Evaluating the Pan-STARRS Variability Parameter

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By Thursday (4/18) we need: well thought out section titles and plots that show all the points we wanna make

remake prob(f) plot with all 300,000 stars (not only 80,000)

LS analysis on ATLAS Pathfinder Telescope data, verified PS variability criteria

INTRODUCTION

- why we care
- what made us care about this project
- NO structure / distance stuff (maybe put it in looking forward section at end)
- talk about PS catalog
- variability surveys (discuss other attempts to measure variables across the sky)
- why are variables interesting
- why do we want to find variables and care about where they are located
- Summary: we ran LS, analyzed stars, why did we do it all
- Mention what will be discussed: "in section 2 we describe the observations we used..."

ATLAS PATHFINDER 1 OBSERVATIONS

- we used data from ATLAS
- supplemented with ATLAS data [REF TONRY] (possibly make this s subsection)
- exposure time
- observation dates
- what was the weather like during observations
- PSF FWHM variations (only include if we discuss crowding)
- 'we recieved the reduced image data from the ATLAS pipeline; which gave us RA, Dec, mag, etc...'

Data

- how we got mags out of data...
- $l^{II} = 202°$
- $b^{II} = \pm 5$

Sorting Pattern

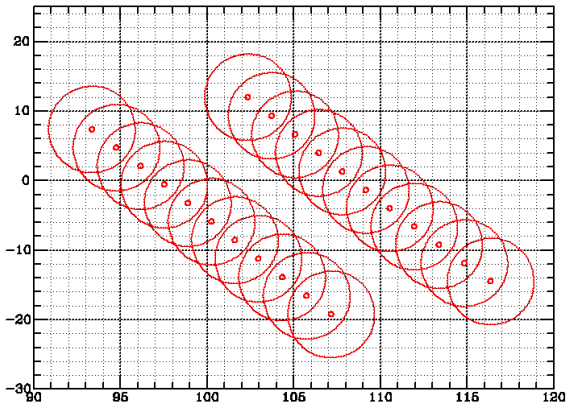


FIG. 1: *Stars were grouped in the pattern shown (down the collected observations)*

CONSTRUCTING STELLAR LIGHT CURVES

- how we selected stars (12+ obs, 1x1 deg^2, etc)

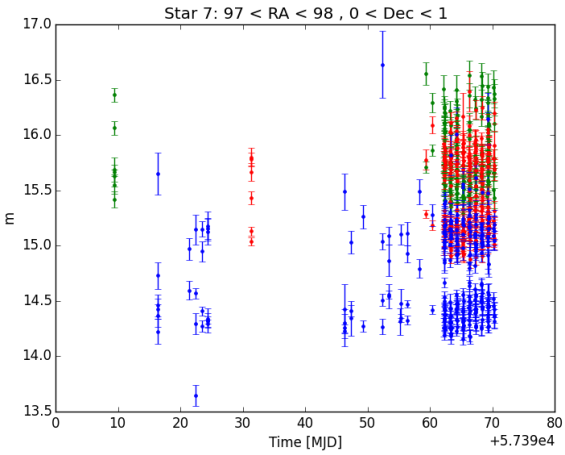


FIG. 2: *Light Curve of variable star, using all collected and ATLAS data.*

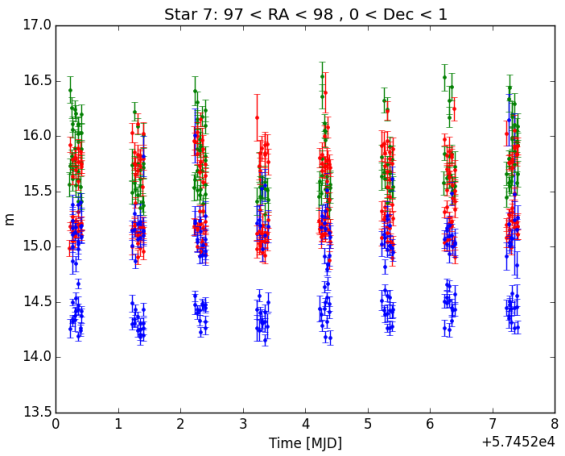


FIG. 3: *Light Curve of variable star, using only collected data (without incorporating extra ATLAS data).*

