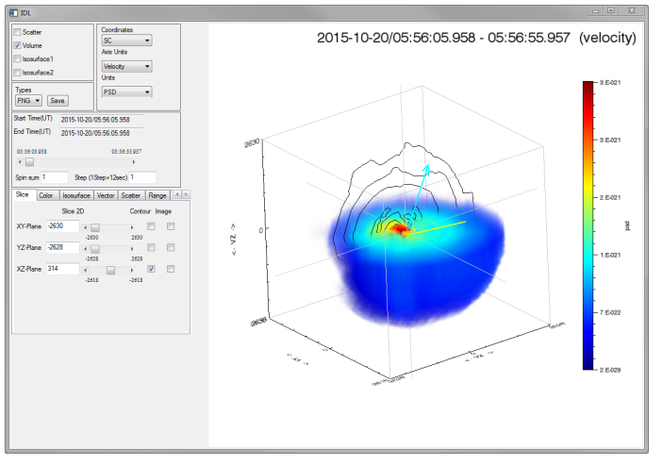
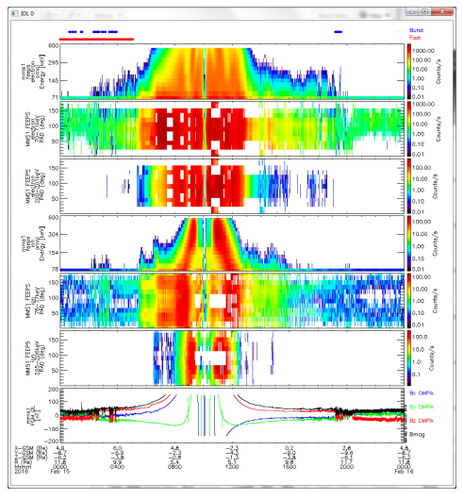
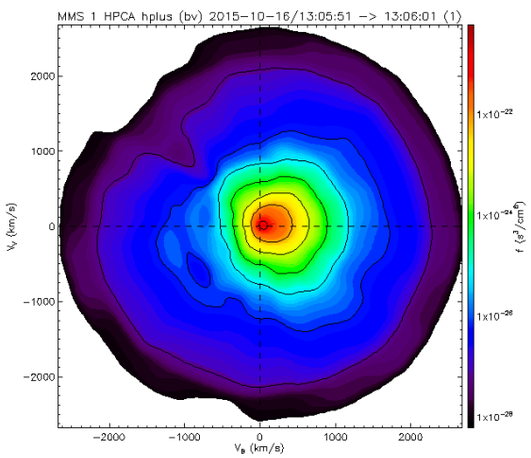
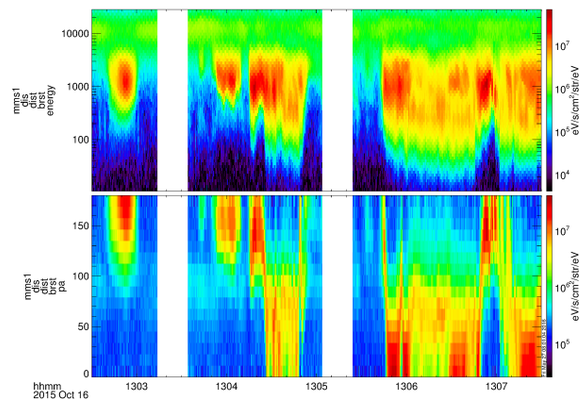


