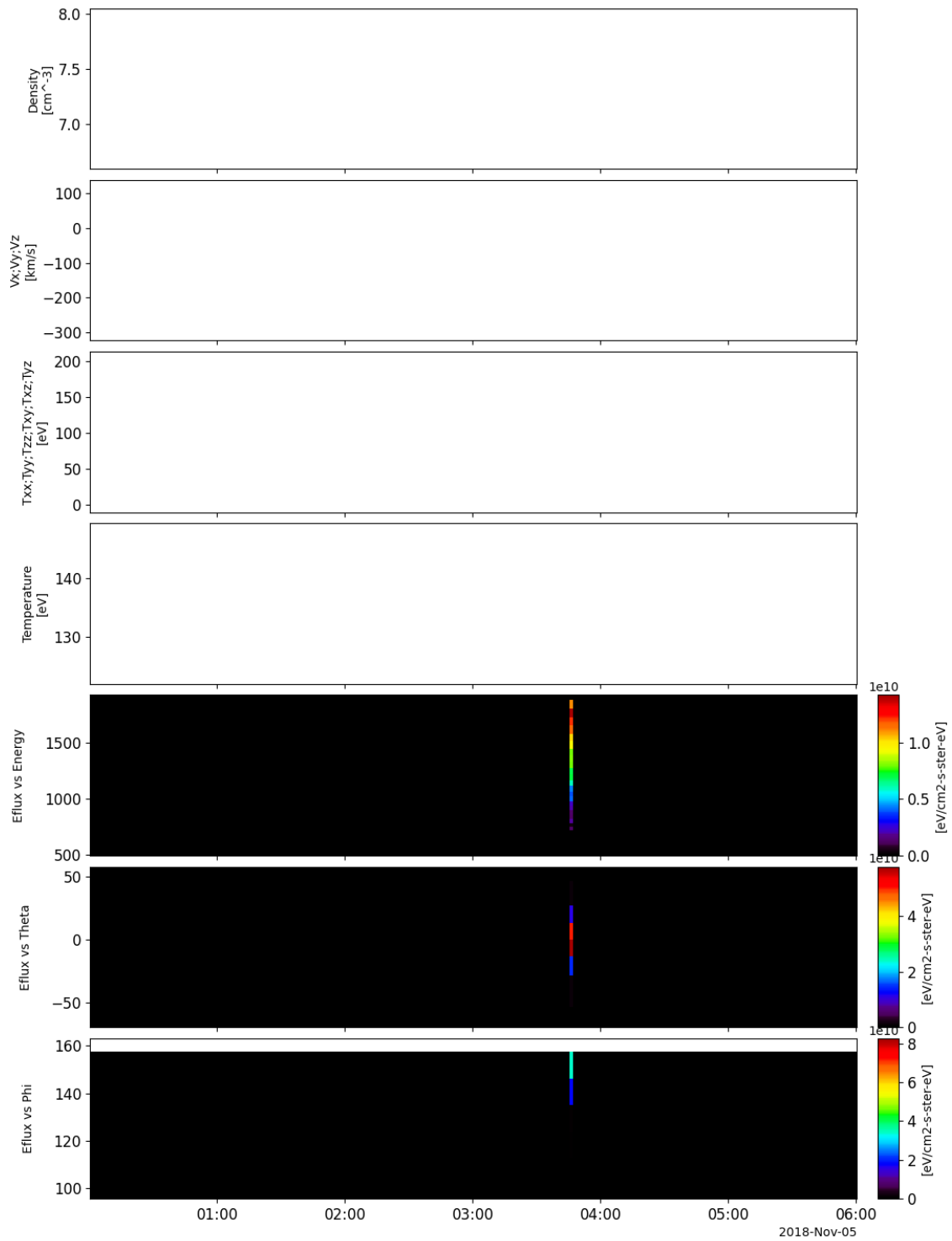
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas  
from pytpplot import tplot  
spi_vars = pyspedas.psp.spi(trange=['2018-11-5', '2018-11-5/06:00'], datatype='spi_sf0a_  
↪mom_inst', level='l3', time_clip=True)  
tplot(['DENS', 'VEL', 'T_TENSOR', 'TEMP', 'EFLUX_VS_ENERGY', 'EFLUX_VS_THETA', 'EFLUX_VS_  
↪PHI'])
```



2.18.5 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

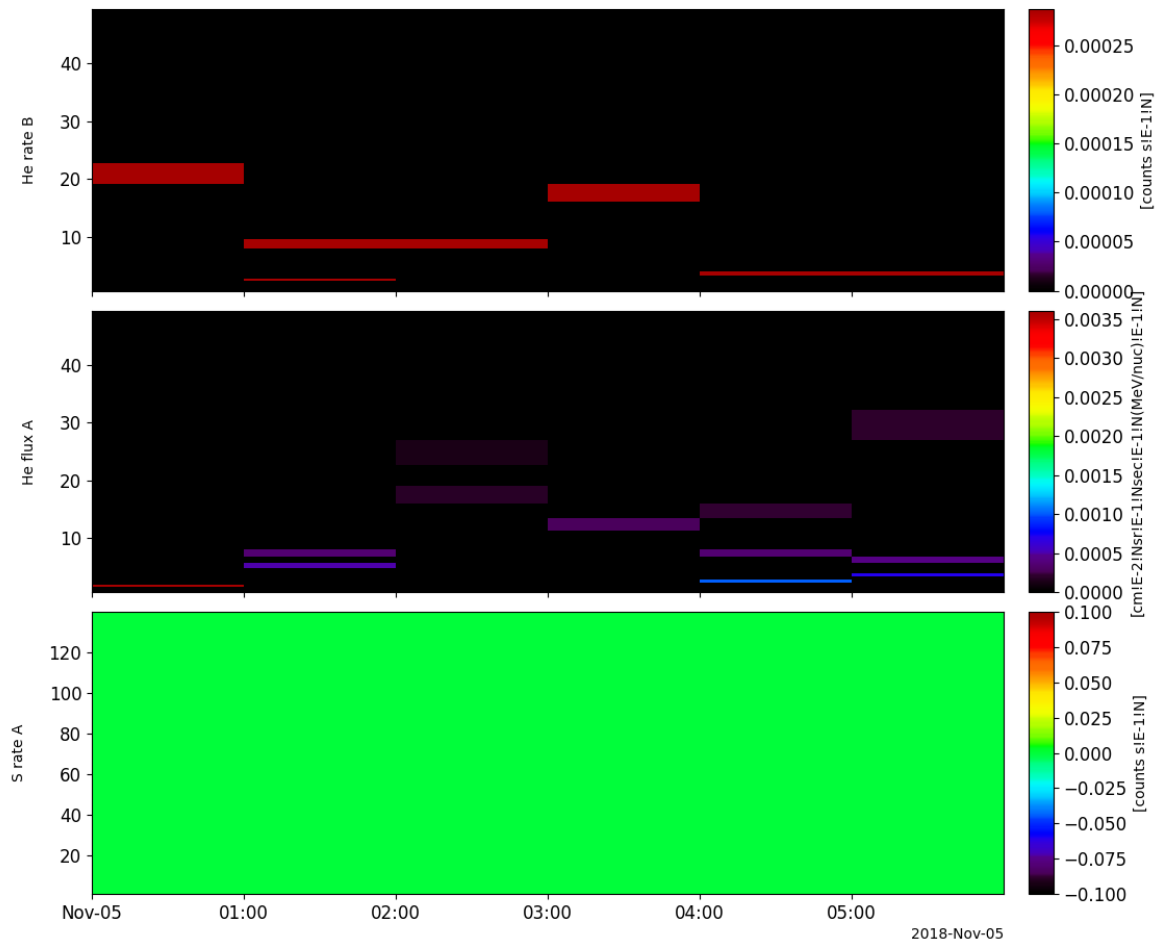
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas  
from pytpplot import tplot  
epihi_vars = pyspedas.psp.epihi(trange=['2018-11-5', '2018-11-5/06:00'], datatype='let1_  
↪rates1h', level='l2', time_clip=True)  
tplot(['B_He_Rate', 'A_He_Flux', 'A_S_Rate'])
```



2.18.6 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 ISOIS/EPI (merged summary) data

Parameters

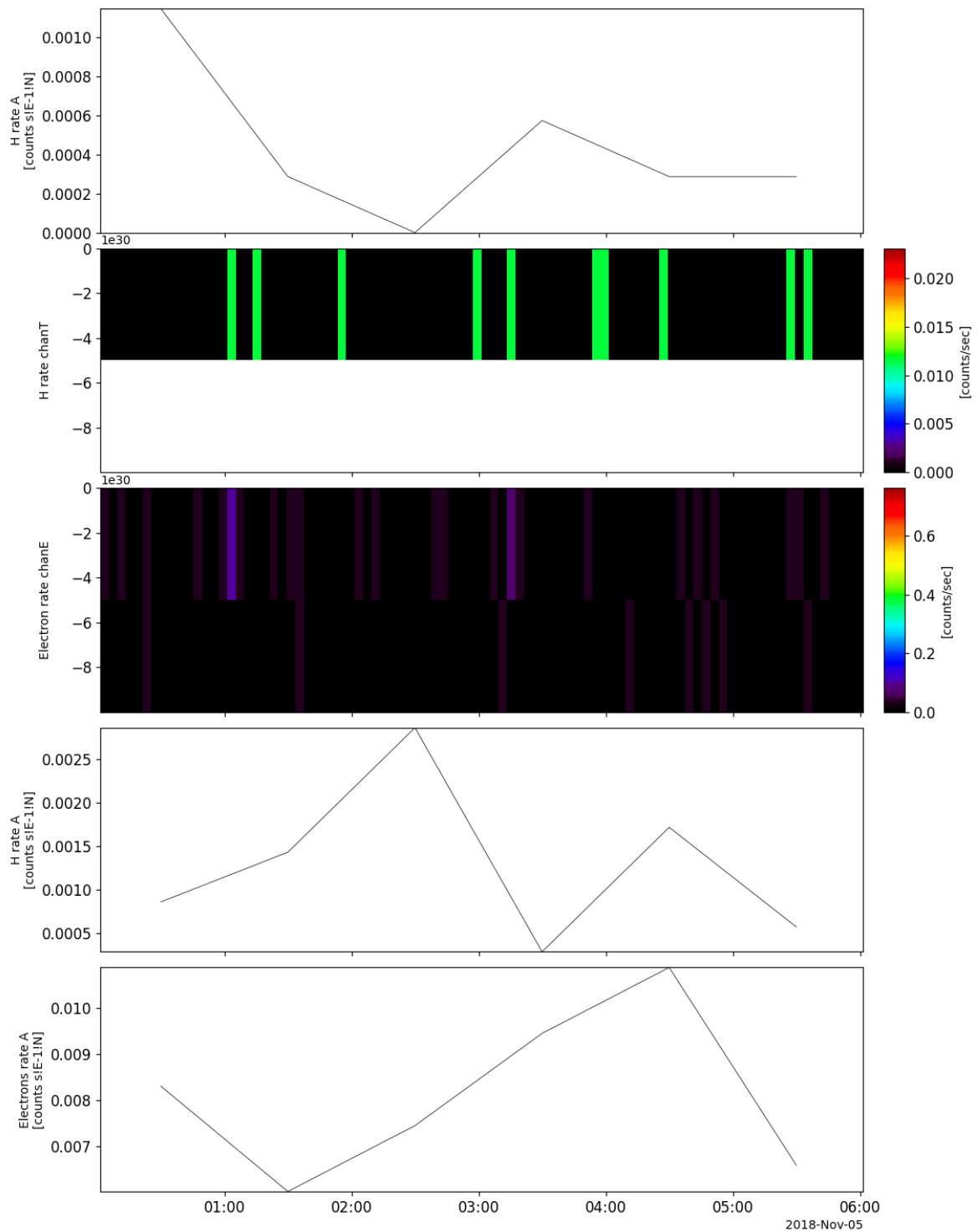
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **suffix** (*str*) – The plot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
epi_vars = pyspedas.psp.epi(trange=['2018-11-5', '2018-11-5/06:00'], datatype='summary',
    ↪ level='l2', time_clip=True)
tplot(['A_H_Rate_TS', 'H_CountRate_ChanT_SP', 'Electron_CountRate_ChanE', 'HET_A_H_Rate_
    ↪ TS', 'HET_A_Electrons_Rate_TS'])
```



2.19 Solar Orbiter (SOLO)

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

2.19.1 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)

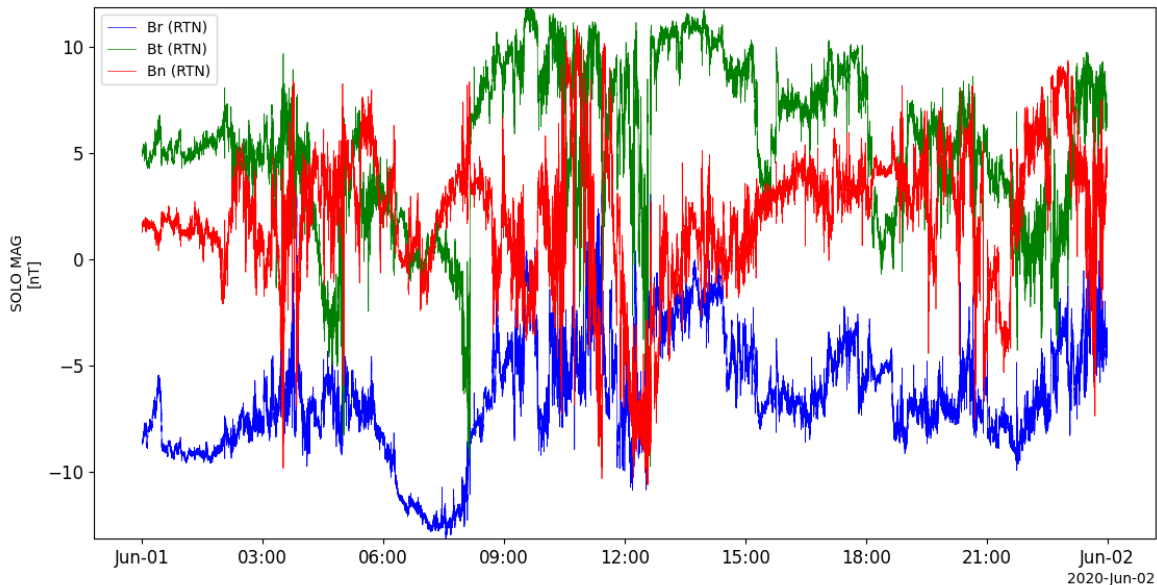
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pyplot import tplot
mag_vars = pyspedas.solo.mag(trange=['2020-06-01', '2020-06-02'], datatype='rtn-normal')
tplot('B_RTIN')
```



