Imaging stars with a known exoplanet

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In Chapter 3 of his book 'Exoplanet Observing for Amateurs', Bruce Gary describes a project which might be of interest - Bright Transiting Exoplanets (BTEs) – which he defines as host stars brighter than mag 14.

 Using the Exoplanet Transit Database Transit predictions website you can obtain data, including magnitude and magnitude drop, for future transits for your location. Figure 1 shows an example of this for the location 0° longitude and 52° latitude. Predictions are given for the date of access, in this case 2019 June 8 as highlighted, but predictions for a range of dates can be entered in the two boxes on the line 'User defined time span'. HAT-P-22b is one of the brightest and is also circumpolar which is a great advantage as it can be imaged all year. However, this star may be a little too bright as it is good practice to pick comparison stars of similar magnitude and there are none in the field of view shown in Figure 2. Also there appears to be an adjacent star in the 11 o'clock position which will make aperture photometry less easy.
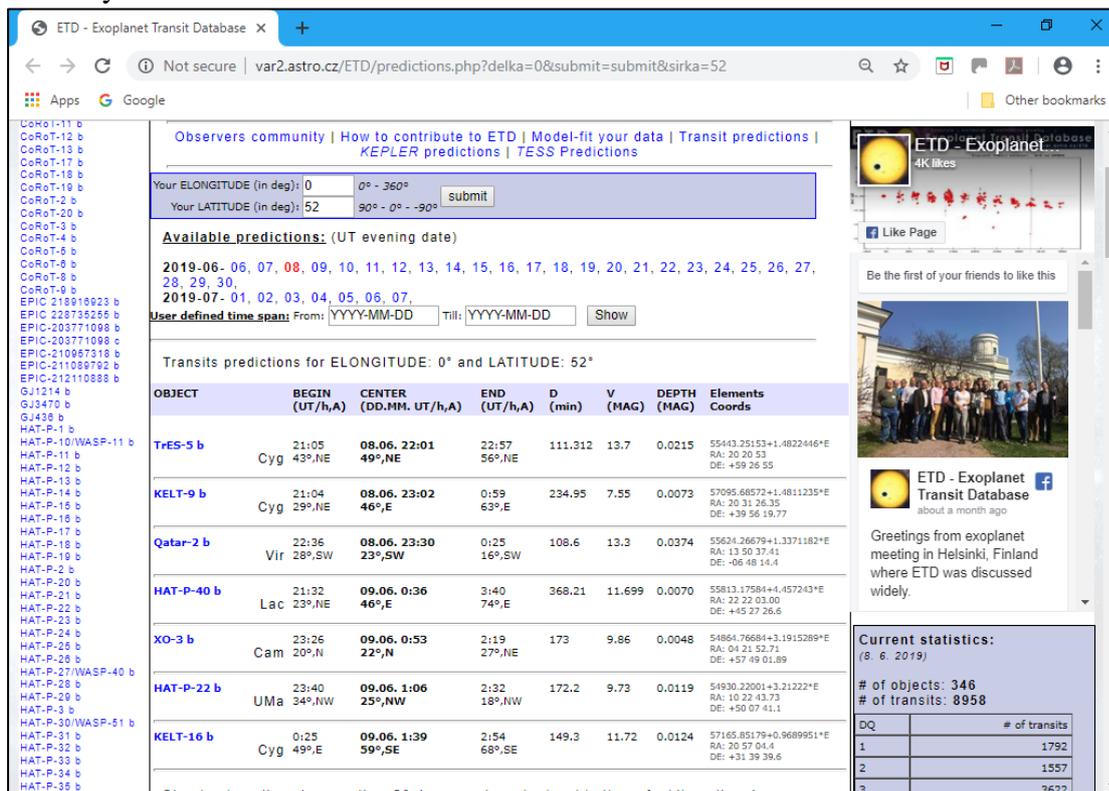