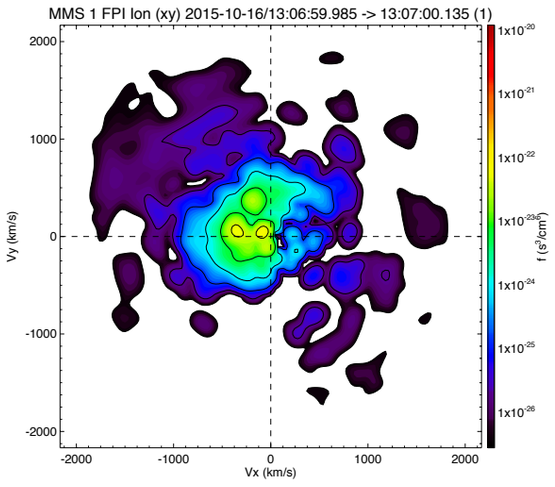


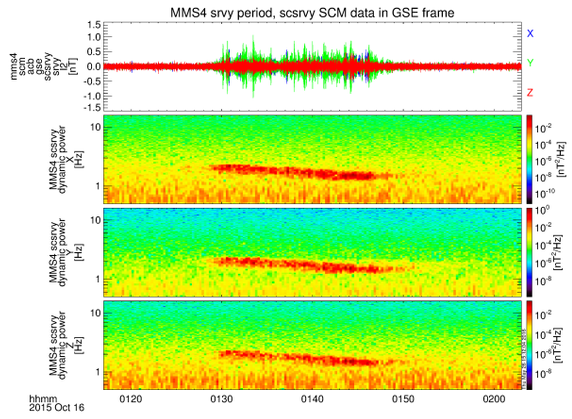


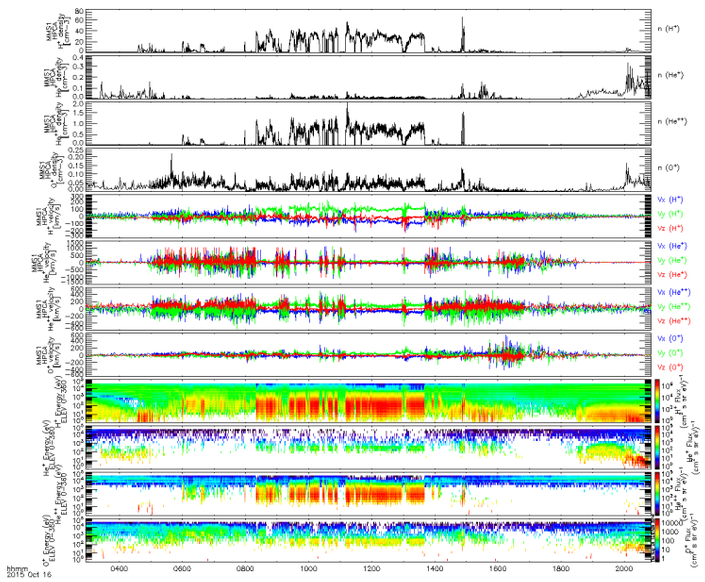


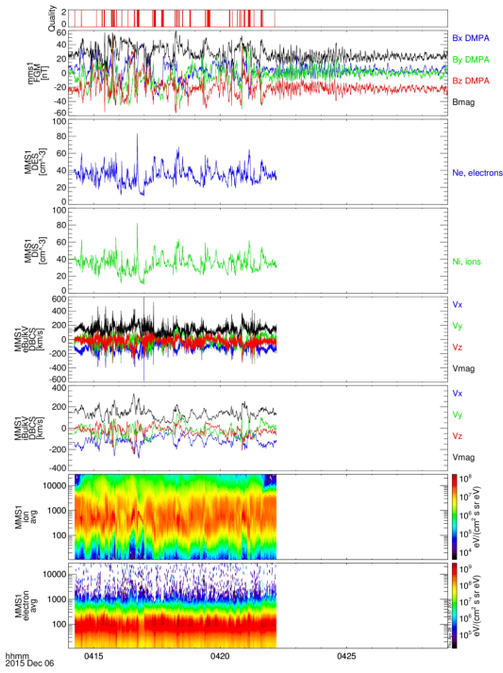
MMS plug-ins for SPEDAS

Access, analysis and visualization, in conjunction with other Heliophysics assets









MMS plug-ins for SPEDAS

- Introduction
- Examples
- The Graphical User Interface (GUI)
- Getting Help

Introduction

Requirements

- Windows, Linux, OS X, or Solaris
- IDL 8.2.3+
- IDL CDF Library 3.6+

Installation

http://spedas.org/wiki/index.php?title=Downloads_and_Installation

Documentation

http://spedas.org/ (click “SPEDAS wiki”)