2.19.2 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

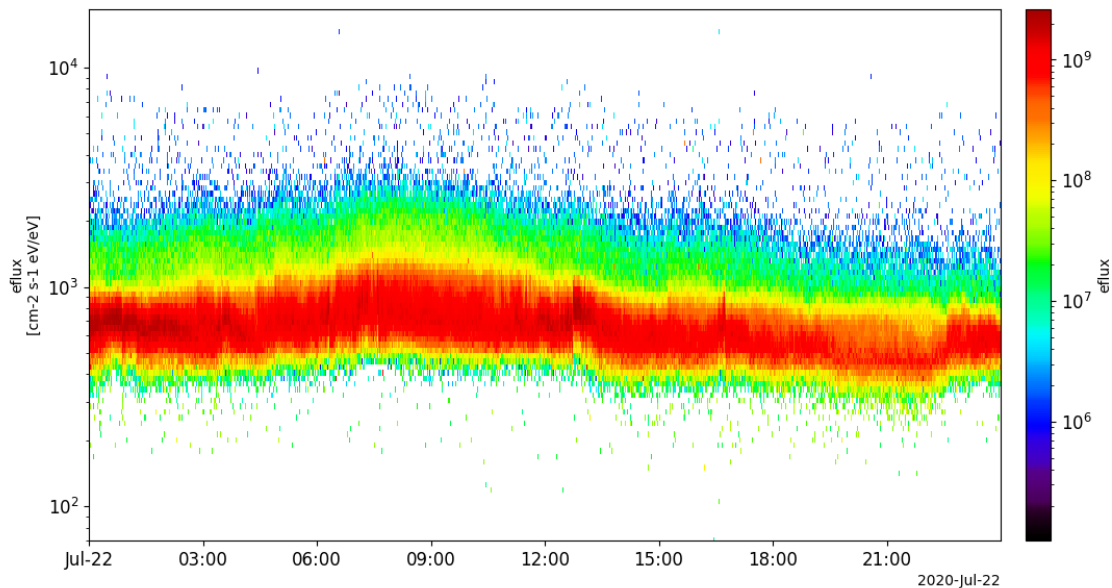
- **trange** (list of str) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (str) – Data type; Valid options:
- **level** (str) – Data level (default: l2)
- **suffix** (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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
swa_vars = pyspedas.solo.swa(trange=['2020-07-22', '2020-07-23'], datatype='pas-eflux')
tplot('eflux')
```



2.19.3 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

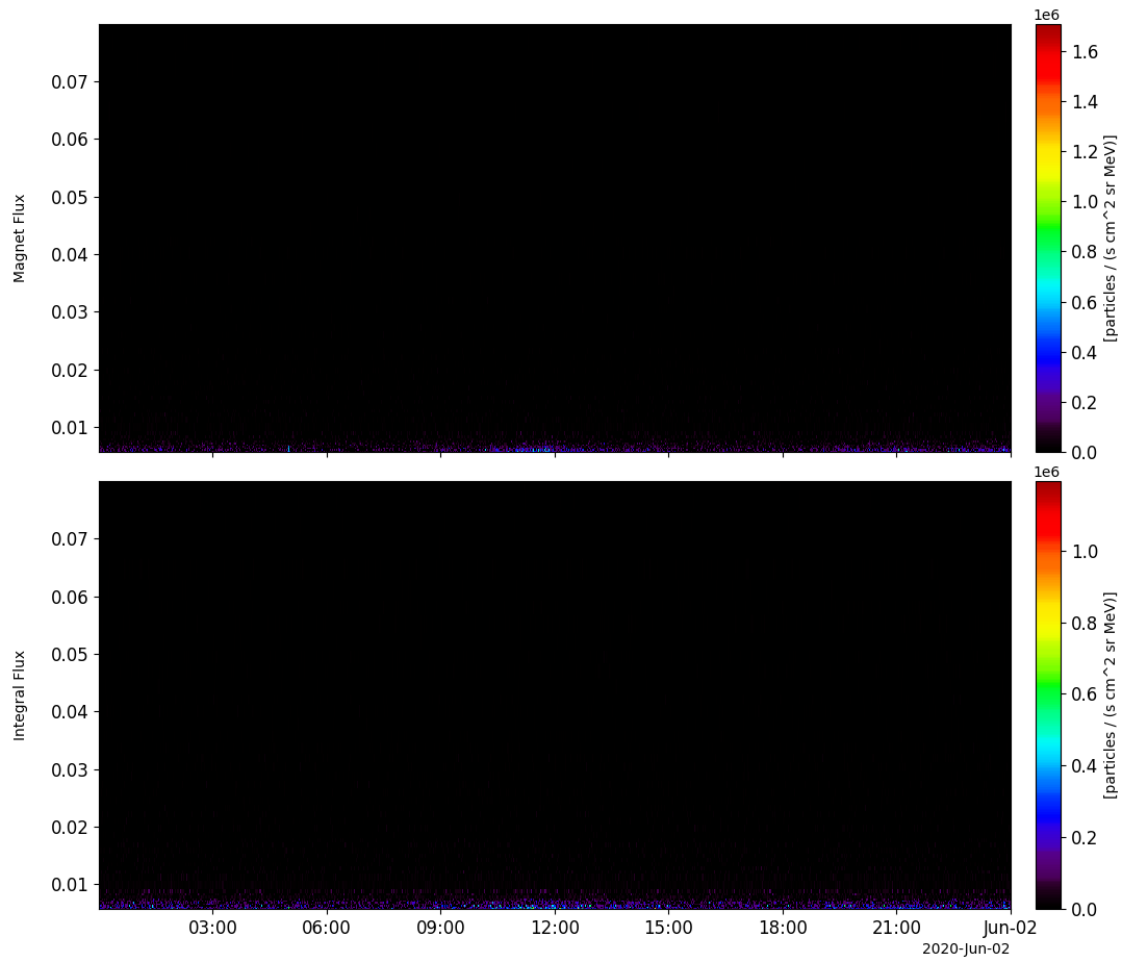
- **trange** (*list of str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **mode** (*str*) – EPD mode; Valid options:

- **level** (`str`) – Data level (default: 12)
- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
epd_vars = pyspedas.solo.epd(trange=['2020-06-01', '2020-06-02'], datatype='step', mode=
    ↪ 'rates')
tplot(['Magnet_Flux', 'Integral_Flux'])
```



2.19.4 Radio and Plasma Waves (RPW)

```
pyspedas.solo.rpw(trange=['2020-06-15', '2020-06-16'], datatype='hfr-surf', 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-surf', 'lfr-surf-asm', 'lfr-surf-bp1', 'lfr-surf-bp2', 'lfr-surf-cwf', 'lfr-surf-swf',
 'tds-surf-hist1d', 'tds-surf-hist2d', 'tds-surf-mamp', 'tds-surf-rswf', 'tds-surf-stat',
 'tds-surf-tswf', 'tnr-surf' (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

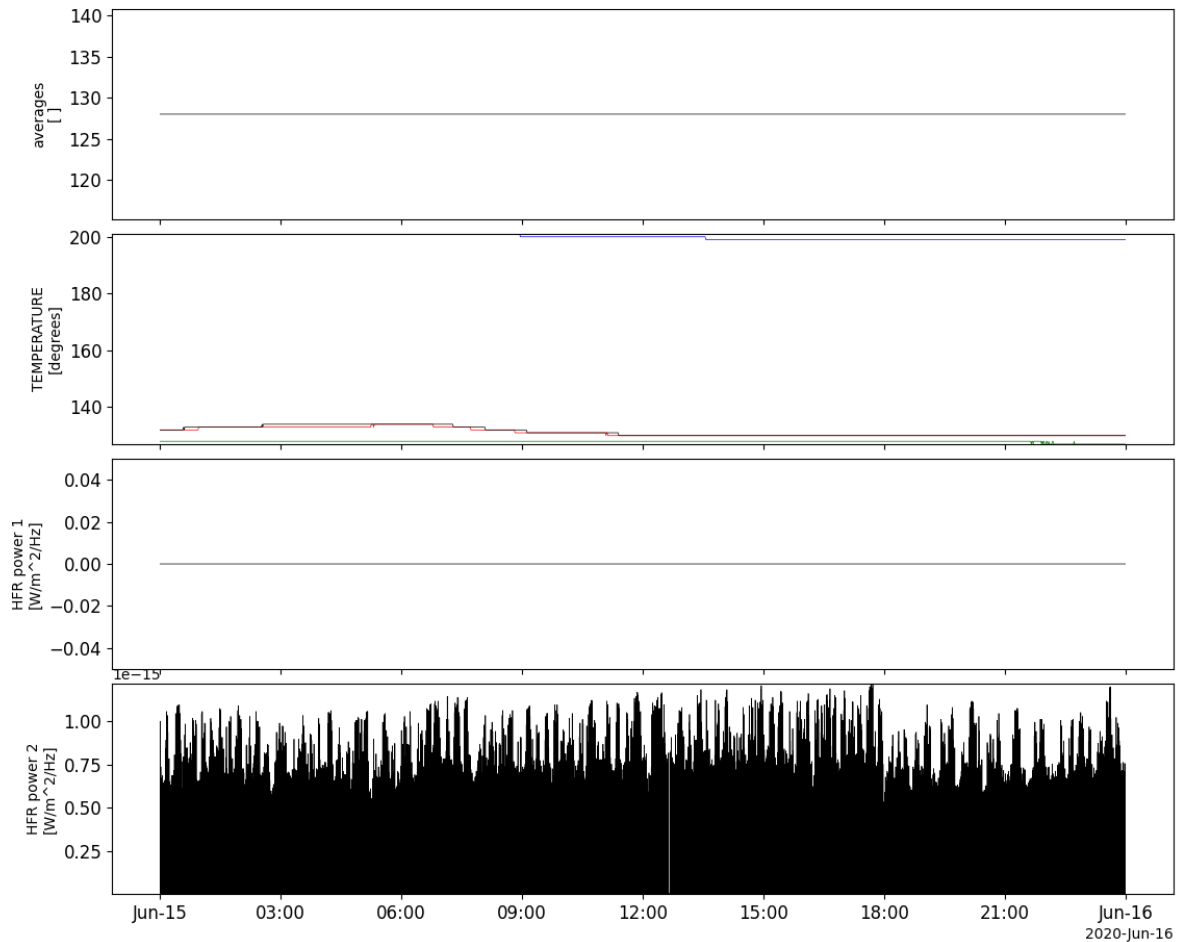
Level 3: 'bia-density': Plasma density derived from probe-to-spacecraft potential and electron plasma frequency 'bia-density-10-seconds': same as above, but median value over 10 s interval 'bia-efield-10-seconds': Electric field vector in SRF. Median value over 10 s interval 'bia-scpot-10-seconds': Spacecraft 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: 12)
- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pyplot import tplot
rpw_vars = pyspedas.solo.rpw(trange=['2020-06-15', '2020-06-16'], datatype='hfr-srv')
tplot(['AVERAGE_NR', 'TEMPERATURE', 'FLUX_DENSITY1', 'FLUX_DENSITY2'])
```



2.20 Solar Terrestrial Relations Observatory (STEREO)

The routines in this module can be used to load data from the Solar Terrestrial Relations Observatory (STEREO) mission.

2.20.1 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

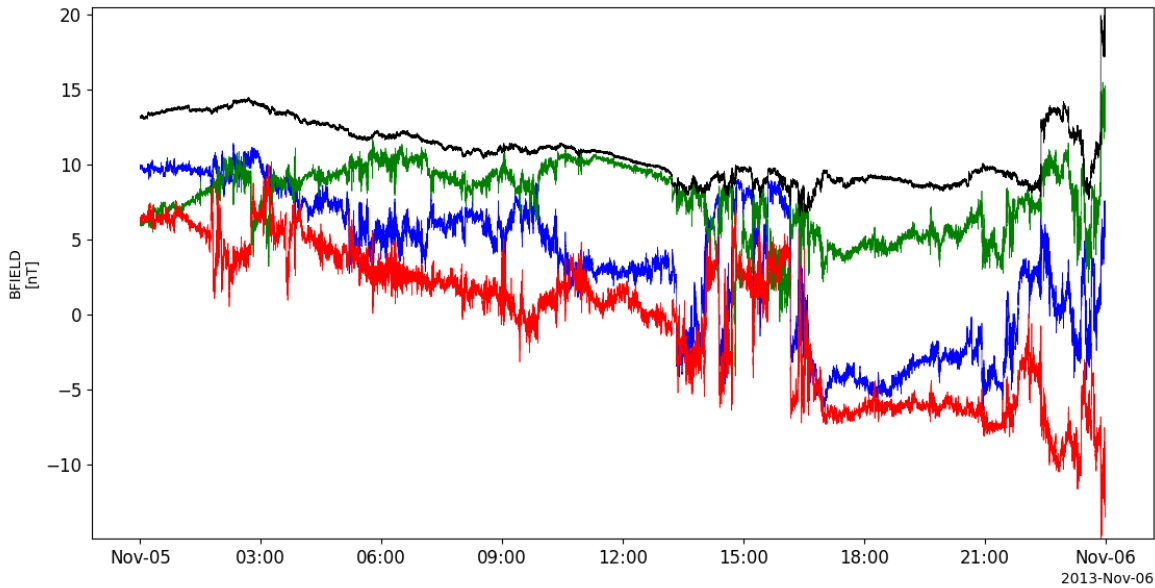
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpot import tplot
mag_vars = pyspedas.stereo.mag(trange=['2013-11-5', '2013-11-6'])
tplot('BFIELD')
```



2.20.2 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

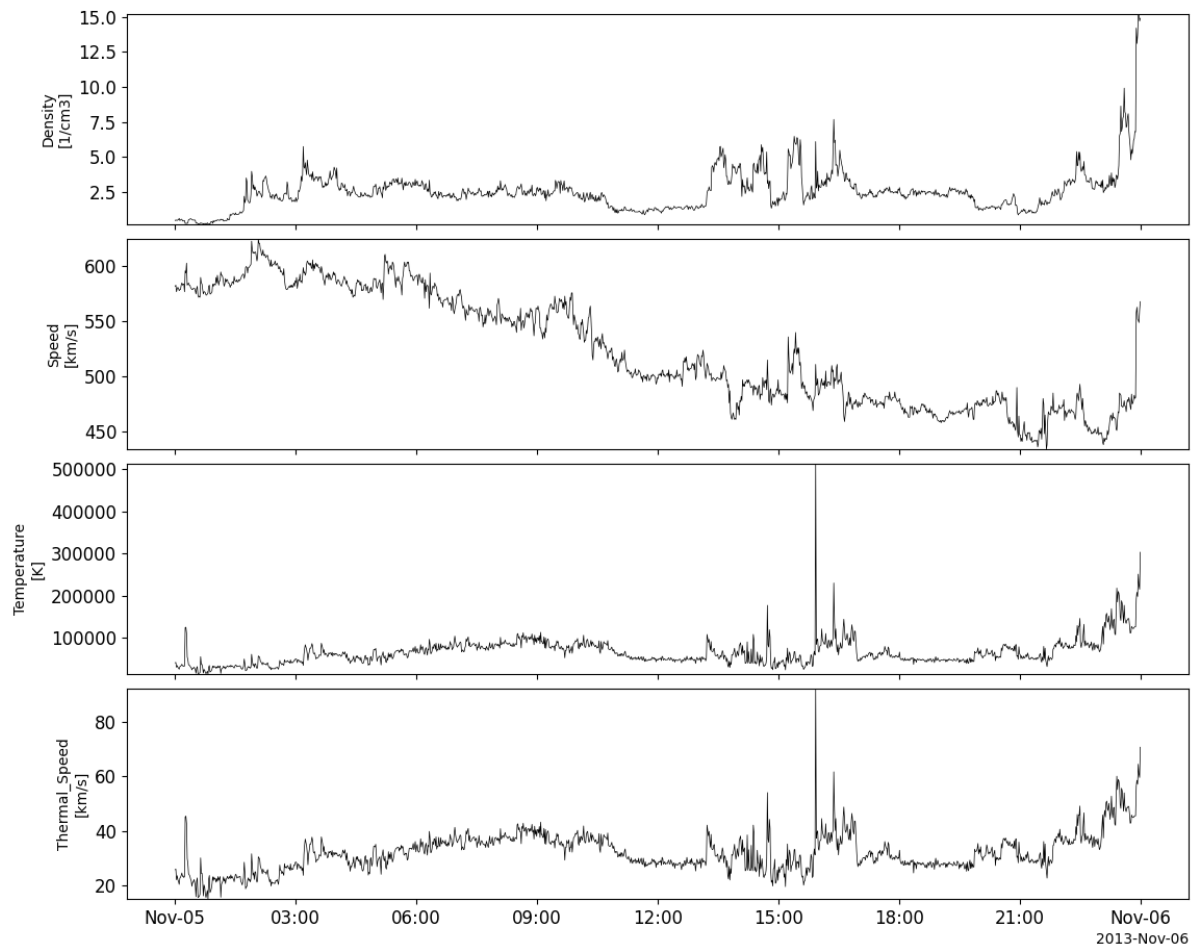
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
plastic_vars = pyspedas.stereo.plastic(trange=['2013-11-5', '2013-11-6'])
tplot(['proton_number_density', 'proton_bulk_speed', 'proton_temperature', 'proton_
    thermal_speed'])
```



2.21 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.

2.21.1 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

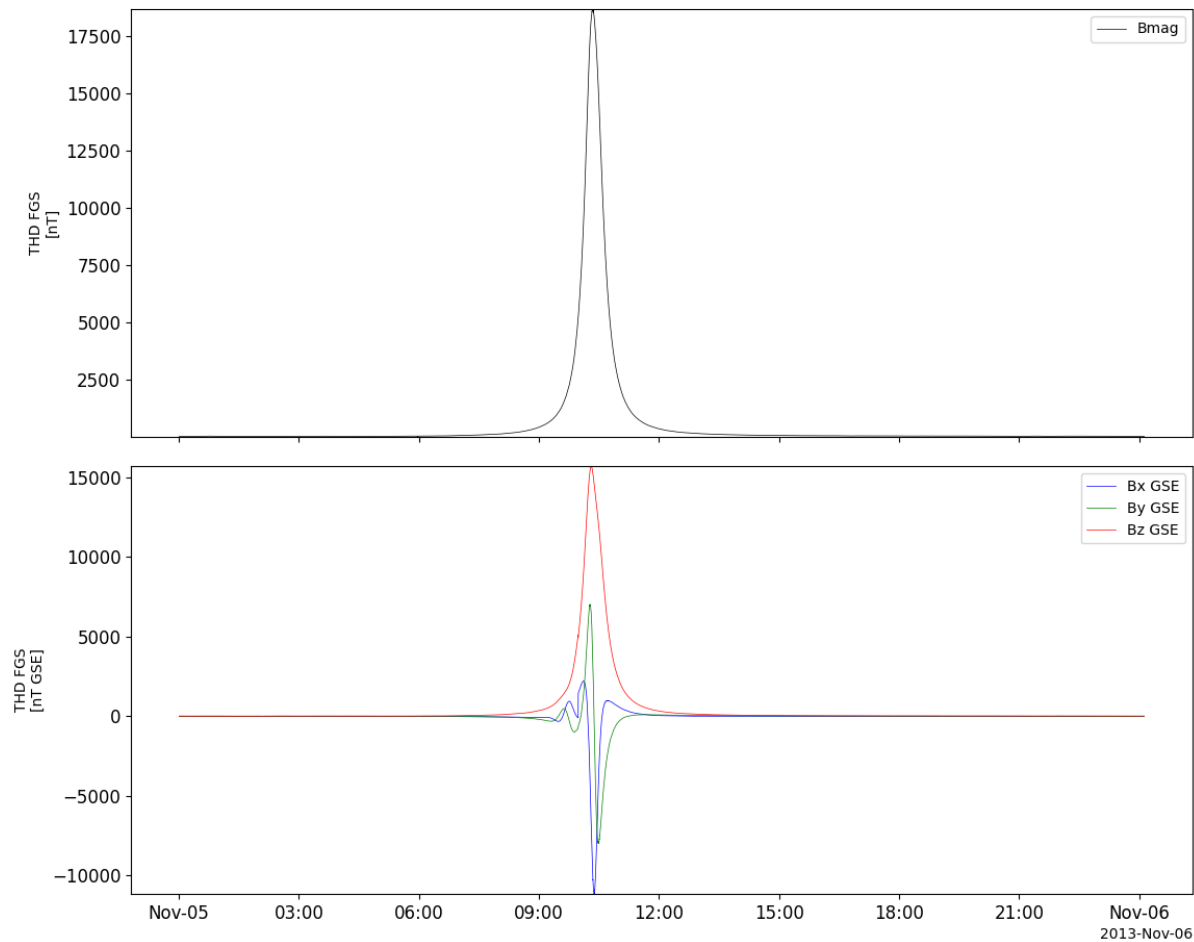
Parameters

- **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.

