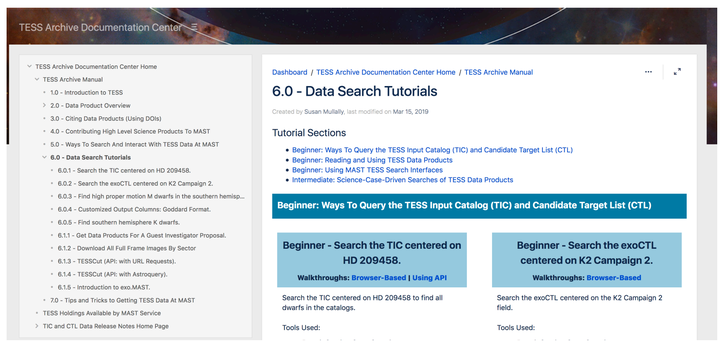
Data Products and Data Retrieval via Python Notebook Tutorials

https://github.com/spacetelescope/notebooks

TESS Tutorials are listed and described in the TESS Archive Manual.



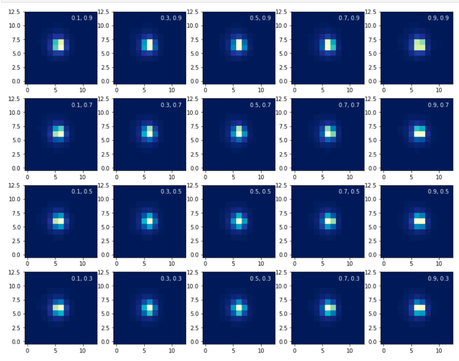
WHAT'S NEW?

Notebook that explores the TESS Pixel Response Function Model

Sample the PRF at sub-pixel locations.

The PRF varies quite a bit depending on where on the pixel the star's light falls. As a result it is instructive to plot the PRF for one pixel at var locations. In the following we show a 5x5 grid of the prf above. Note that there are actually 9 different intra-pixel locations provided in the TE: Here we plot them on a linear scale because most of the variation is in the brightest pixels of the PRF.

```
In [11]: # Define the location for which we want to retrieve the PRF.
         col = 125.0
         row = 1044.0
         ccd = 2
         camera = 2
         sector = 1

         # This is the directory where MAST stores the prf FITS files.
         path = "https://archive.stsci.edu/missions/tess/models/prf_fitsfiles/"

         kwargs['vmax'] = .2
         plt.figure(figsize = (14, 14))

         # Loop over the 5 different locations
         nplot=0
         for row_add in np.arange(0.9, 0, -.2):
             for col_add in np.arange(0.1, 1, .2):
                 nplot=nplot+1
                 plt.subplot(5,5,nplot)
                 prf = getPrfAtColRowFits(col + col_add, row + row_add, ccd, camera, sector, path)
                 plt.imshow(prf, **kwargs)
                 plt.annotate("%.1f, %.1f" % (col_add, row_add), (8, 11), color='w')

         _ = kwargs.pop('vmax')  #unset vmax
```



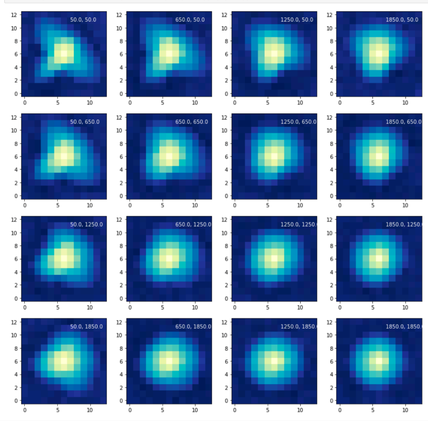
Sample of PRFs across the chip

Let's plot the PRF across a single CCD to show how it varies. The PRF images are plotted using a log scale to see the difference in the wings of the PRF.

Notice that the nice round PRF shape is in the corner of our grid, near (1850,1850). This is because there are 4 CCDs for each camera and so this location is nearest to the center of the focal plane and has the least optical distortion. Note that the read-out direction of the CCDs is different for each CCD. See Figure 2.6 of the Instrument Manual to determine the actual orientation of each CCD.

As an experiment you should change the ccd value see how it varies from one CCD to another across the TESS field-of-view.

