Questions from Theodora

Tags	Insights
Association (project, codes, etc to make connections easier)	Luhman 16 AB TESS
Date created	@August 29, 2023 1:14 PM
Status	Exploratory

1. Background sources light curve analysis

With help from Domenico I gathered a list of comparable or brighter objects in the vicinity of Luhman 16 AB, and examined their light curve and periodogram.

```
# GAIAID  = ' 5353626607922101504' / Gaia DR3 identifier
# TICID   = ' 00119862172'         / unique tess target identifier
------------------------------------------------------------
# GAIAID  = ' 5353625847691848192' / Gaia DR3 identifier
# TICID   = ' 00119862113'         / unique tess target identifier
------------------------------------------------------------
# GAIAID  = ' 5353625955087289088' / Gaia DR3 identifier
# TICID   = ' 00119862176'         / unique tess target identifier
------------------------------------------------------------
# GAIAID  = ' 5353625950770711424' / Gaia DR3 identifier
# TICID   = ' 00119862180'         / unique tess target identifier
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# GAIAID  = ' 5353626539202665472' / Gaia DR3 identifier
# TICID   = ' 00119862617'         / unique tess target identifier
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# GAIAID  = ' 5353626569246332288' / Gaia DR3 identifier
# TICID   = ' 00119862111'         / unique tess target identifier
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# GAIAID  = ' 5353625852008069632' / Gaia DR3 identifier
# TICID   = ' 00119862142'         / unique tess target identifier
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# GAIAID  = ' 5353636503526702720' / Gaia DR3 identifier
