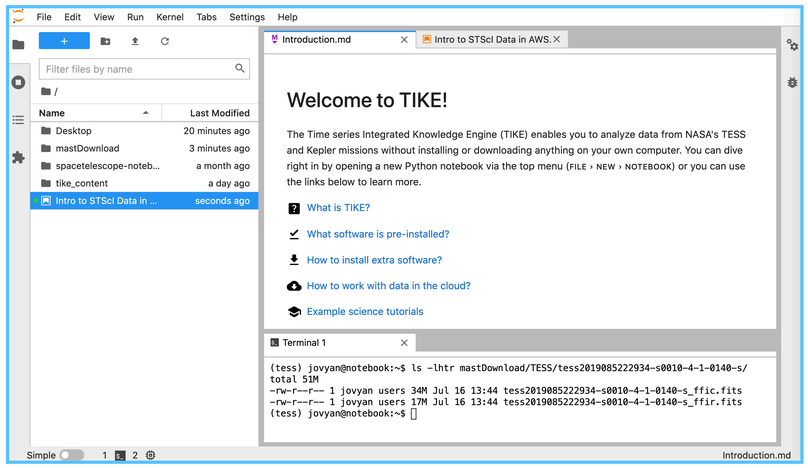
The Timeseries Integrated Knowledge Engine (TIKE): cloud-based user interface for analysis of TESS mission data.

TIKE Science Platform

Coming in 2021! (stay tuned)

- Over 20 pre-installed community software packages
- Tutorials and example notebooks
- JupyterHub service in same region as MAST AWS Public Datasets: free, high bandwidth to TESS data



MAST AWS TESS data now free to transfer

https://registry.opendata.aws/collab/stsci/

- MAST AWS data no longer uses "requestor pays"
- Astroquery (>= 0.4.2) and other clients no longer need AWS credentials
- High-throughput data access anywhere (cloud or not)

We can use astroquery.MAST to search and filter data products, return the S3 paths, and download them.

For astroquery >= 0.4.2, *no AWS account is required*

```
from astroquery.mast import Observations

#Identify a few Sector 10 FFIs
obsTable = Observations.query_criteria(obs_id=f"tess-s0010-4-1")
products = Observations.get_product_list(obsTable)
filtered = Observations.filter_products(products[0:10],
                                        productSubGroupDescription="FFIC",
                                        mrp_only=False)
f"Found {len(filtered)} products"
```

```
'Found 5 products'
```

```
#Return the AWS S3 locations (URIs)
Observations.enable_cloud_dataset(provider='AWS')
uris = Observations.get_cloud_uris(filtered)
print(uris[0])
```

```
INFO: Using the S3 STScI public dataset [astroquery.mast.cloud]
s3://stpubdata/tess/public/ffi/s0010/2019/085/4-1/tess2019085222934-s0010-4-1-0140-s_ffic.fits
```

```
#Download a few example products
manifest = Observations.download_products(products[0:2], cloud_only=True)
```

```
Downloading URL s3://stpubdata/tess/public/ffi/s0010/2019/085/4-1/tess2019085222934-s0010-4-1-0140-s_ffic.fits to
./mastDownload/TESS/tess2019085222934-s0010-4-1-0140-s/tess2019085222934-s0010-4-1-0140-s_ffic.fits ... [Done]
Downloading URL s3://stpubdata/tess/public/ffi/s0010/2019/085/4-1/tess2019085222934-s0010-4-1-0140-s_ffir.fits to
./mastDownload/TESS/tess2019085222934-s0010-4-1-0140-s/tess2019085222934-s0010-4-1-0140-s_ffir.fits ... [Done]
```

```
#Print local file location
print(manifest)
```

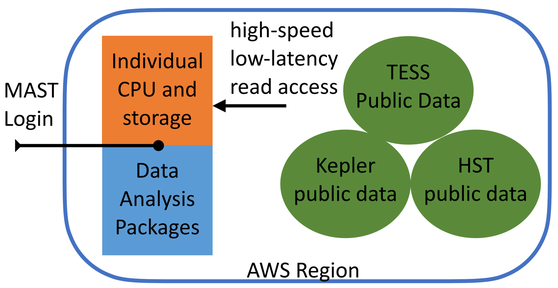
```
                                          Local Path                                          ...
______________________________________________________________________________________________ ...
./mastDownload/TESS/tess2019085222934-s0010-4-1-0140-s/tess2019085222934-s0010-4-1-0140-s_ffic.fits ...
./mastDownload/TESS/tess2019085222934-s0010-4-1-0140-s/tess2019085222934-s0010-4-1-0140-s_ffir.fits ...
```

Initial focus on timeseries analyses, e.g. TESS, Kepler

Pre-installed Python packages

- Core scientific packages: numpy, scipy, matplotlib, pandas.
- Core astronomy packages: astropy, astroquery, pyvo.
- Data analysis packages: emcee, george, celerite.
- TESS- or Kepler-focused packages: lightkurve, astrocut, everest.
- Machine learning: tensorflow, scikit-learn.
- Cloud tools: awscli, boto3, s3fs.

Quickly visualize TESS & Kepler data



Computing adjacent to MAST AWS datasets

Access TESS data without transferring it over internet

The table below shows the typical time it takes to sequentially download 30 TESS Full Frame Images (~1 GB) in different environments. These results are a snapshot obtained at a single point in time on Feb 3, 2021.

Environment	Data location	Client	Time	Speed	Diff
TIKE platform	AWS	boto3	9s	907 Mbps	1x
TIKE platform	AWS	httpx	16s	510 Mbps	2x
TIKE platform	MAST	httpx	1m13s	112 Mbps	8x
WiFi	AWS	boto3	5m49s	23 Mbps	39x
WiFi	AWS	httpx	11m31s	12 Mbps	77x
WiFi	MAST	httpx	14m05s	10 Mbps	94x

STScI is hiring!

e.g. Scientist to support TESS archive (Aug 20, 2021)
https://jobregister.aas.org/ad/144258c4

Link to full STScI Job board

Greg Snyder
Susan Mullally, Geert Barentsen (NASA Ames), Clara Brasseur, Scott Fleming, Joshua Peek, Ivelina Momcheva, Andrew Cortese, Michael Fox, Michael Gough, Brian Hayden, Ru Kein, Jacob Matuskey, Todd Miller, Christine Slocum