

and flat field corrected. Images were measured using MPO Canopus (Bdw Publishing). All observations were made using unfiltered differential photometry and all data were light-time corrected. Period analysis was also done with Canopus, incorporating the Fourier analysis algorithm by Harris (1989).

36 Atalante. Observations were conducted on four consecutive nights from UT March 10-13. A total of 232 observations were made. The synodic period was found to be 9.93 ± 0.01 hr, which agrees well with previous reports, e.g., Harris (1980) and Schober (1981). The amplitude of the curve was 0.12 ± 0.02 mag.

416 Vaticana. Observations were conducted on 3 consecutive nights from UT February 15-17. A total of 130 observations were made. Miles (1990) and Michalowski (2000) both report a period of 5.372 hr, consistent with the 5.38 ± 0.01 hr result based on my analysis. Both Miles and Michalowski reported an amplitude of about 0.37 mag, which is considerably larger than the 0.06 ± 0.01 mag. value seen at this, perhaps more pole-on aspect, apparition.

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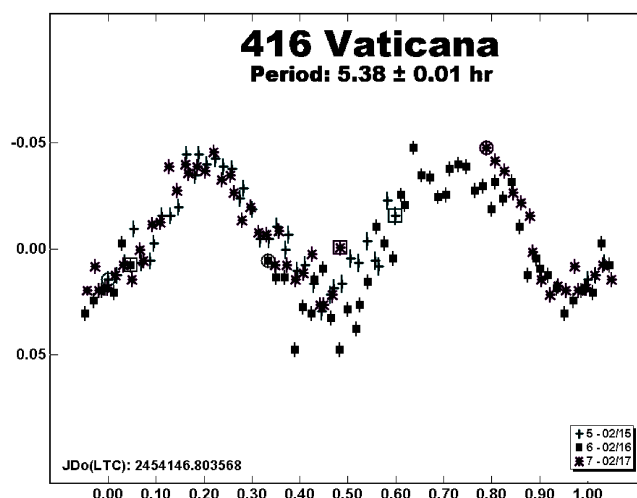
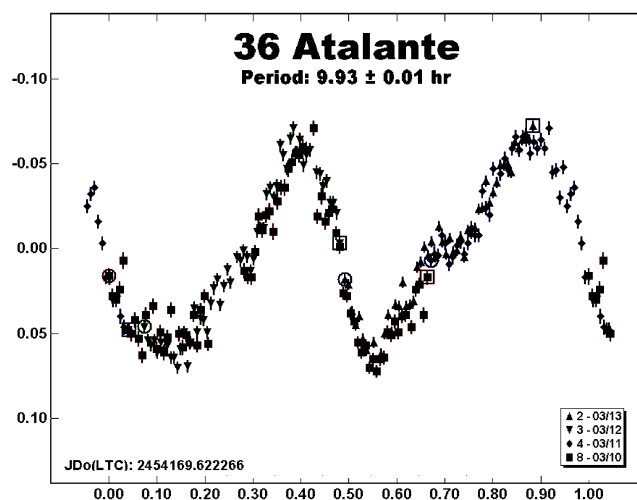
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ASTEROID LIGHTCURVE ANALYSIS AT THE OAKLEY OBSERVATORY – NOVEMBER 2006

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Lightcurves for 23 asteroids were obtained at the Oakley Observatory over six nights in November of 2006: 24 Themis, 26 Proserpina, 57 Mnemosyne, 66 Maja, 67 Asia, 89 Julia, 143 Adria, 159 Aemilia, 179 Klytaemnestra, 227 Philosophia, 242 Kriemhild, 298 Baptistina, 340 Eduarda, 381 Myrrha, 536 Merapi, 563 Suleika, 665 Sabine, 799 Gudula, 1046 Edwin, 1087 Arabis, 1321 Majuba, 1621 Druzhba, 2152 Hannibal, and 5142 Okutama.

We were able to collect data on a total of 32 main belt asteroids over six nights in November of 2006 from the Oakley Observatory

on the campus of Rose-Hulman Institute of Technology in Terre Haute, Indiana. The data gave us useful lightcurves and rotational periods for 23 asteroids. Of these 23 periods, 14 agreed reasonably well with previously published periods, 5 periods disagreed or removed ambiguity from previously published periods, and 4 were completely new results.

