SPEDAS and pySPEDAS

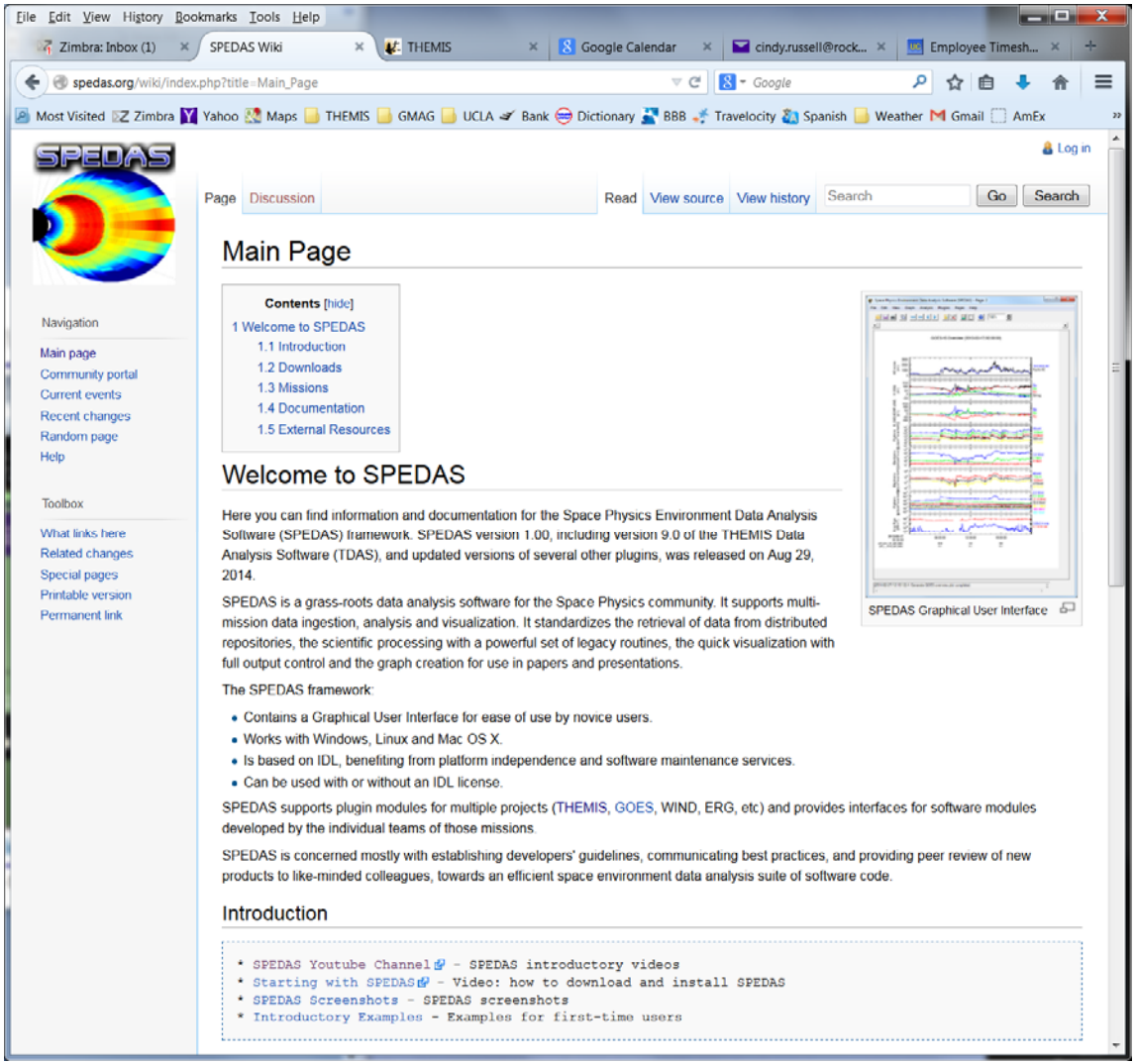
THEMIS/ARTEMIS SWT meeting, Dec 14, 2019, San Francisco CA

