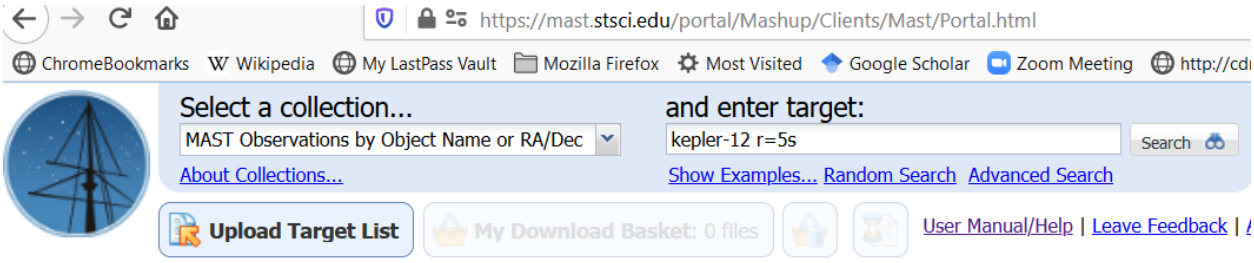
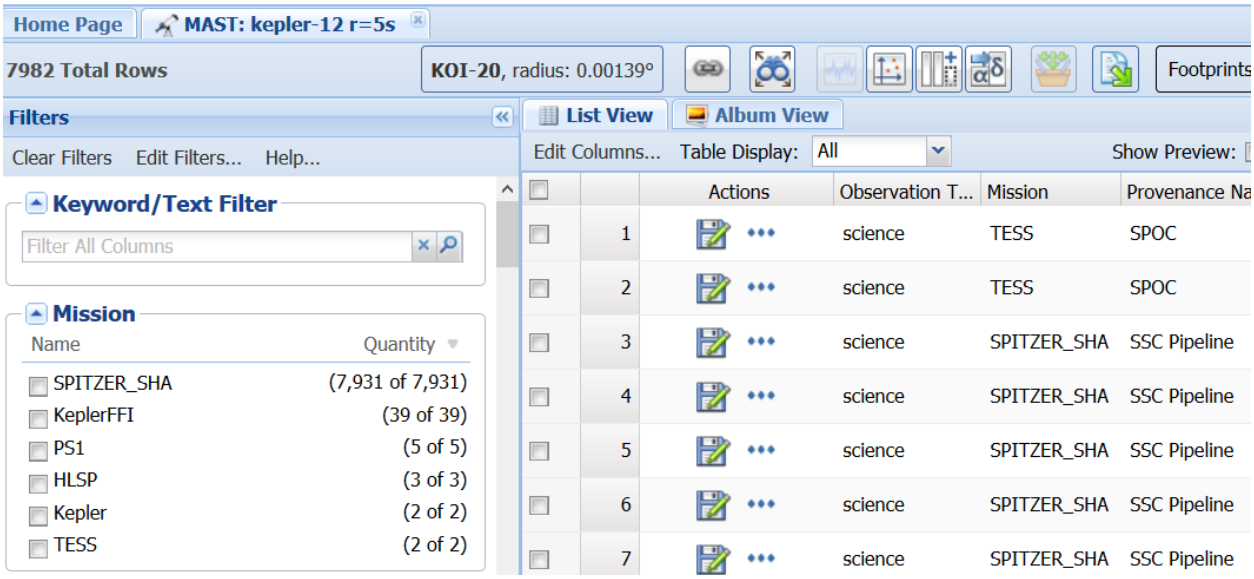
INSTRUCTIONS FOR USING THE KEPLER/TESS FITS v2.0 FILE VStar PLUG IN

With the availability of the TESS light-curves, this plugin now handles Kepler, K2 and TESS light-curve files. In addition, there is now a unified MAST portal that allows you to download Kepler, K2 and TESS light-curves along with many other data products from these and other missions. The portal is well documented. Therefore, this document simply provides a quick start in the form of three examples.