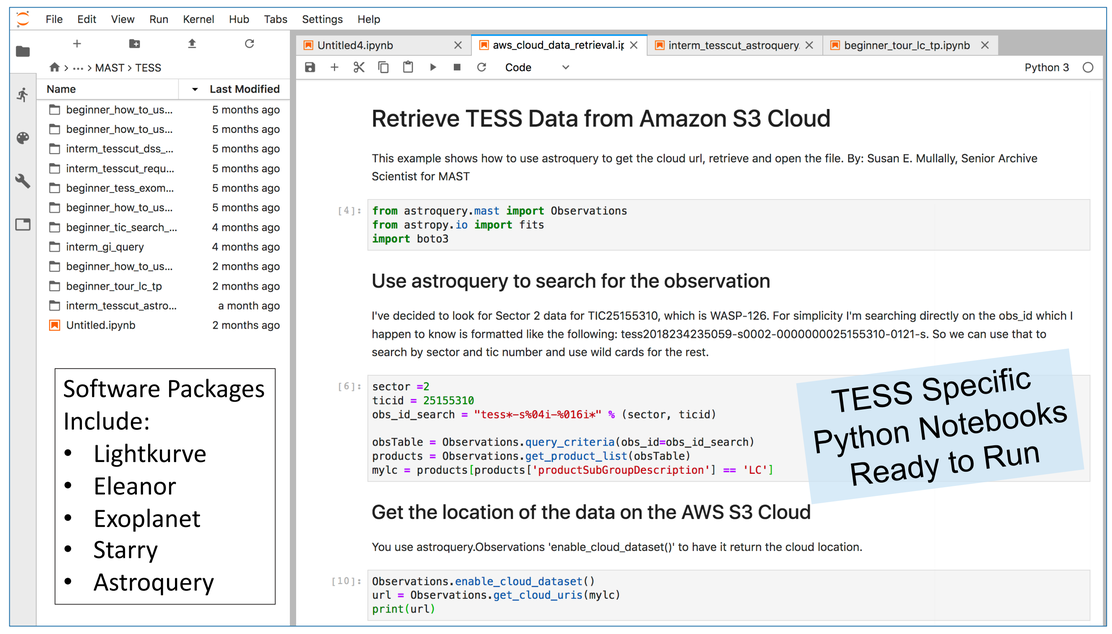
```
In [10]: # Define the CCD for which we want to retrieve the PRFs
         sector = 1    #Values 1 - 13
         camera = 3    #Values 1 - 4
         ccd = 1       #Values 1 - 4

         # Create plot
         plt.figure(figsize=(14, 14))
         plt.title('Intra Pixel PRF')

         # Loop over the 25 different locations
         nplot=0
         for row in np.arange(50, 1851, 600):
             for col in np.arange(50, 1851, 600):
                 nplot=nplot + 1
                 plt.subplot(4, 4, nplot)
                 prf = getPrfAtColRowFits(col + .5, row + .5, ccd, camera, sector, path)
                 plt.imshow(np.log10(prf), **kwargs)
                 plt.annotate("%.1f, %.1f" % (col, row), (7, 11), color='w')
```



Data Analysis on the Cloud via TESS Science Platform

https://tessworkshop.science.stsci.edu

JupyterHub software platform running on Amazon installed with common TESS software tools.



Software Packages Include:
- Lightkurve
- Eleanor
- Exoplanet
- Starry
- Astroquery

TESS Specific Python Notebooks Ready to Run

To gain access:
- Go to https://tessworkshop.science.stsci.edu
- Login with your MyST account.
- Copy /opt/notebooks/ to home directory.

Try out the Platform, Give Feedback

Email Susan Mullally at smullally@stsci.edu (all 4 els) to get further instructions and join those Beta testers providing feedback on features they would like to see on this platform.

