

## 7.0 - Tips and Tricks to Getting TESS Data At MAST

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## Using Astroquery to Find Data

[Astroquery](#) is a convenient, programmatic way to filter all of MAST holdings and retrieve your desired data files.

Using it effectively means understanding how the TESS data is represented in the MAST Observations database (the Common Archive Observation Model, CAOM). All data at MAST is split into observations. Each of those observations has several data files associated with them. Once you have the observation ID, you can request a list of data products. Thus most searches for MAST data through Astroquery require two filters, one on the observations level and one for the data products. These tables provide useful information about the fields you might use for those queries. Please see the [CAOM fields list](#) and [data products fields](#) for the complete list of filters.

### Observations

Filter	Field Name	How it is used for TESS
Observation ID	obs_id	<b>FFI:</b> tess-s0001-4-2, where the 0001 is the sector, the 4 is the camera, and 2 is the CCD  <b>Postage stamp:</b> the name is based on the file name and encodes the TIC ID and Sector Information.  <b>Multi-sector DV:</b> tess2018206190142-s0001-s0009-0000000141942911-00205, the range of the sectors searched and TIC ID is encoded.  <b>Fast-cadence or 20s data:</b> tess2020186164531-s0027-0000000259886373-0189-a_fast.
Proposal ID	proposal_id	The Guest Investigator IDs are provided in this column. They are stored in a string with underscores separating them.  <i>e.g. G011183_G011132_G011048_G011250</i>
Sector	sequence_number	Sector number is stored in this field as an integer. For multi-sector observations, the last sector of the search is stored.
Data Product Type	dataprodut_type	<b>FFI:</b> "image"  <b>postage-stamp:</b> "timeseries"
Target Name	target_name	<b>postage-stamp:</b> The integer TIC ID is given.  <b>FFI:</b> "TESS-FFI" is always the value.

### Astroquery Example

```
#To get back all Observations containing TESS Mission light curves from sector 14

from astroquery.mast import Observations
obs = Observations.query_criteria(obs_collection = 'TESS', sequence_number = [14], dataprodut_type =
"timeseries")

#To get back 20-second, fast-cadence TESS Observations from sector 27
obs_fast = Observations.query_criteria(obs_collection = 'TESS', sequence_number = [27], t_exptime = [20],
dataprodut_type = "timeseries")
```

### Data Products Filter

Filter	Field Name	How it is used for TESS Data
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Minimum Recommended Product	mrp_only	When set to True you only get the most common data products. They are:  <b>postage-stamp:</b> light curve files and target pixel files.  <b>FFI: <i>There are no MRPs.</i></b>
Product Type	product_type	<b>postage-stamp:</b> "timeseries"  <b>FFI:</b> "image"
Description	description	Choices are":  <ul style="list-style-type: none"> <li>• calibrated full frame images</li> <li>• uncalibrated full frame images</li> <li>• Light curves</li> <li>• Target pixel files</li> </ul>
Data File Type	productSubGroupDescription	<ul style="list-style-type: none"> <li>• FFIR - raw FFIs</li> <li>• FFIC - calibrated FFIs</li> <li>• TP - Target pixel files</li> <li>• LC - Light curves</li> <li>• DVR - Data validation report (includes pdf report and xml file)</li> <li>• DVS - Data validation summary</li> <li>• DVT - Data validation timeseries</li> <li>• DVM - Data validation mini report</li> <li>• FAST-TP - fast cadence target pixel files</li> <li>• FAST-LC - fast cadence light curve files</li> </ul>

## Common Problems when Using the MAST Portal for TESS

Problem	Solution
There are no FFIs in the basket to Download.	<ol style="list-style-type: none"> <li>1. You must click on Minimum Recommended Products on the left. None of the FFIs are listed as a MRP.</li> <li>2. Consider downloading the FFIs through Bulk Downloads or the API.</li> </ol>
I asked for a certain TIC ID, but it showed me products for a different part of the sky.	You must include the catalog name when you do a cone search, i.e., "TIC 100100827". Otherwise, your number may match another catalog, like the K2 EPIC Catalog.
I find no data when I do a cone search at the center of the Camera's Field of View.	The 4 CCDs per camera do not have continuous coverage. If you add a fairly large radius to your cone search, you will then overlap all four CCDs. For example, try Camera 4 by typing the following into the Portal's search box, <i>90.0042, -66.5647 r=2 d</i>
Why are there two observations for the same Sector and TIC ID?	Likely, the Pipeline found a TCE in a multi-sector data search. Multi-sector data get their own row in the MAST Portal. However, there are no lightcurve or target pixel files associated with that observation, only data validation products.

## CasJobs Information

[CasJobs](#) is a great way to do a large, sql search on the TESS Input Catalog. Here are the tables of interest once logged in.

Context/Table	
TIC_v81/catalogRecord	TESS Input Catalog v8.1
TIC_V81/catalogRecordV80Values	290 rows as they appeared in TIC v8.0