Three telescopes were used on all but one night. Each telescope is a 14-inch Celestron optical tube assembly mounted on a Paramount ME. One camera was an Apogee AP-8p which operated unfiltered at a pixel scale of 2.00 arcseconds per pixel. The other two cameras were SBIG STL-1001E which used a V filter at a pixel scale of 1.75 arcseconds per pixel. Two minute exposures were used for all data frames. Images were calibrated with master twilight flats and master darks. About half of the images were calibrated using MaxImDL and half using CCDSoft. All images were then measured with MPO Canopus.

Asteroids were selected based on their position in the sky one hour after sunset. Priority was given to asteroids without previously published lightcurves, but asteroids with well known periods were also targeted with the hope that the new data would help with shape modeling and determination of the pole orientation. After the first two nights, it was realized that there was considerable

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Number	Name	Dates of Observation Nov 2006	Number of Data Points	Period (h)	Period Error (h)	Amplitude (mag)	Amplitude Error (mag)
24	Themis	21 – 24	206	8.376	0.001	0.14	0.03
26	Proserpina	9, 10	110	13.06	0.03	0.21	0.01
57	Mnemosyne	21 – 24	62	12.66	0.03	0.14	0.01
66	Maja	21 – 24	114	9.736	0.009	0.30	0.04
67	Asia	21, 22, 23	55	15.90	0.02	0.26	0.04
89	Julia	21 – 24	164	11.38	0.01	0.20	0.02
124	Alkeste	21, 22, 23	60	Not found		>0.08	0.01
143	Adria	9, 10	110	11.0	0.1	0.07	0.04
159	Aemilia	21 – 24	199	16.37	0.02	0.24	0.04
179	Klytaemnestra	21 – 24	63	11.13	0.02	0.55	0.02
227	Philosophia	9, 10	112	Not found		0.35	0.05
242	Kriemhild	21 – 24	51	4.558	0.003	0.15	0.02
276	Adelheid	21, 22, 23	127	Not found		>0.08	0.02
298	Baptistina	9, 10	107	9.301	0.001	0.10	0.07
340	Eduarda	9, 10	103	8.04	0.02	0.25	0.03
381	Myrrha	21 – 24	180	6.572	0.002	0.34	0.05
529	Preziosa	21 – 24	185	Not found		0.20	0.08
536	Merapi	21 – 24	122	8.809	0.008	0.23	0.05
538	Friederike	21 – 24	190	Not found		0.10	0.05
563	Suleika	21 – 24	123	5.628	0.002	0.28	0.01
665	Sabine	21 – 24	124	4.294	0.001	0.50	0.04
799	Gudula	9, 10, 21 – 23	182	14.814	0.003	0.30	0.03
904	Rockefellia	21, 22, 23	134	Not found		0.10	0.03
953	Painleva	9, 10	75	Not found		0.10	0.03
1046	Edwin	9, 10	109	5.30	0.02	0.3	0.1
1071	Brita	9, 10	46	Not found		0.01	0.03
1087	Arabis	21 – 24	239	5.797	0.001	0.40	0.02
1321	Majuba	9, 10	103	5.207	0.009	0.25	0.05
1621	Druzhba	21 – 24	210	47.9	0.5	>1.00	0.05
2152	Hannibal	21 – 24	273	5.978	0.001	0.32	0.04
4155	Watanabe	9, 10	110	Not found		0.3	0.1
5142	Okutama	9, 10, 21 – 23	189	3.803	0.001	0.27	0.05

time remaining before morning twilight. So on the last four nights additional asteroids were targeted after the initial asteroids had set.

To our knowledge, this is the first reported observations of the period for the following asteroids: 799 Gudula, 1621 Druzhba, 2152 Hannibal, and 5142 Okutama. Our measurements confirm the periods given by Harris and Warner (2006) for the following asteroids: 24 Themis, 57 Mnemosyne, 66 Maja, 67 Asia, 89 Julia, 143 Adria, 179 Klytaemnestra, 242 Kriemhild, 381 Myrrha, 536 Merapi, 563 Suleika, 665 Sabine, 1046 Edwin, and 1087 Arabis. On the following 5 asteroids, we report new periods or remove ambiguities from previously published values: 26 Proserpina, 159 Aemilia, 298 Baptistina, 340 Eduarda, and 1321 Majuba.

Due to large uncertainties on the individual data points, no repeatable pattern was found for the following asteroids: 124 Alkeste, 227 Philosophia, 276 Adelheid, 529 Preziosa, 538 Friederike, 904 Rockefellia, 953 Painleva, 1071 Brita, 4155 Watanabe. For these asteroids the amplitude reported in the table is actually the full range observed.