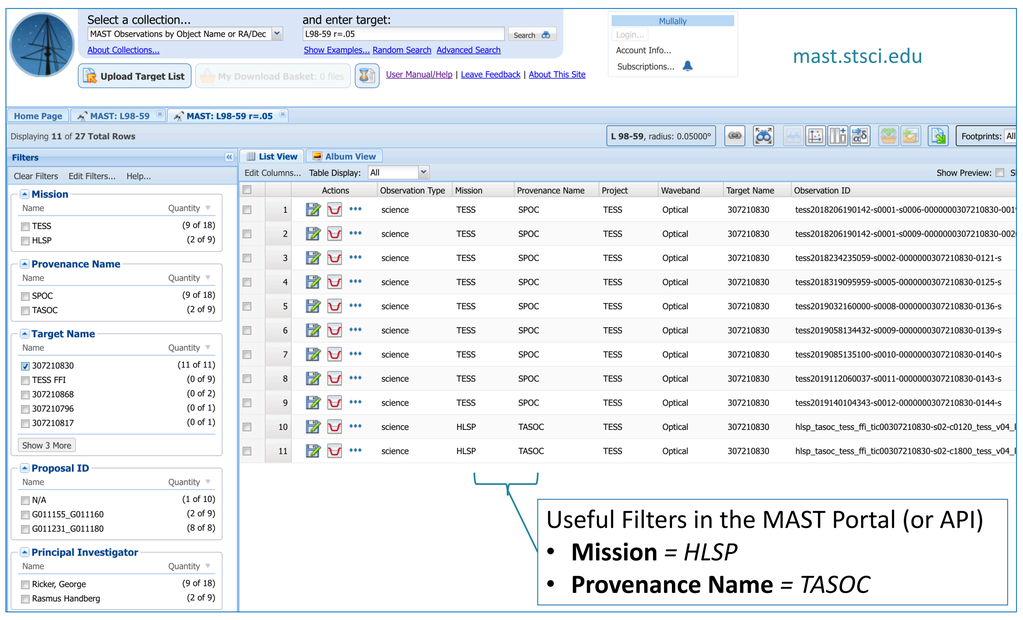
Enabling TESS Science at the MAST

https://archive.stsci.edu/tess

Access to Community Data Products via HLSPs

https://archive.stsci.edu/hlsp/

High Level Science Products are community provided data products.
MAST archives them and makes them available alongside the mission data.



Useful Filters in the MAST Portal (or API)
- **Mission** = *HLSP*
- **Provenance Name** = *TASOC*

WHAT'S NEW?

1.7 million FFI Light Curves from T'DA Sectors 1&2

TESS Data For Asteroseismology Lightcurves (TASOC)

Primary Investigator: Rasmus Handberg

HLSP Authors: Rasmus Handberg, Mikkel Lund, Daniel Huber

Released: 2019-06-10

Updated: 2019-06-10

Primary Reference(s): Lund et al. 2015 & Lund et al. 2017

DOI: 10.17909/t9-4smn-dx89

Citations: See ADS Statistics

Read Me

archive.stsci.edu/hlsp/tasoc/

The TESS Asteroseismic Consortium (TASC) provides this HLSP. The data platform is known as the TESS Asteroseismic Science Operations Center (TASOC). The TASC partakes in a coordinated activity called "TESS Data For Asteroseismology" (T'DA), which produces data products for the TASC.

Access to TESS exoplanets via EXOMAST

https://exo.MAST.stsci.edu

FYI: All TESS TCEs are available in exo.MAST, named by TIC ID, sectors searched and number.

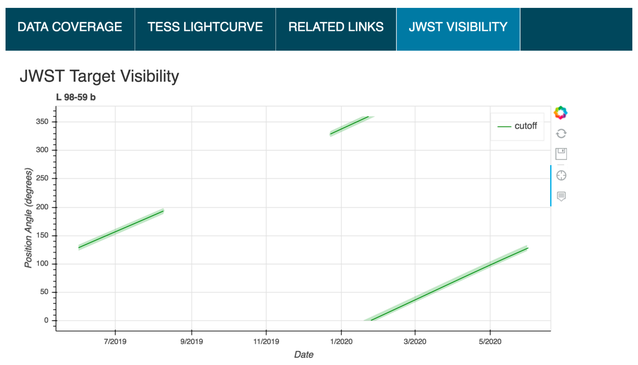
Hint: You can retrieve and embed these bokeh plots. See TESS Exoplanet Python Tutorial Notebook.

WHAT'S NEW?

Exoplanet Characterization Toolkit

ExoCTK

Links to JWST observation planning tools from the Exoplanet Characterization Toolkit.



Show in the Exoplanet Characterization Toolkit: Contamination Overlap | JWST Groups and Integrations

PandExo: HST | JWST

What can MAST do to help enable your science in the extended mission?

Poster by Susan E. Mullally, @mustaric, smullally@stsci.edu

Please come find me if you have questions about the MAST Archive.

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