Reducing a graze with Pymovie/Pyote

For a graze video reduction, there will likely be only one star visible, the target. Then, the bet option with Pymovie is to use the 2-point tracker, where the target star is also the tracker, when collecting the light intensity data. The CSV file will only have data for that star.

Make any time corrections needed. If part of the time data from IOTA VTI was obscured by the bright lunar limb, find a region where there are signals and take two of those frames and their times and enter that into the manual time stamp. If you have a concern that frames may have been dropped, manually determine the time stamp for two frames from viewing the video at the start of the recording, use those to correct the CSV time, then compare the time stamp on the last frame with that you can determine from viewing the last frames of the video.

If the GPS time is found with a GPS flash tagger, or other version of time determination, follow the usual steps to get that timing information.

If the CSV file has had time correction, then save the CSV to one with a label that includes "time corrected" or "time updated". Read that in to use for event time determination.

Here is a procedure that will assist in determining the event times from a graze using Pyote.

Read in the CSV file.

For each event,

If this is not the first event, click the "start over" tab at the bottom of the SqWave model page to remove what was done for the previous attempt.

For a disappearance:

1. Trim left and right so that only the D event in question is considered. Trimming the data to isolate the event is important. That prevents having the light level changes from other events affect the timing determination.
2. Mark the disappearance region
3. Find event
4. Evaluate the result. If the error seems anomalously large, the DNR rather small, or Pyote refuses to generate a timing, start over and select a larger region when trimming.

For a reappearance

1. Trim left and right so that only the R event in question is considered
2. Mark the event

3. Find event
4. Evaluate the result and redo with a larger region if necessary.

Repeat until all the events have been processed.

Note that the Pyote computations of magnitude drop are compromised by the intruding lunar limb.

The example we have of a reduction done this way is the Nov 27, 2024 graze of Spica, which we observed in Paint Rock, Texas. The altitude was low (10 deg.) and the sky partly cloudy. But the first magnitude Spica and the Moon are both clear and bright on the videos.