The observations were made primarily to test a custom program used to control the telescopes and cameras. The program reads a text file containing the target names and interfaces with TheSky6

and CCDSoft to aim the telescope and operate the camera. It also automatically takes twilight flats, darks, and bias frames. We were able to get 23 reasonable lightcurves in six nights of observing which shows that the experiment was a success. However, improvements can be made. In particular we learned that it is important to at least take a quick look at the data while the observing run is in progress. If we had done this, we could have increased the exposure times for asteroids that proved to be fainter than predicted. And perhaps, we could have acquired more data on asteroids with periods longer than 8 hours.

The results are summarized in the table below with individual lightcurve plots after the table. The results and lightcurves are presented without comment except when necessary.

26 Proserpina. Our results agree fairly well with the period of 13.13 h reported by Scaltriti and Zappalà (1979). Our data clearly eliminate any ambiguity in the measured period, as it does not support either the 10.6 h reported by Chang, et al. (1981) or the 6.67 h period reported by Riccioli, et al. (2001).

67 Asia. The data from 21 November and 23 November show minima that match nicely with a period as shown. Clearly more data are needed.

159 Aemilia. According to the list of Harris and Warner (2006) this asteroid's period is about 25 h. We had four consecutive nights of data with more than 7 hours of data each night and got a good fit to the data with a shorter period.

298 Baptistina. Even though our data are noisy, our observations do not support the 7 h period found by Wisniewski, et al. (1997).

340 Eduarda. Two nights of data result in a period slightly longer than the 0.32 d (7.68 h) reported by Lagerkvist (1978). Our data, with amplitude of 0.20 and points with individual uncertainties of 0.02, are inconsistent with the shorter period.

563 Suleika. Period given in the Harrison and Warner (2006) list is 5.69 h.

665 Sabine. Data includes simultaneous observations on two telescopes on three of the four nights.

1321 Majuba. The accepted 6.78 h period of Majuba is based on a single night's data collected by Binzel (1987). The paper mentions that the data are consistent with either 6.78h or 5.4h, although the former was favored. Our data from two nights confirms that the latter value was close to correct.

1621 Druzhba. Based on a single night, Wisniewski, et al. (1997) reported that the period had to be greater than 12 h. We were able to determine the period based on four consecutive nights of data to be 47.9 ± 0.5 h. Due to the difficulties with a 48 h period, we were not able to obtain more than 40% phase coverage. However, this was clearly enough to determine the period as seen in the raw data plot shown. This asteroid will need more data to get higher precision on the period as well as coverage of the full cycle.