Example

```
import pyspedas
from pytpplot import tplot
fgm_vars = pyspedas.themis.fgm(probe='d', trange=['2013-11-5', '2013-11-6'])
tplot(['thd_fgs_btotal', 'thd_fgs_gse'])
```



2.21.2 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

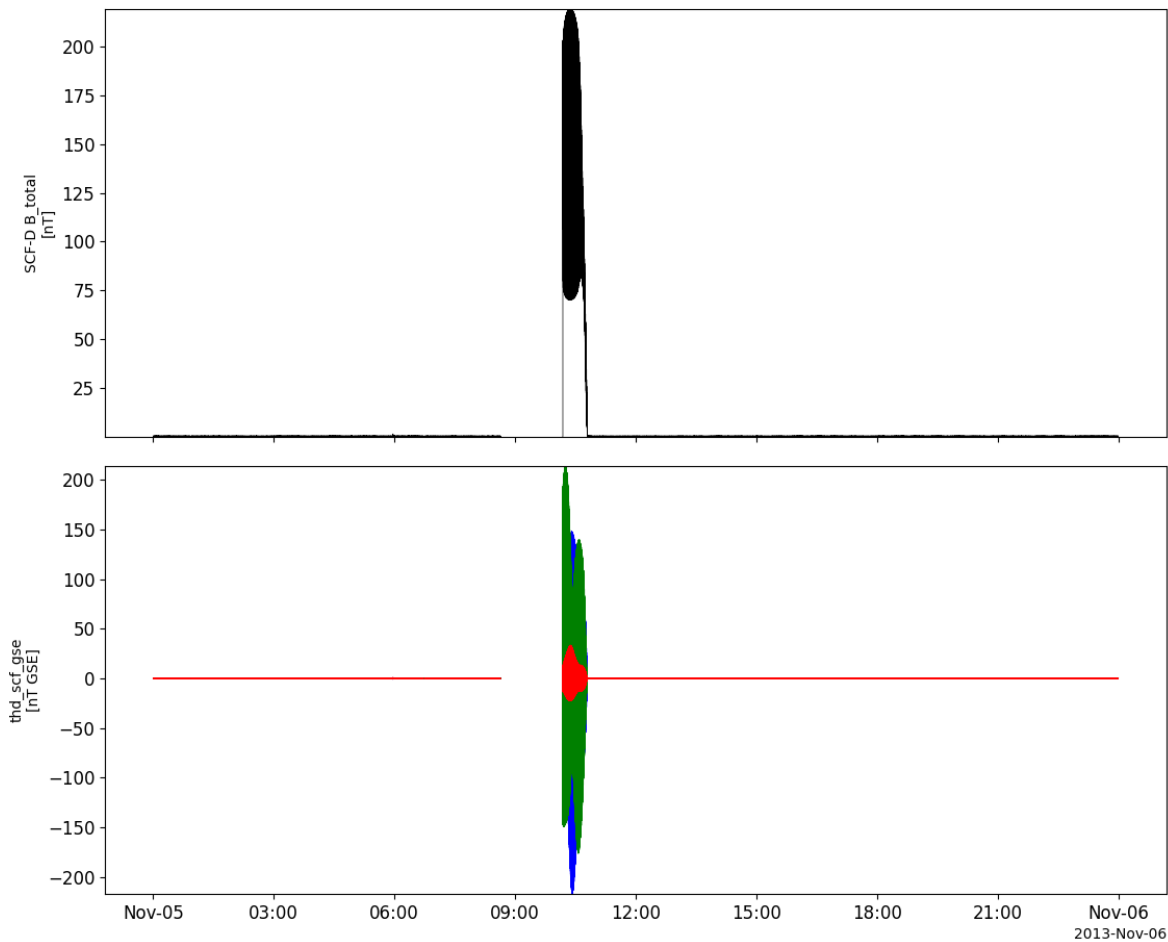
- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** – str or list of str Spacecraft probe letter(s) (‘a’, ‘b’, ‘c’, ‘d’ and/or ‘e’)
- **level** – 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.

Example

```
import pyspedas
from pytpplot import tplot
scm_vars = pyspedas.themis.scm(probe='d', trange=['2013-11-5', '2013-11-6'])
tplot(['thd_scf_btotal', 'thd_scf_gse'])
```



2.21.3 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

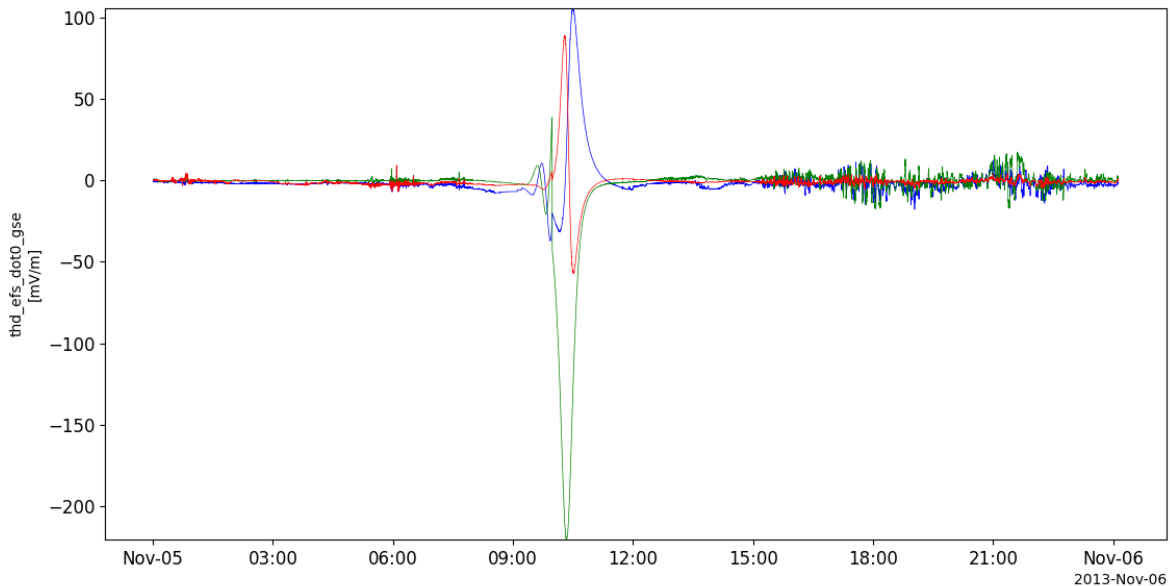
- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** – str or list of str Spacecraft probe letter(s) (‘a’, ‘b’, ‘c’, ‘d’ and/or ‘e’)
- **level** – 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.

Example

```
import pyspedas
from pytpplot import tplot
efi_vars = pyspedas.themis.efi(probe='d', trange=['2013-11-5', '2013-11-6'])
tplot('thd_efs_dot0_gse')
```



2.21.4 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

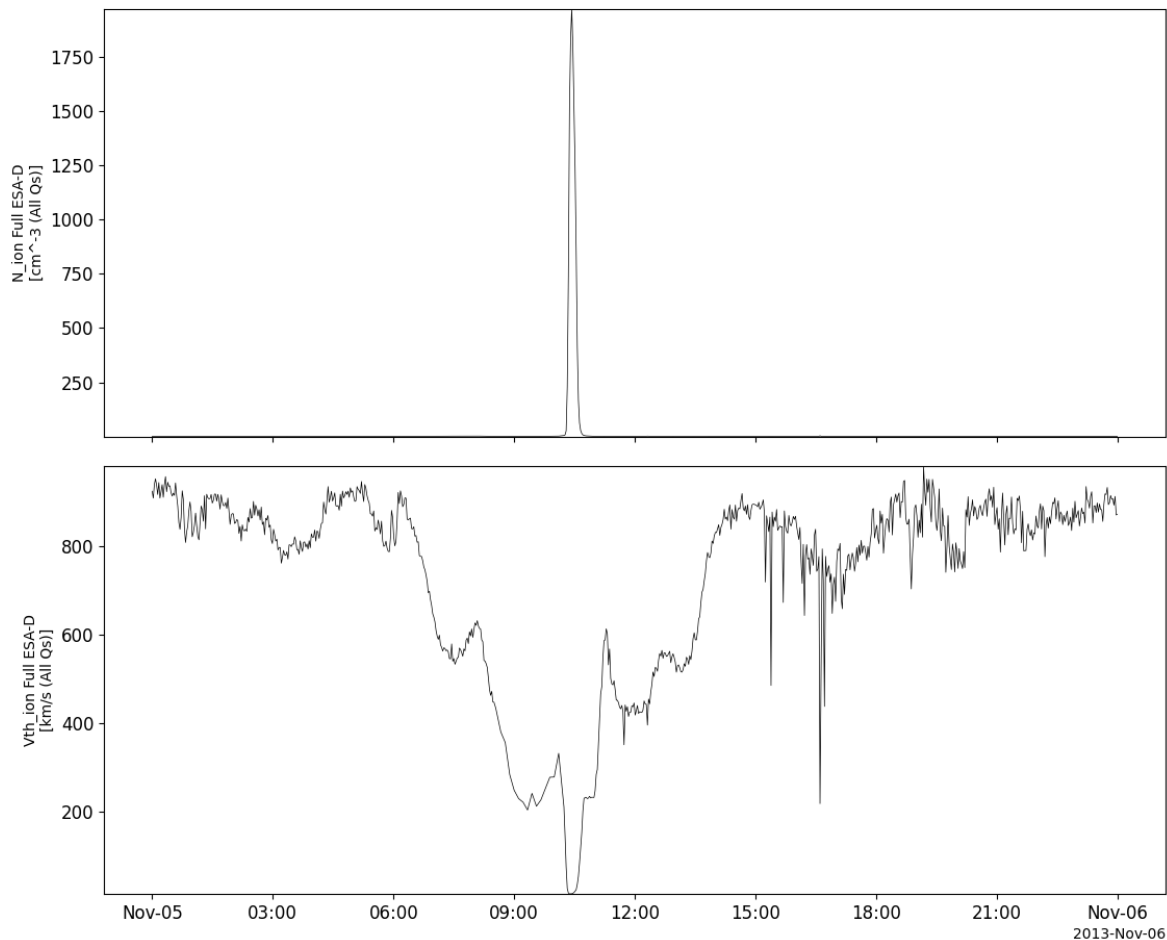
Parameters

- **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: ‘11’, ‘12’
- **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.

Example

```
import pyspedas
from pytplot import tplot
esa_vars = pyspedas.themis.esa(probe='d', trange=['2013-11-5', '2013-11-6'])
tplot(['thd_peif_density', 'thd_peif_vthermal'])
```



2.21.5 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

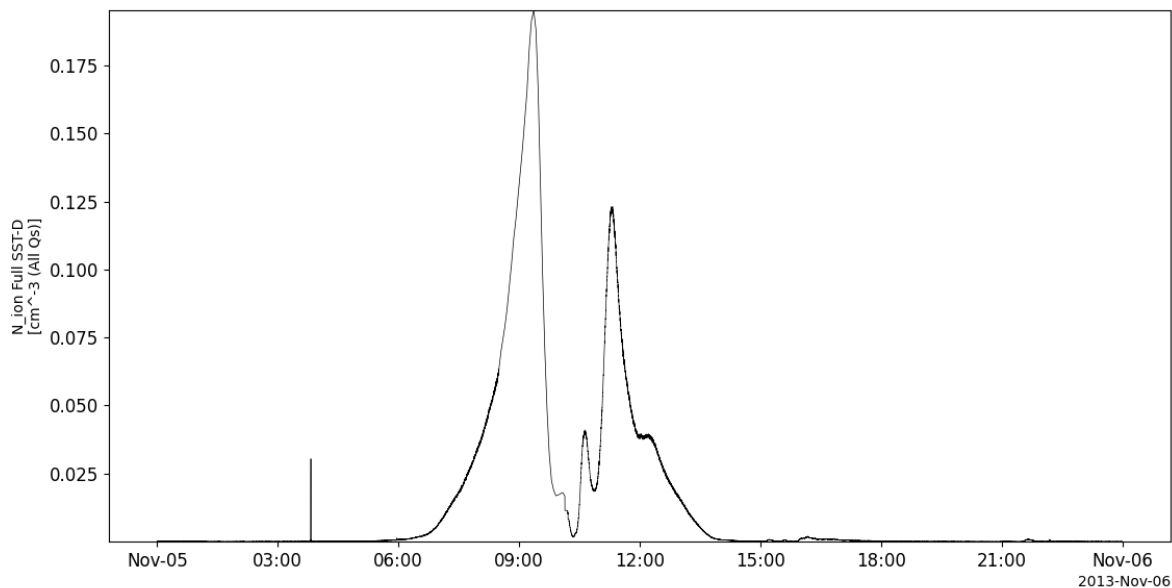
- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** – str or list of str Spacecraft probe letter(s) (‘a’, ‘b’, ‘c’, ‘d’ and/or ‘e’)
- **level** – 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.

Example

```
import pyspedas
from pytplot import tplot
sst_vars = pyspedas.themis.sst(probe='d', trange=['2013-11-5', '2013-11-6'])
tplot('thd_psif_density')
```



2.21.6 Moments data

```
pyspedas.themis.mom(trange=['2008-03-23', '2008-03-24'], 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 THEMIS moments data

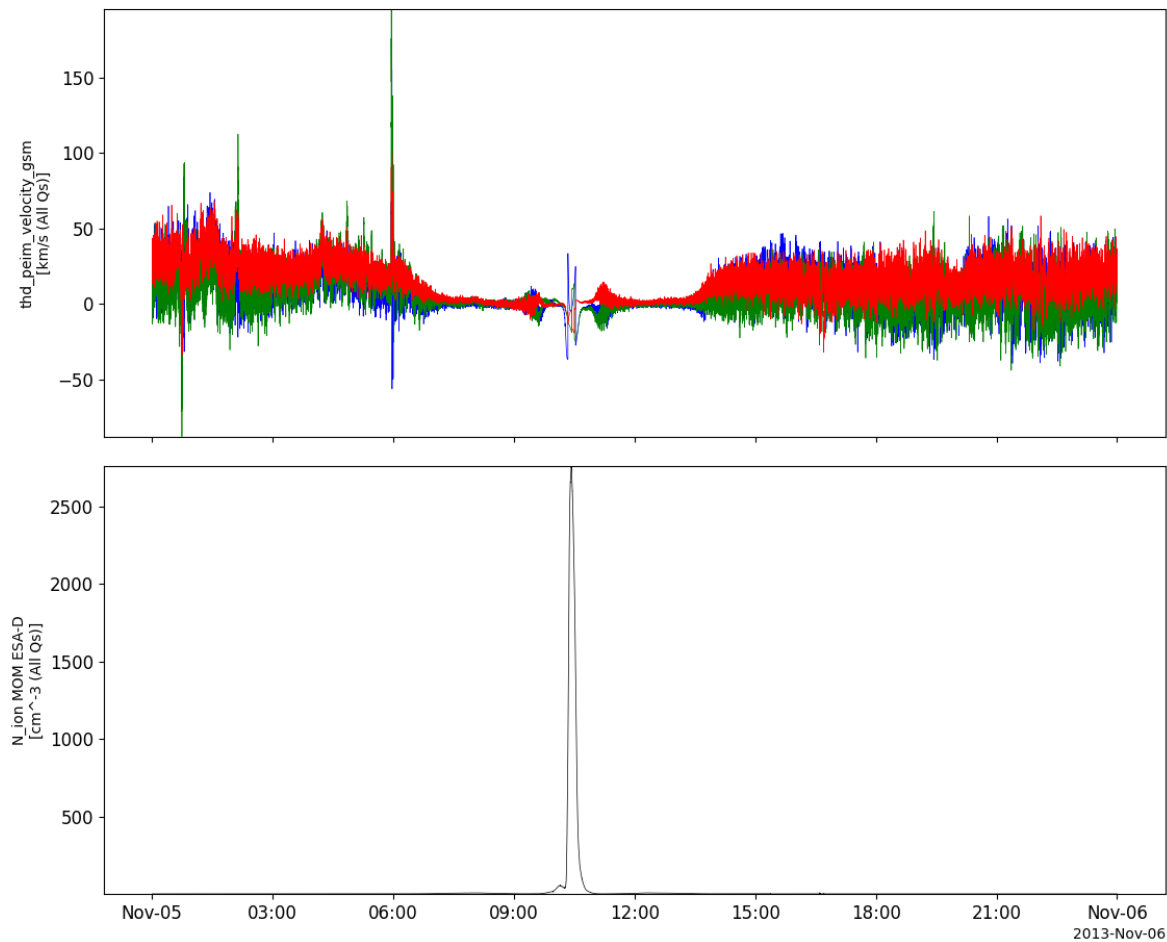
Parameters

- **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: ‘11’, ‘12’
- **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.

Example

```
import pyspedas
from pytpplot import tplot
mom_vars = pyspedas.themis.mom(probe='d', trange=['2013-11-5', '2013-11-6'])
tplot(['thd_peim_velocity_gsm', 'thd_peim_density'])
```



2.21.7 Ground computed moments data

```
pyspedas.themis.gmom(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 THEMIS Level 2 ground calculated combined ESA+SST moments.