Introduction

mms_load_fgm	Fluxgate Magnetometer
mms_load_scm	Search-coil Magnetometer
mms_load_mec	Ephemeris and Coordinates
mms_load_fpi	Fast Plasma Investigation
mms_load_hpca	Hot Plasma Composition Analyzer
mms_load_eis	Energetic Ion Spectrometer
mms_load_feeps	Fly's Eye Energetic Particle Sensor
mms_load_edp	Electric-field Double Probe
mms_load_edi	Electron Drift Instrument
mms_load_dsp	Digital Signal Processor
mms_load_aspoc	Active Spacecraft Potential Control
mms_load_tetrahedron_qf	Tetrahedron Quality Factor
mms_load_brst_segments	Burst intervals
mms_load_fast_segments	Fast intervals

See folder: /projects/mms/

Introduction

Keywords

- trange `trange=['2015-10-16', '2015-10-17']`
- probes `probes=[1, 2, 3, 4]`
- level `level='l2'`
- data_rate `data_rate='srvy'`
- datatype `datatype=['des-moms', 'dis-moms']`

See top of each file for more keyword documentation

Introduction

Keywords

- suffix `suffix='_burst_mode'`
- time_clip `/time_clip`
- no_update `/no_update`
- spdf `/spdf`
- tplotnames `tplotnames=tvarnames`
- center_measurement (FPI and HPCA) `/center`

See top of each file for more keyword documentation

Introduction

Keywords

- available `/available`
- cdf_filenames `cdf_filenames=data_file_list`
- cdf_version `cdf_version='3.0.0'`
- min_version `min_version='3.0.0'`
- latest_version `/latest_version`
- versions (in bleeding edge) `versions=file_versions`

See top of each file for more keyword documentation

Examples

See folder: /projects/mms/examples/

- “basic” subfolder: scripts that show basic functionality

- “advanced” subfolder: scripts that show more advanced functionality (includes many scripts that generate multi-instrument figures)

- “quicklook” subfolder: scripts that generate the same QL plots that can be found at the SDC (requires MMS team access to the SDC)

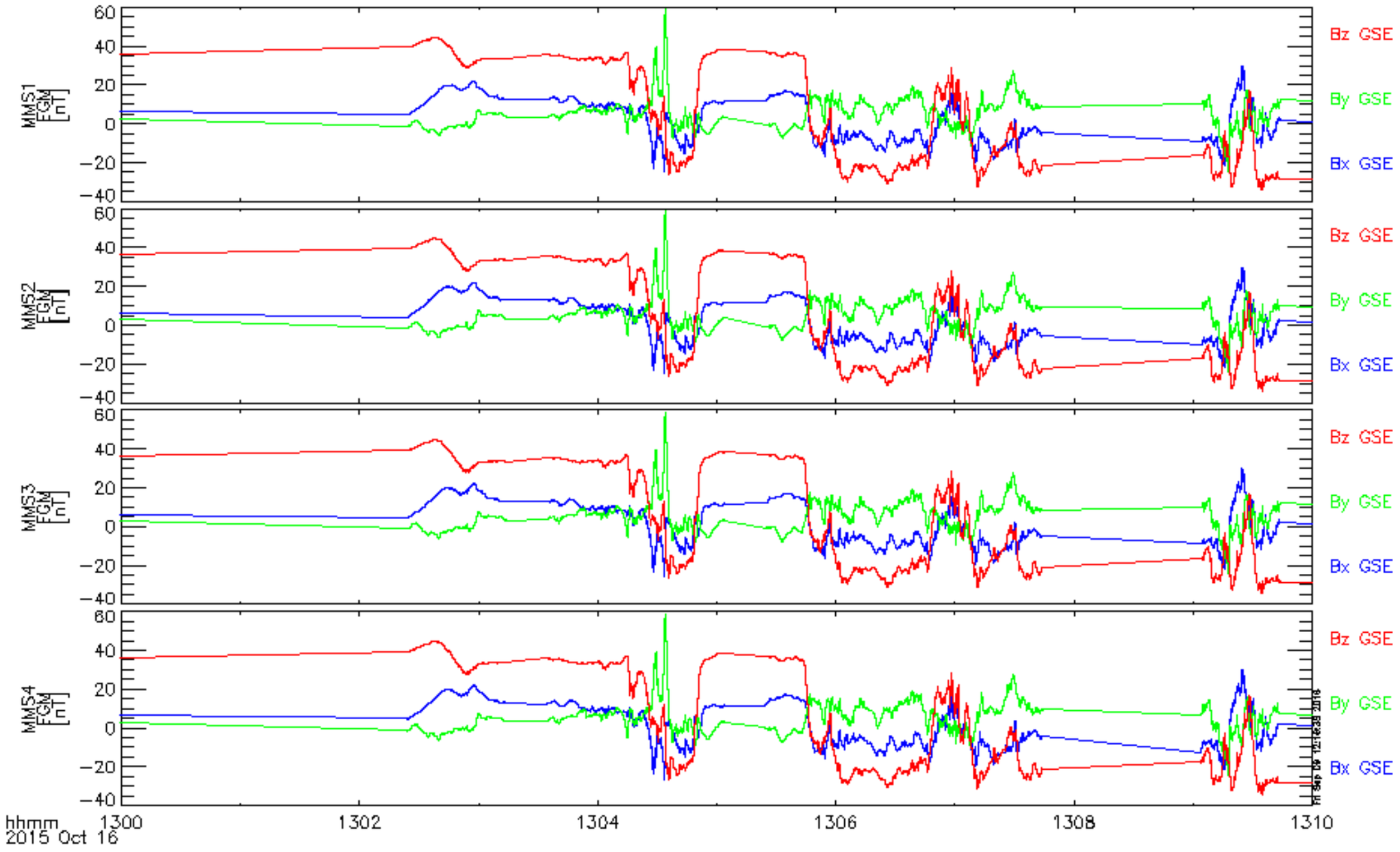
Basic Examples

```
mms_load_fgm_burst_crib.pro
mms_load_fgm_crib.pro
mms_load_fpi_burst_crib.pro
mms_load_fpi_burst_crib_v3.pro
mms_load_fpi_crib.pro
mms_load_fpi_crib_v3.pro
mms_load_aspoc_crib.pro
mms_load_hpca_burst_crib.pro
mms_load_dsp_crib.pro
mms_load_hpca_crib.pro
mms_load_edi_crib.pro
mms_load_scm_crib.pro
mms_load_edp_crib.pro
mms_load_state_crib.pro
mms_load_eis_burst_crib.pro
mms_load_eis_crib.pro
mms_load_feeps_crib.pro
spd_mms_load_bss_crib.pro
mms_feeps_sectspec_crib.pro
mms_cotrans_crib.pro
mms_qcotrans_crib.pro
mms_formation_crib.pro
mms_find_burst_intervals_crib.pro
```

