Docs: http://docs.sunpy.org/projects/irispy/en/latest/
Code: github.com/sunpy/irispy
Live Demo: https://github.com/DanRyanIrish/irispy_tutorials

IRISpy: Expanding IRIS Data Analysis into Python and Upgrading the Solar Physics Software Paradigm for a New Generation

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What is IRISpy?

IRISpy **is:**

- A **free, open source,** SunPy-affiliated package for reading, manipulating and visualising IRIS **level 2** data in **Python**.
- A gateway for IRIS users to access the greater **scientific Python environment** and a repository for IRIS-specific Python tools.
- A chance to enhance and streamline our software paradigm by evaluating positive and negative aspects of previous aproaches.
- **Community-developed**.
- **Version controlled**.
- Still **in development**, but approaching a stable release.

Warning: *IRISpy is still under heavy development and should not yet be relied upon long term. The API can change at any time. But we are striving towards a stable version. To get involved, see:* http://docs.sunpy.org/projects/irispy/en/latest/

What Can Python and IRISpy Do For IRIS?

This means IRISpy can help:

- Increase the **longevity** of IRIS data analysis as younger scientists and new instruments are increasingly preferring Python;
- Facilitate **cross-instrument collaborations** with instruments which have their analysis tools in Python, e.g. DKIST;
- Help increase the **size** and geographic **diversity** of IRIS's user base by providing free analysis tools in a free language;
- Leverage cross-field **tools not available in IDL**, e.g. machine learning (scikit-learn)
- Make IRIS science more **transparent** and **reproducible** by using version control to enable scientists to easily cite and revert to a specific version of the software.
- Give young scientists a bankable, **transferable skill** for a career beyond solar physics.

Structure of IRISpy

Multiple Spectral Windows

FITS Readers

Reads data into

IRISSpectrograph

Reads data into

Contains within

SJI images from multiple files

IRISMapCubeSequence

IRISSpectrogramCubeSequence

Spectrograms from multiple files

Contains within

Contains within

SJI images from single file

IRISMapCube

Data, **uncertainties**, **coordinate transformations**, **units**, **metadata** from single files

IRISSpectrogramCube

Spectrograms from single file

IRIS tools

Module of IRIS-specific functions, e.g.

- exposure time correction
- Convert unit (DN, photons, radiance)
- IRIS response function

Functionality of IRISpy

Data classes:

- Combine **data** with **pixel-to-world transformations**, **uncertainties,** data **unit**, data **mask, metadata** and **auxiliary data (**e.g. exposure times, measurement times, etc.).
- Unified array-like and real-world-coordinate-based **slicing/indexing API** that **simultaneously** manipulates above properties with a single operation
- Easy-to-use functions to:
  - perform **coordinate transformations**.
  - Data **unit conversion** (DN, photons, radiance)
  - apply/undo **exposure time corrections**
- Simple, unified **visualisation** API that can represent data as:
  - 1D plot or animation (1D spectrum)
  - 2D image or animation (2D spectrogram)

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Time for a demo!

https://github.com/DanRyanIrish/irispy_tutorials

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Learn, Use, and Contribute

To learn more, install and use go to

http://docs.sunpy.org/projects/irispy

To see the code and contribute, go to

https://github.com/sunpy/irispy

Download IRISpy Tutorial

IRISpy tutorial jupyter notebook & sample data now available at:

https://github.com/DanRyanIrish/irispy_tutorials