

ASTERIOD LIGHTCURVE ANALYSIS OF 554 PERAGA

David Higgins
Hunters Hill Observatory (E14)
7 Mawalan Street
Ngunnawal ACT 2913, Australia
higginsdj@bigpond.com

Brian D. Warner
Palmer Divide Observatory
Colorado Springs, CO 80908

Roger Dymock
Director, Asteroids and Remote Planets Section
British Astronomical Association

Martin Crow
Crayford Manor House Astronomical Society
Kent, UK

(Received: 24 December)

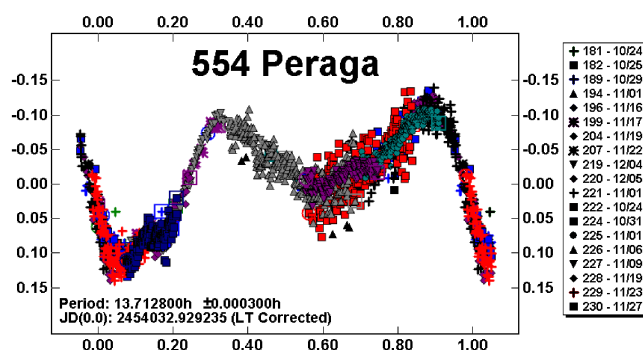
The main belt asteroid 554 Peraga was observed by the authors in support of radar observations. Data analysis produced a lightcurve with a synodic period of 13.7128 ± 0.0003 hrs and amplitude of 0.20 ± 0.02 mag.

Observations of 554 Peraga were requested by Dr. Ellen Howell of Arecibo to support radar observations. The target was also observed by Roger Dymock and Martin Crow from the UK who obtained a period of 13.715hrs from their own data and additional data were obtained by Brian Warner of Palmer Divide Observatory, Colorado Springs, USA. The previous published data for this target indicated a period of 13.68 hrs (Scaltriti 1979).

Hunters Hill Observatory is equipped as described in Higgins (2005). All observations for this paper were made using a clear filter with guided exposure times ranging from 120 seconds to 240 seconds. MaxIm DL/CCD, driven by ACP4, was used for telescope and camera control whilst calibration and image measurements were undertaken by MPO Canopus version 9. Palmer Divide Observatory, run by Brian D Warner, used a 0.35m SCT at f/9.1 and a FLI IMG-1001E CCD producing a scale of 2.5 arcseconds/pixel. Exposures were limited to 90 seconds. Roger Dymock used a 0.25 m, f/6.4 Newtonian on a German equatorial mount with a Starlight Xpress MX516 CCD camera attached. Martin Crow used an 0.25 m, f/10 SCT with a Starlight Xpress MX916 attached. Table I shows which observations were contributed by each observer.

Analysis of the combined data set showed yielded a synodic rotation period of 13.7128 ± 0.0003 hrs. The amplitude of the curve was 0.20 ± 0.02 mag. The results reported here are in agreement with those reported by Stephens (2007).

Howell was able to obtain data from radar observations at Arecibo. All the data obtained in this observing campaign have been sent to Howell to assist with the interpretation of that radar data. Early indications are of an unusual shape for such a large Main Belt asteroid. Howell's data and interpretation will be published separately.



Acknowledgements

The SBIG ST-8E used by Hunters Hill was funded by The Planetary Society under the 2005 Gene Shoemaker NEO Grants program.

References

Higgins, D. (2005). "Asteroid Lightcurve Analysis at Hunters Hill Observatory and Collaborating Stations - Autumn/Winter 2005", *Minor Planet Bulletin* **33**, 8-11.

Scaltriti, F. and Zappala, V. (1979). *Icarus* **39**, 124-130.

Stephens, R. D. (2007). "Asteroid Lightcurve Photometry from Santana and GMARS Observatories - September-December 2006". *MPB* **32**, 31

Warner, B.D. (2006). CALL website, <http://www.minorplanetobserver.com/astlc/default.htm>.

Observer	Sessions (see plot)
Higgins	181, 182, 189, 194, 196, 199, 204, 207
Dymock	221
Crow	222, 224, 225, 226, 227, 228, 229, 230
Warner	219, 220

Table I. Observation sessions by observer.