Kepler Exoplanet Example

On the MAST portal, enter the target name and search radius. The default radius is 0.2 degrees, so you usually want something smaller. Try using a radius of 5 arcsec for the exoplanet Kepler-12 – "kepler-12 r=5s".





There is a very long list of results. We are looking for light-curve results from Kepler. Select the Kepler Mission and you should now see two light-curve results. Download the first of these two by clicking the top diskette icon.

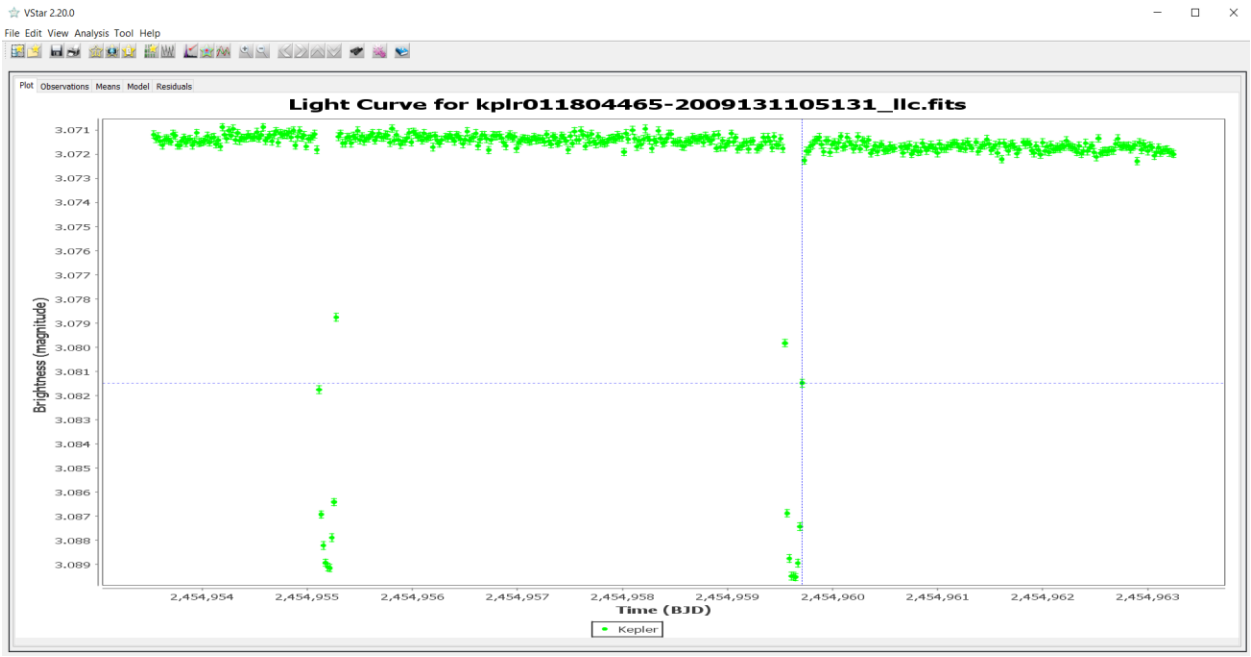
Inside the downloaded ZIP file is a dictory tree with PDF files and a TAR file at the lowest level. The PDF files contain reports on the observations. The TAR file contains the light-curves. Extract the files with "tar". This command is available on Linux, MacOS and current versions of Windows. For the latter, use the command line Windows program and issue the command

