

ASTEROID LIGHTCURVE PHOTOMETRY FROM SANTANA AND GMARS OBSERVATORIES – WINTER AND SPRING 2006

Robert D. Stephens
11355 Mount Johnson Court
Rancho Cucamonga, CA 91737 USA
rstephens@foxandstephens.com

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Lightcurve period and amplitude results from Santana and GMARS Observatories are reported for 2006 January-June.

58 Concordia (9.895 ± 0.002 hr and 0.10 mag.),
268 Adorea (7.800 ± 0.002 hr and 0.16 mag.),
293 Brasilia (8.17 ± 0.01 hr and 0.20 mag.),
(6185) 1997 YD (21.05 ± 0.01 hr and 0.34 mag.),
(19204) 1992 ME (3.17 ± 0.01 hr and 0.04 mag.)

The author operates telescopes at two observatories. Santana Observatory (MPC Code 646) is located in Rancho Cucamonga, California at an elevation of 400 meters and contains a Meade 0.3m RCX400 telescope. GMARS (Goat Mountain Astronomical Research Station, MPC G79) is located at the Riverside Astronomical Society's observing site at an elevation of 879 meters and contains several observatories. The author's observatory contains a Celestron 0.35m mounted on a Paramount from Software Bisque. All observations were obtained with an SBIG ST1001 CCD camera. Further details of the equipment used can be found at the author's web site (<http://members.dslextrême.com/users/rstephens/>). The images were measured and period analysis were done using the software program MPO Canopus which uses differential aperture photometry to determine the values used for analysis.

Results

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.

58 Concordia. This asteroid was previously observed by Gill-Hutton (Gill-Hutton 1993) who could not determine a period but

estimated it to be longer than 16 hours. X. Wang (Wang 2002) also reported a period of 9.90 hours, in good agreement with the current data.

268 Adorea. Holliday (1995) previously reported a period of 9.44 hours while Tedesco (1979) reported at period of 6.1 hours. Behrend (2006) reported a period of 15.595 hours resulting in a four extrema light curve. All of these periods were tested with the 2006 data and did not yield a reasonable fit. The 7.80 period is in agreement with the preferred period listed on the known lightcurve periods maintained by Harris and Warner (Harris 2006).

293 Brasilia. Observations were initially obtained with Santana's 0.3m telescope in suburban city skies. When adequate signal to noise could not be obtained, additional observations were acquired with the 0.35m telescope at GMARS under dark desert skies.

(6185) 1987 YD. This asteroid was selected as part of the Survey of Asynchronous Binary Asteroids (Pravec 2005). After four sessions it was apparent that the asteroid was not a binary candidate. Further observations could not be obtained due to the winter weather.

(19204) 1992 ME. This asteroid was also selected as part of the Survey of Asynchronous Binary Asteroids. Its amplitude was very low and it moved into crowded star fields. Observations were halted when it was felt that any potential binary nature could not be resolved. The period of 3.17 hours is a best fit, but the substantial noise and scatter reduces confidence in this solution.

Acknowledgements

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References

Behrend, R. (2006). Observatoire de Geneve web site, http://obswww.unige.ch/~behrend/page_cou.html

Harris, A. W., Warner, B. D. 2006.
<http://www.minorplanetobserver.com/astlc/LC.zip>

Holiday, B. "Lightcurve Observations of Minor Planet 268 Adorea." Minor Planet Bulletin **22**, 33.

Asteroid	Dates	Sess	Obs	Phase	L _{PAB}	B _{PAB}	Per (h)	PE	Amp	AE
58 Concordia	2006 02/04 - 13	4	916	1.7, 3.9	132.8	-3.0, -2.9	9.895	0.002	0.10	0.04
268 Adorea	2006 02/23 - 03/02	3	857	0.7, 3.3	153.6	1.6, 1.7	7.80	0.02	0.16	0.03
293 Brasilia	2006 04/18 - 05/01	5	704	8.7, 3.8	226.8	6.5, 5.6	8.17	0.01	0.20	0.03
(6185) 1997 YD	2006 01/21 - 23	4	273	7.9, 7.6	124.4	11.3, 11.4	21.05	0.01	0.34	0.02
(19204) 1992 ME	2006 05/20 - 06/04	4	392	25.2, 22.6	253.1	31.6, 29.4	3.17	0.01	0.04	0.03

Gil-Hutton, R. (1993). "Photoelectric Photometry of Asteroids 58 Concordia, 122 Gerda, 326 Tamara, and 441 Bathilde." *Rev. Mexicana Astron. Astrof.* **25**, 75-77.

Pravec, P. (2005). "Photometric Survey of Asynchronous Binary Asteroids." In *Proceedings of the Symposium on Telescope Science (The 24th Annual Conference of the Society for Astronomical Science)*, B.D. Warner, D. Mais, D. A. Kenyon, J. Foote (Eds.), 61-67.

Stephens, R. D. (2006).
<http://members.dslextrreme.com/users/rstephens/>

Tedesco, E. F. (1979). PhD Dissertation, New. Mex. State Univ. 280.

Wang, X. (2002). "CCD Photometry of asteroids (58) Concordia, (360) Carlova and (405) Thia." *Earth, Moon, and Planets*, **91**(1) 25-30.