ASTEROID LIGHTCURVE PHOTOMETRY FROM SANTANA AND GMARS OBSERVATORIES – SEPTEMBER TO DECEMBER 2006

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

(Received: 27 December)

Lightcurve period and amplitude results from Santana and GMARS Observatories are reported for 2006 September-December:

554 Peraga (13.71 ± 0.01 hr and 0.28 mag),
2215 Sichuan (3.975 ± 0.001 hr and 0.40 mag),
3279 Solon (8.10 ± 0.01 hr and 0.85 mag),
3773 Smithsonian (6.9804 ± 0.0001 hr and 1.04 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 observatories at GMARS contains a Celestron 0.35m mounted on a Paramount from Software Bisque and a Meade 0.35m RCX400 telescope. All observations were obtained with an SBIG ST1001 CCD camera with the image scale of approximately 2.2 arcseconds per pixel at Santana Observatory and 2.4 arcseconds per pixel at GMARS. Further details of the equipment used can be found at the author's web site:
<http://members.dslextrême.com/users/rstephens/>.

Unless otherwise noted, all observations were obtained from Santana Observatory. Most targets were chosen from the list of asteroid photometry opportunities published by Brian Warner and Alan Harris on the Collaborative Asteroid Lightcurve Link (CALL) website (Harris 2006). The images were measured and period analysis was done using the software program MPO Canopus which uses differential aperture photometry to determine the values used for analysis.

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 observations used. Column 4 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 5 and 6 give the range of values for the Phase Angle Bisector (PAB) longitude and latitude respectively. Column 7 gives the period and column 8 gives the error in hours. Columns 9 and 10 give the amplitude and error in magnitudes.

554 Peraga. This target was selected because of a request for lightcurve observations from Ellen Howell to support radar observations and IR spectroscopy. The results reported here are in agreement with those reported by Higgins et al. (2007).

3279 Solon. Observations were initially obtained with Santana's 0.3m telescope in suburban city skies. Shortly thereafter the target was added to the Binary Asteroid Survey. Additional observations were obtained from GMARS on November 25 and 26 using the Meade 0.35m RCX400.

3773 Smithsonian. Observations were initially obtained with Santana's 0.3m telescope in suburban city skies. Shortly thereafter the target was added to the Binary Asteroid Survey (Pravec 2005). Additional observations were obtained from GMARS on September 23 and 24 using the 0.35m Celestron.

Acknowledgements

Thanks are given to Dr. Alan Harris of the Space Science Institute, Boulder, CO, and Dr. Petr Pravec of the Astronomical Institute, Czech Republic, for their ongoing support of all amateur asteroid. Also, thanks to Brian Warner for his continuing work and enhancements to the software program "Canopus" which makes it possible for amateur astronomers to analyze and collaborate on asteroid rotational period projects and for maintaining the CALL Web site which helps coordinate collaborative projects between amateur astronomers.

References

- Harris, A. W., Warner, B. D. (2006). <http://www.minorplanetobserver.com/astlc/LC.zip>.
- Higgins, D., Warner, B. D., Dymock, R., and Crow, M. (2007). "Asteroid Lightcurve Analysis of 554 Peraga". *MPB* **32**, 30
- Pravec, P. (2005). "Photometric Survey of Asynchronous Binary Asteroids".
<http://www.asu.cas.cz/~asteroid/binaryphotosurvey.htm>
- Stephens, R.D. (2006). <http://members.dslextrême.com/users/rstephens/>.

Asteroid	Dates (2006)	Data Points	Phase	I_{PAB}	B_{PAB}	Per (h)	PE	Amp	AE
554 Peraga	09/27-10/05	1,005	13.4, 9.5	25.7, 26.4	4.1, 4.2	13.71	0.01	0.28	0.03
2215 Sichuan	12/01-08	395	1.4, 0.2, 2.6	71.1, 71.5	-0.2, 0.4	3.975	0.001	0.40	0.03
3279 Solon	11/19-26	398	2.2, 4.8	56.7, 57.1	-3.3, -3.4	8.10	0.01	0.85	0.03
3773 Smithsonian	09/13-24	1,112	10.2, 3.1	3.1, 4.4	-1.9	6.9804	0.0001	1.04	0.02

Table I: Observation Results