Parameters

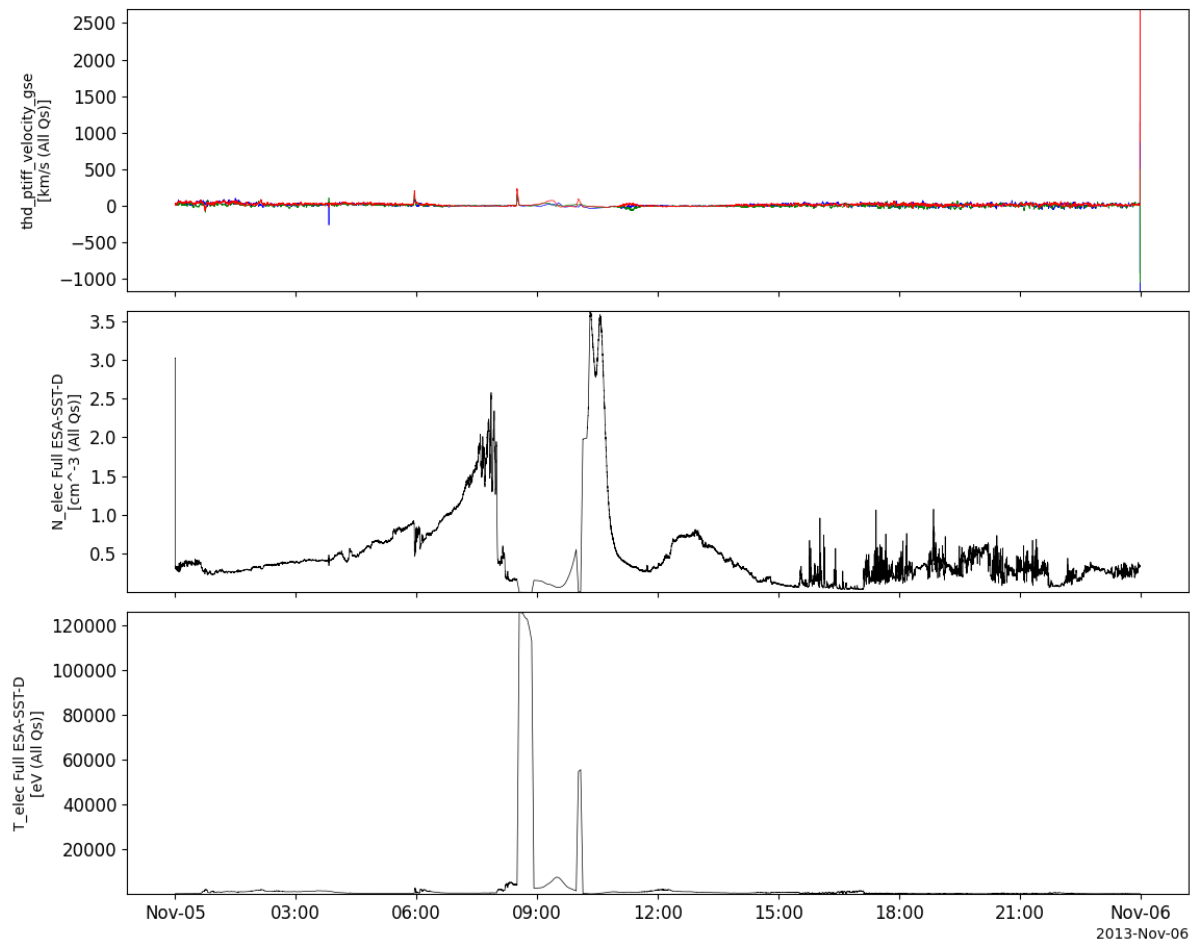
- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** – str or list of str Spacecraft probe letter(s) (‘a’, ‘b’, ‘c’, ‘d’ and/or ‘e’)
- **level** – str Data type; Valid options: ‘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.

Example

```
import pyspedas
from pytpplot import tplot
gmom_vars = pyspedas.themis.gmom(probe='d', trange=['2013-11-5', '2013-11-6'])
tplot(['thd_ptiff_velocity_gse', 'thd_pteff_density', 'thd_pteff_avgtemp'])
```



2.21.8 State data

```
pyspedas.themis.state(trange=['2007-03-23', '2007-03-24'], probe='c', level='11', 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

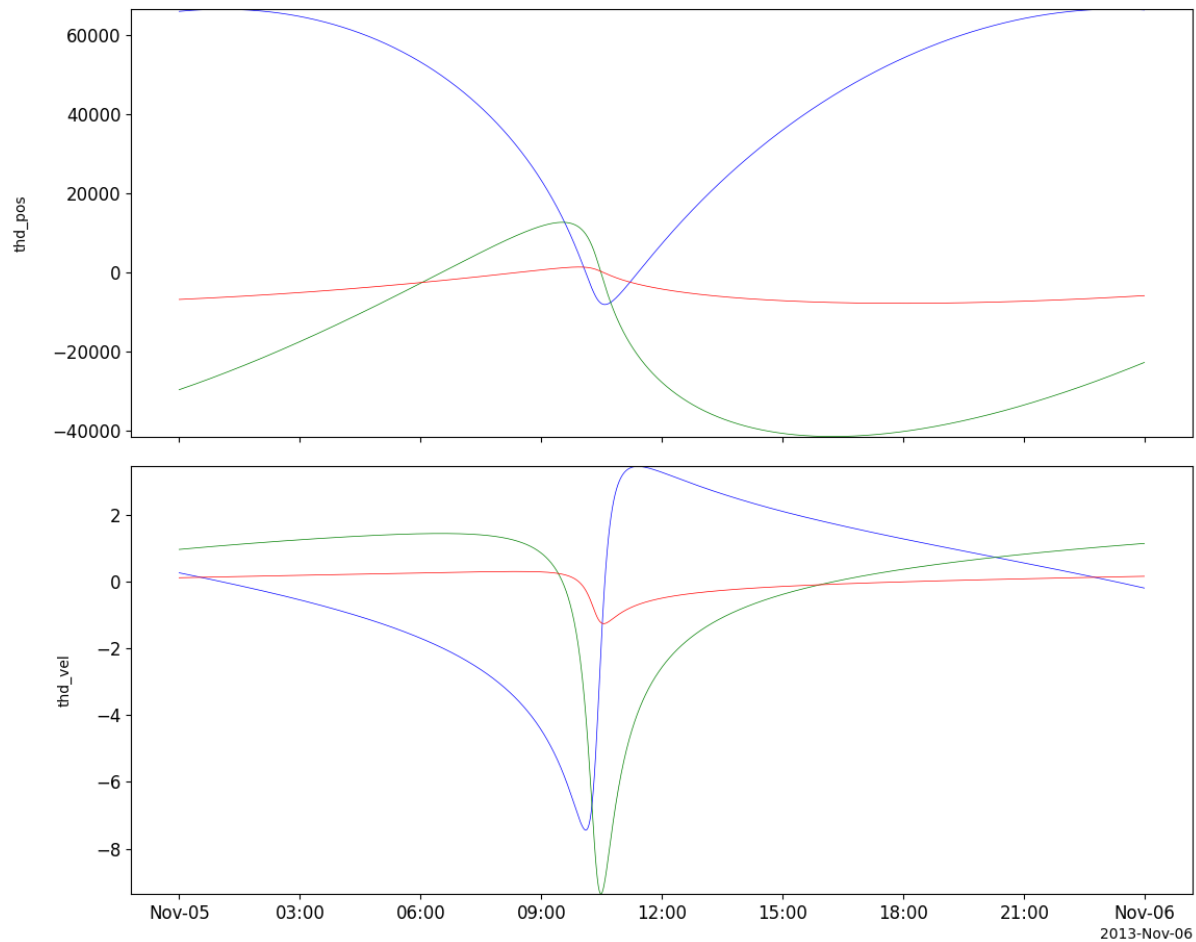
- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** – str or list of str Spacecraft probe letter(s) (‘a’, ‘b’, ‘c’, ‘d’ and/or ‘e’)
- **level** – str Data type; Valid options: ‘11’
- **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.

Example

```
import pyspedas
from pytpplot import tplot
state_vars = pyspedas.themis.state(probe='d', trange=['2013-11-5', '2013-11-6'])
tplot(['thd_pos', 'thd_vel'])
```



2.21.9 Ground magnetometer data

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

This function loads ground magnetometer data

Parameters

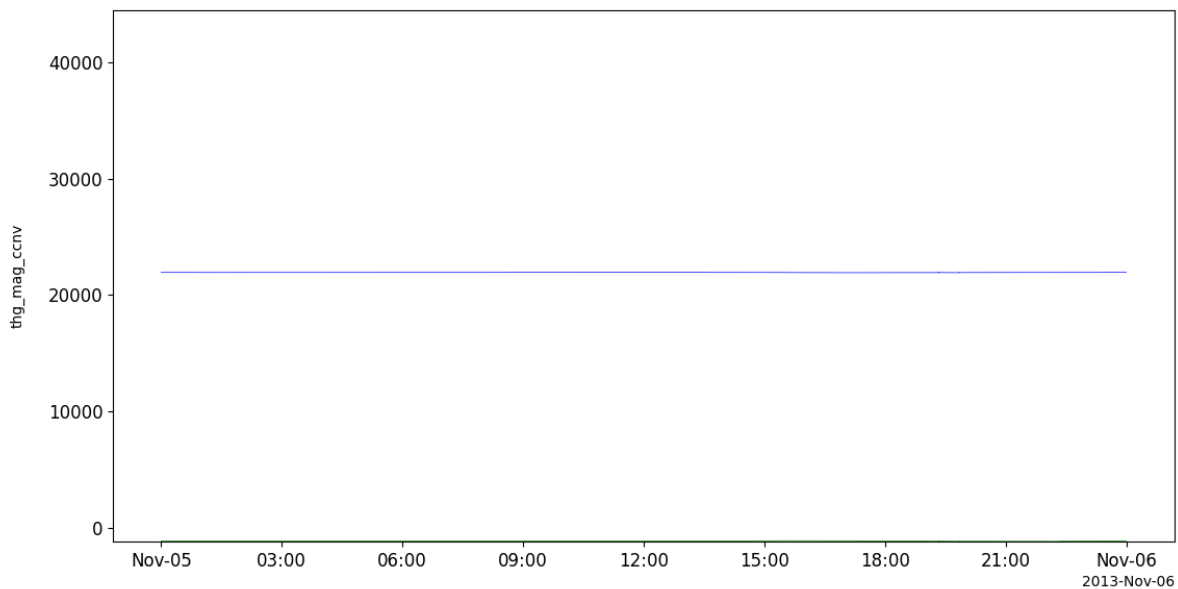
- **trange** – list of str time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **level** – str Data type; Valid options: ‘l1’, ‘l2’
- **suffix** – str The tplot variable names will 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
- **sites** – str/list of str GMAG station names to load (e.g. ‘bmls’).
- **group** – str GMAG group of stations (eg. ‘epo’). If specified, stations is ignored.

Returns List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
gmag_vars = pyspedas.themis.gmag(sites='ccnv', trange=['2013-11-5', '2013-11-6'])
tplot('thg_mag_ccnv')
```



2.22 Two Wide-Angle Imaging Neutral-Atom Spectrometers (TWINS) Mission

The routines in this module can be used to load data from the Two Wide-Angle Imaging Neutral-Atom Spectrometers (TWINS) Mission mission.

2.22.1 Energetic Neutral Atom (ENA) 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

Return type List of tplot variables created.

2.22.2 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

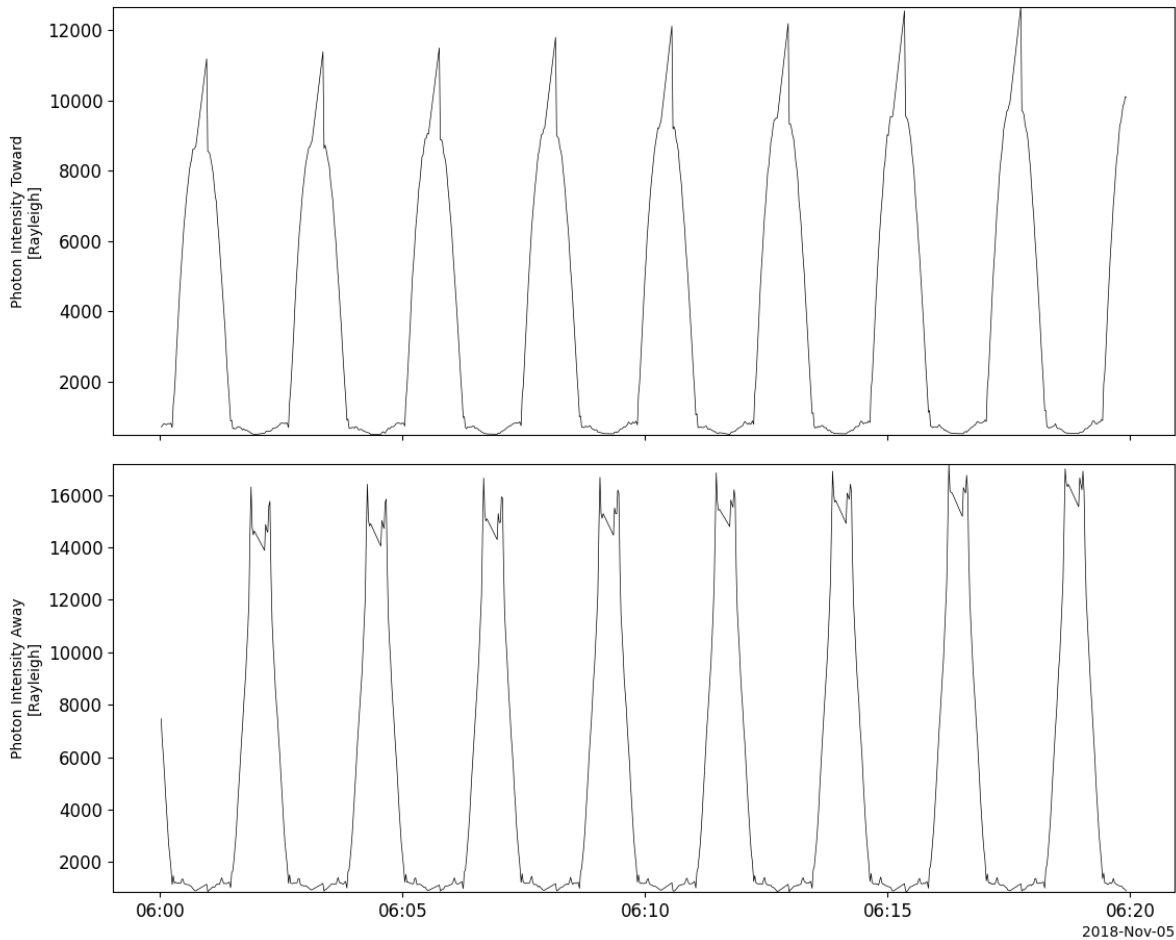
- **trange** (list of str) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
lad_vars = pyspedas.twins.lad(trange=['2018-11-5/6:00', '2018-11-5/6:20'], time_
↪ clip=True)
tplot(['lad1_data', 'lad2_data'])
```



2.22.3 Ephemeris

```
pyspedas.twins.ephemeris(trange=['2018-11-5', '2018-11-6'], probe='1', 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

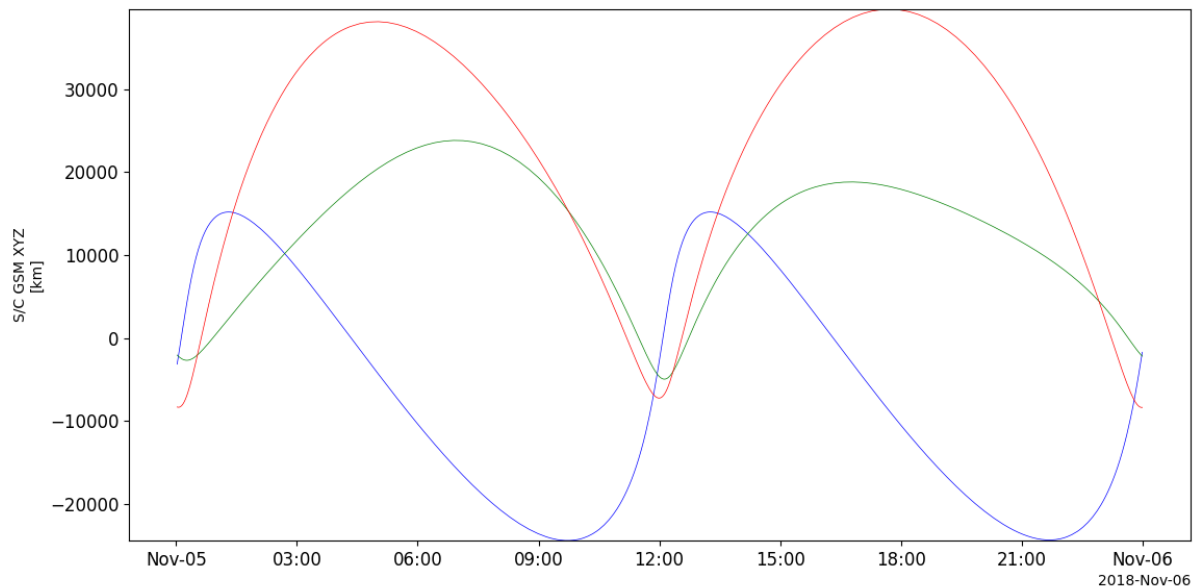
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **suffix** (*str*) – The plot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpot import tplot
ephem_vars = pyspedas.twins.ephemeris(trange=['2018-11-5', '2018-11-6'])
tplot('FSCGSM')
```



2.23 Ulysses

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

2.23.1 Magnetic field (VHM)