Basic Example

```
;+
; PROCEDURE:
;         mms_load_fgm_brst_crib
;
; PURPOSE:
;         Crib sheet showing how to load and plot MMS magnetometer data in burst mode
;
;
;
;$LastChangedBy: egrimes $
;$LastChangedDate: 2016-05-19 10:51:27 -0700 (Thu, 19 May 2016) $
;$LastChangedRevision: 21138 $
;$URL: svn+ssh://thmsvn@ambrosia.ssl.berkeley.edu/repos/spdsoft/trunk/projects/mms/examples/basic/mms_load_fgm_burst_crib.pro $
;-

; set the time span
timespan, '2015-10-16', 1

; load MMS FGM burst data for all spacecraft
; only grab the latest version of the CDF
mms_load_fgm, probes=[1, 2, 3, 4], data_rate='brst', level='l2', /latest_version, cdf_filenames = files

; plot the data in GSE coordinates for all spacecraft
tplot, 'mms?_fgm_b_gse_brst_l2_bvec'
stop

; zoom into the burst interval
tlimit, ['2015-10-16/13:00', '2015-10-16/13:10']
stop

; print the filenames of the files used to load the data
; note only the latest CDF version used for each spacecraft
print, files
stop

; load the FGM data, along with the ephemeris data stored in the FGM files
mms_load_fgm, probes=3, trange=['2015-10-16/13:00', '2015-10-16/13:10'], data_rate='brst', /get_fgm_ephemeris

; plot the FGM data, along with position in GSM coordinates
tplot, ['mms3_fgm_b_gsm_brst_l2_bvec', 'mms3_fgm_r_gsm_brst_l2_vec']
stop

; delete the data from previous loads
del_data, '*'

; load the FGM data without splitting the variables
mms_load_fgm, probe=1, trange=['2015-10-16/13:00', '2015-10-16/13:10'], data_rate='brst', /get_fgm_ephemeris, /no_split_vars

; since the variables aren't split, they can't be used by routines
; in SPEDAS that expect vectors to be stored as vectors
tplot, ['mms1_fgm_b_gsm_brst_l2', 'mms1_fgm_r_gsm_brst_l2']

end
```