Current state of SPEDAS/IDL development

- SPEDAS 3.2 was released in November 2019
- Updated plugin to support ICON mission (FUV, EUV, MIGHTI instruments; still under active development)
- ERG/Arase plugin updated with support for recently released L2 data products, ISEE tool for visualizing 3-d particle distributions
- Load routines for Parker Solar Probe (SWEAP and FIELDS data publicly available for first two encounters)
- Many updates to MMS plugin
- New spd_flipbookify tool for generating series of plots from 2-d slices over a time range
- GUI panel for Minimum Directional Derivative and Spatial Temporal Derivative (MDD/STD)
- Improved ability to import/export data between SPEDAS and Autoplot

SPEDAS Wiki

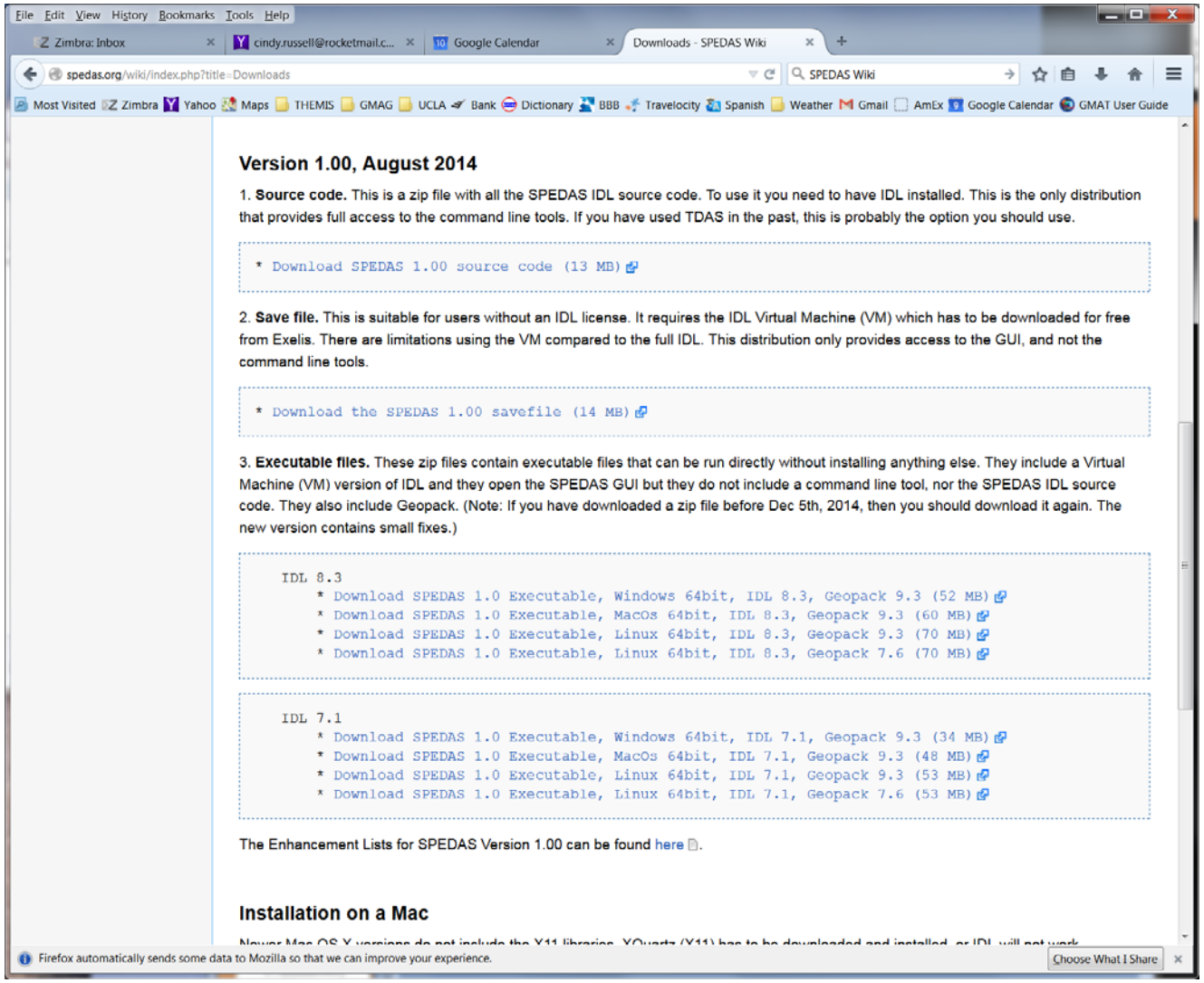
Introduction:
- You Tube Channel
- SPEDAS video
- Introductory Examples
- Screen shots