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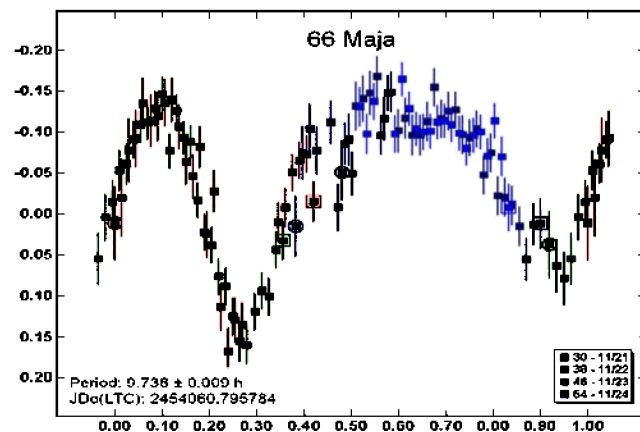
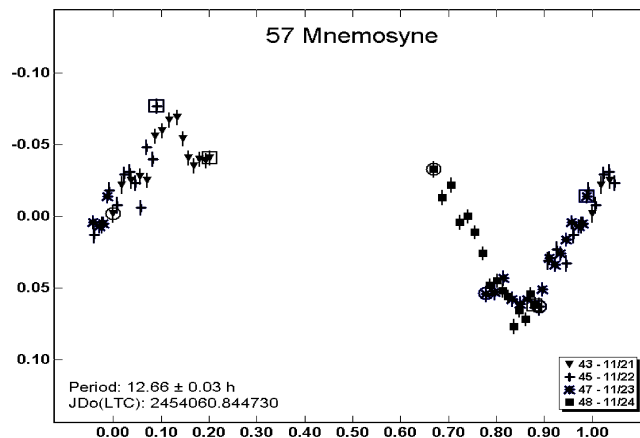
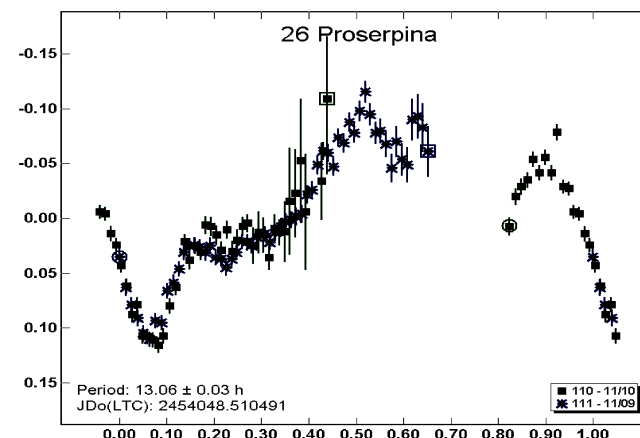
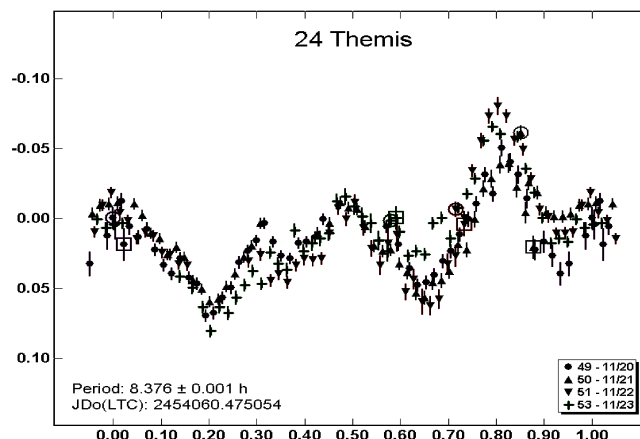
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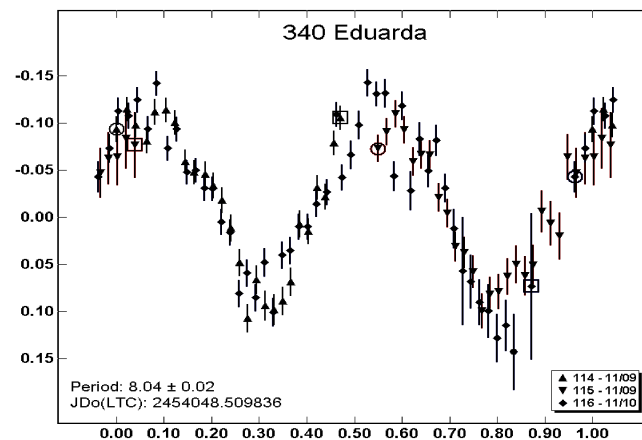