# TICID   = ' 00119788311'         / unique tess target identifier
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# GAIAID  = ' 5353626573562711680' / Gaia DR3 identifier
# TICID   = ' 00119862086'         / unique tess target identifier
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# TICID   = ' 00119788211'         / unique tess target identifier
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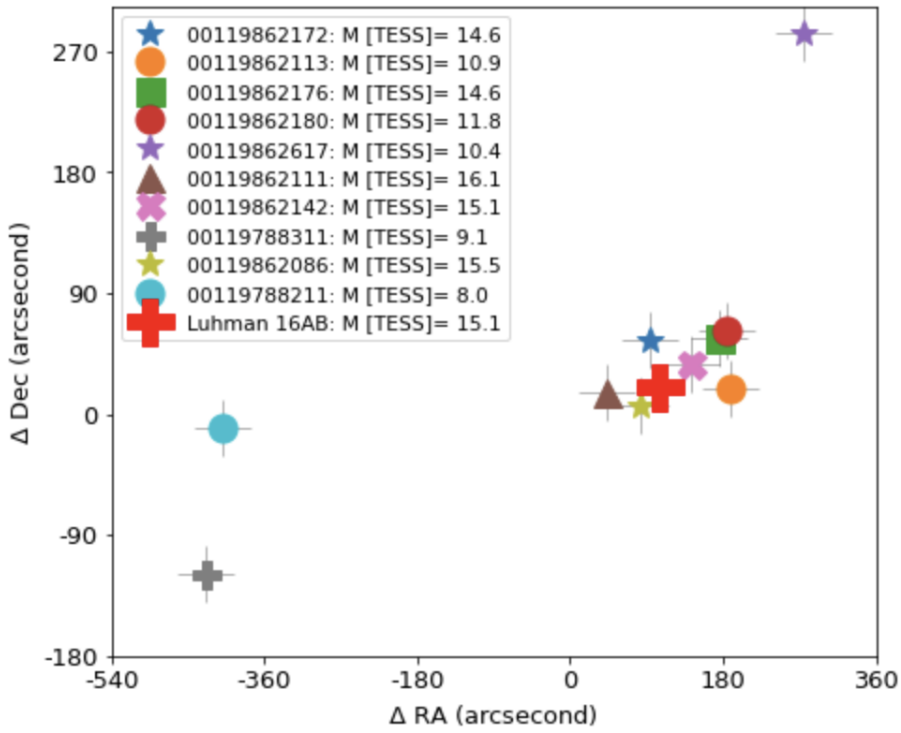
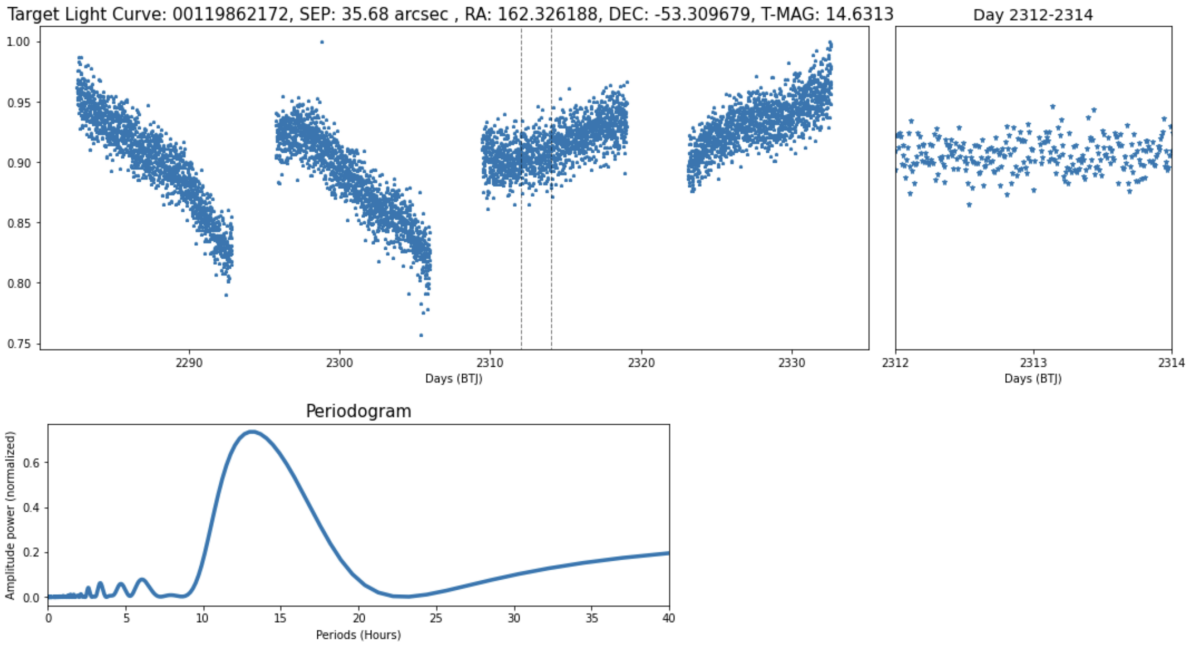