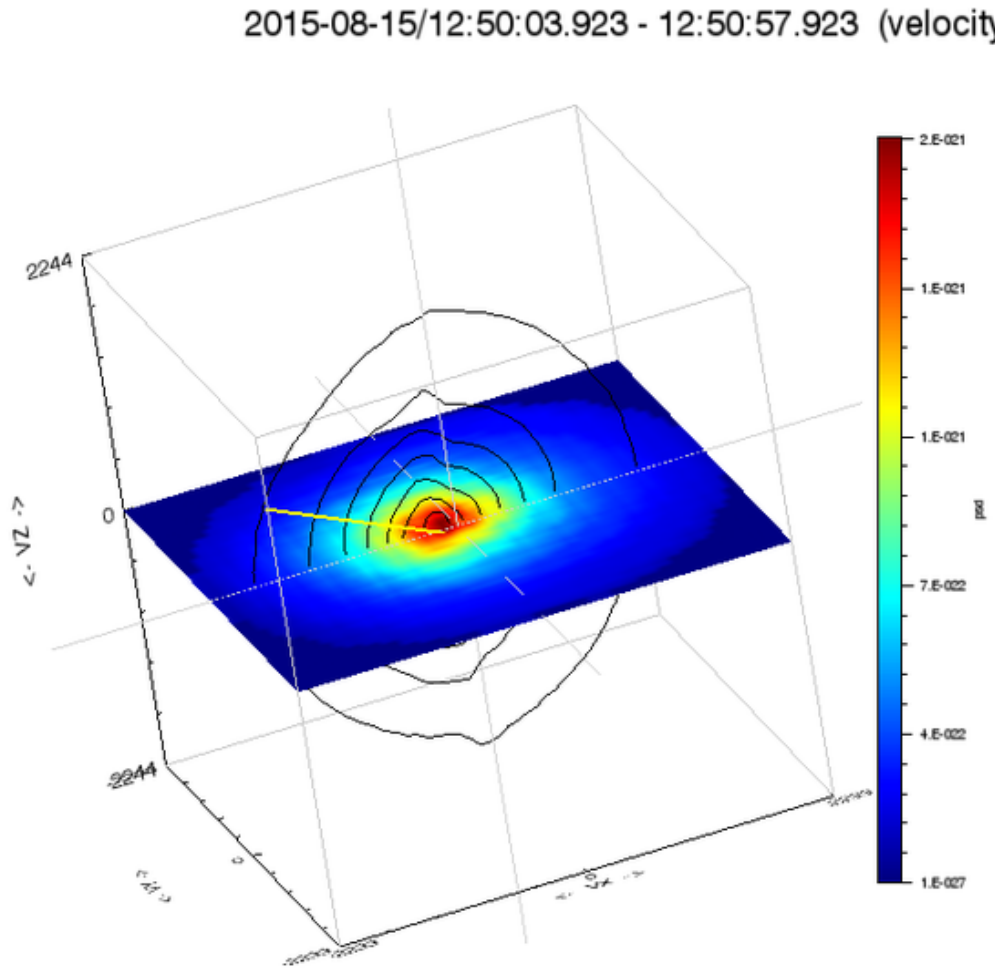
spedas.org/wiki

SPEDAS Downloads

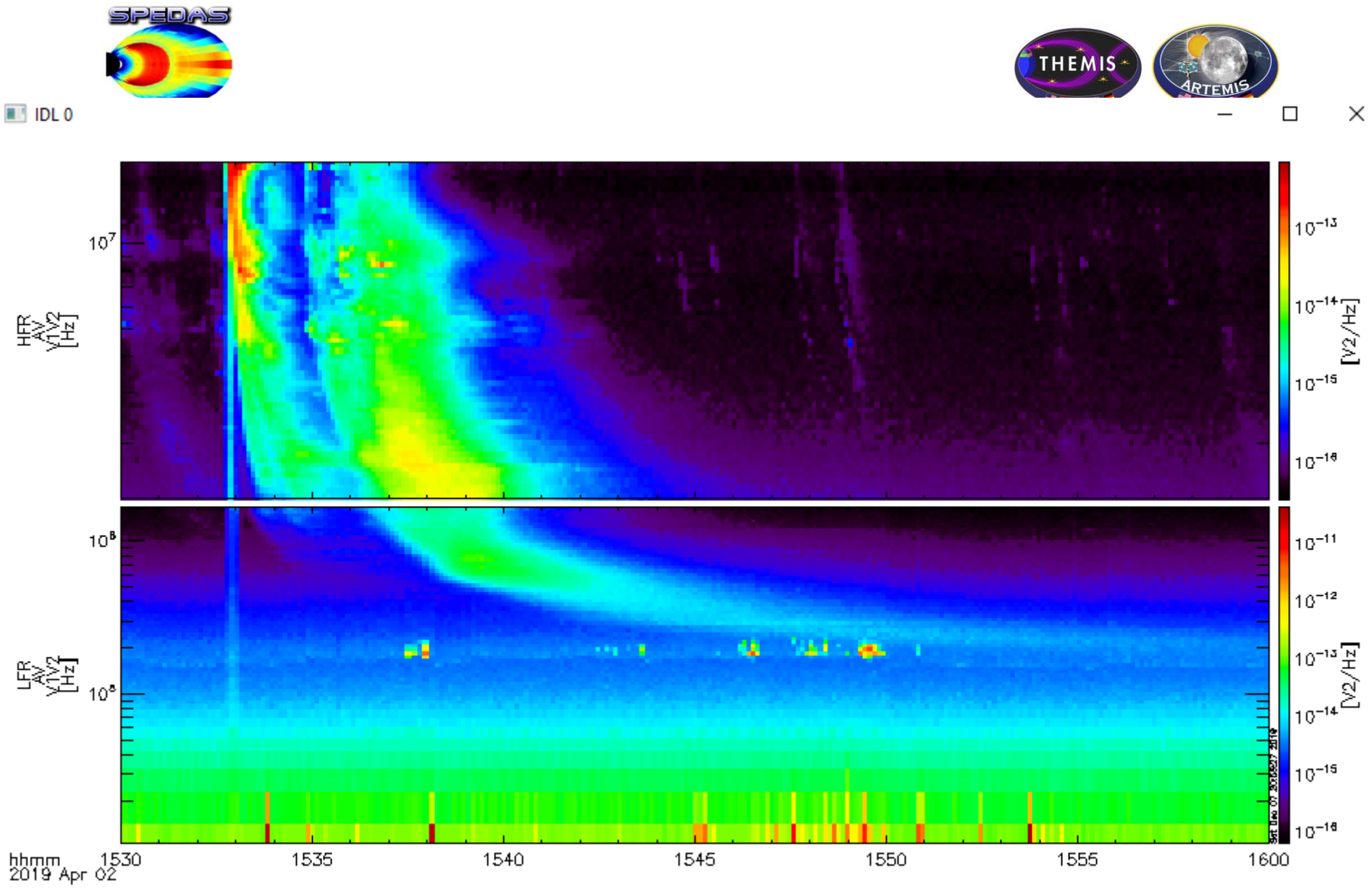
Select:
1.2 Downloads From Main Page



spedas.org/wiki/index.php?title=Downloads


2015-08-15/12:50:03.923 - 12:50:57.923 (velocity)
2244
0
-2244
<- VZ ->
<- VY ->
<- VX ->
2.E-021
1.E-021
1.E-021
7.E-022
4.E-022
1.E-027