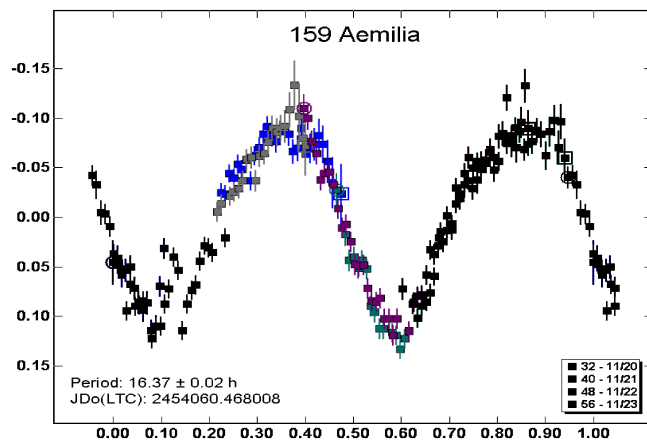
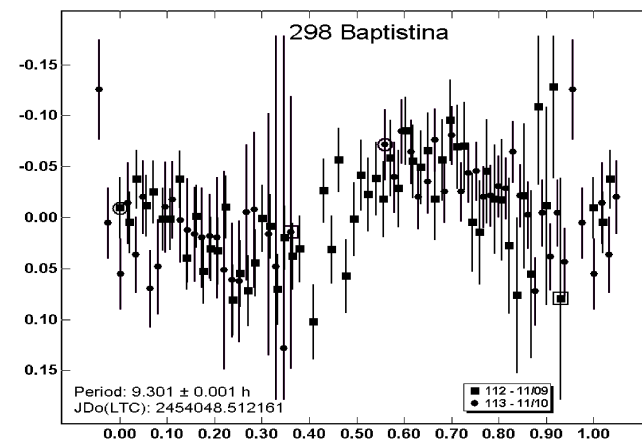
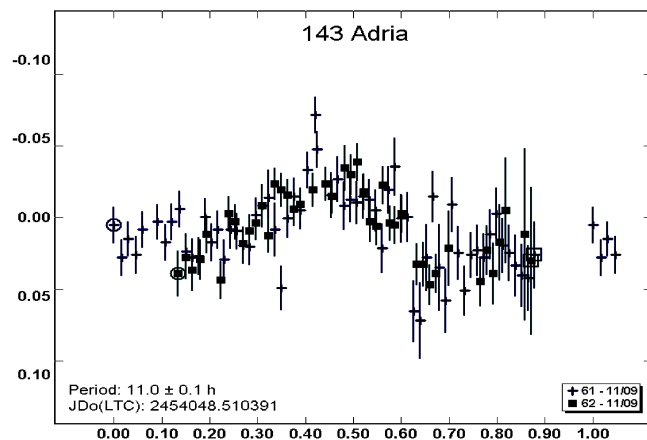
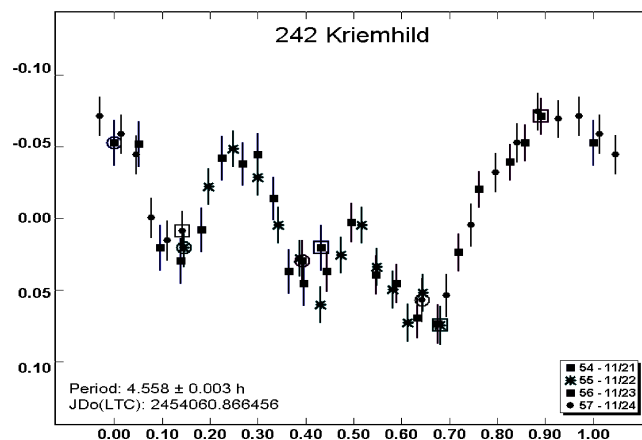
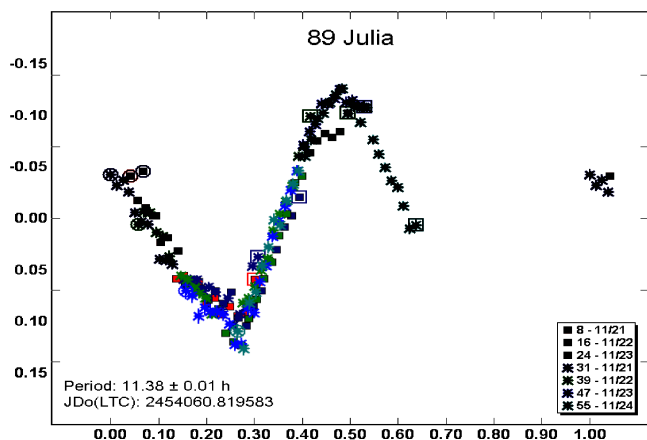
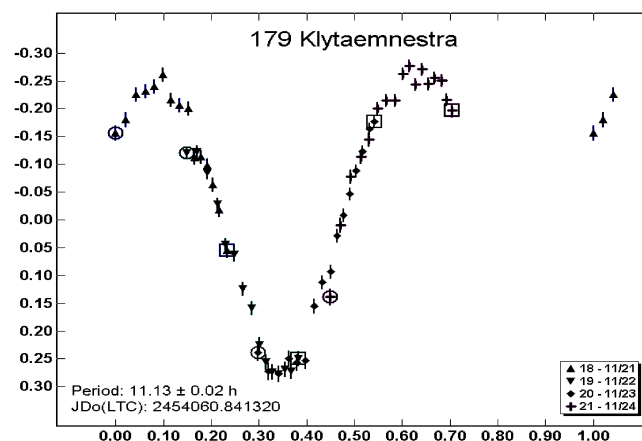
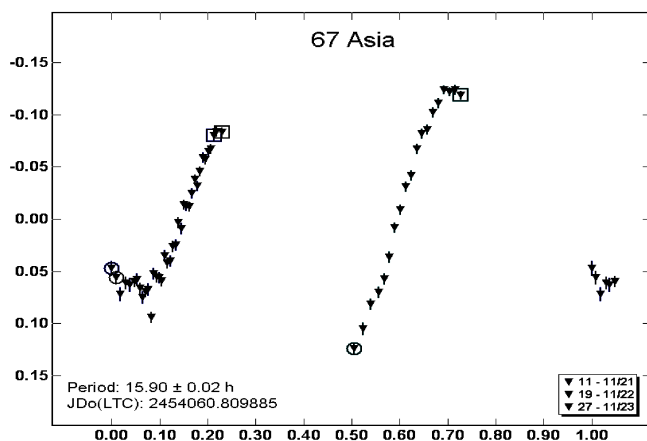