Basic Example



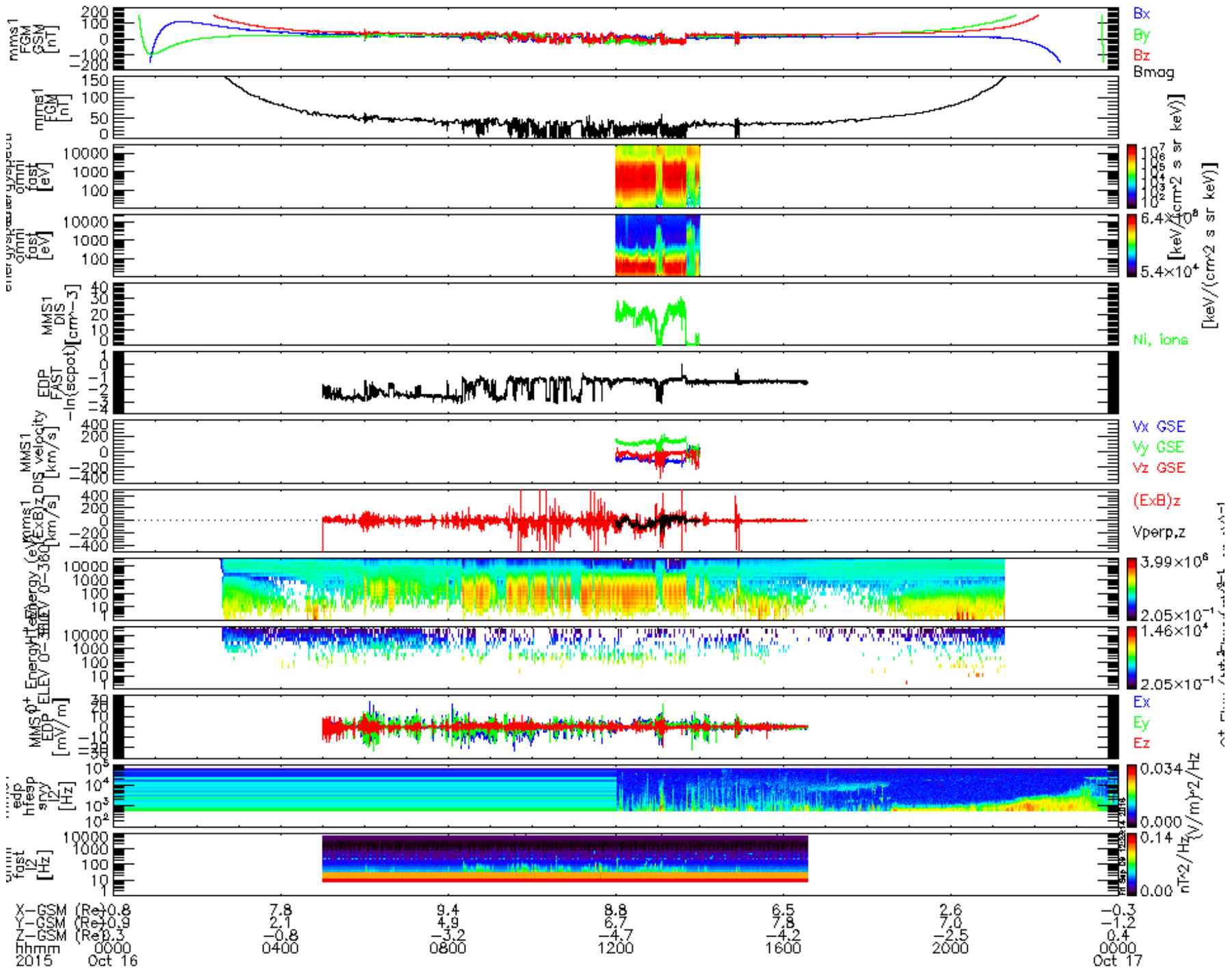
Advanced Examples

```
crib_master
mms_basic_dayside.pro
mms_basic_dayside_v3.pro
mms_fpi_dist_slice_comparison_crib_l2.pro
mms_fpi_dist_slice_comparison_crib_v3.pro
mms_isee_3d_crib.pro
mms_isee_3d_crib_basic.pro
mms_load_fpi_summary_crib.pro
mms_load_fpi_summary_crib_v3.pro
mms_multi_axis_figure.pro
mms_mva_crib.pro
mms_neutral_sheet_crib.pro
mms_part_products_crib.pro
mms_part_products_crib_v3.pro
mms_slice2d_fpi_crib.pro
mms_slice2d_fpi_crib_v3.pro
mms_slice2d_hpca_crib.pro
mms_wavpol_crib.pro
```