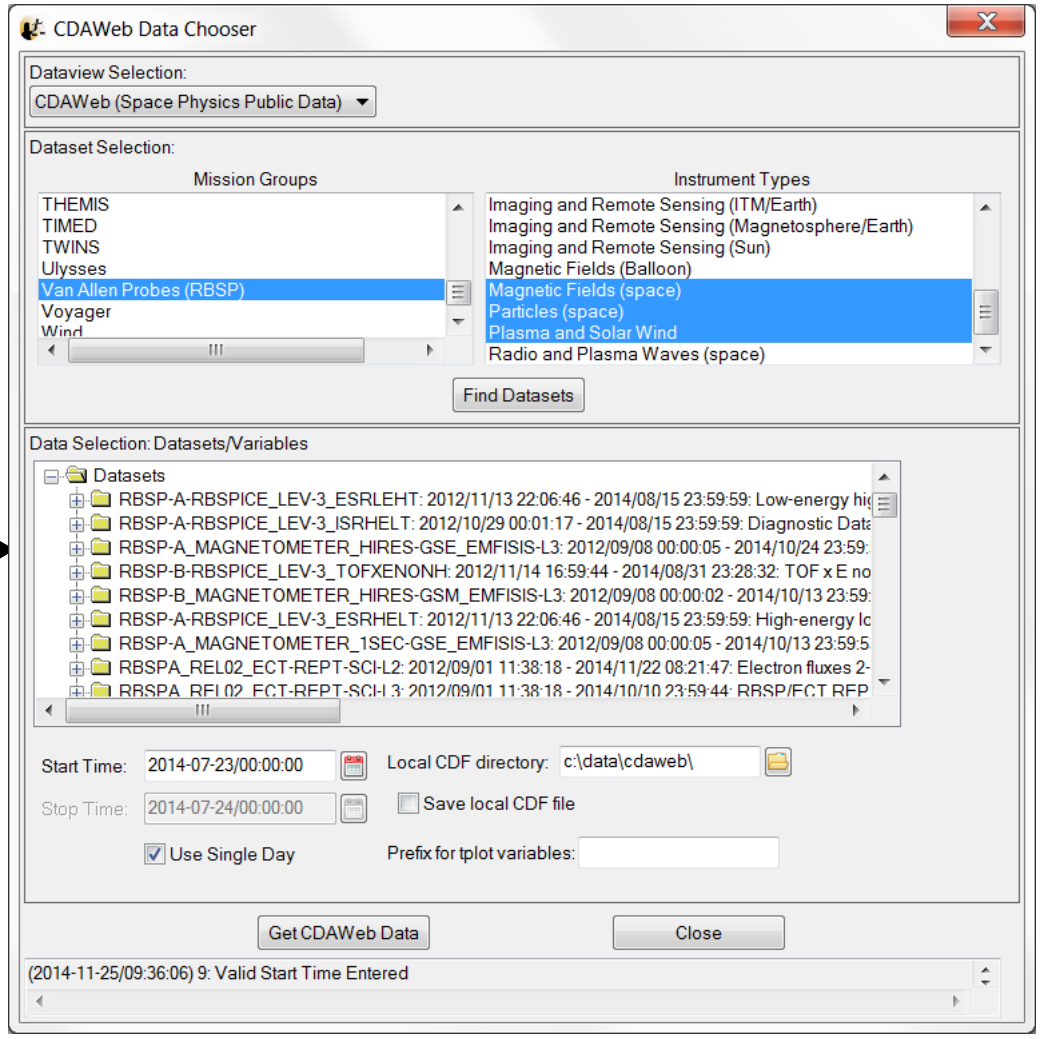
```
; Large radio burst observed during Encounter 2

timespan, '2019-04-02'

psp_fld_load, type = 'rfs_hfr'
psp_fld_load, type = 'rfs_lfr'

tplot, ['psp_fld_l2_rfs_hfr_auto_averages_ch0_V1V2', $
  'psp_fld_l2_rfs_lfr_auto_averages_ch0_V1V2']

tlimit, ['2019-04-02/15:30:00','2019-04-02/16:00:00']
```