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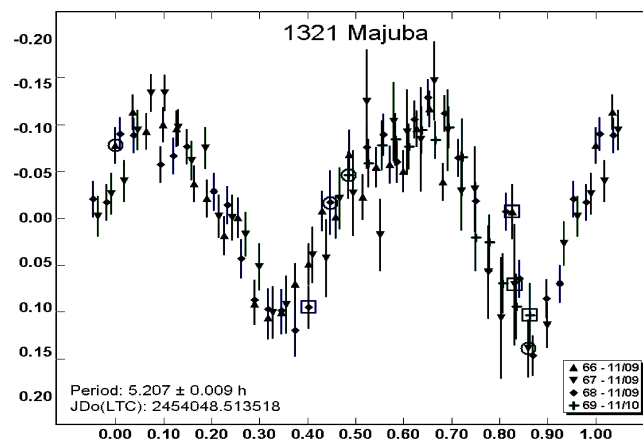
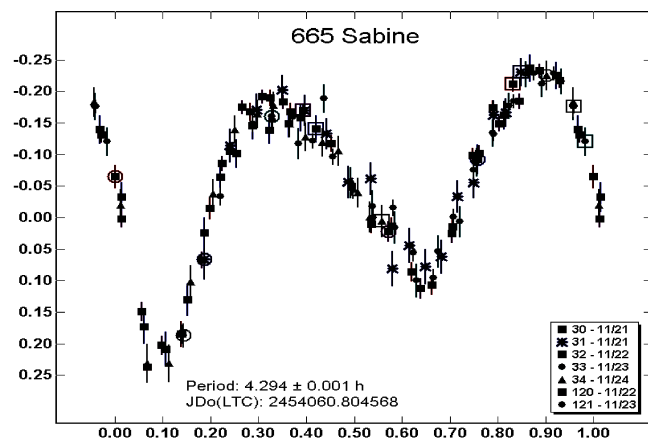
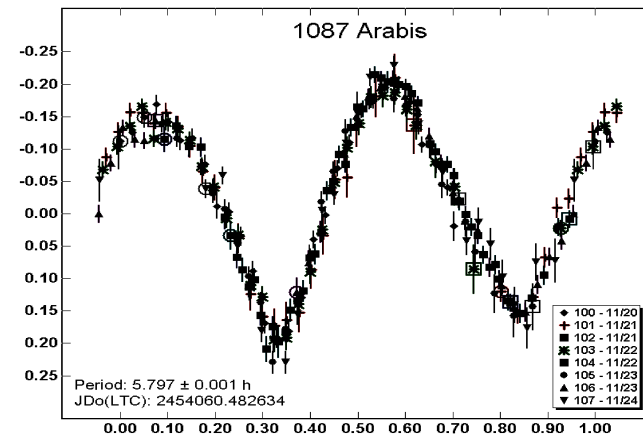
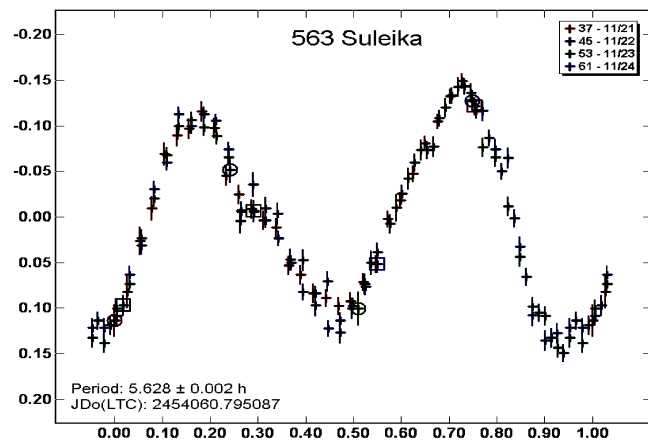
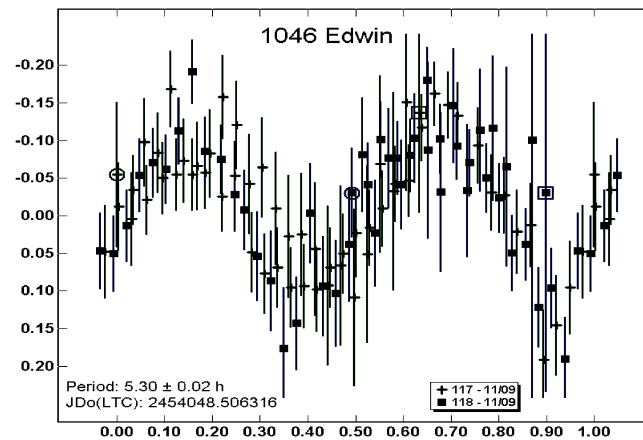
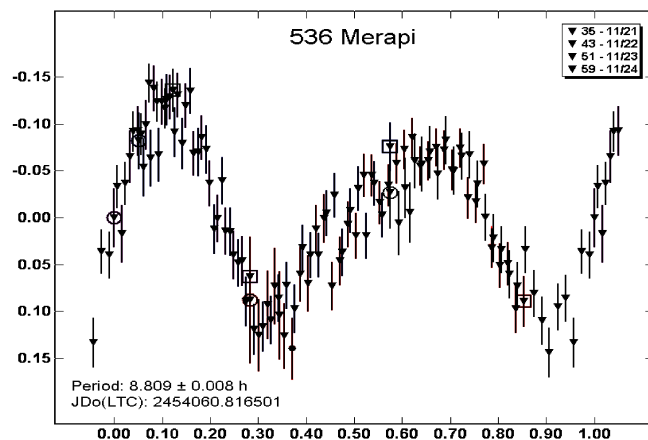
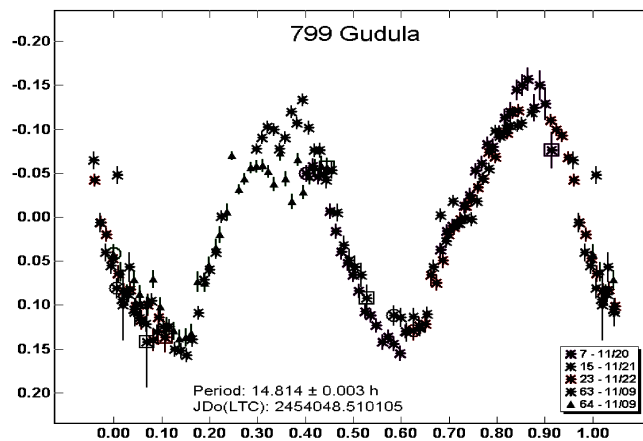
