



SunPy | Plotting a Solar Image in Python

SunPy is a package for solar data analysis using Python. We will be using this package for analysis of solar data

Installation

On the command line type:

```
pip install sunpy
```

Downloading Sample Data

The SunPy package contains a number of data files which are solar data of proton/electron fluxes from various solar observatory and solar labs. They are stored under the module sunpy.data.

To download the sample data simply run the following command:

```
import sunpy.data
sunpy.data.download_sample_data()
```

In this small project, we will see a very simple way to plot a sample AIA image.

AIA = Atmospheric Imaging Assembly (AIA), is another instrument board the Solar Dynamics Observatory(SDO) designed to study the solar corona, taking simultaneous full disc images in multiple wavelengths of the corona and transitional region (up to half a solar radius above the solar limb), with 1.5 arc sec resolution and 12 second temporal cadence or better.

First we try to explore.

Maps: Maps are the primary data type in SunPy they are spatially and / or temporally aware data arrays. There are types of maps for a 2D image, a time series of 2D images or 1D spectra or 2D spectrograms. Making a map of your data is the normally the first step in using SunPy to work with your data.

Creating a Map

SunPy supports many different data products from various sources ‘out of the box’ we shall use SDO’s AIA instrument as an example in this tutorial. The general way to create a map from one of the supported data products is with the sunpy.Map() command.

sunpy.Map() takes either a filename, list of filenames data array and header. We can test map with:

```
import sunpy
aia = sunpy.Map(sunpy.AIA_171_IMAGE)
```

This returns a map named aia.

Plotting a sample solar data file

Let’s begin by creating a simple plot of an AIA image. To make things easy, SunPy includes several example files. These files have names like sunpy.AIA_171_IMAGE and sunpy.RHESSI_IMAGE.

```
from sunpy.data.sample import AIA_171_IMAGE
import sunpy.map

# We now create the Map using the sample data.
aiamap = sunpy.map.Map(AIA_171_IMAGE)

# Now we do a quick plot.
aiamap.peek()
```

Output

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