```
pyspedas.ulysses.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

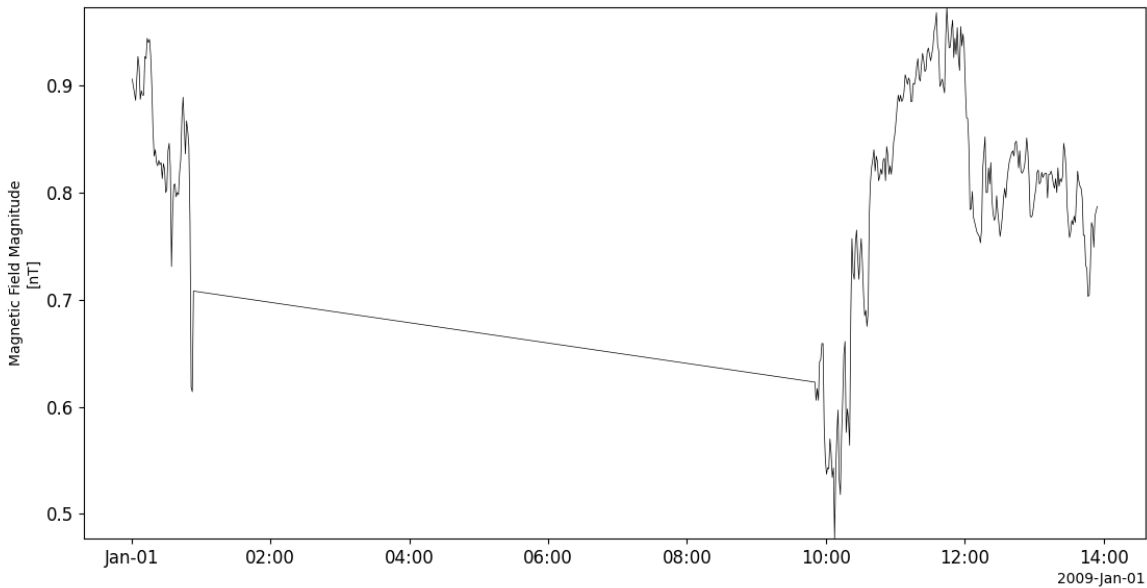
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpot import tplot
vhm_vars = pyspedas.ulysses.vhm()
tplot('B_MAG')
```



2.23.2 Solar wind plasma (SWOOPS)

```
pyspedas.ulysses.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

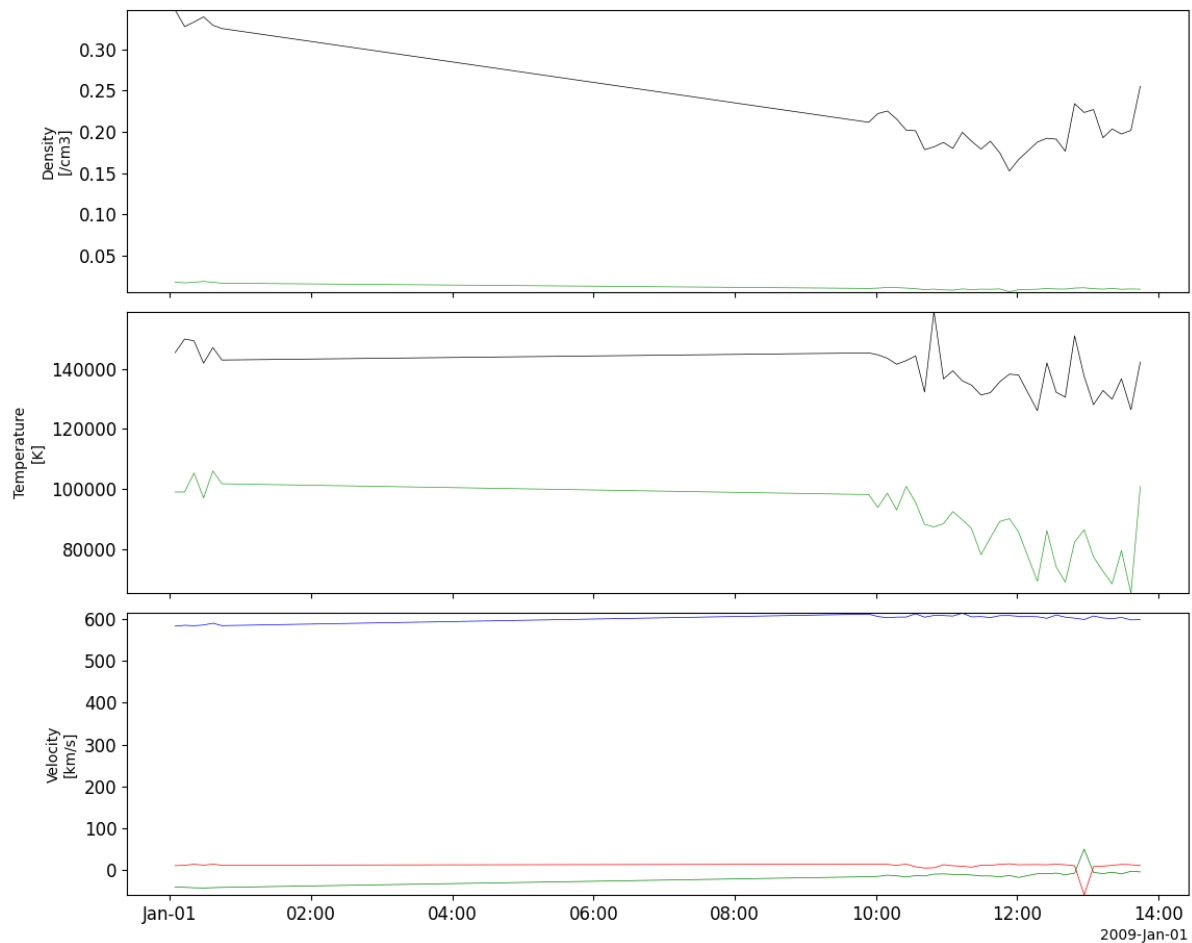
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format 'YYYY-MM-DD','YYYY-MM-DD'] or to specify more or less than a day ['YYYY-MM-DD/hh:mm:ss','YYYY-MM-DD/hh:mm:ss']
- **datatype** (*str*) – Data type; Valid options:
- **level** (*str*) – Data level; Valid options: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

Return type List of *tplot* variables created.

Example

```
import pyspedas
from pytpplot import tplot
swoops_vars = pyspedas.ulysses.swoops()
tplot(['Density', 'Temperature', 'Velocity'])
```



2.23.3 Solar wind ion composition (SWICS)

```
pyspedas.ulysses.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

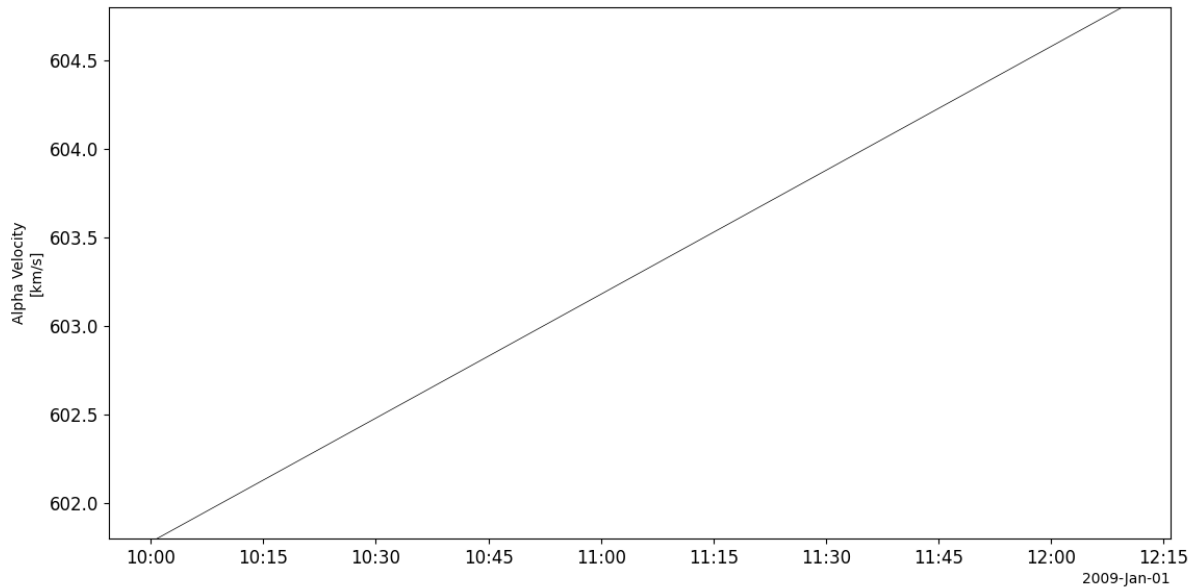
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
swics_vars = pyspedas.ulysses.swics()
tplot('Velocity')
```

2.23.4 Energetic particles (EPAC)

```
pyspedas.ulysses.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

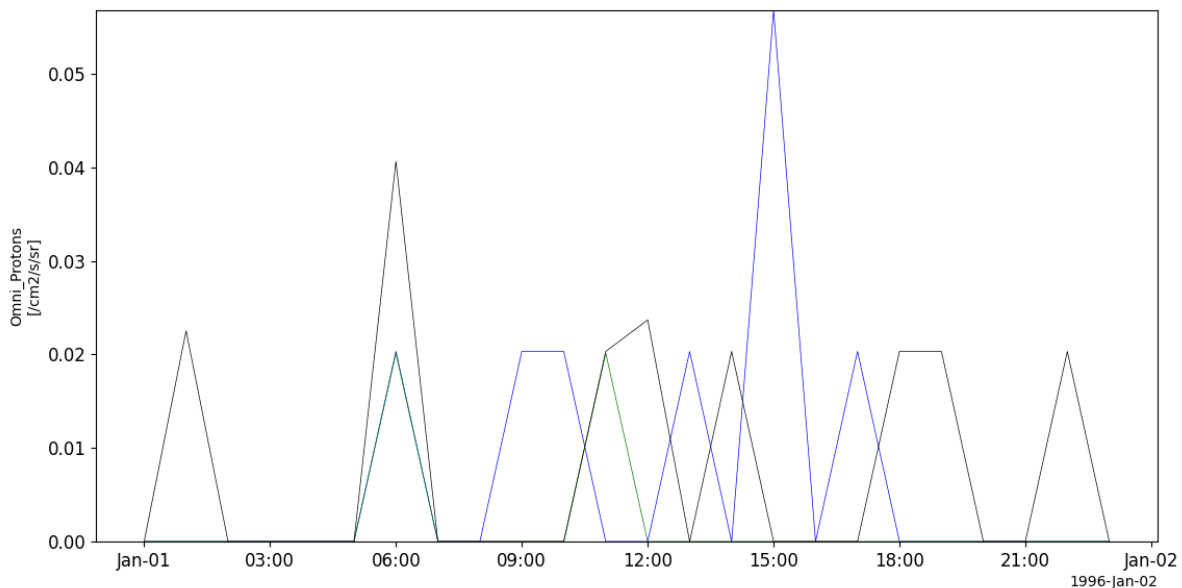
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **level** (*str*) – Data level; Valid options: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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
epac_vars = pyspedas.ulysses.epac()
tplot('Omni_Protons')
```



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

```
pyspedas.ulysses.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

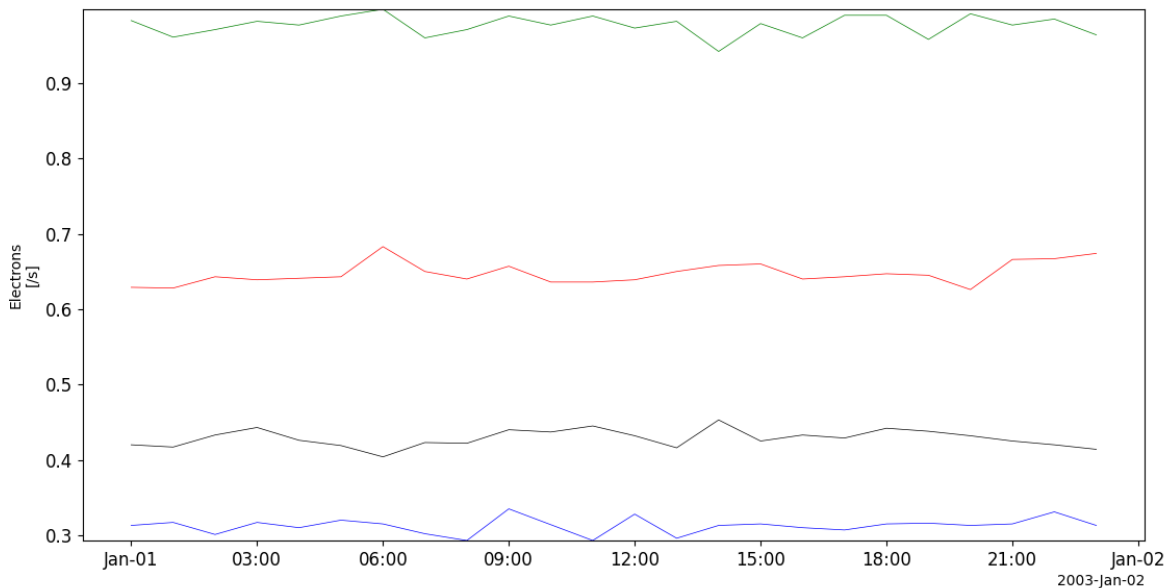
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format 'YYYY-MM-DD', 'YYYY-MM-DD'] or to specify more or less than a day ['YYYY-MM-DD/hh:mm:ss', 'YYYY-MM-DD/hh:mm:ss']
- **datatype** (*str*) – Data type; Valid options:
- **level** (*str*) – Data level; Valid options: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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
hiscall_vars = pyspedas.ulysses.hiscall()
tplot('Electrons')
```



2.23.6 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

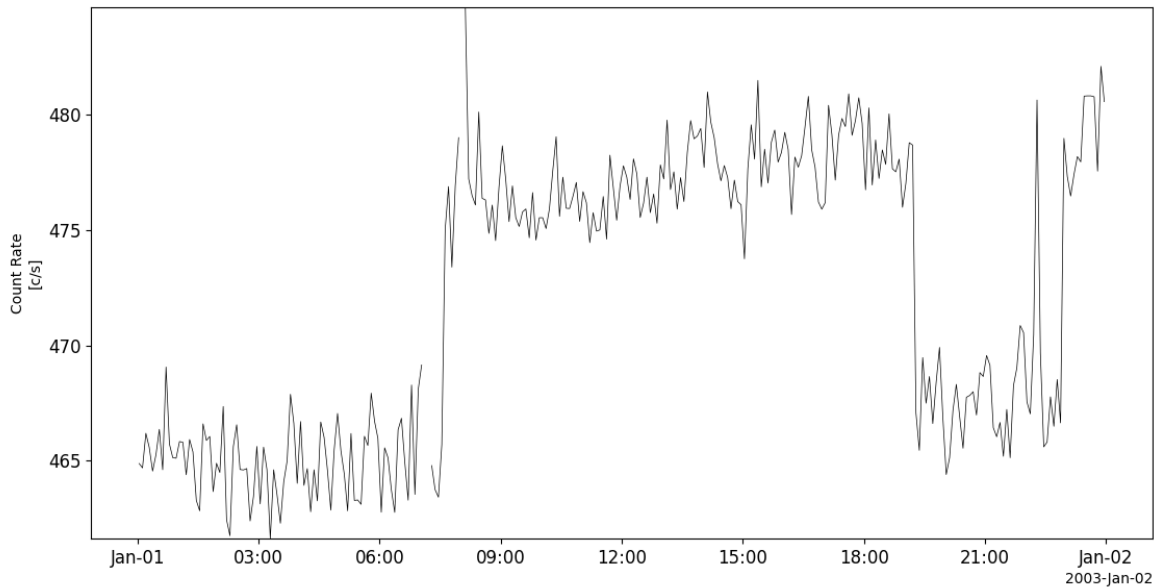
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas  
from pytpplot import tplot  
grb_vars = pyspedas.ulysses.grb()  
tplot('Count_Rate')
```



2.24 Van Allen Probes (RBSP)

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

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

```
pyspedas.rbbsp.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'