>tar xf kplr011804465_lc_Q111111110111011101.tar

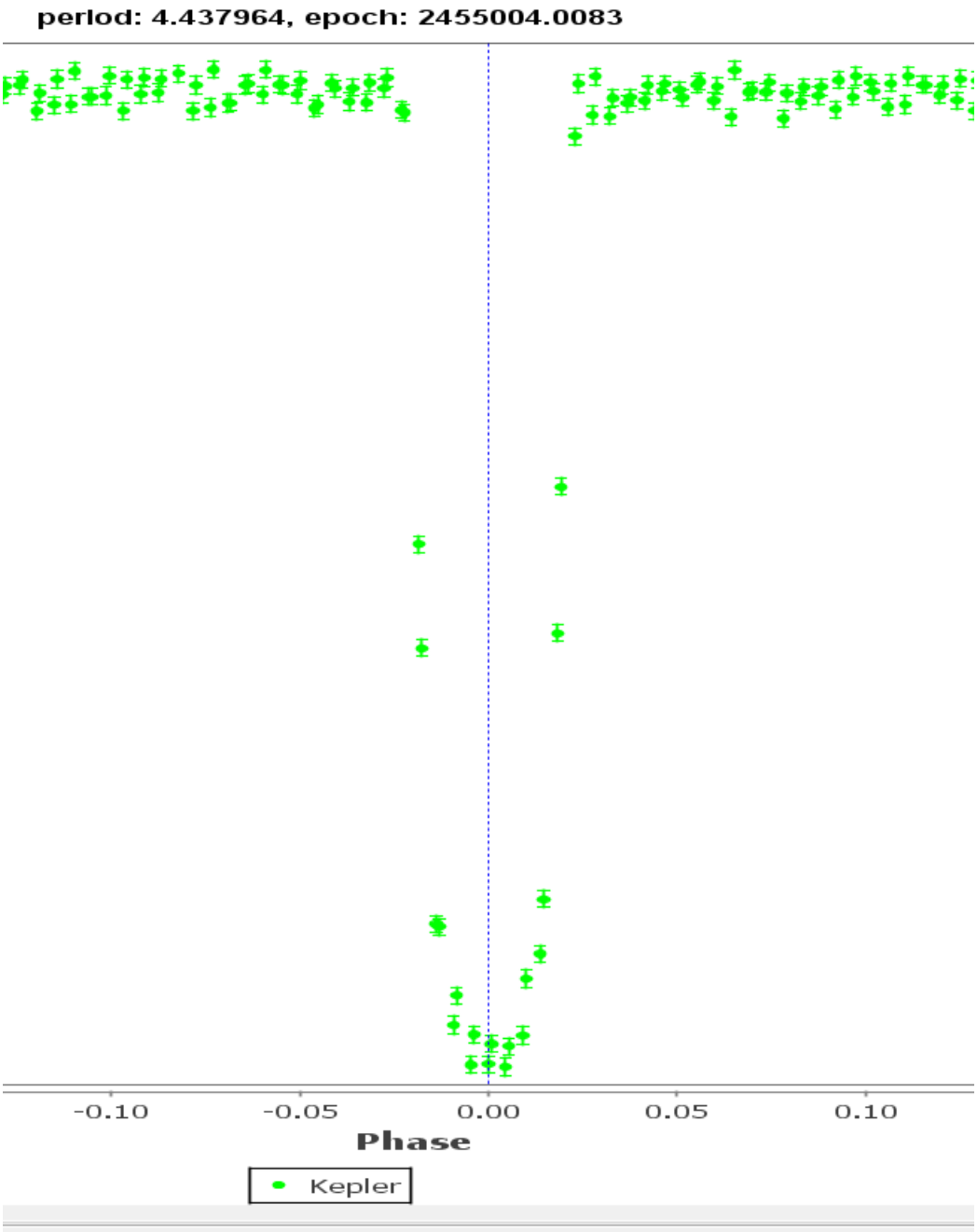
You will now find a set of FITS files with the light-curves for various dates in the folder 011804465.

Now comes the easy part. Select New Star From Kepler/TESS FITS v2.0 from the file drop down list.