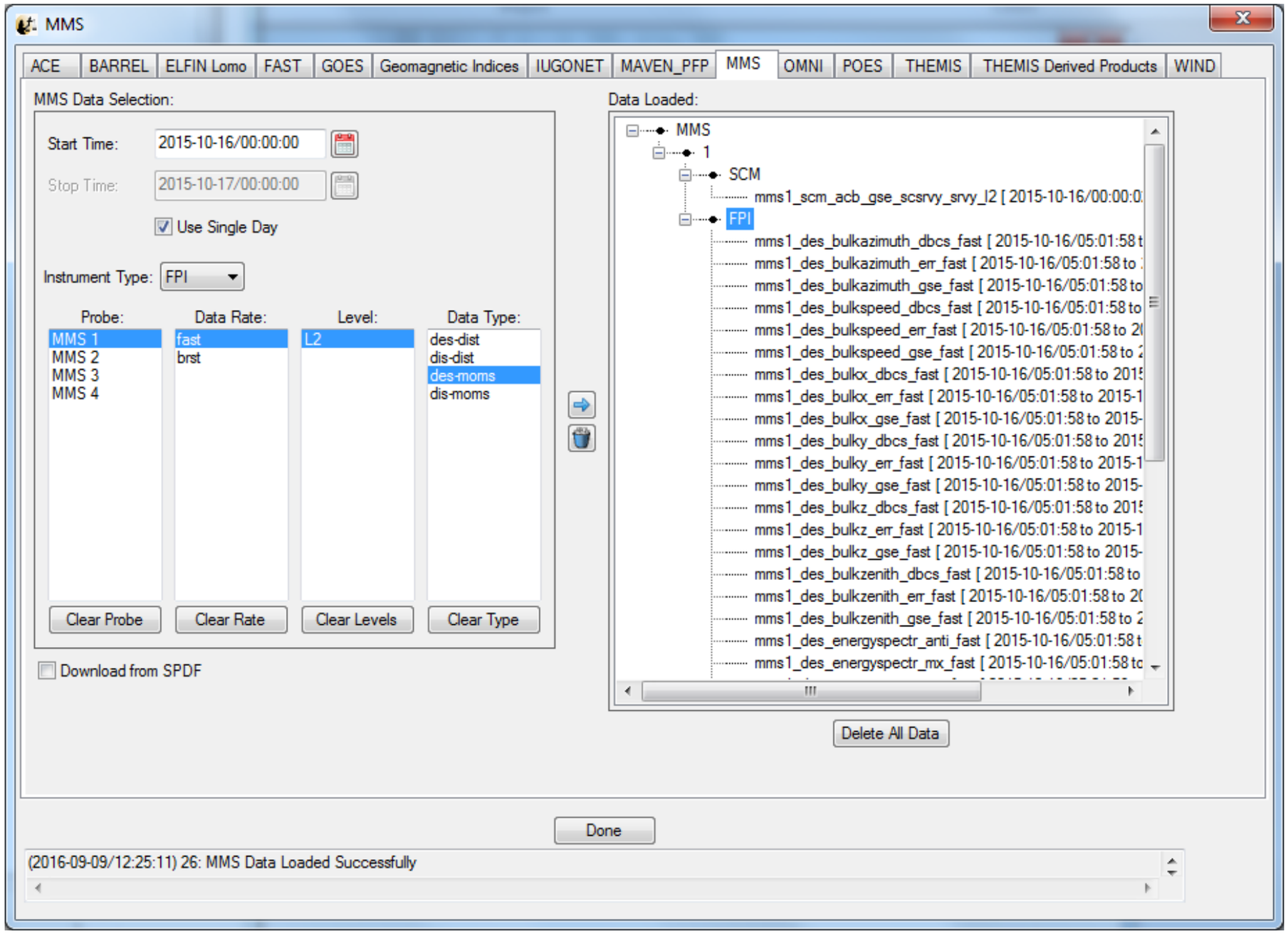
Advanced Example

```
;+
; script for basic dayside science (from EVA, first plot)
;
;  This version is meant to work with v3.0.0+ of the FPI CDFs
;
; Plots on the figure include:
;   1: FGM, srvy, GSM
;   2. FGM magnitude
;   3. FPI ion spectra
;   4. FPI electron spectra
;   5. FPI Ni (ion density)
;   6. EDP, -log(scpot)
;   7. FPI Vi (ion velocity, 3 components)
;   8. (ExB)z, vperp(z)
;   9. HPCA H+
;   10. HPCA O+
;   11. EDP fast
;   12. EDP srvy, EPSD spectra (x) mms*_edp_hfesp_srvy_l2
;   13. DSP, fast, bpsd omni
;
; $LastChangedBy: egrimes $
; $LastChangedDate: 2016-09-02 09:09:34 -0700 (Fri, 02 Sep 2016) $
; $LastChangedRevision: 21783 $
; $URL: svn+ssh://thmsvn@ambrosia.ssl.berkeley.edu/repos/spdsoft/trunk/projects/mms/examples/advanced/mms_basic_dayside_v3.pro $
;-
start_time = systime(/sec)

date = '2015-10-16/00:00:00
timespan, date, 1, /day
probe = '1'
; options for send_plots_to:
;   ps: postscript files
;   png: png files
;   win: creates/opens all of the tplot windows
send_plots_to = 'win'
plot_directory = ''
postscript = send_plots_to eq 'ps' ? 1 : 0

; load the data
mms_load_fgm, probe=probe, data_rate='srvy', level='l2'