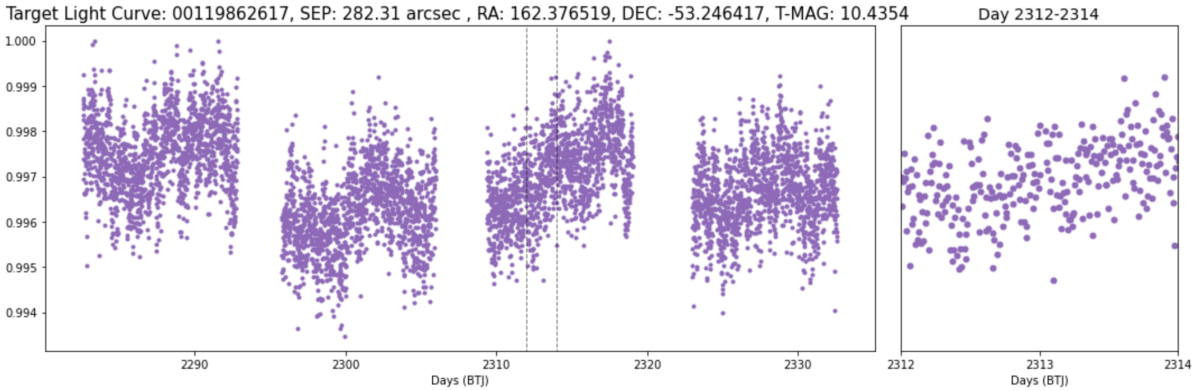
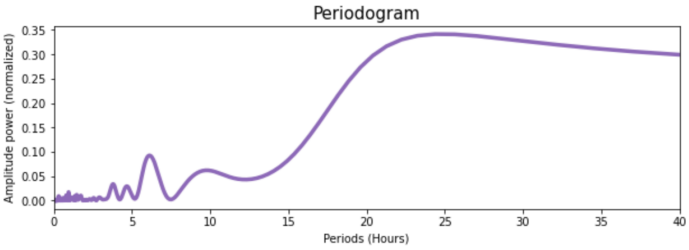
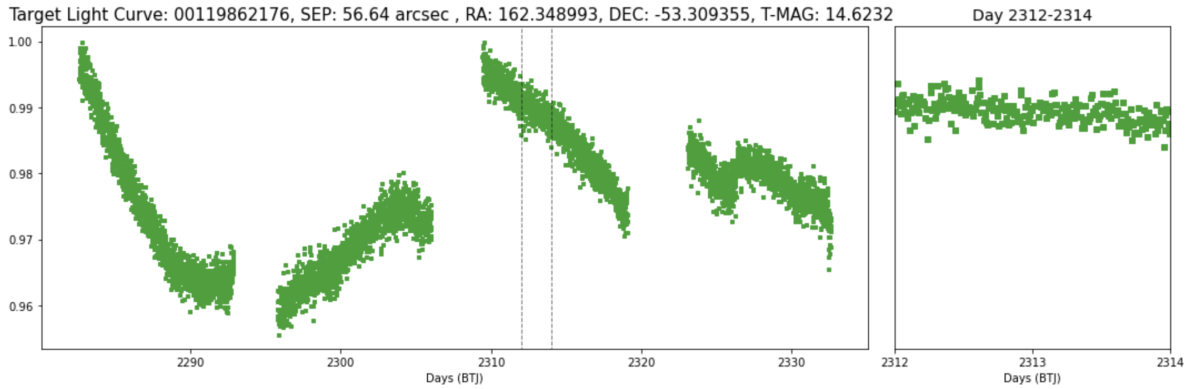


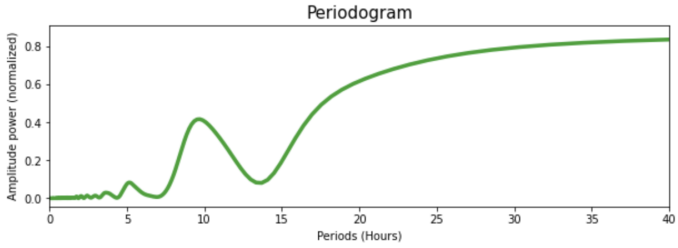
- **In the plot title: TESS Target ID, Separation from Luhman 16 AB, Ra and Dec, TESS-band magnitude.**

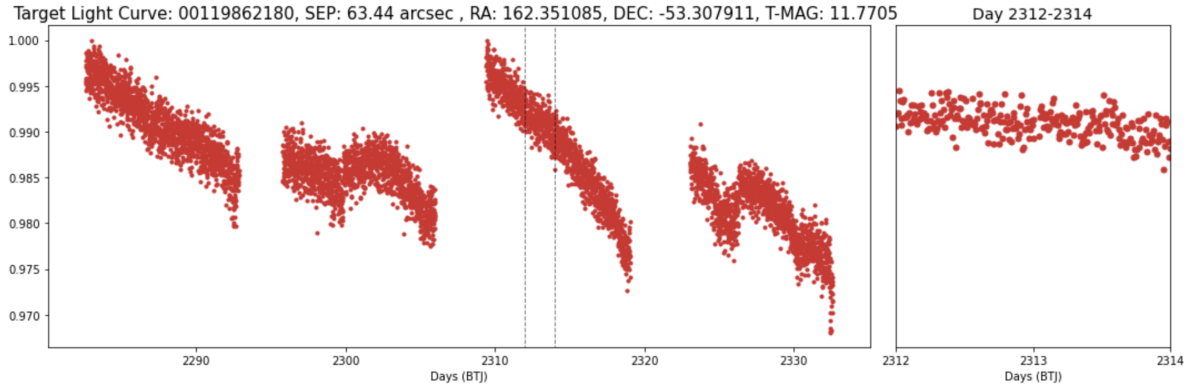


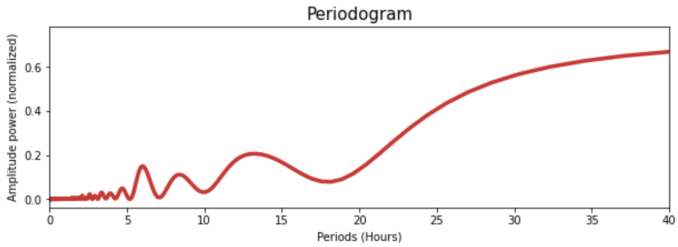

Target Light Curve: 00119862617, SEP: 282.31 arcsec , RA: 162.376519, DEC: -53.246417, T-MAG: 10.4354
Day 2312-2314
Days (BTJ)
Days (BTJ)

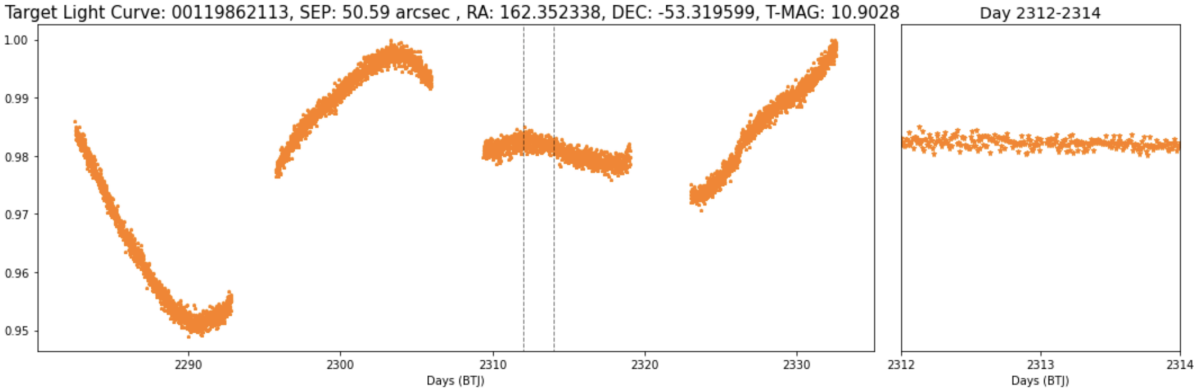

Periodogram
