2016 Workshop: Python in Space Science

Long title
Snakes on a Spaceship: Python in Space Science
CEDAR-GEM
Conveners
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Description

The pursuit of system science requires integrating measurements from multiple platforms into a coherent system for analysis. The variety of instrument types and data formats makes this a challenge. Typically these challenges are solved separately by different research teams leading to duplicated efforts. The study of the magnetosphere and the ionosphere as a system would be enhanced if solutions to these problems were made broadly available to the community.

The use of community developed software has found acceptance in Astronomy (astropy) and solar science (sunpy). 'Snakes on a Spaceship' is focused on introducing the Python language, associated tools, and science software packages developed for the CEDAR and GEM community.

Agenda

4:00-4:30 - Introduction to Python (pdf)- Dan Welling - U. Michigan

4:30-4:45 - GeoData and more - John Swoboda and Michael Hirsch - Boston University

Plot and analyze data from geophysics sources such as radar and optical systems. (pdf)

4:45-5:00 - Madrigal and Python - Bill Rideout - MIT

Database of ground-based measurements and models of the Earth's upper atmosphere and ionosphere. (pdf)

5:00-5:15 - DaViTpy - Muhammad Maimaiti - Virginia Tech

Access and visualize SuperDARN (Super Dual Auroral Radar Network) data. (pdf)

5:15-5:30 - SpacePy - Steve Morley - U. Michigan

Tools for Space Science Applications. (pdf)

5:30-5:45 - pysat - Russell Stoneback - University of Texas at Dallas

Space science data analysis across platforms. (pdf)

5:45-6:00 - Panel discussion - hosted by Jeff Klenzing - NASA/GSFC

Python and Space Science

Justification

GEM justification: Geospace systems science

CEDAR justification: strategic thrust #6: manage, mine, and manipulate geoscience data and models

1) How the questions will be addressed. The challenge of performing system science is addressed by teaching the community about the existence and use of open source science software that enables system science

2) What resources exist, are planned, or are needed. Science python software already exists that helps the community achieve these goals, pysat, davitpy, spacepy, madrigal, etc.

3) How progress should be measured. Participation rates in open source science python software. Publications that use community tools can also be tracked.

Summary

Attendance: 70 (40 expected)

The discussion after the presentations was lively and went over by a half-hour.

Pysat issued a friendly challenge to the CEDAR community to add their instrument to pysat.

Members of the community explicitly expressed a desire for a recurring 'Snakes on a Spaceship' CEDAR workshop.

A request was also made for a high-level encompassing CEDAR package, a default package to rally the community around e.g. sunpy, astropy. Pysat and Spacepy self-nominated. There was also debate on the need for a single package. Regardless, more communication among the community and developers is needed at future CEDAR workshops to decide on a path forward and enact upon it.

In the interim a google group page dedicated to Python in Space Science is under construction, and will be advertised to the community via the CEDAR mailing list.

The question of properly citing current software was raised. Some packages such as SpacePy have conference links from previous SciPy conferences. Pysat developers are pursuing a publication at JGR. Nature had a recent article on the need for publications for science software about an NSF project to track science software (http://depsy.org). There are some resources via ORCID (http://orcid.org) to link authorship to software repositories at places like GitHub.

The Data Integration in Geospace Workshop also covered resources for citing software and data

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