mms_load_mec, probe=probe, data_rate='srvy', level='l2'
mms_load_fpi, probe=probe, data_rate='fast', level='l1b', datatype=['des-moms', 'dis-moms'], min_version='2.2.0'
mms_load_edp, probe=probe, datatype='scpot', level='l2'
mms_load_edp, probe=probe, data_rate='fast', level='l2', datatype='dce'
mms_load_edp, probe=probe, data_rate='srvy', level='l2', datatype=['dce', 'hfesp']
mms_load_dsp, probe=probe, data_rate='fast', level='l2', datatype='bpsd'
mms_load_hpca, probe=probe, data_rate='srvy', level='l2', datatype='ion'

; sum the HPCA spectra over the full field of view
mms_hpca_calc_anodes, fov=[0, 360], probe=probe

; For the s/c potential, we plot -ln(scpot), to match the plot in EVA
calc, '"mms'+probe+'_edp_fast_scpot_ln" = -ln("mms'+probe+'_edp_scpot_fast_l2")'
; update the Y-axis title
options, 'mms'+probe+'_edp_fast_scpot_ln', ytitle='EDP!CFAST!C-ln(scpot)'

;;;;; The following ExB calculations were taken from EVA, 12/10/2015
; ExB
;------------
sc = 'mms'+strcompress(string(probe), /rem)
vthres = 500.
get_data,sc+'_fgm_b_dmpa_srvy_l2',data=B
get_data,sc+'_edp_dce_dsl_fast_l2',data=E,dl=dl,lim=lim
tnB = tnames(sc+'_fgm_b_dmpa_srvy_l2',ctB)
```