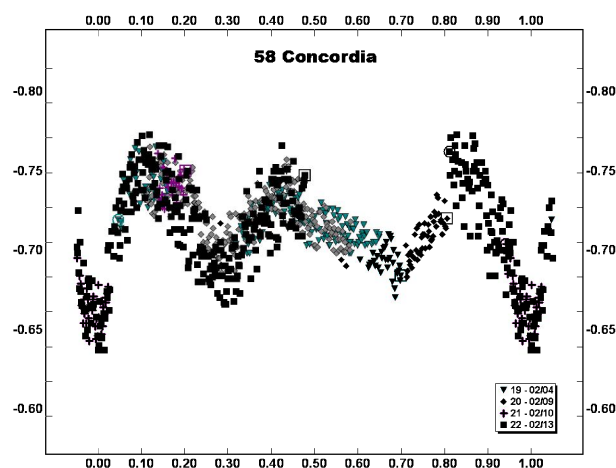


Figure 1: Lightcurve of 58 Concordia. The 0% Phase is equal to JD 2453799.709833 (corrected for light time).

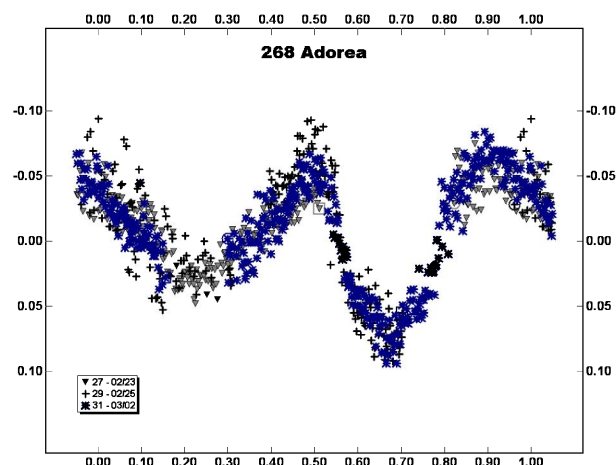


Figure 2: Lightcurve of 268 Adorea. The 0% Phase is equal to JD 2453791.671533 (corrected for light time).

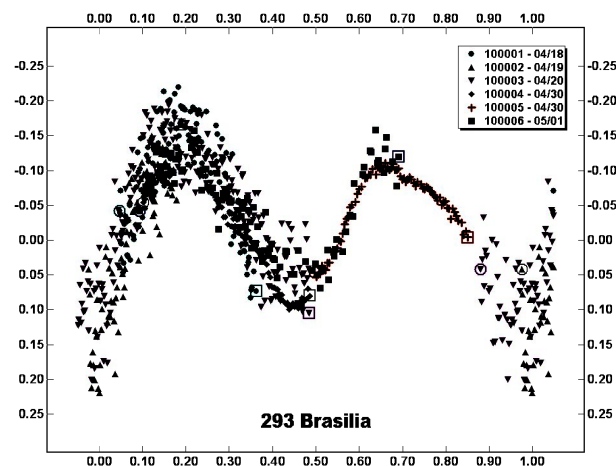


Figure 3: Lightcurve of 293 Brasilia. The 0% Phase is equal to JD 2453844.781647 (corrected for light time).

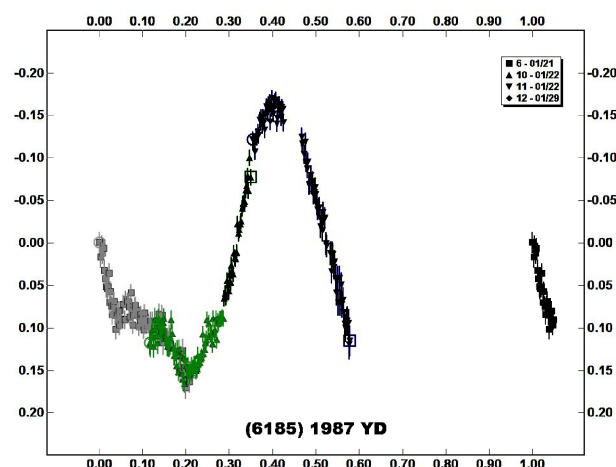


Figure 4: Lightcurve of (6185) 1987 YD. The 0% Phase is equal to JD 2453756.663623 (corrected for light time).

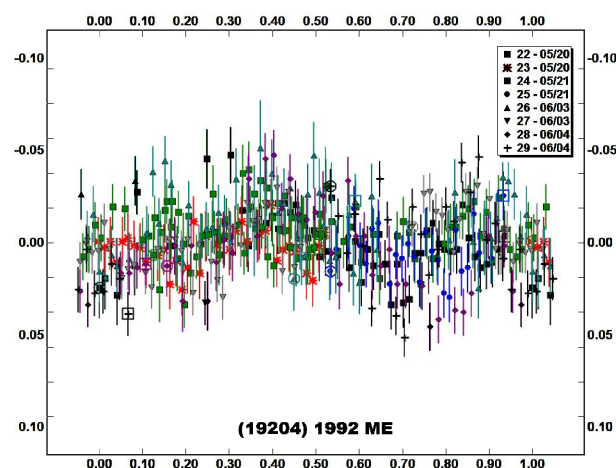


Figure 5: Lightcurve of (19204) 1992 ME. The 0% Phase is equal to JD 2453875.755866 (corrected for light time).