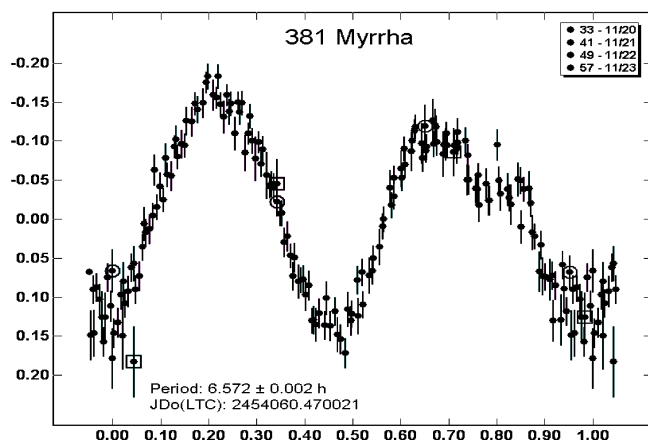
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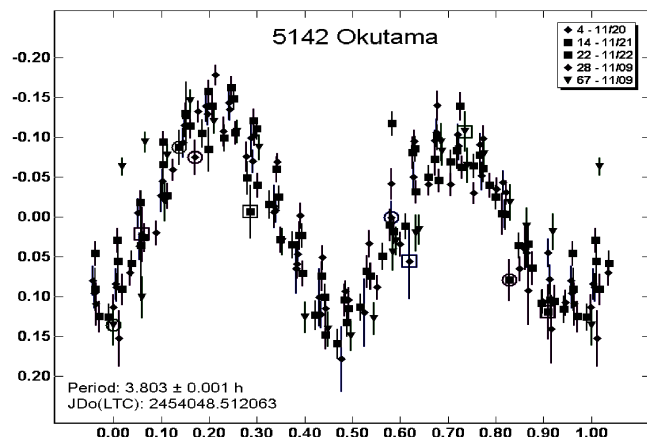
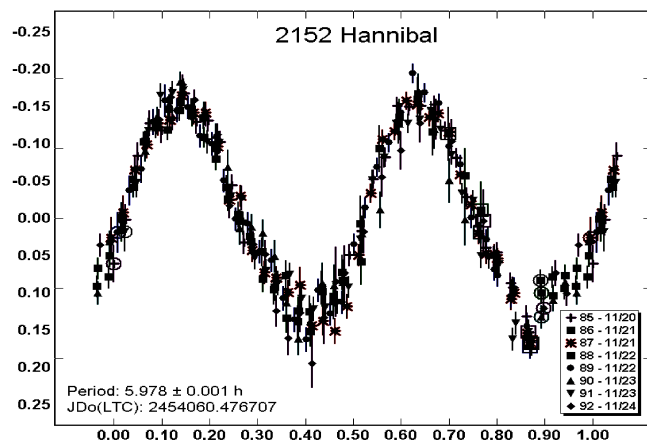
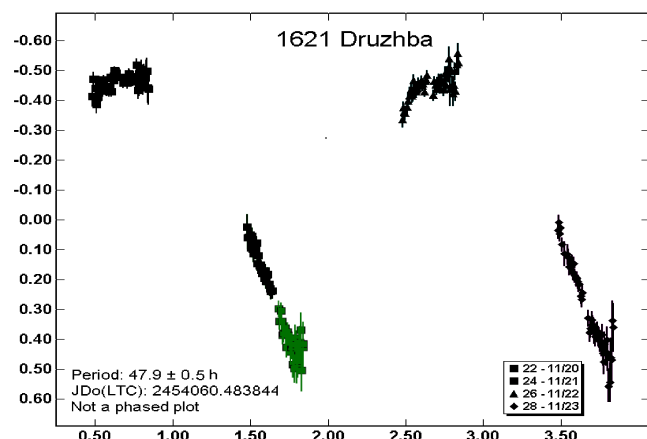
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PHOTOMETRY FROM GMARS AND SANTANA OBSERVATORIES – EARLY 2007

