Rotational Periods of Asteroids 2167 Erin and 1084 Tamariwa

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Introduction

- We observed and analyzed asteroids 2167 Erin and 1084 Tamariwa to find their light curves and their rotational periods.

Data was taken at Hobbs Observatory near Fall Creek, WI using a 0.6-m telescope.

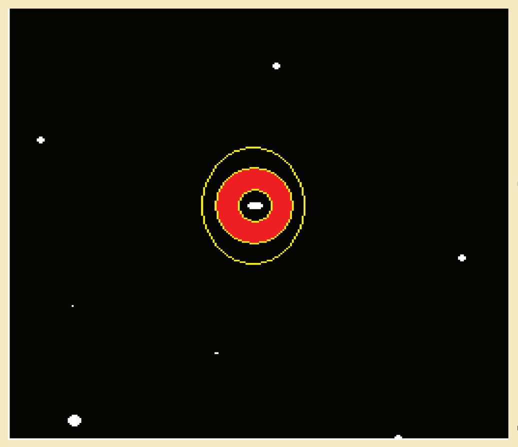
Image Processing

- All telescopes and cameras pick up light differently, so it was necessary to account for these variations
- Took biases, darks and images in standard R and V filters for uses in further image processing
- Using Canopus software we created a master dark and subtracted it from images in R and V filters
- Made master flat (in R and V filters)
- Merged the flat with dark subtracted images
- All processes were repeated for each type of filter

How We Chose Asteroids

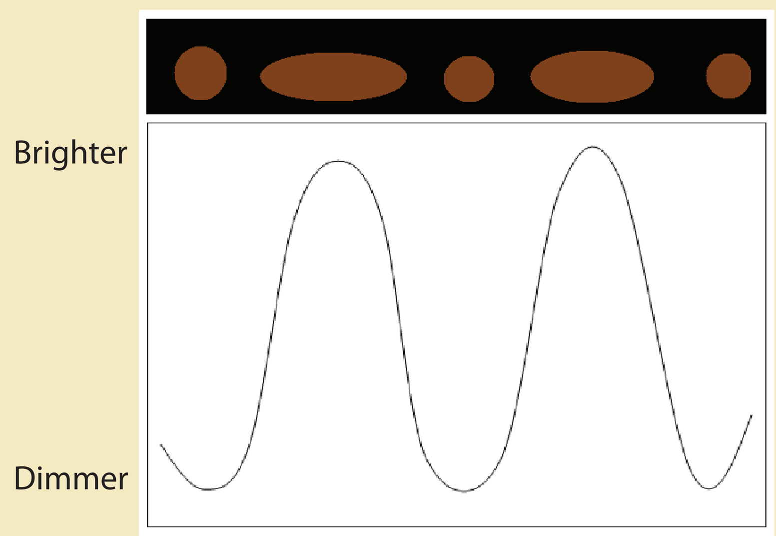
- Asteroid had to rise at beginning of observation time and set at the end of time
- High in the sky for less atmospheric interference
- Short period so a full rotation can be observed in one night
- Bright enough to make meaningful intensity measurements
- Had an uncertain period

How to Find a Light Curve



- Red ring, called "dead zone", is completely subtracted from the image
- Values of pixels in outer ring averaged and then subtracted from inner ring, where star is located, to remove excess background "sky" noise.
- Beginning with standard images that contain well known stars, nightly transforms, zero points and first order extinction coefficients are found
- These standards were used in the measurements of magnitudes of steady, non-fluctuating stars that could be found near the asteroids

Why Brightness Changes



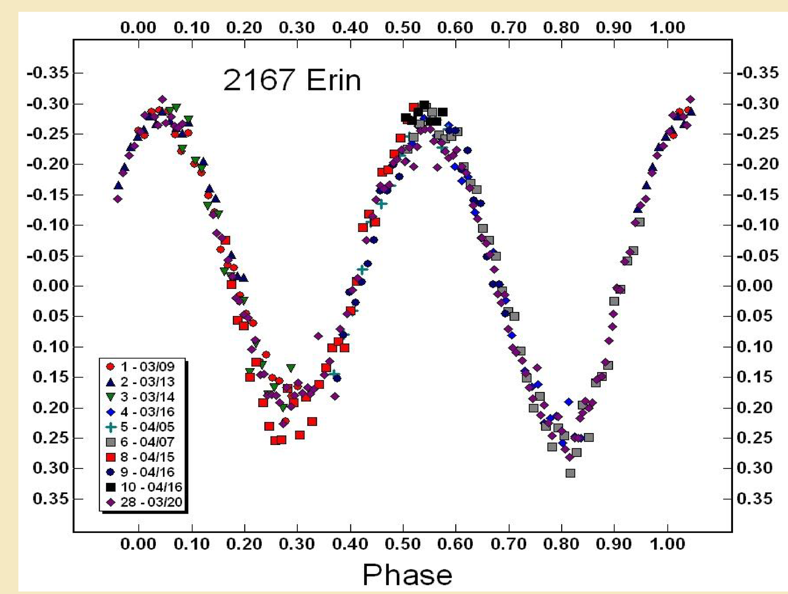
Top section of graph shows the cross-section of the asteroid as we see it at different times during its period. The bottom is the lightcurve it would create.

The Results

A group in Italy (Montigiani, et. al.) took measurements of Erin during the same month our data was taken. A composite lightcurve was found with a period of 5.7186 ±0.0001 hours. This lightcurve is vastly superior to the lightcurve obtained by Lagerkvist, therefore our period is more likely to be correct than his reported value of 7.68 hours.

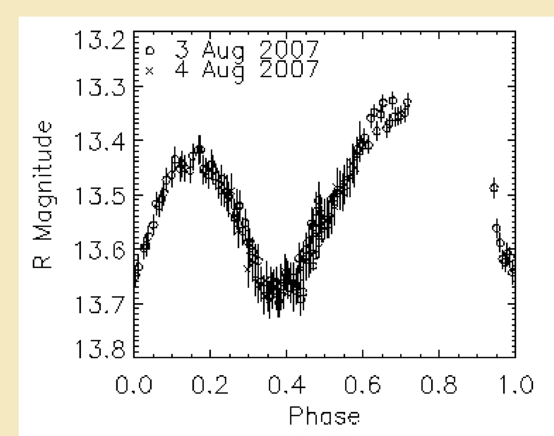
Tamariwa had two reported periods of 7.08±0.02 hours (Binzel) and 6.19±0.01 hours (Ivarson, et. al.). Our measurement of 6.22±0.03 hours confirms the results of Ivarson, et. al.

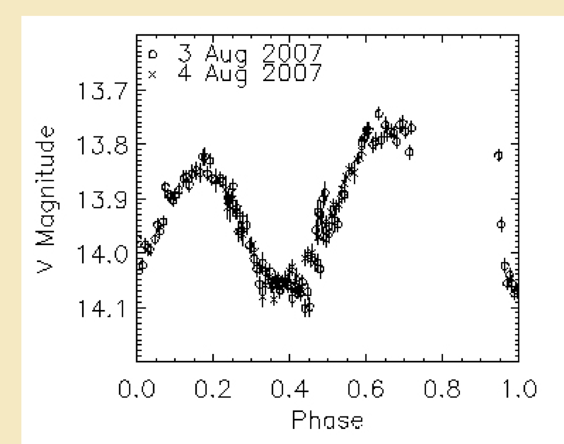
Erin Data



Eau Claire Asteroid group data merged with Montigiani data.

Tamariwa Data





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