Advanced Example

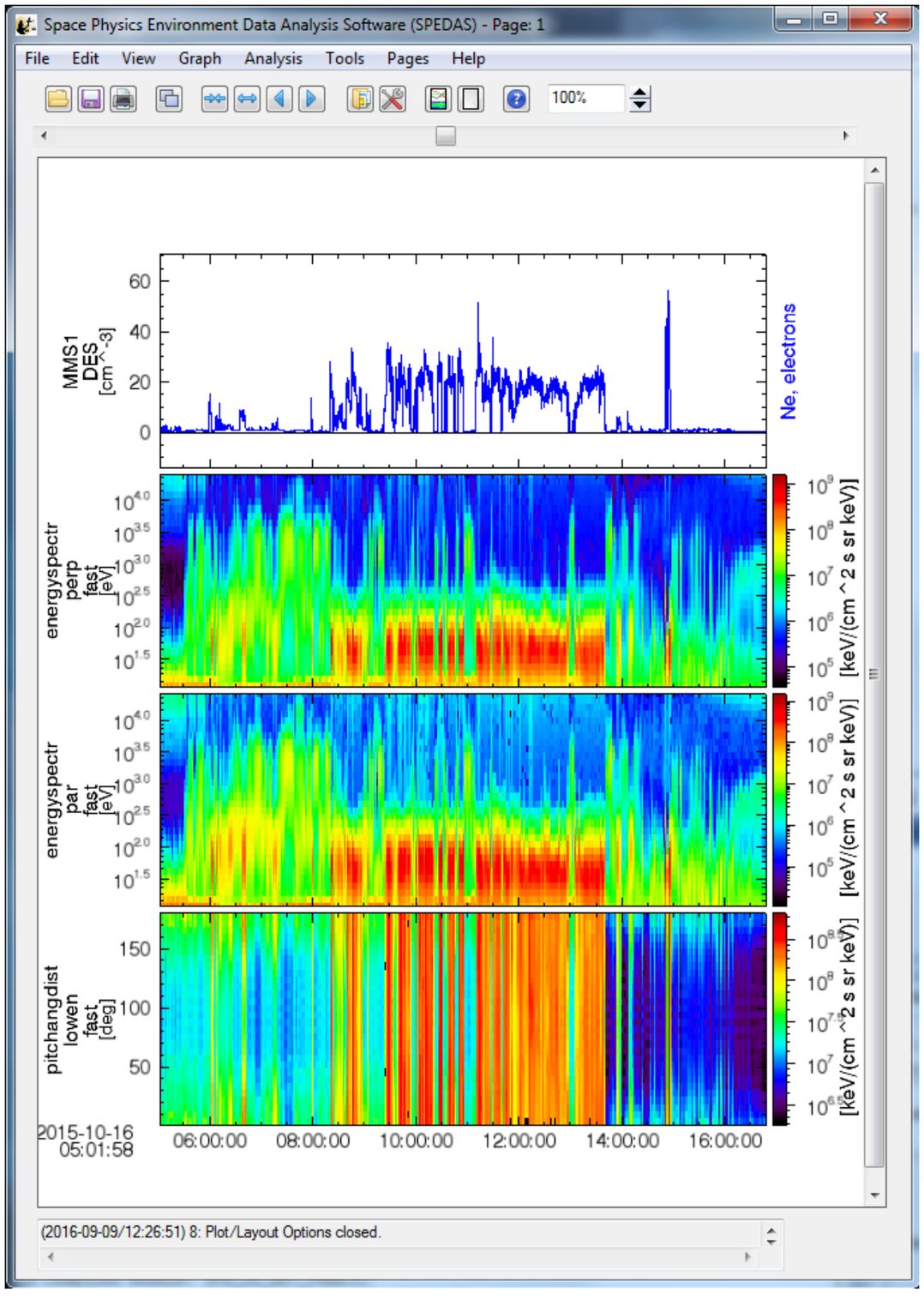


The GUI



spd_gui -> File -> Load Data

The GUI


Space Physics Environment Data Analysis Software (SPEDAS) - Page: 1
File Edit View Graph Analysis Tools Pages Help
100%
MMS1 DES [cm^-3]
Ne, electrons
energyspectr perp fast [eV]
energyspectr par fast [eV]
pitchangdist lowen fast [deg]
[keV/(cm ^2 s sr keV)]
2015-10-16 05:01:58
06:00:00 08:00:00 10:00:00 12:00:00 14:00:00 16:00:00
(2016-09-09/12:26:51) 8: Plot/Layout Options closed.

Getting Help

- spedas.org
- egrimes@igpp.ucla.edu (email me **any time**)
- https://groups.google.com/forum/#!forum/spedas
- 2016 GEM Tutorial - http://spedas.org/mms/mms_gem_2016.pdf (many command line examples)
- This presentation - http://spedas.org/mms/mms_ucla_2016.pdf

Getting Help

- Browse the data at the SDC:

  https://lasp.colorado.edu/mms/sdc/public/data/

- QL plots at the SDC:

  https://lasp.colorado.edu/mms/sdc/public/quicklook/

- More info on MMS data at the SDC:

  https://lasp.colorado.edu/mms/sdc/public/datasets/