Amplitude power (normalized)
Periods (Hours)

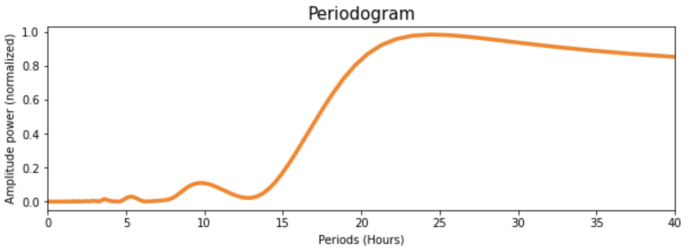

Target Light Curve: 00119862176, SEP: 56.64 arcsec , RA: 162.348993, DEC: -53.309355, T-MAG: 14.6232
Day 2312-2314
Days (BTJ)
Days (BTJ)

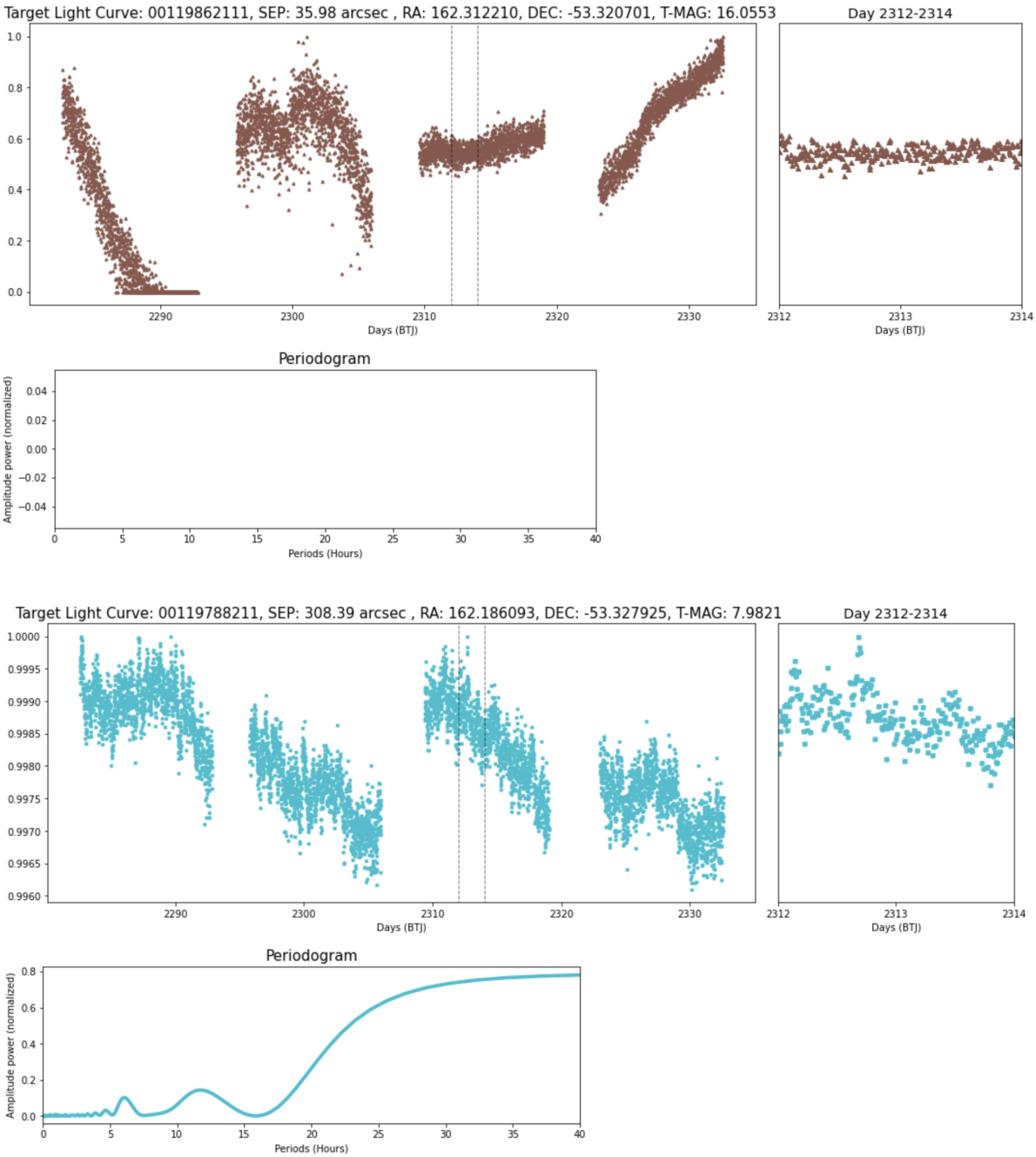

Periodogram
Amplitude power (normalized)
Periods (Hours)


Target Light Curve: 00119862180, SEP: 63.44 arcsec , RA: 162.351085, DEC: -53.307911, T-MAG: 11.7705
Day 2312-2314
Days (BTJ)
Days (BTJ)

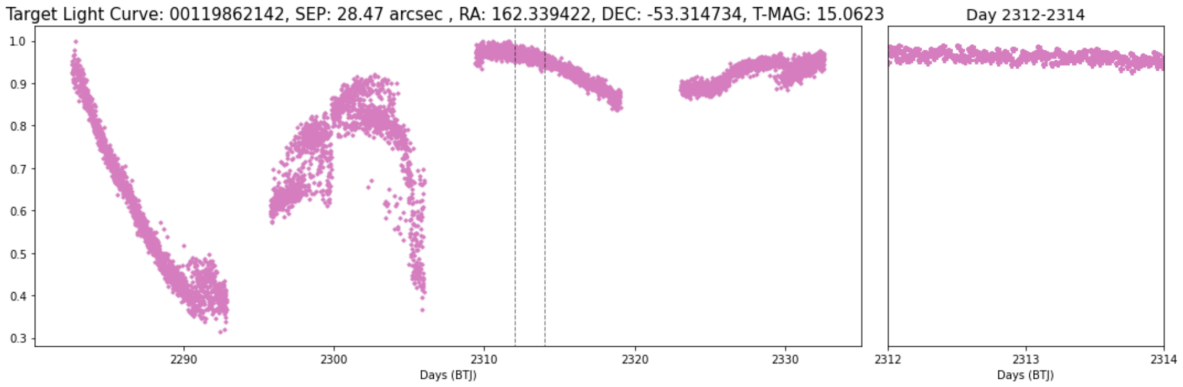

Periodogram
Amplitude power (normalized)
Periods (Hours)