Figure 1. Exoplanet Transit Database predictions

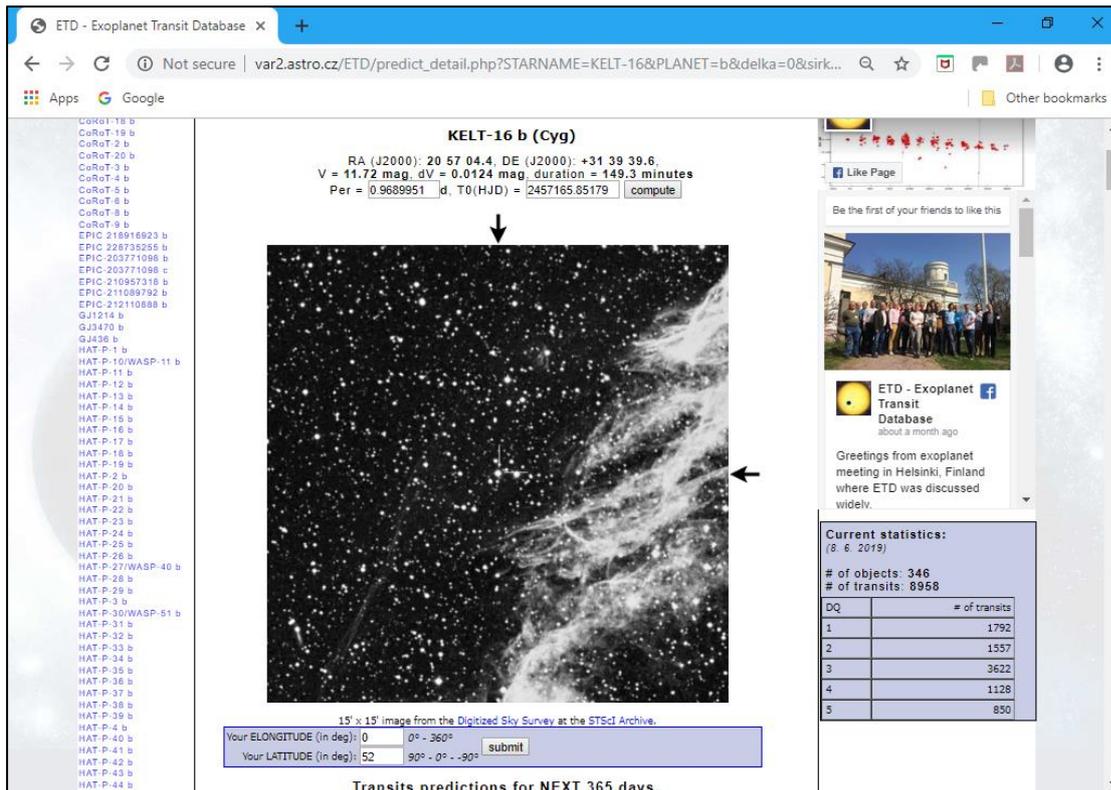For a finder chart and a list of transits, Figure 2, click on the Object name – in this example Kelt-16b.

Figure 2. Finder chart for Kelt-16b

Figure 3 shows a wider field view using Stellarium (the only planetarium program I have found which displays exoplanet data).
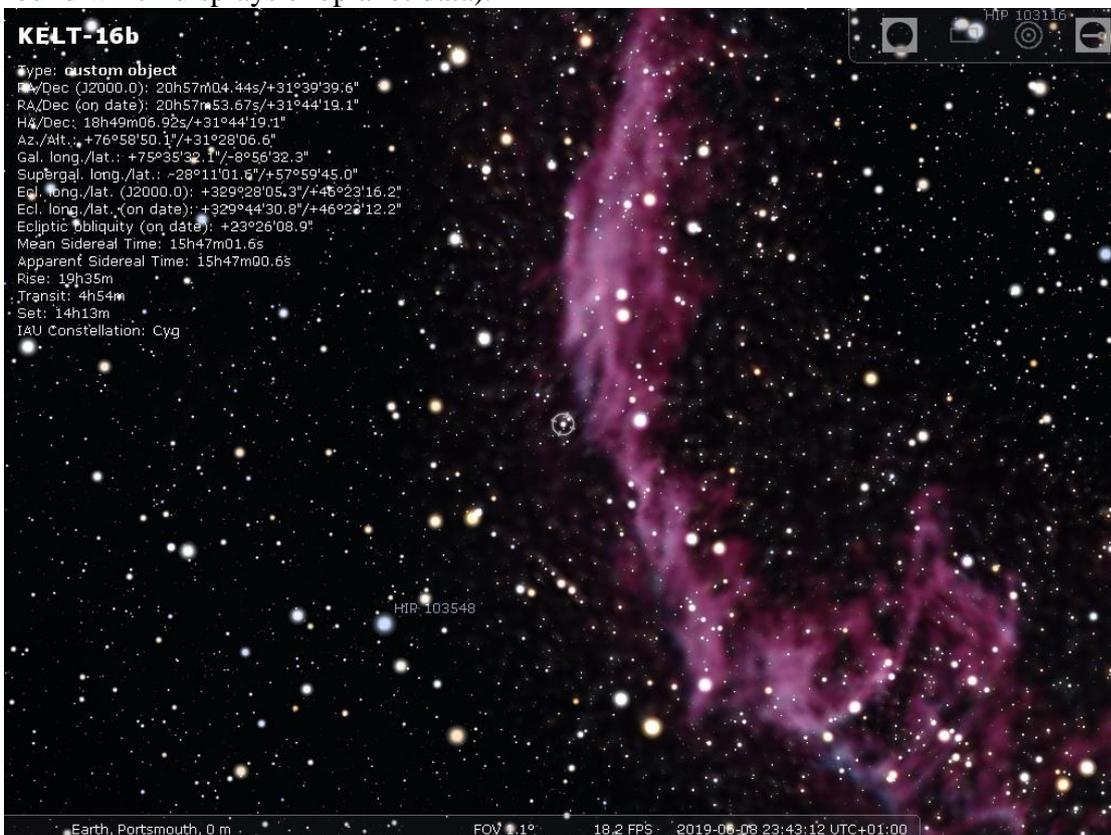