IDL 0
HFR AV V1V2 [Hz]
LFR AV V1V2 [Hz]
[V2/Hz]
hhmm
2019 Apr 02
1530
1535
1540
1545
1550
1555
1600

Loading CDAWeb Data

To Load **CDAWeb Data**:

-Select 'Load Data using CDAWeb' under the File menu
- Select Mission Group (i.e., TWINS, Cluster, RBSP, etc.)
- Select the Instrument Type
- Click 'Find Datasets'
- Select variable or dataset to download
- Click 'Get CDAWeb Data'



HAPI: Heliophysics Application Program Interface

- HAPI is a protocol for querying remote catalogs, locating data sets of interest, and retrieving data and metadata matching user requests.
- HAPI is intended to promote interoperability between different data providers, clients, and platforms
- SPEDAS includes command-line and GUI methods for browsing HAPI servers, retrieving data, and loading the results in TPLOT or GUI variables for visualization and analysis

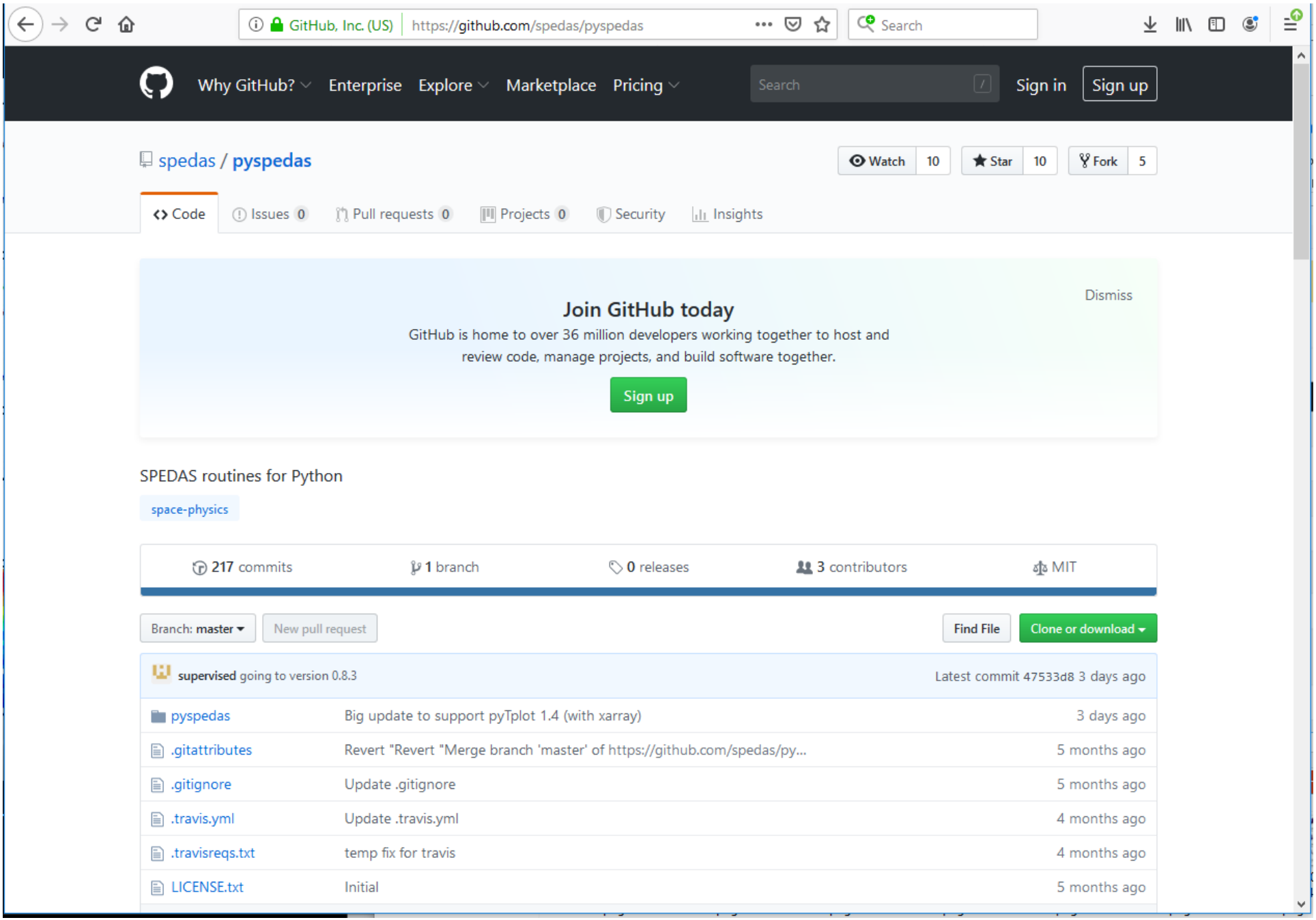
From SPEDAS to pyspedas

Main objectives of pyspedas:

- Develop python-based software similar to the IDL-based SPEDAS.
- Provide a significant subset of the current SPEDAS functionality: automatic downloads and local cache management of data files from remote sources; analysis and plotting tools for space-based and ground-based field, particle, and image data; interface to magnetic field models; rich set of geophysical, geomagnetic, field-aligned, and mission-specific coordinate transformations
- Implement python functions with names and workflows similar to SPEDAS tools (but implemented in a Pythonic way, rather than simply rewriting IDL code in Python)
- Load, analyze and plot data from multiple sources in a common environment
- Easy to install and use.
- Leverage other existing python projects where appropriate, without duplicating their code (examples: cdflib, pytplot), and make SPEDAS code available for easy reuse in other Python-based tools
- Ease learning curve by publishing useful, heavily annotated examples as Jupyter notebooks or other appropriate formats

Current state of pyspedas development

- Currently early beta version.
- Can be easily installed using “pip install pyspedas”.
- Source repository:
  https://github.com/nickssl/pyspedas