PERIODOGRAM ANALYSIS

- extract variability from LS
- describe how it works and why we used LS
- major aliasing at 1 day and 0.5 day periods
- things that fall at at -50 (in Figure 6) means that those are VERY probably variable stars
- roughly _____ stars fell at -50 in Figure 6
- 315,992 stars tested for variability
- other stars (outside of 315,992) are statistically unlikely to be variable

Fast Lomb-Scargle Periodogram

- brief explanation of the fast LS
- period search range to avoid aliasing
- compute gri periods individually and compare each other
- Fourier series fit to extract variable types

prob(f)

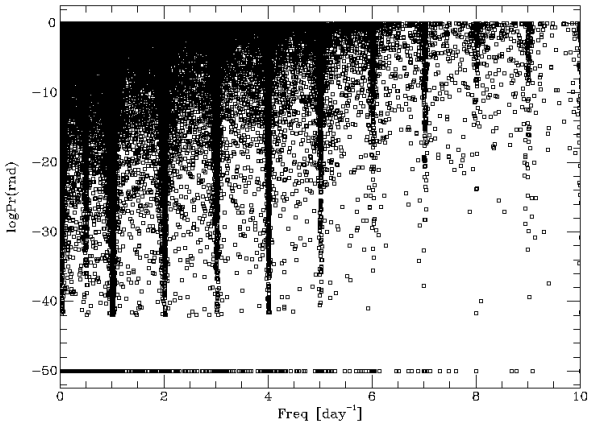


FIG. 4: *prob(f) of 80,000, most variable, stars LS was run on*

Period Error Estimation

- explanation of period error estimation using Fourier series

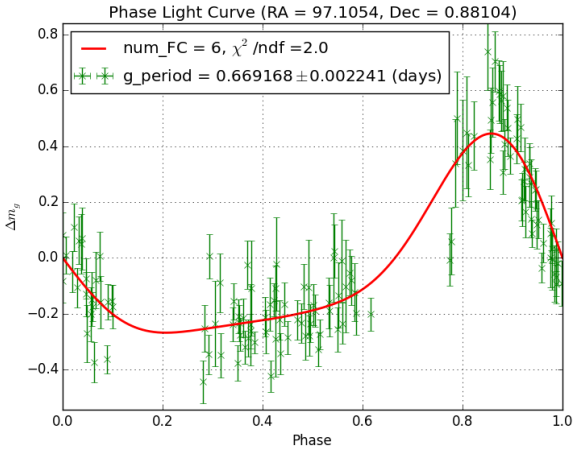


FIG. 5: *Type ab*

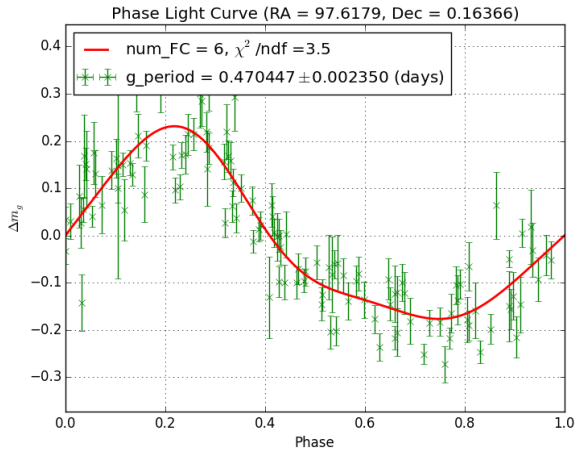


FIG. 6: *Type c*

RESULTS

- compare with PS
- density/distribution of variables in sky
- (what LS gave us for our catalog)
- put a table with 5 stars, to show off part of catalog

Simbad Completeness

- Pull established RR list from Simbad
- Pull other variable data from simbad, too
- Compare list of observed RR to catalogs
- Is anyone actually reading this outline, this bullet point serves no purpose
- Wow, its sad how little Jeff did since class began (especially after JT gave him the code to do it a month ago) - 6 obs x 4 nights = January-April work period haha
- Establish completeness with Simbad