Then select one of the extracted FITS files



Using the epoch and period from VSX, you can get a phase plot:



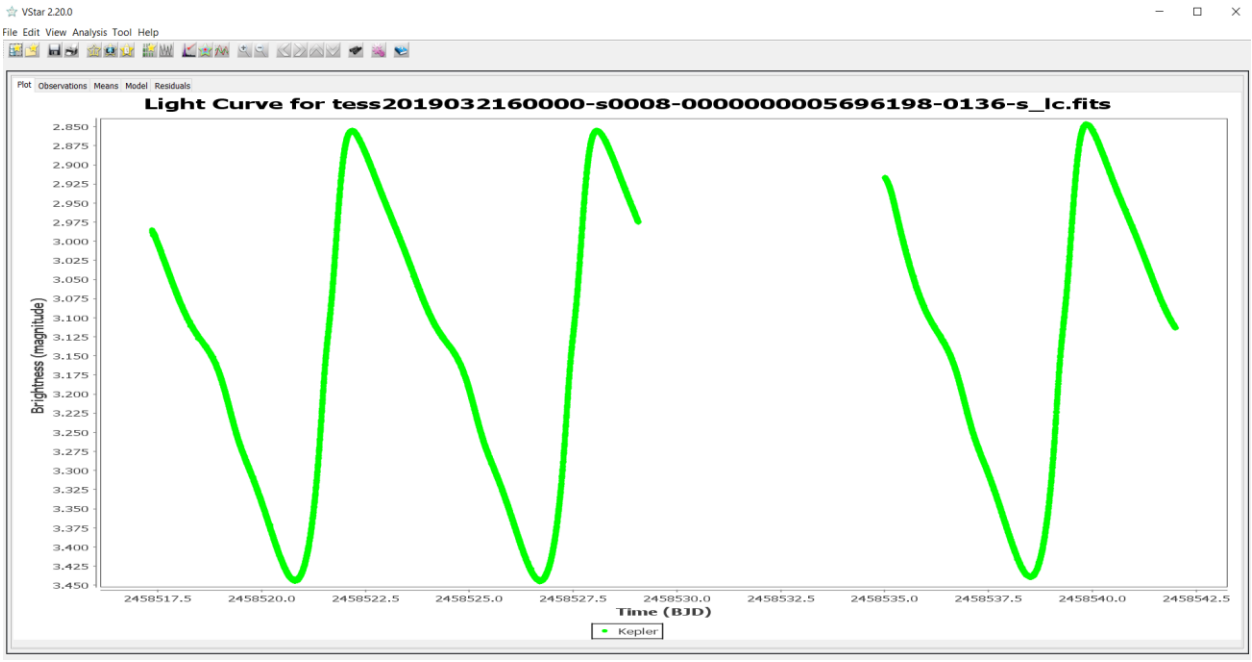
If you want to add Kepler Data files together you can use the “Add to Current” check box at the top right of the open file dialog.

Kepler data is NOT restricted to Kepler exoplanet objects of interest. You can find data on essentially any star in the field, certainly any star that was in the Kepler input file. Also ASAS imaged most of the field for about 6 months in 1999 in preparation for the Kepler mission. You can cross index ASAS and Kepler IDs for objects in the field.

TESS T Antliae (T Ant) Cepheid Example

Now we want to see what TESS observed for the classical Cepheid T Ant. When using TESS, you must be aware that this is an all-sky survey mission with a large angle of the sky contained in each camera pixel – 21 arcsec. An aperture just 3 pixels wide contains a full arcmin. To determine if we are likely to get a measure of T Ant by itself, search VSX for all variables within 1 arcmin of the coordinates for T Ant – "09 33 50.86 -36 36 56.8". We find there are no others.