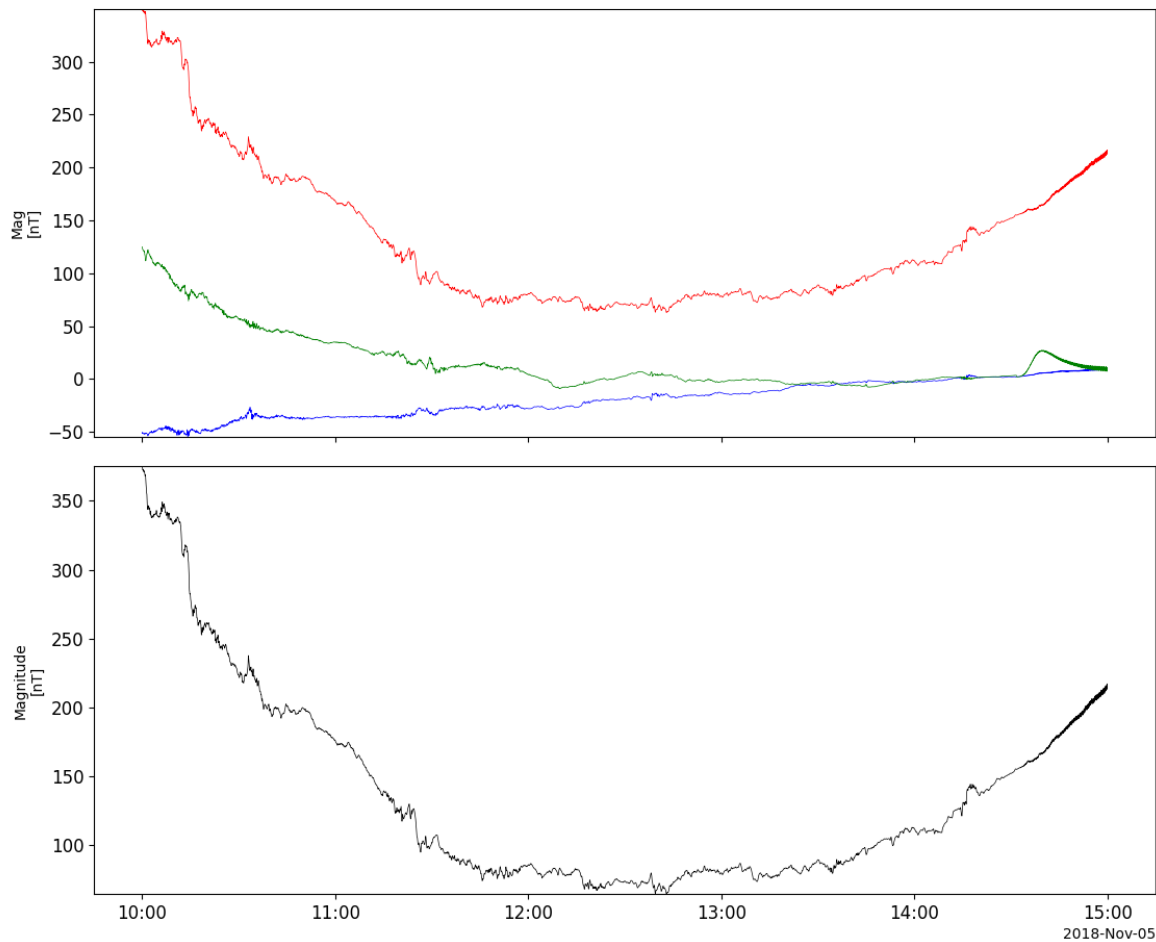
For descriptions of these data, see: https://emfisis.physics.uiowa.edu/data/L2_products

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
emfisis_vars = pyspedas.rbsp.emfisis(trange=['2018-11-5/10:00', '2018-11-5/15:00'],
    datatype='magnetometer', level='l3', time_clip=True)
tplot(['Mag', 'Magnitude'])
```



2.24.2 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”

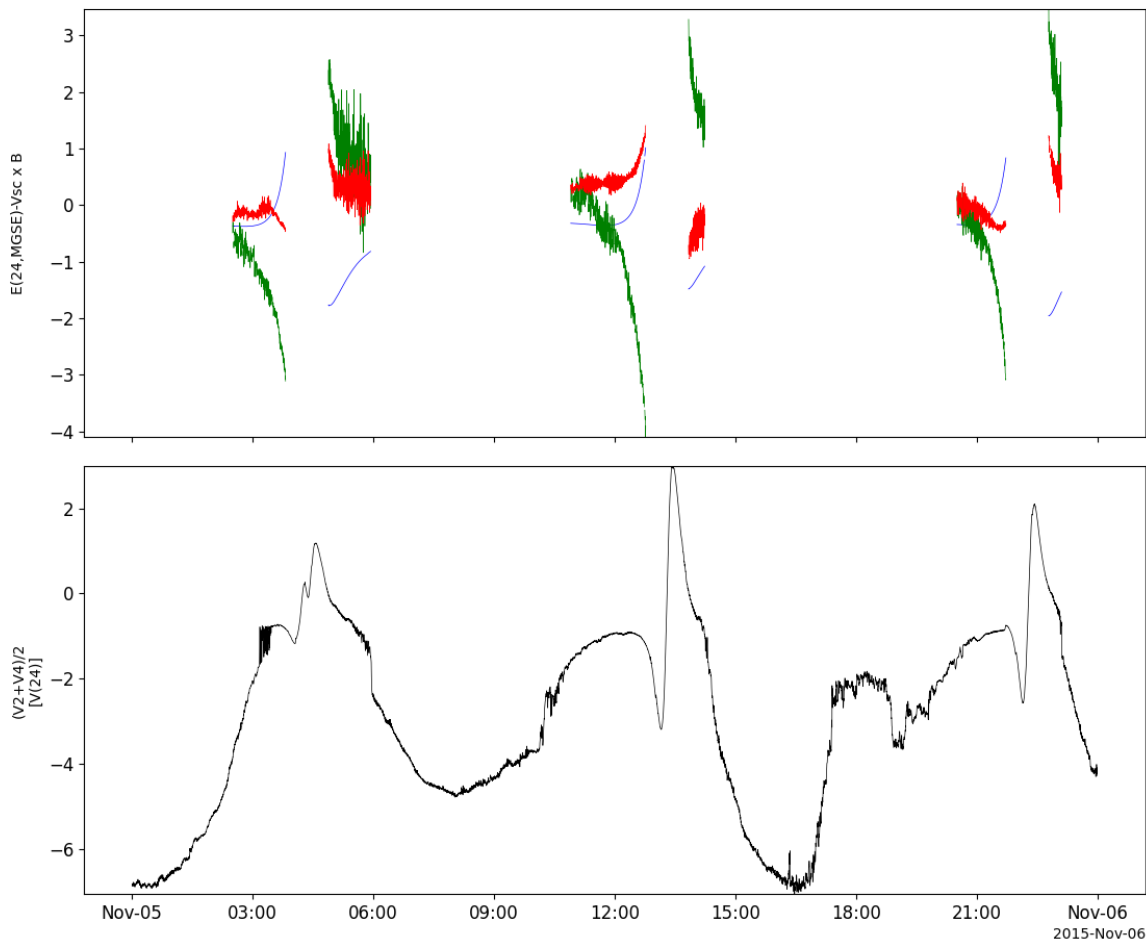
attribute of “data”.

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
efw_vars = pyspedas.rbsp.efw(trange=['2015-11-5', '2015-11-6'], level='l3')
tplot(['efield_in_inertial_frame_spinfit_mgse', 'spacecraft_potential'])
```

2.24.3 Radiation Belt Storm Probes Ion Composition Experiment (RBSPICE)

```
pyspedas.rbsp.rbspice(trange=['2018-11-5', '2018-11-6'], probe='a', datatype='tofkeh', 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

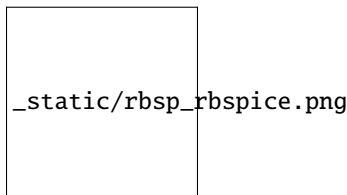
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format 'YYYY-MM-DD', 'YYYY-MM-DD'] or to specify more or less than a day ['YYYY-MM-DD/hh:mm:ss', 'YYYY-MM-DD/hh:mm:ss']
- **probe** (*str* or *list* of *str*) – Spacecraft probe name ('a' or 'b'); default: a
- **datatype** (*str*) – Data type (default: tofkeh); 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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpot import tplot
rbspice_vars = pyspedas.rbsp.rbspice(trange=['2018-11-5', '2018-11-6'], datatype='tofzeh', level='l3')
tplot('Alpha')
```



2.24.4 Energetic Particle, Composition, and Thermal Plasma Suite (ECT) - MagEIS

```
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

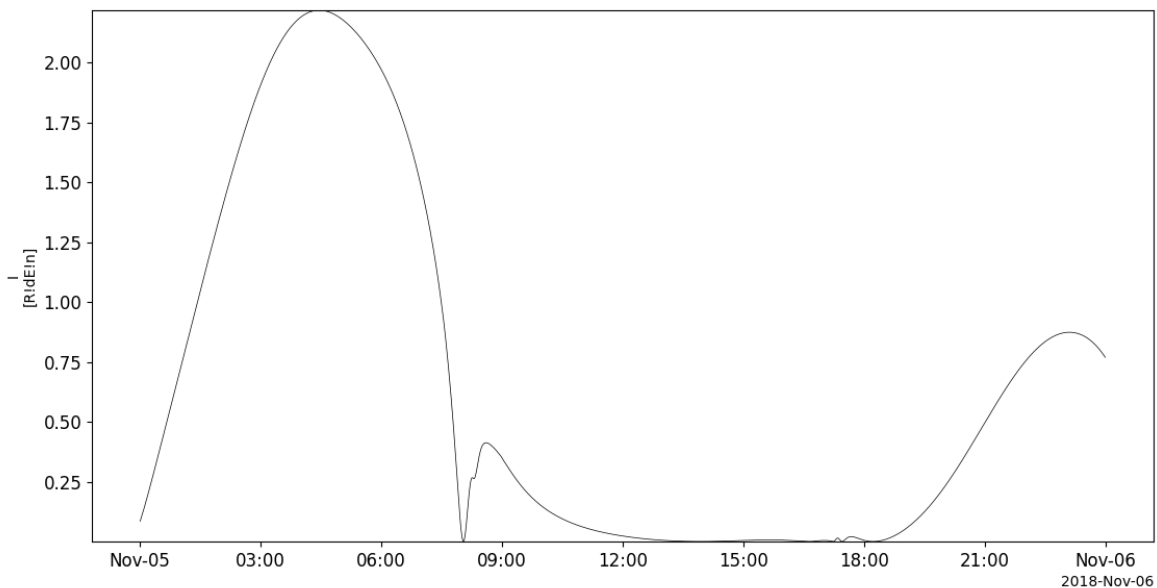
- **trange** (*list of str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (*str or list of str*) – Spacecraft probe name (‘a’ or ‘b’); default: a
- **datatype**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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
mageis_vars = pyspedas.rbsp.mageis(trange=['2018-11-5', '2018-11-6'], level='l3', rel=
    ↪ 'rel04')
tplot('I')
```



2.24.5 Energetic Particle, Composition, and Thermal Plasma Suite (ECT) - HOPE

```
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)

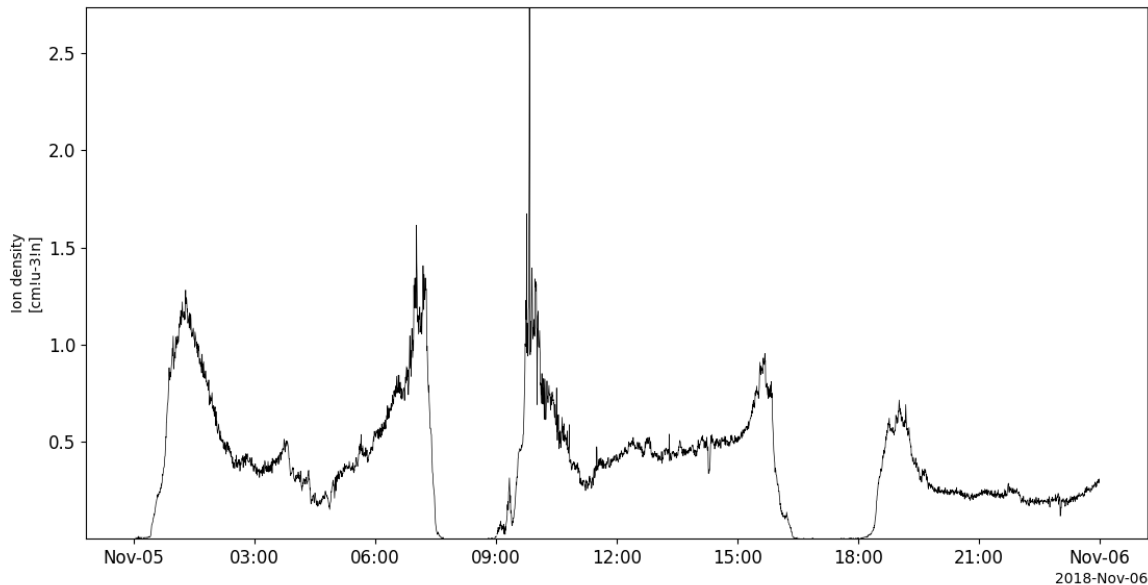
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpot import tplot
hope_vars = pyspedas.rbsp.hope(trange=['2018-11-5', '2018-11-6'], datatype='moments',
                                level='l3', rel='rel04')
tplot('Ion_density')
```



2.24.6 Energetic Particle, Composition, and Thermal Plasma Suite (ECT) - REPT

```
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

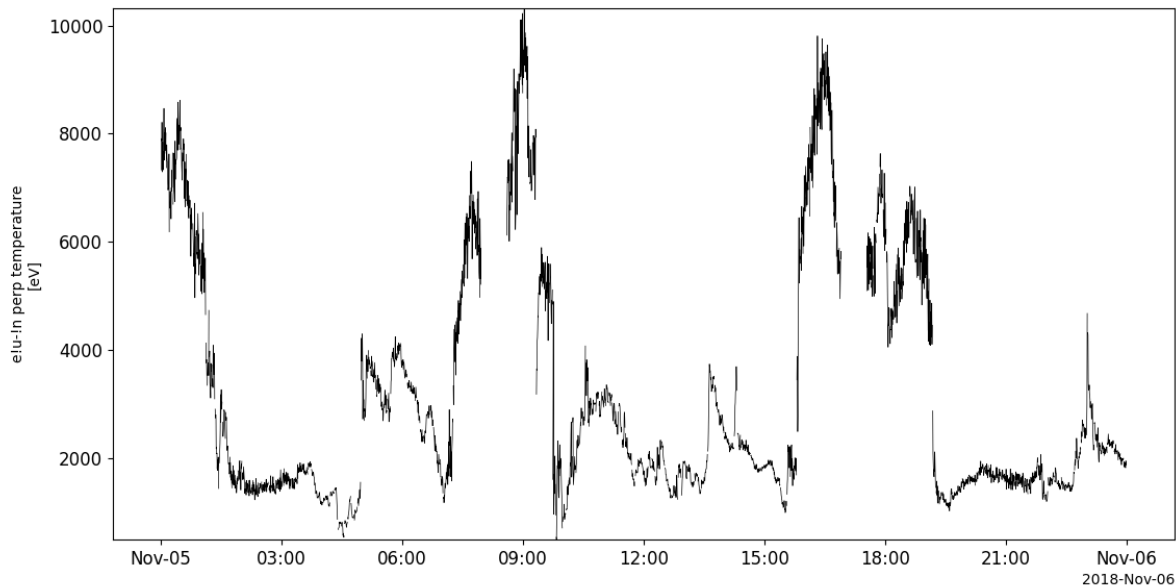
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **probe** (*str* or *list* of *str*) – Spacecraft probe name (‘a’ or ‘b’); default: a
- **datatype**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

Return type List of tplot variables created.

Example

```
import pyspedas
from pyplot import tplot
rept_vars = pyspedas.rbsp.rept(trange=['2018-11-5', '2018-11-6'], level='l3', rel='rel03
→')
tplot('Tperp_e_200')
```



2.24.7 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

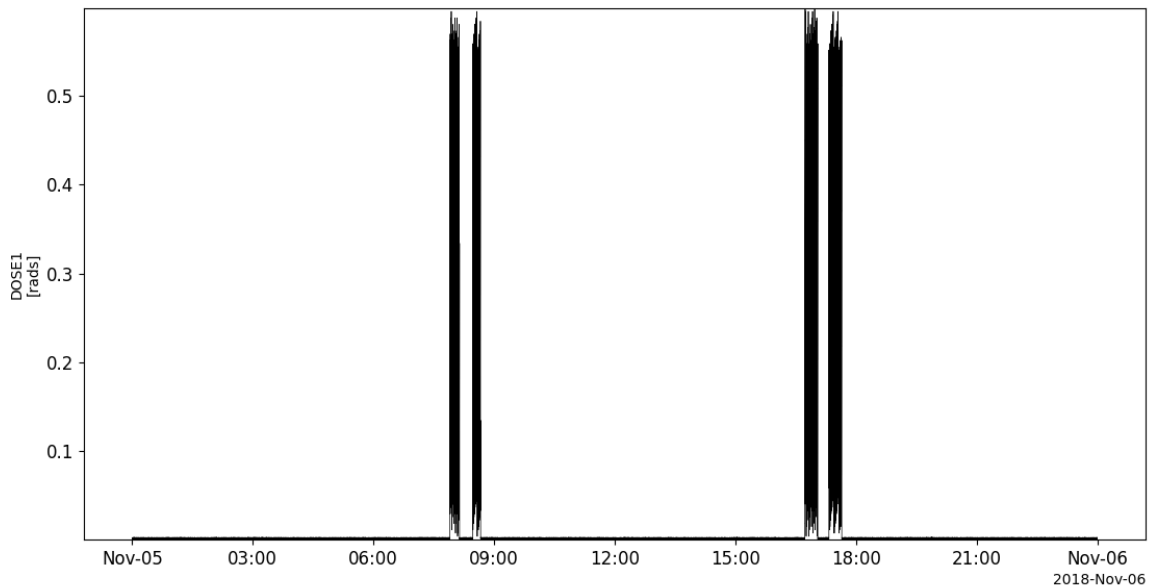
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format 'YYYY-MM-DD', 'YYYY-MM-DD'] or to specify more or less than a day ['YYYY-MM-DD/hh:mm:ss', 'YYYY-MM-DD/hh:mm:ss']
- **probe** (*str* or *list* of *str*) – Spacecraft probe name ('a' or 'b'); default: a
- **datatype** (*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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
rps_vars = pyspedas.rbsp.rps(trange=['2018-11-5', '2018-11-6'], datatype='rps', level='l2
→')
tplot('DOSE1')
```