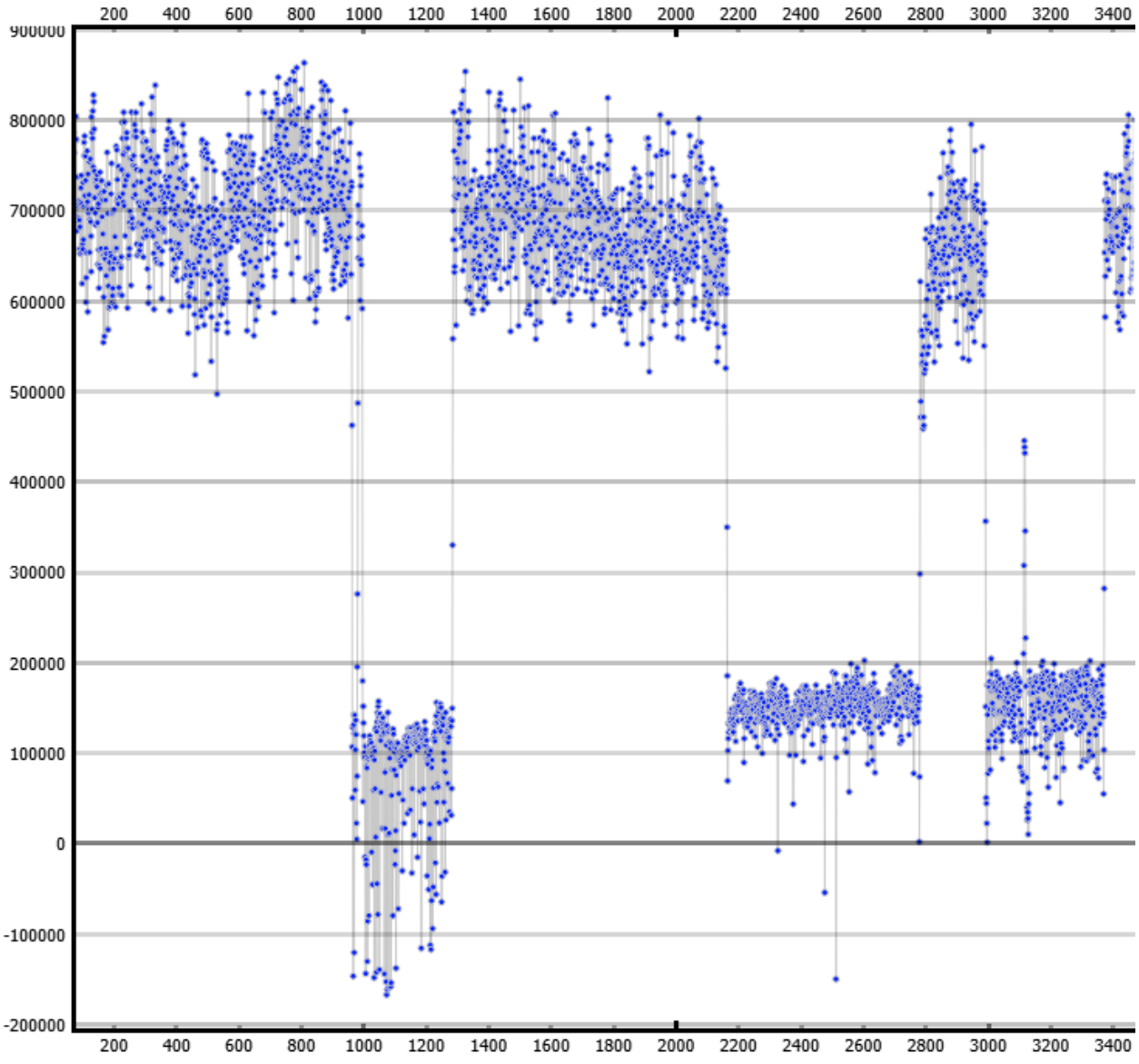
We observed from two locations. Dunham1 was a C8 tube on an iOptron GoTo mount using a ZWO ASI178MM and an Aart Olsen GPS flash tagger, data capture done with SharpCap. Dunham2 was an Orion 80mm refractor (the Midi scope) on a Broughton paver mount with a RunCam and IOTA VTI, data capture done with IOTA Video Capture.