On the MAST portal, enter target "T Ant r=5s". Select the TESS mission to narrow the result set and you should see three light-curve results. Click on the light-curve icon for first of these. You are told there is no timeseries data, so we cannot use this one. Download the second one and, as before, extract the ZIP. This time, there is no TAR – the light-curve FITS is at the lowest level. It is the file ending in "s_lc.fits"

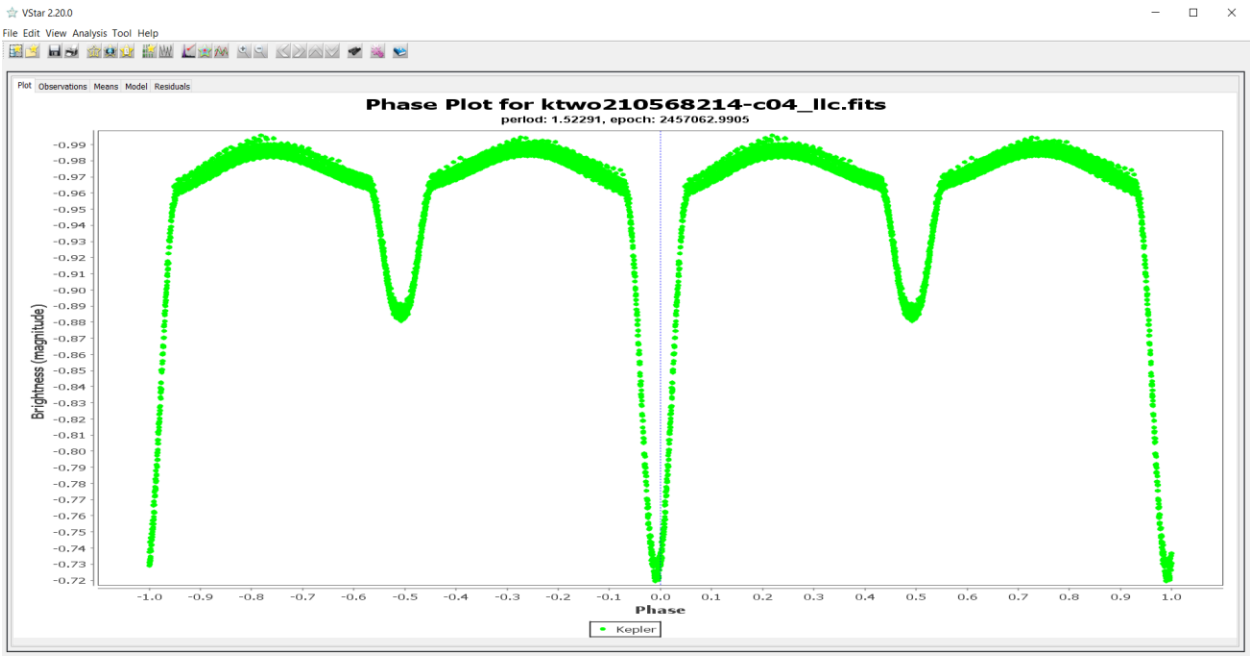


Note that while the brightness axis is in magnitudes, it is simply a calculation from the flux contained in the FITS file with an arbitrary zero point.

K2 Eclipsing Binary Example ASAS J035812+1629.7

Looking at VSX for the Algol type EB, ASAS J035812+1629.7 we see two other names that start with "EPIC". These indicate K2 observations. If we try the MAST portal for ASAS J035812+1629.7, we are told it cannot resolve that name. We can use coordinates or one of the VSX other names – EPIC, HD, etc. Use "HD 285322,r=10s". Limit the result set by picking the K2 mission.

Download the one with Provenance Name (source) K2. Unzip the file and at the lowest folder is the light-curve file - ktwo210568214-c04_llc.fits. Opening it and doing a phase plot yields this



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Revision History

Rev	Date	Description
A	6/7/2014	Initial Release
B	6/8/2014	Added item 10
C	6/9/2014	Added Footnote 1, changed text in item 10 describing locations of the “Search” buttons and added revision history
D	6/9/2014	Correct item 10
E	6/10/2014	Correct item 7 & add page numbers
F	11/7/2018	Alter intro to add instruction for either Kepler or K2 (C. Kotnik)
G	1/8/2020	TESS and MAST portal rewrite. (C. Kotnik)