- Implements functions to load Themis and GMAG data.
- Implements some of analysis function in SPEDAS (time_clip, tclip, tintepol, subtract_average, etc).
- Requirements:
  - Python 3, Anaconda (optional, recommended).
- Dependencies:
  - Cdflib (CDF file reader), developed by Michael Liu and Bryan Harter,
    https://github.com/MAVENSDC/cdflib
  - Pytplot (Data object, similar to SPEDAS tplot object), developed by Bryan Harter,
    https://github.com/MAVENSDC/PyTplot


GitHub, Inc. (US)
https://github.com/spedas/pyspedas
Search
Why GitHub?
Enterprise
Explore
Marketplace
Pricing
Search
Sign in
Sign up
spedas / pyspedas
Watch 10
Star 10
Fork 5
Code
Issues 0
Pull requests 0
Projects 0
Security
Insights
Dismiss
Join GitHub today
GitHub is home to over 36 million developers working together to host and review code, manage projects, and build software together.
Sign up
SPEDAS routines for Python
space-physics
217 commits
1 branch
0 releases
3 contributors
MIT
Branch: master
New pull request
Find File
Clone or download
supervised going to version 0.8.3
Latest commit 47533d8 3 days ago
pyspedas Big update to support pyTplot 1.4 (with xarray) 3 days ago
.gitattributes Revert "Revert "Merge branch 'master' of https://github.com/spedas/py... 5 months ago
.gitignore Update .gitignore 5 months ago
.travis.yml Update .travis.yml 4 months ago
.travisreqs.txt temp fix for travis 4 months ago
LICENSE.txt Initial 5 months ago

Future development roadmap

- Provide data loaders for other missions.
- Support other data formats (NetCDF, ASCII)
- Support interoperability with other Python packages, by adopting common conventions for data and metadata representations (times, units, data descriptions), and structuring pyspedas code with an eye toward future reuse and repurposing
- Integrate with HAPI and CDAWeb tools.
- Implement more SPEDAS data analysis functions.
- Integrate coordinate transformation functions from other heliophysics Python packages where available, or implement new code as needed
- Create a more stable release.
- Implement the recommendations of the “Heliophysics Python Community Standards Document”.
- Provide some examples as Jupyter Notebooks.