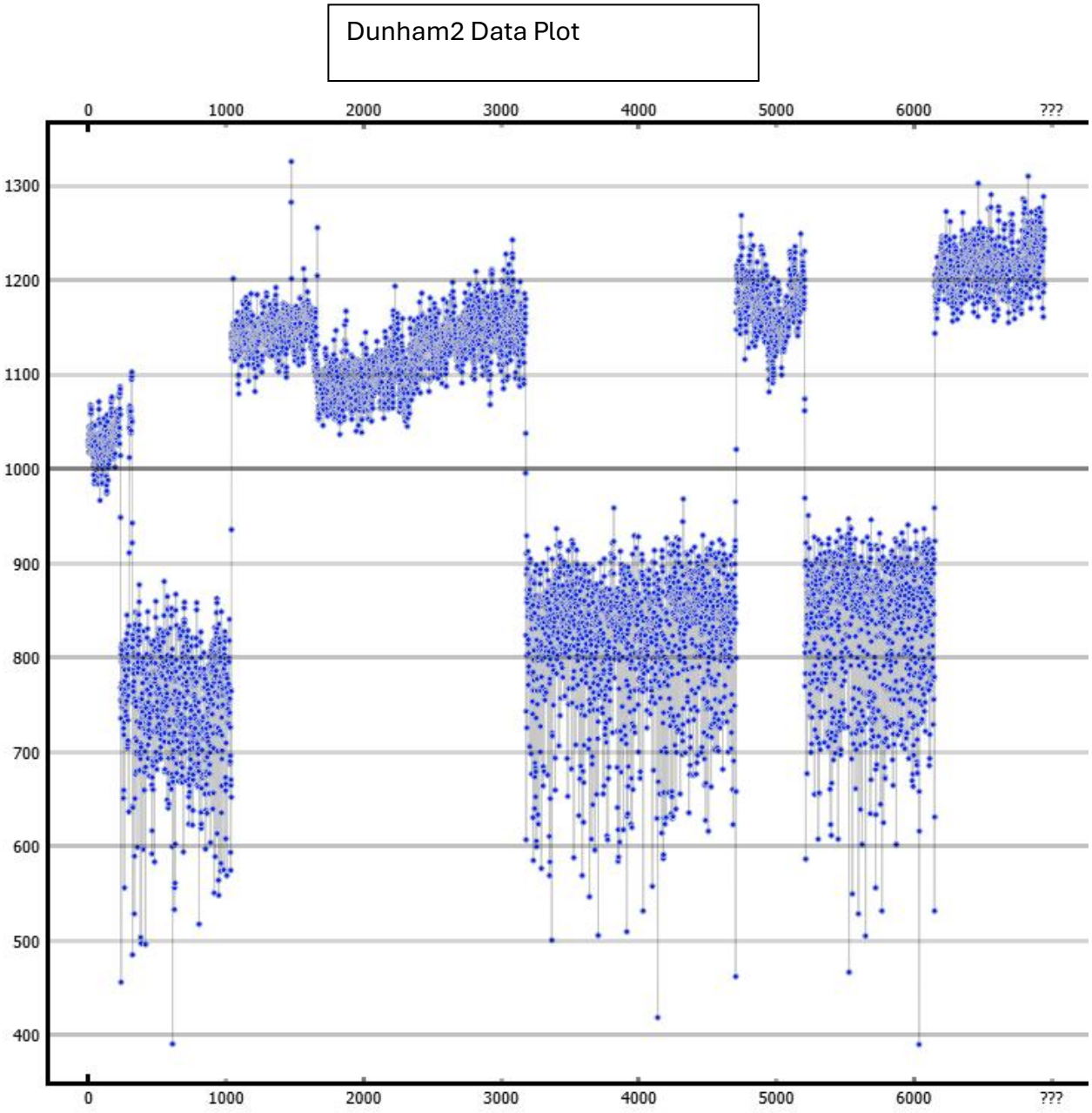
While the videos look spectacular, they are about as ugly an occultation recording as anyone will ever encounter. Due to multiple factors, such as concern that the approaching clouds would compromise our recordings, the stress of a long trip and chasing clear skies, the problems finding a site with a clear view of the horizon and some hope that we might be able to detect the supposed secondary – we overexposed both videos. Spica is a large blob. The lunar dark side is very distinct and seeing the non-instantaneous disappearances and reappearances of Spics is quite interesting. There is also some interference from lights of passing cars at the Dunham2 site.

The videos can be made available if anyone would like to see them or use them.

Pymovie had no problem collecting the data from either of the two recordings. The Pyote plots from the two CSV files are given below.

Dunham1 Data Plot






As can be seen in the plots, 5 events were observed at Dunham1, 4 at Dunham2.

Here is a table of the events as determined by Pyote using the technique described above.

| Event | Dunham1 | Dunham2 |
|---|---|---|
| D 1 | 10:54:31.3039 +/- 0.0237 | 10:54:31.1780 +/- 0.0145 |
| R 1 | 10:54:32.8355 +/- 0.0245 | 10:54:33.2681 +/- 0.0101 |
| D 2 | 10:54:34.0220 +/- 0.0196 | 10:54:33.9701 +/- 0.0212 |
| R 2 | 10:54:57.6368 +/- 0.0184 | 10:54:58.0113 +/- 0.0087 |
| D3 | 10:56:09.5055 +/- 0.0135 | 10:56:09.2413 +/- 0.0142 |
| R3 | 10:57:00.0714 +/- 0.0192 | 10:57:00.2204 +/- 0.0113 |
| D4 | 10:57:17.2212 +/- 0.0168 | 10:57:16.7772 +/- 0.0120 |
| R4 | 10:57:27.2838 +/- 0.0133 | |
| D5 | 10:57:27.6316 +/- 0.0196 | |
| R5 | 10:57:48.3268 +/- 0.0143 | 10:57:48.2962 +/- 0.0110 |

The errors given are from the .95 containment level.

We will report these data, but the times and errors will be to the hundredth second.