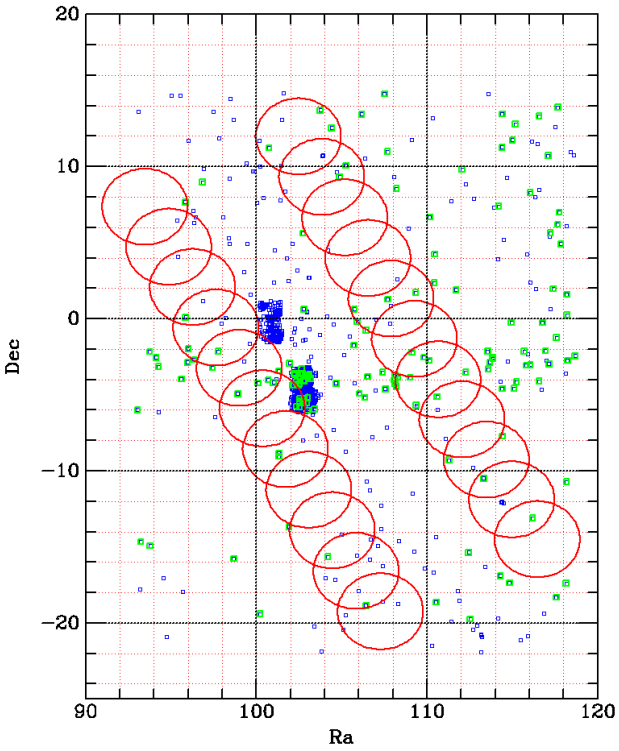


FIG. 7: *Observation path with Simbad pulsators in blue and RR Lyrae in green.*

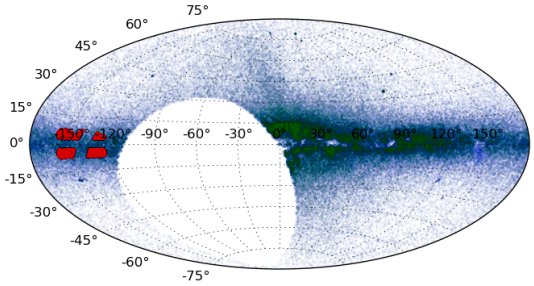
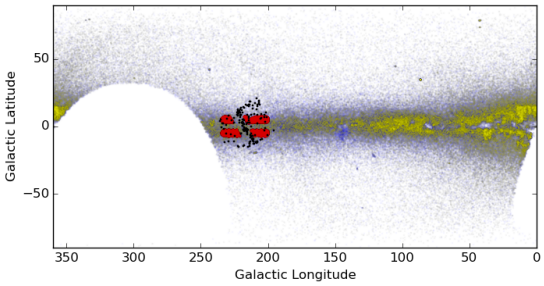


FIG. 8: *Aitoff projection of observed and PS RR Lyrae candidates. Blue are candidates from PS that ¿= 0.05, green are PS candidates that ¿= 0.2., observed data in red.*

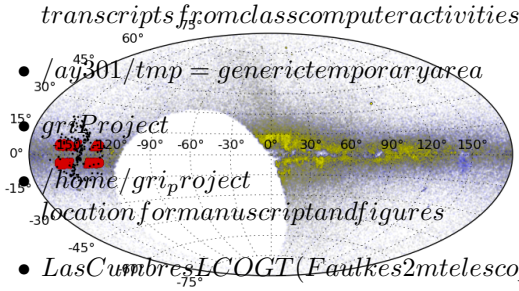
DISCUSSION

- Evaluation of PS criteria
- what went wrong

- what could have gone better
- future outlook
- we could map spiral arms using x y and z



(a) *Aitoff map.*



(b) *Aitoff projection*

FIG. 9: *Aitoff projection of observed and PS RR Lyrae candidates. Blue are candidates from PS that ¿= 0.05, yellow are PS candidates that ¿= 0.2., observed data in red, simbad in black.*

SUMMARY AND CONCLUSIONS

[TALK ABOUT IT]

RESOURCES FROM WEBSITE (REMOVE THIS SECTION)

- $ay301.ifa.hawaii.edu$
- $/ay301/atlas = locationforallthegriProjectdataandprograms$
- $/ay301/script = transcriptsfromclasscomputeractivities$
- $/ay301/tmp = generictemporaryarea$
- $griProject$
- $/home/gri_project = locationformanuscriptandfigures$
- $LasCumbresLCOGT(Faulkes2mtelescopeonHaleakala)$
- $ATLAS(fallingstar.com)$
- $0.5mtelescopewithc, o, B, V, R, I, H - alphafilters$
- $0.18mPathfindertelescopewithg, r, ifilters$
- $0.06m35mmpiggy - backcamerawithRGB$
- $0.01m35mmfisheyecamera$

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