2.25 Wind

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

2.25.1 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

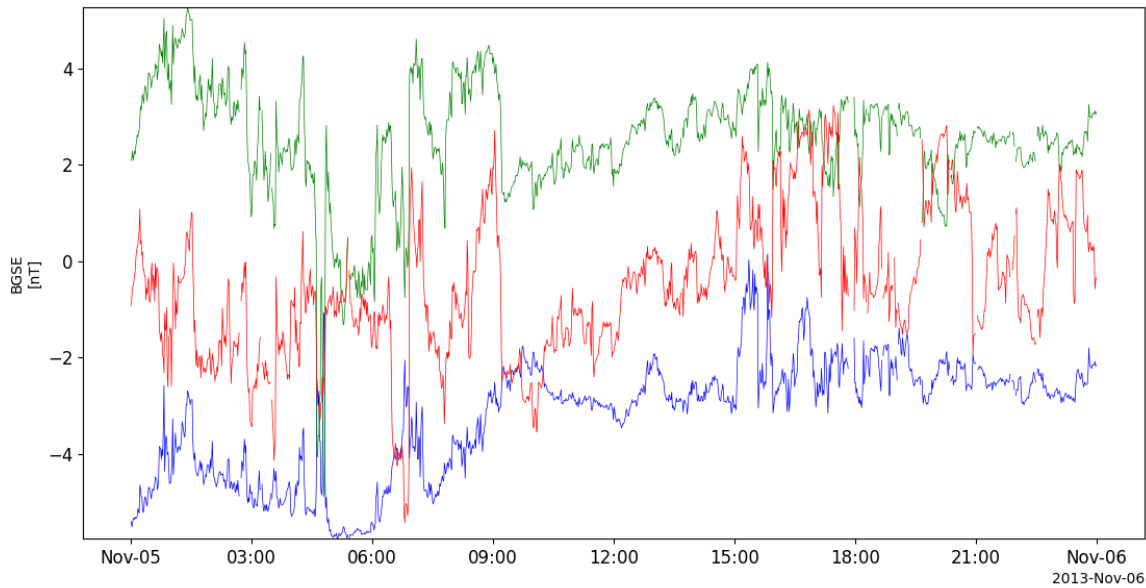
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas  
from pytpplot import tplot  
mfi_vars = pyspedas.wind.mfi(trange=['2013-11-5', '2013-11-6'])  
tplot('BGSE')
```

2.25.2 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

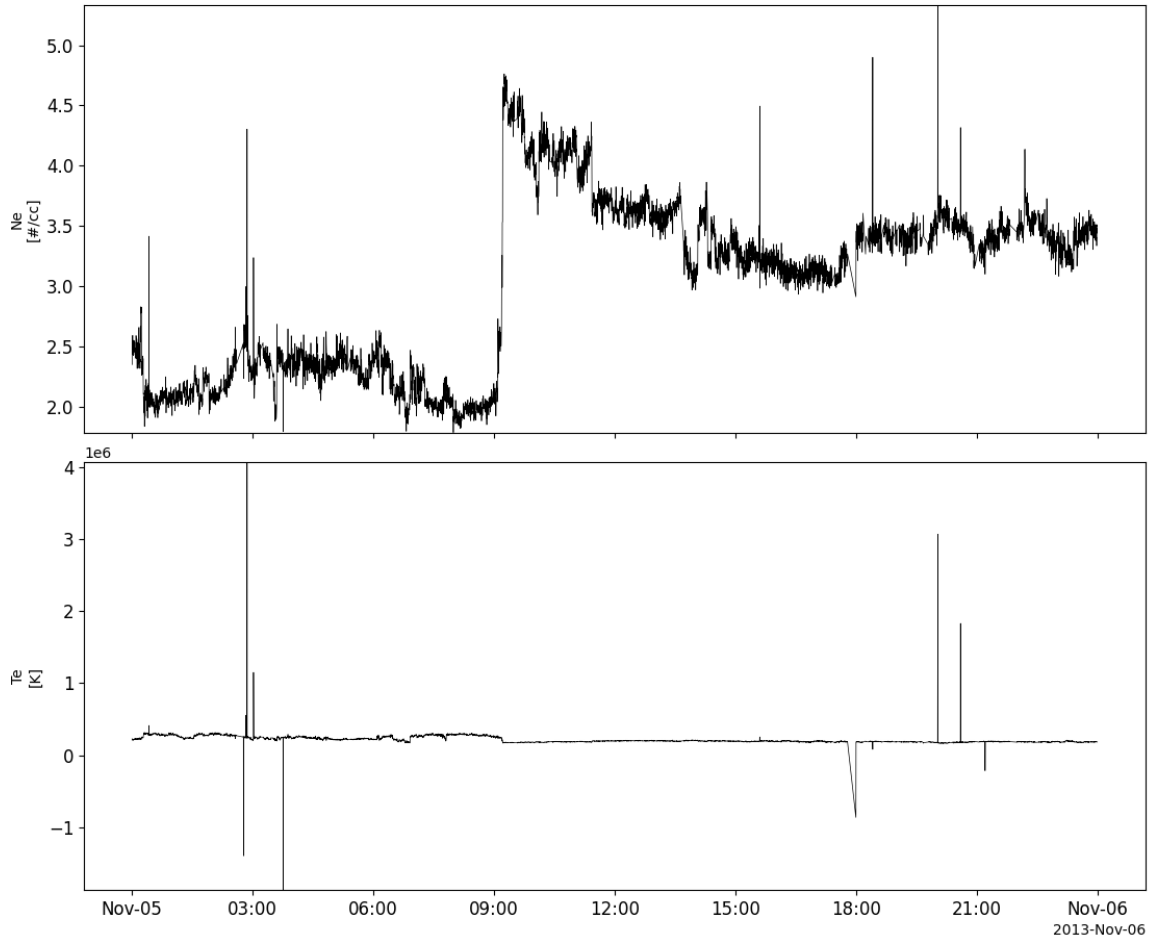
Parameters

- **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 key-word

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
swe_vars = pyspedas.wind.swe(trange=['2013-11-5', '2013-11-6'])
tplot(['N_elec', 'T_elec'])
```



2.25.3 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

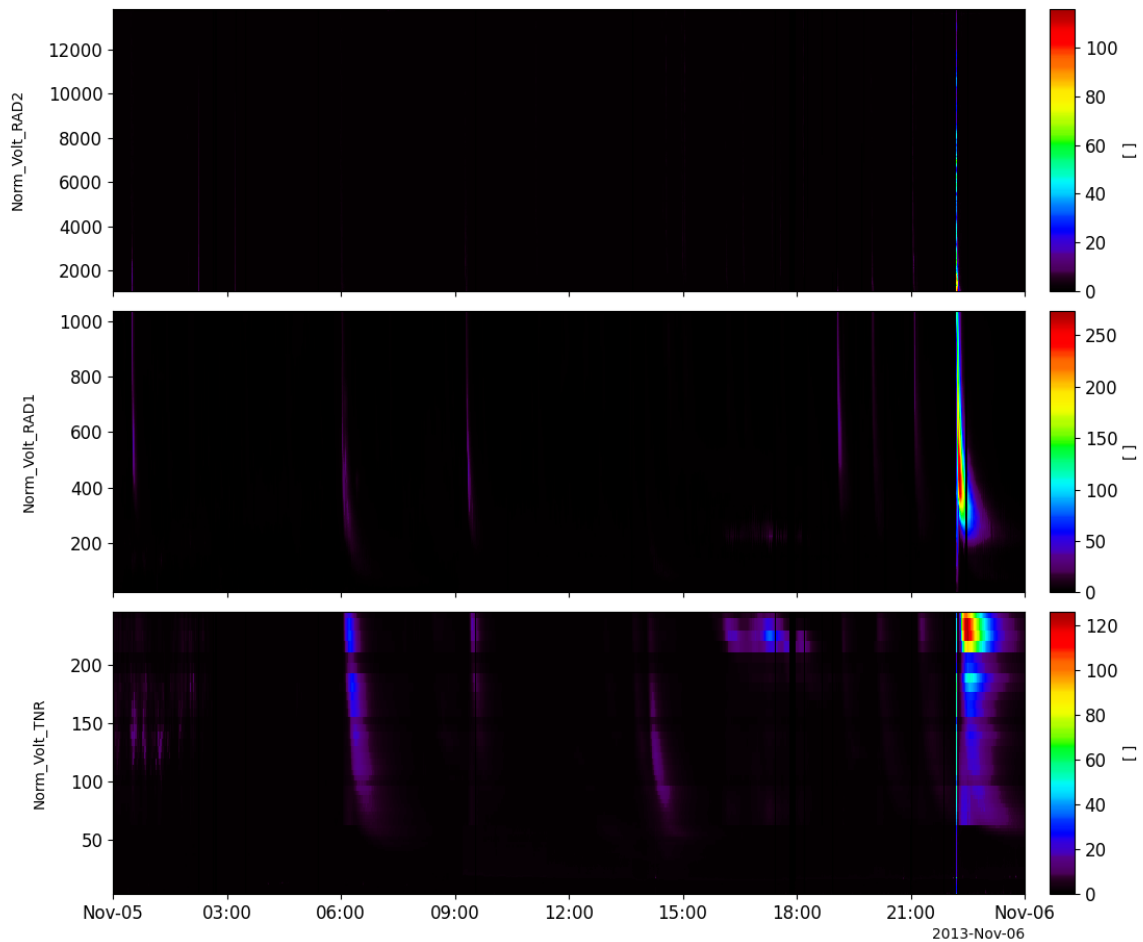
Parameters

- **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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
waves_vars = pyspedas.wind.waves(trange=['2013-11-5', '2013-11-6'])
tplot(['E_VOLTAGE_RAD2', 'E_VOLTAGE_RAD1', 'E_VOLTAGE_TNR'])
```



2.25.4 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

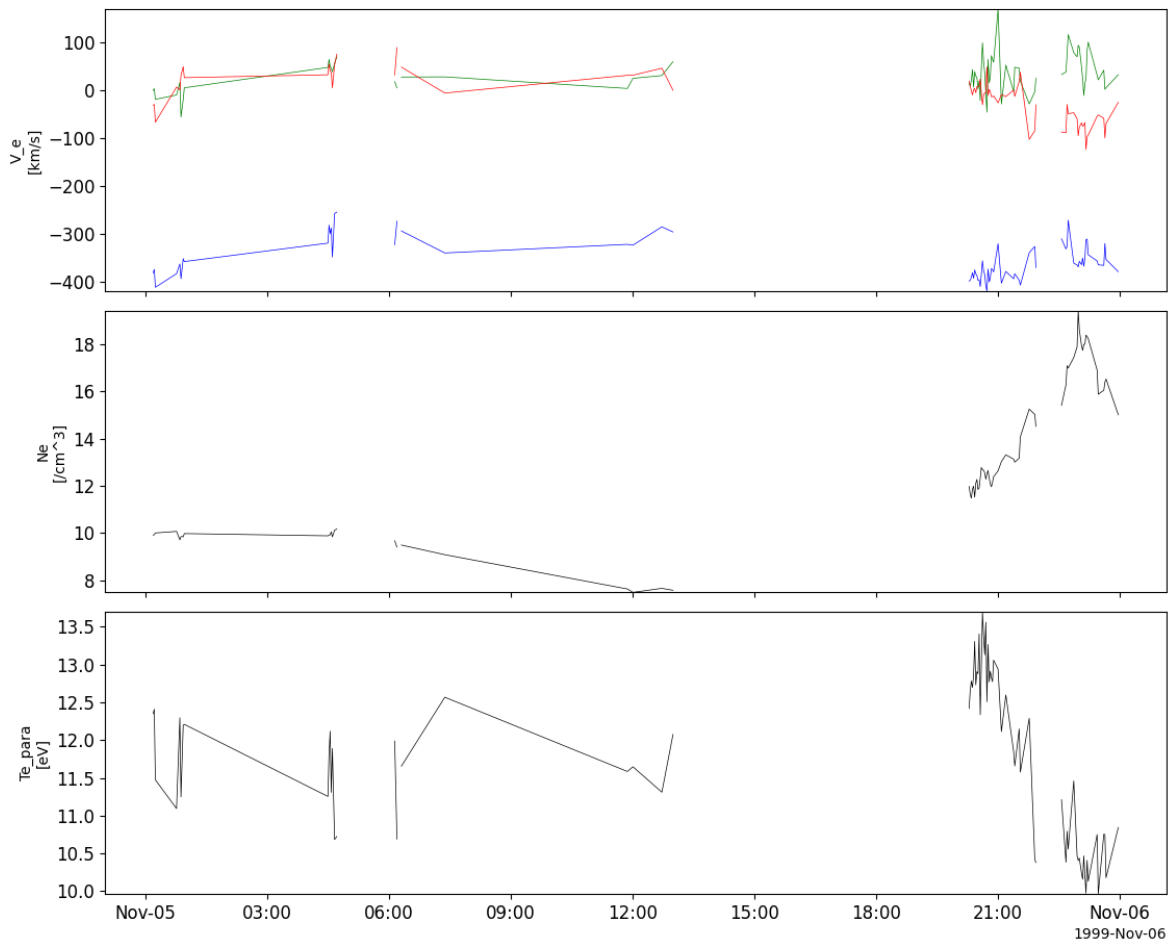
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **suffix** (*str*) – The tplot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
threedp_vars = pyspedas.wind.threedp()
tplot(['V_e_xyz_gse_wi_3dp', 'N_e_dens_wi_3dp', 'T_e_par_wi_3dp'])
```



2.25.5 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

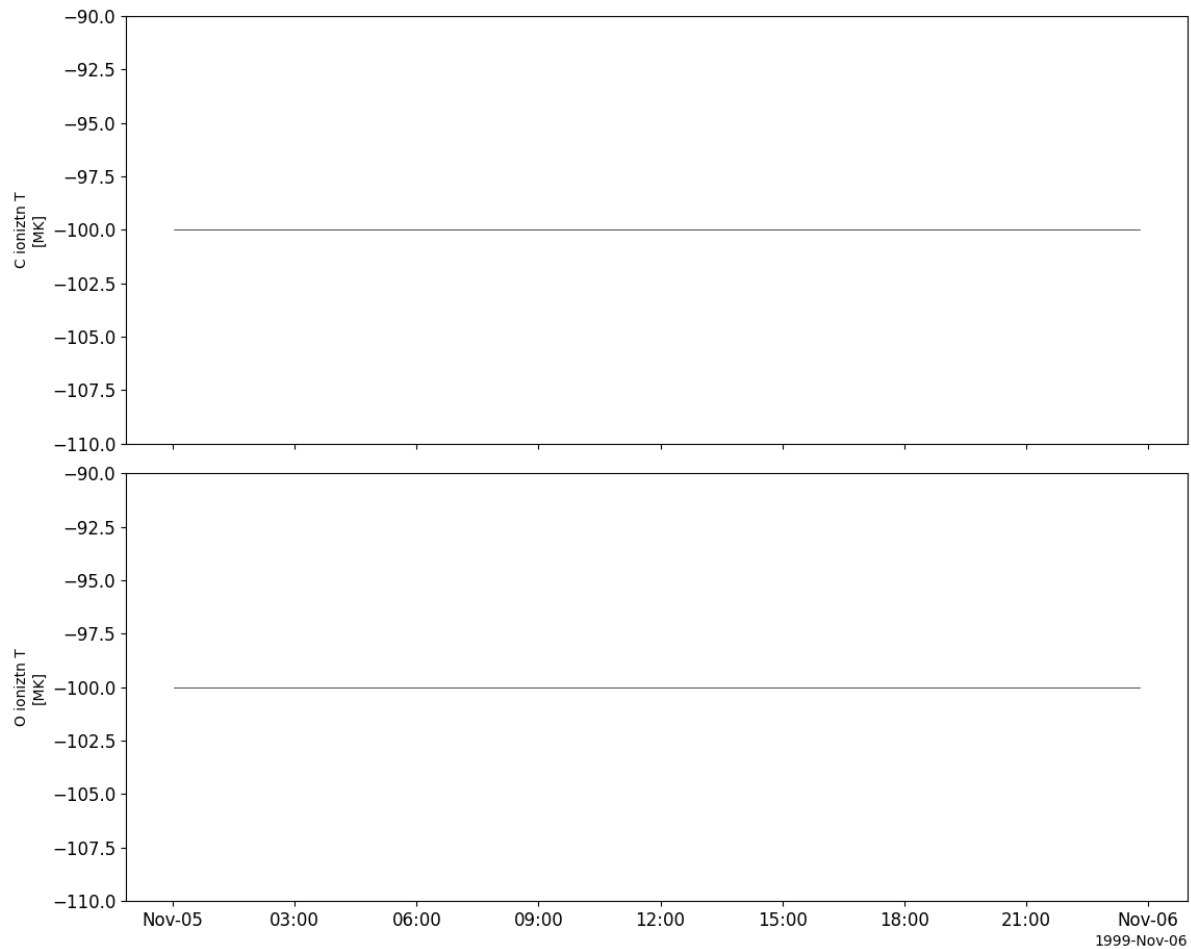
- **trange** (*list* of *str*) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (*str*) – Data type; Valid options:
- **suffix** (*str*) – The plot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytpplot import tplot
sms_vars = pyspedas.wind.sms()
tplot(['C_ion_temp', 'O_ion_temp'])
```



2.25.6 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

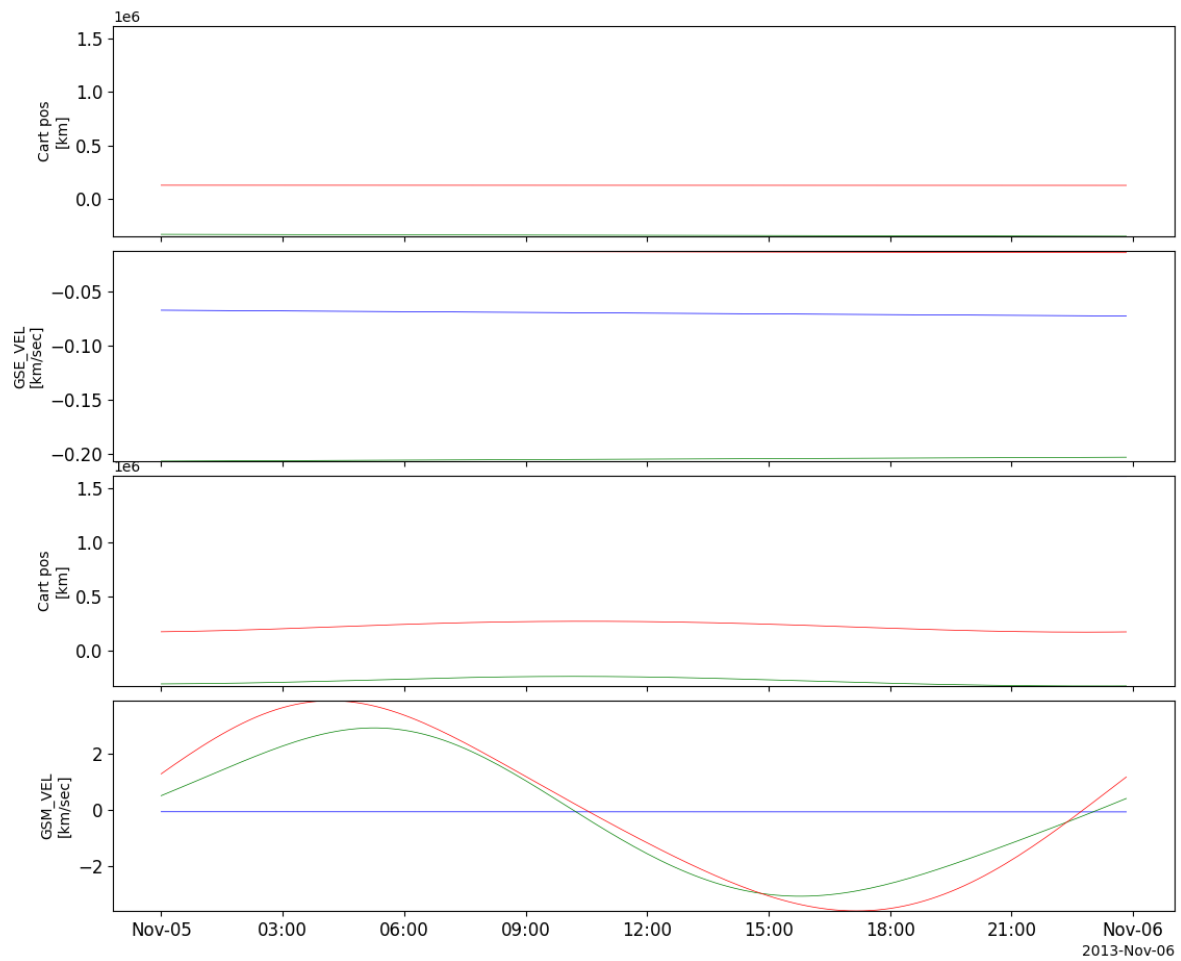
- **trange** (`list` of `str`) – time range of interest [starttime, endtime] with the format ‘YYYY-MM-DD’, ‘YYYY-MM-DD’] or to specify more or less than a day [‘YYYY-MM-DD/hh:mm:ss’, ‘YYYY-MM-DD/hh:mm:ss’]
- **datatype** (`str`) – Data type; Valid options:
- **suffix** (`str`) – The plot variable names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

Return type List of tplot variables created.

Example