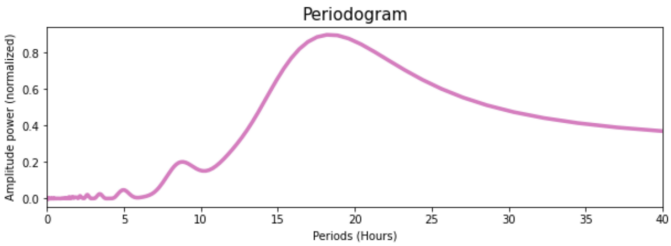

Target Light Curve: 00119862113, SEP: 50.59 arcsec , RA: 162.352338, DEC: -53.319599, T-MAG: 10.9028
Day 2312-2314
Days (BTJ)
Days (BTJ)

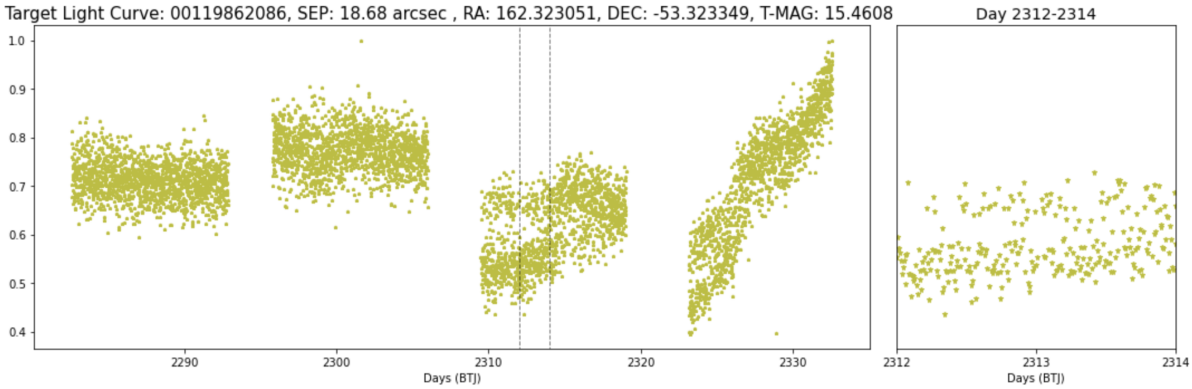

Periodogram
Amplitude power (normalized)
Periods (Hours)

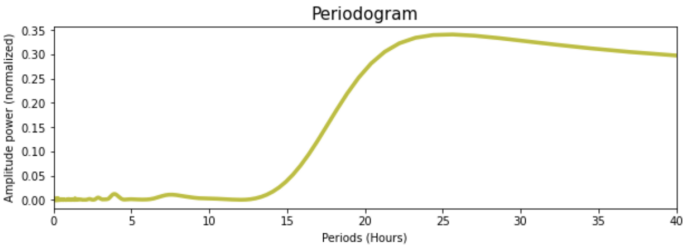


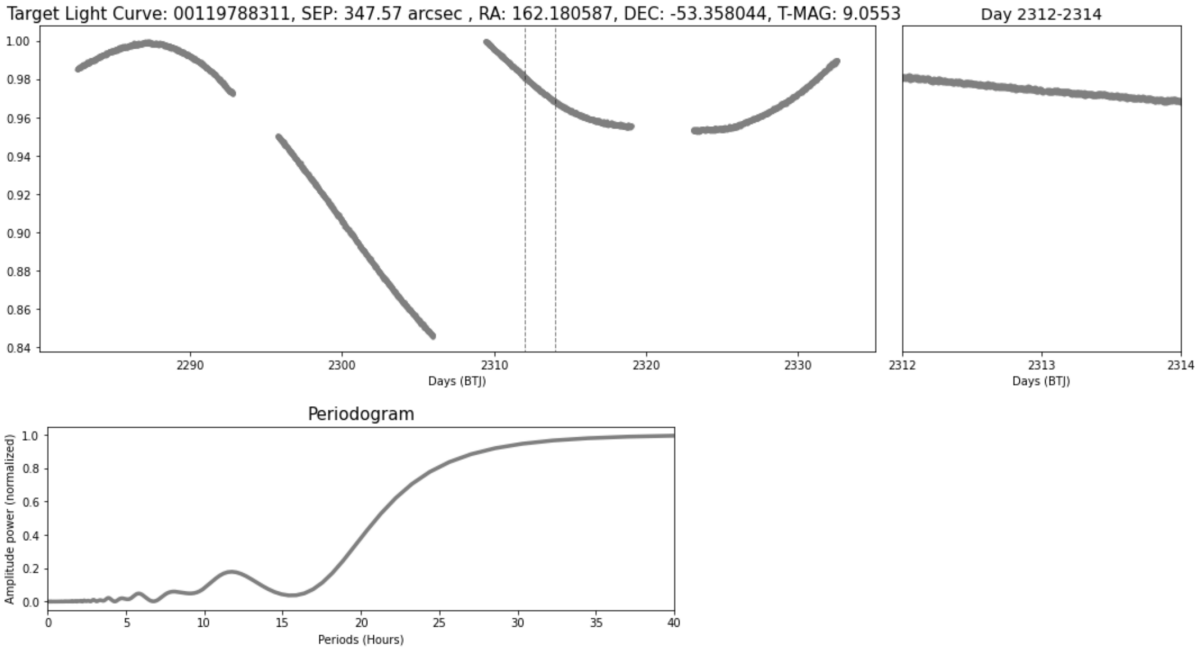
This object has the most interesting, visibly variable light curve with power from 5 to 15 hours, but it is located far enough from Luhman 16AB that it should not contaminate our target.