Figure 3. Wider field of view using Stellarium

Selecting any particular object from the list on the left of the page leads to a list of previous observations against which you can compare your results. Scroll down the page, Figure 4, and you will see an example obtained by Anael Wunsche.

Figure 4. Observations of Kelt-16b

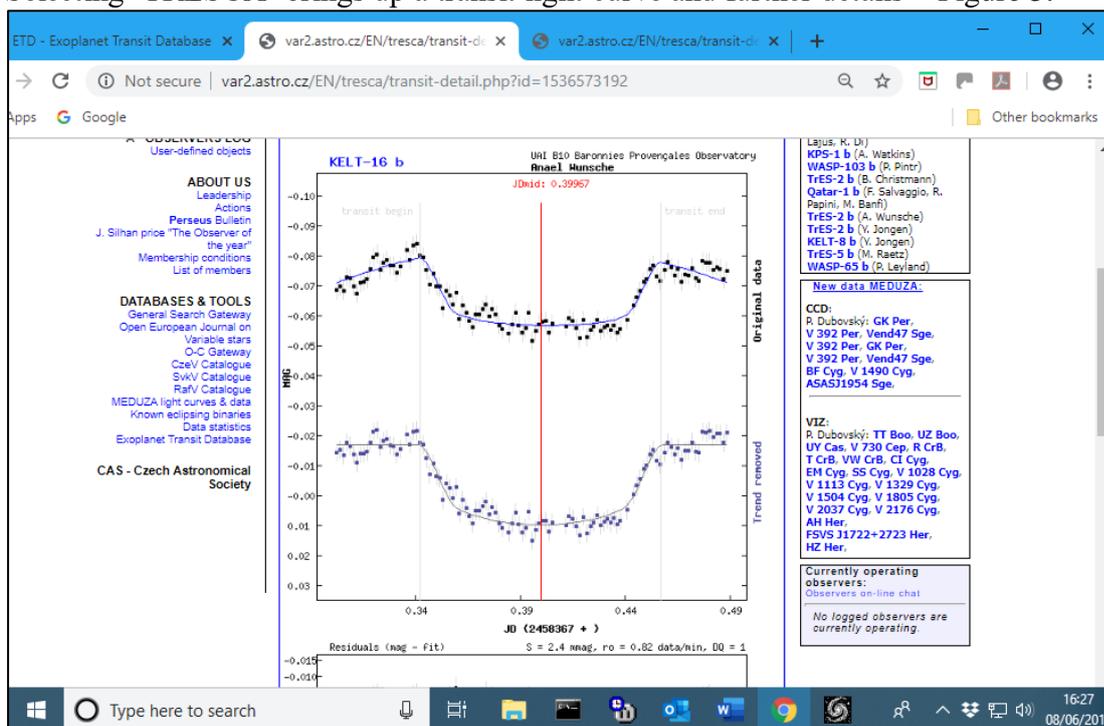Selecting 'TRESCA' brings up a transit light curve and further details – Figure 5.

Figure 5. Transit light-curve for Kelt-16b

At this point, to avoid duplication on the website, one should refer to the 'Exoplanet Transit Imaging and analysis Process' by Mark Salisbury starting at paragraph 5.0 (or from the beginning for an introduction and additional information on target selection).

To produce a light curve from your observations AstroImageJ is recommended and there are guides to this on the Guides/Tutorials.

It is good practice to make ones results available to the wider astronomical world. Submitting observations to the BAA Photometry Database and the Exoplanet Transit Database (ETD) is covered in section 7.0 of Mark's process. Links to the BAA Photometry Database and relevant guides are listed on the Guides/Tutorials page in the section Other guides and tutorials.