```
import pyspedas
from pytplot import tplot
orb_vars = pyspedas.wind.orbit(trange=['2013-11-5', '2013-11-6'])
tplot(['GSE_POS', 'GSE_VEL', 'GSM_POS', 'GSM_VEL'])
```



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.

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

Return type None.

3.3 Cross products

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

Calculates the cross product of two tplot variables

v1: str First tplot variable

v2: str Second tplot variable

Parameters

- **newname** (*str*) – Name of the output variable
- **return_data** (*bool*) – Returns the data as an ndarray instead of creating a tplot variable

Return type Name of the tplot variable

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

variable1: str First tplot variable

variable2: str Second tplot variable

Parameters **newname** (*str*) – Name of the output variable

Return type Name of the tplot variable

3.5 Dynamic power spectra

`pyspedas.tdpwrspc(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 pytplot variable.
- **newname** (*str, optional*) – Name of new pytplot 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.
- **notmvvariance** (*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, notmvvariance=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.
- **notmvvariance** (*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.tinterp`(*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’.

Return type None.

3.7 Normalize vectors

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

Normalize all the vectors stored in a tplot variable

variable: *str* or *np.ndarray* tplot variable (or numpy array) containing the vectors to be normalized

Parameters

- **newname** (*str*) – name of the output variable; default: `variable_normalized`
- **return_data** (*bool*) – return the normalized vectors instead of creating a tplot variable

Returns

- name of the tplot variable created or normalized vectors if `return_data`
- is set

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.

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.

Return type None.

3.10 Wave polarization

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

Apply wavpol to a pyplot variable.

Creates multiple pyplot variables: '_powspec', '_degpol', '_waveangle', '_elliptict', '_helict', '_pspec3_x', '_pspec3_y', '_pspec3_z'

Parameters

- **tvarname** (*string*) – Name of pyplot variable.
- **prefix** (*string, optional*) – Prefix for pyplot 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.
- **degpol** (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(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

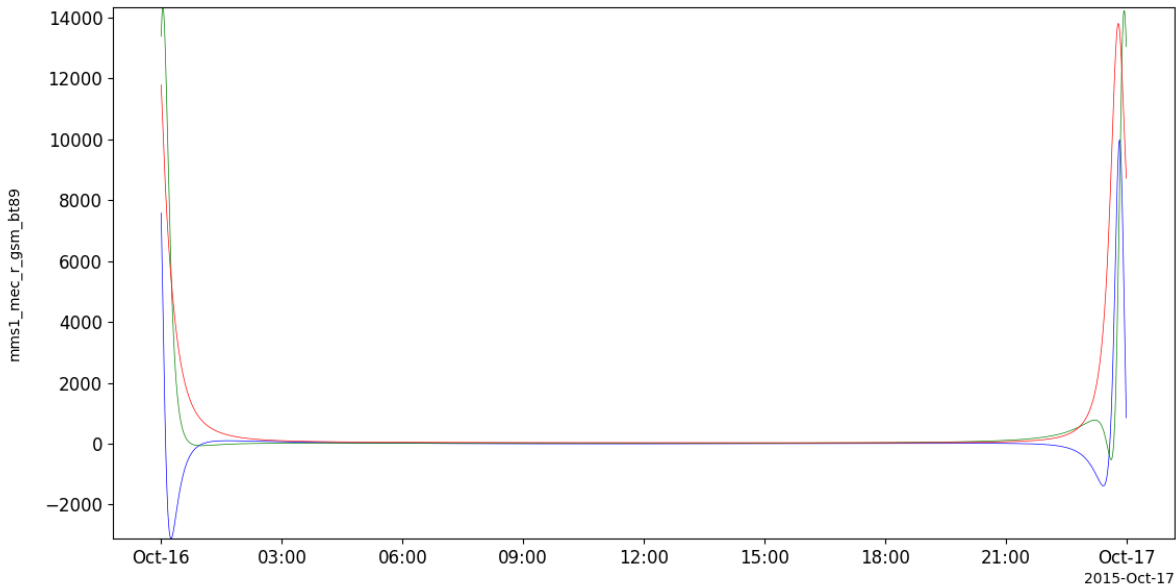
Return type Name of the tplot variable containing the model data

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 import tt89
tt89('mms1_mec_r_gsm')

from pytpplot import tplot
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

Return type Name of the tplot variable containing the model data

4.2.1 T96 Example

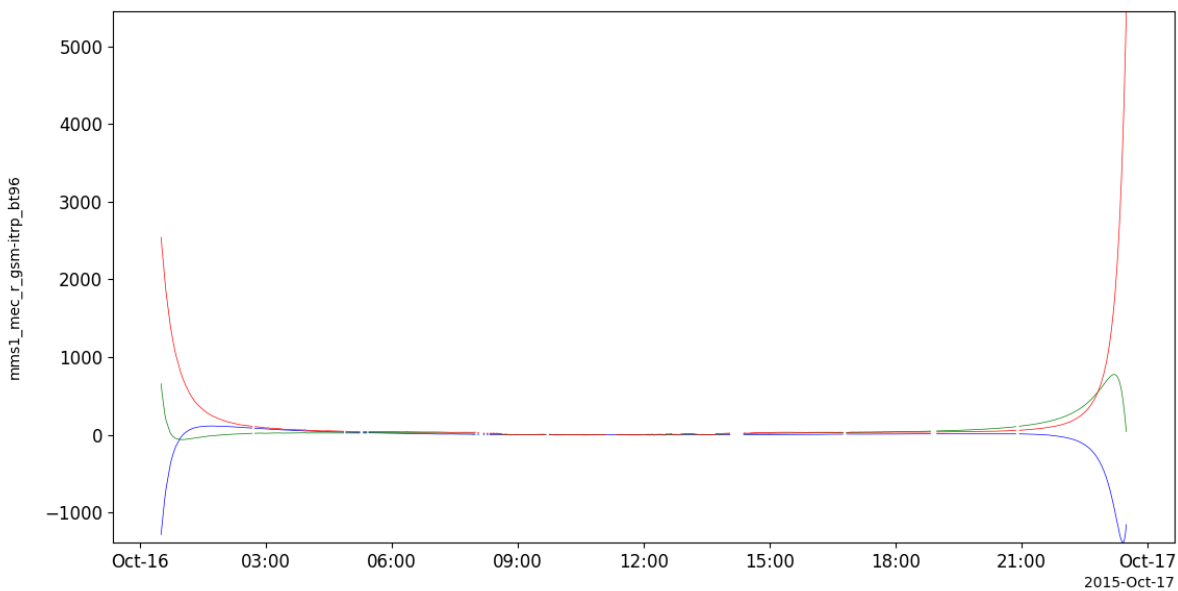
```
# load some spacecraft position data
import pyspedas
pyspedas.mms.mec(trange=['2015-10-16', '2015-10-17'])

# calculate the params using the solar wind data; see the "Solar Wind Parameters"
# section below for an example

# interpolate the MEC timestamps to the solar wind timestamps
from pyspedas import tinterpol
tinterpol('mms1_mec_r_gsm', 'proton_density')

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

from pyplot import tplot
tplot('mms1_mec_r_gsm-itrp_bt96')
```



4.3 Tsyganenko 2001 (T01)

`pyspedas.geopack.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

Return type Name of the tplot variable containing the model data

4.3.1 T01 Example

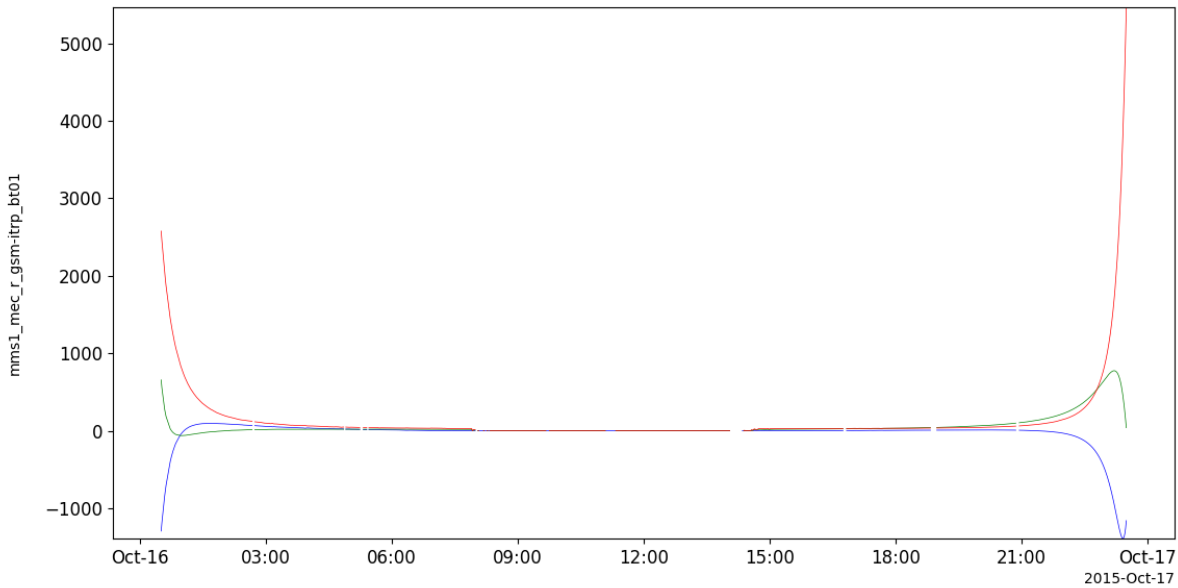
```
# load some spacecraft position data
import pyspedas
pyspedas.mms.mec(trange=['2015-10-16', '2015-10-17'])

# calculate the params using the solar wind data; see the "Solar Wind Parameters"
# ↪ section below for an example

# interpolate the MEC timestamps to the solar wind timestamps
from pyspedas import tinterpol
tinterpol('mms1_mec_r_gsm', 'proton_density')

# calculate the field using the T01 model
from pyspedas.geopack import tt01
tt01('mms1_mec_r_gsm-itrp', parmod=params)

from pyplot import tplot
tplot('mms1_mec_r_gsm-itrp_bt01')
```



4.4 Tsyganenko-Sitnov 2004 (TS04)

`pyspedas.geopack.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

Return type Name of the tplot variable containing the model data

4.4.1 TS04 Example

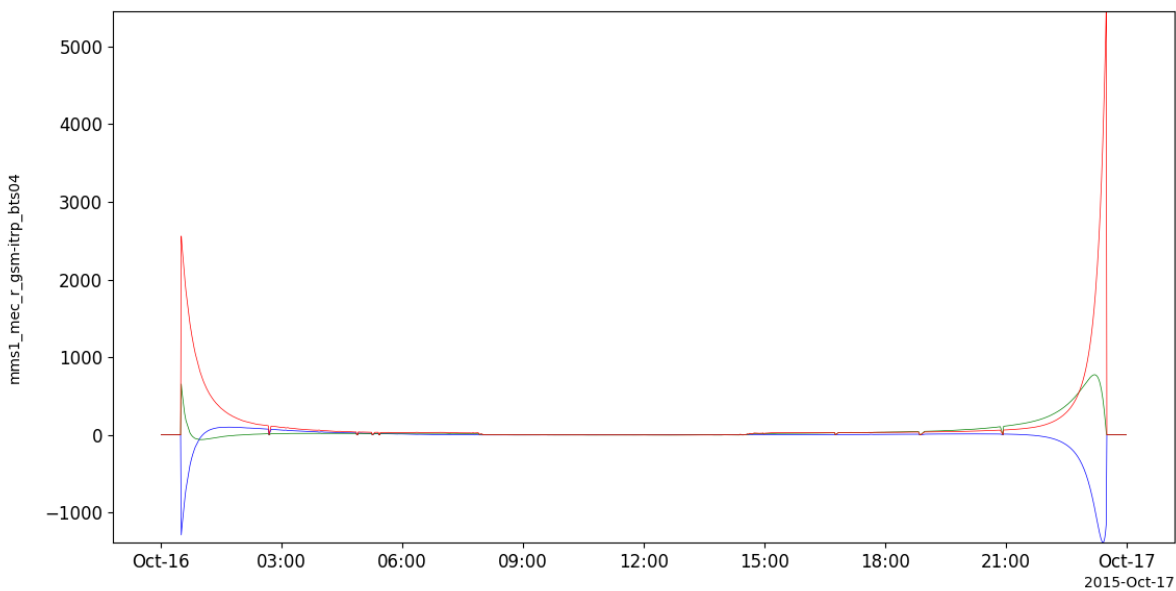
```
# load some spacecraft position data
import pyspedas
pyspedas.mms.mec(trange=['2015-10-16', '2015-10-17'])

# calculate the params using the solar wind data; see the "Solar Wind Parameters"
# section below for an example

# interpolate the MEC timestamps to the solar wind timestamps
from pyspedas import tinterpol
tinterpol('mms1_mec_r_gsm', 'proton_density')

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

from pyplot import tplot
tplot('mms1_mec_r_gsm-itrp_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 pytpplot 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(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 succesful completion.

5.1.1 Examples

```
import pyspedas
pyspedas.themis.state(trange=['2015-10-16', '2015-10-17'], probe='c')

from pyspedas import cotrans
cotrans(name_in='thc_pos_gse', name_out='gsm_data', coord_in='gse', coord_out='gsm')
cotrans(name_in='thc_pos_gse', name_out='sm_data', coord_in='gse', coord_out='sm')
cotrans(name_in='thc_pos_gse', name_out='geo_data', coord_in='gse', coord_out='geo')

from pytplot import tplot
tplot(['gsm_data', 'sm_data', 'geo_data'])
```

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_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_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

- `iy` (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 sidereal 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`)

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`)

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.tgsmgm_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.tsmgm_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. Usually, 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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