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Lightcurve period and amplitude results from Santana and GMARS Observatories are reported for 2007 January to March: 386 Siegena (9.760 ± 0.002 hours and 0.11 mag.), 1790 Volkov (10.7419 ± 0.0022 hours and 0.09 mag.), 2086 Newell (78.2 ± 0.1 hours and 1 mag.)

The author operates telescopes at two observatories. Santana Observatory (MPC Code 646) is located in Rancho Cucamonga, California and GMARS (Goat Mountain Astronomical Research Station, MPC G79) located at the Riverside Astronomical Society's observing site. Stephens (2006) gives equipment details.

1790 Volkov and 2086 Newell were selected for lightcurve studies from a list of targets provided by Pravec (2006) for the Photometric Survey of Asynchronous Binary Asteroids. 386 Siegena was selected to follow up on the author's observations described in Stephens (2005). The author measured the images using MPO Canopus, which employs differential aperture photometry to produce the raw data. Period analysis was done using Canopus, which incorporates the Fourier analysis algorithm (FALC) developed by Harris (1989).

The results are summarized in the table below. Column 2 gives the dates over which the observations were made, Column 3 gives the number of actual runs made during that time span and column 4 gives the number of observations used. Column 5 is the range of phase angles over the full data range. If there are three values in the column, this means the phase angle reached a minimum with the middle valued being the minimum. Columns 6 and 7 give the range of values for the Phase Angle Bisector (PAB) longitude and latitude respectively. Column 8 gives the period and column 9 gives the error in hours. Columns 10 and 11 give the amplitude and error in magnitudes.

386 Siegena. Siegena was originally reported to have a 9.763 hour period (Zappala 1982). It was observed again in 1979 and 1980 (Harris and Young 1983 and 1989). The resulting period was inconclusive but consistent with the Zappala period. The amplitude in 1979 was about 0.1 magnitudes and somewhat higher in 1980. Observations obtained in 2004 (Stephens (2005)) suggested a period of 15.98 hours. Despite the favorable 2004 opposition, the observations were extremely noisy, perhaps because it was in dense star fields. 2007 again presented a favorable opposition and observations were obtained using the 0.30m SCT/RCX operated at Santana Observatory.