Target Light Curve: 00119862142, SEP: 28.47 arcsec , RA: 162.339422, DEC: -53.314734, T-MAG: 15.0623
Day 2312-2314
Days (BTJ)
Days (BTJ)


Periodogram
Amplitude power (normalized)
Periods (Hours)


Target Light Curve: 00119862086, SEP: 18.68 arcsec , RA: 162.323051, DEC: -53.323349, T-MAG: 15.4608
Day 2312-2314
Days (BTJ)
Days (BTJ)

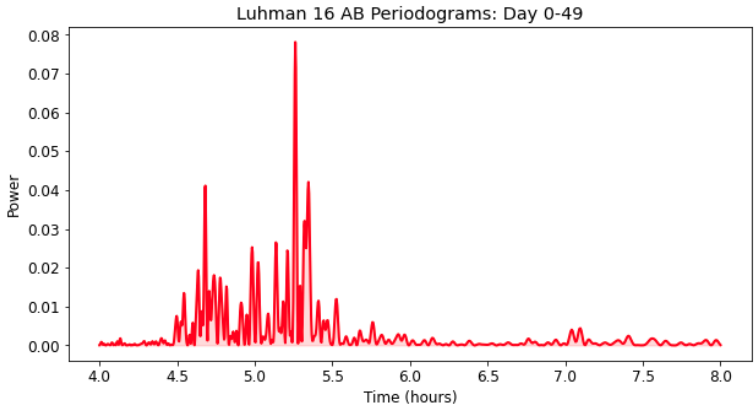

Periodogram
Amplitude power (normalized)
Periods (Hours)



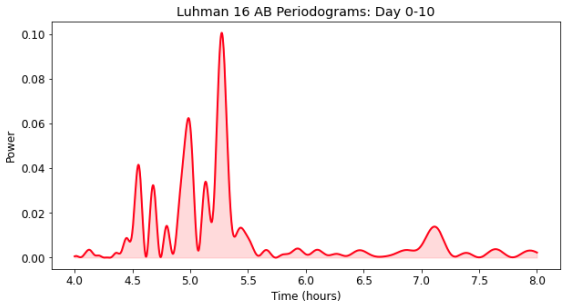
2. How does the analysis window affect relative power of Luhman 16 A variability component?

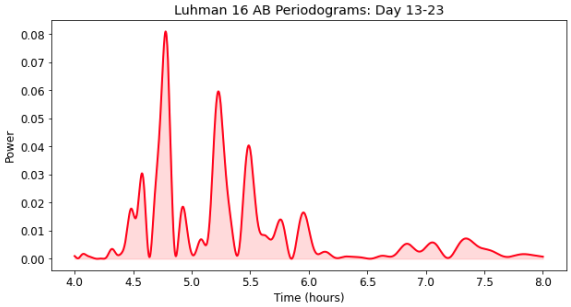
To test this out, I will run the periodogram analysis on different length of the data.

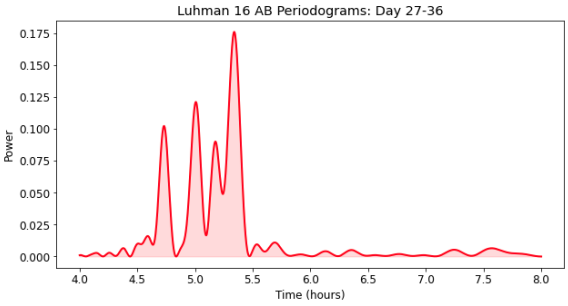
- **Full dataset (50 day)**

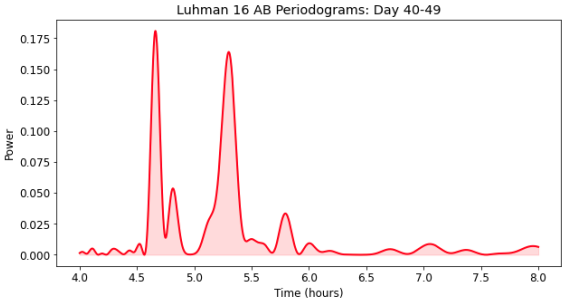


- **10-day windows**









- **5-day windows**