

**ASTEROID LIGHTCURVE ANALYSIS AT RIVERLAND
DINGO OBSERVATORY (RDO): 185 EUNIKE, (17252)
2000 GJ127, AND (152858) 1999 XN35**

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Lightcurves for three asteroids selected from the Collaborative Asteroid Lightcurve Link (CALL; Warner 2011) were obtained at Riverland Dingo Observatory (RDO) in the period October 13 through December 5, 2012: 185 Eunike, (17252) 2000 GJ127, and (152858) 1999 XN35.

The observations reported here were obtained using a 0.41-m *f*/9 Ritchey-Chretien telescope, SBIG STL-1001E CCD camera, and either Clear or Johnson Cousins V filter, as indicated. All images were bias, dark and flat field corrected and have an image scale of 1.35 arc seconds per pixel. Differential photometry measurements were made in *MPO Canopus* (Warner, 2008). V magnitudes for comparison stars were extracted from the AAVSO Photometric All-Sky Survey (APASS; Henden, 2012) catalog. The Asteroid Lightcurve Database (LCDB; Warner *et al.*, 2009) does not contain any previously reported results for asteroids (17252) 2000 GJ127 or (152858) 1999 XN35. Previously reported results for 185 Eunike are referred to below.

185 Eunike is a main-belt asteroid discovered by Peters at Clinton in 1878. A total of 1,164 data points were obtained over eight nights using a Johnson Cousins V filter during the period 2012 November 3 to December 5 including solar phase angles between -16.1° to $+14.5^\circ$. The average magnitude was 11.4 and average SNR was 331. The lightcurve shows a period of 21.7753 ± 0.0001 h and amplitude of 0.23 ± 0.01 mag suggesting that the asteroid rotated 35 times during the period of observation. The LCDB reports six different periods, ranging from 10.83 h to 21.807 h. Only one of these has an uncertainty quality of 3 (Pilcher, 2012), which reports a period of 21.797 ± 0.001 h, in good agreement with the observations reported here.

(17252) 2000 GJ127 is a main-belt asteroid discovered by LINEAR at Socorro in 2000. A total of 437 data points were obtained over four nights using a clear filter during the period 2012 October 13 to November 19 as the solar phase angle increased from $+10.23^\circ$ to $+18.12^\circ$. The average magnitude was 15.6 and average SNR was 129. The lightcurve shows a period of 8.8237 ± 0.0001 h and amplitude of 0.21 ± 0.02 mag, suggesting that the asteroid rotated 100 times during the period of observation.

(152858) 1999 XN35 is a Mars-crossing asteroid discovered by LONEOS at Anderson Mesa in 1999. A total of 501 data points were obtained over seven nights using a clear filter during the period 2012 October 19 to November 22 including solar phase angles between -18.6° to $+19.7^\circ$. The average magnitude was 16.4 and average SNR was 51. The lightcurve shows a period of 2.990 ± 0.001 h and amplitude of 0.18 ± 0.03 mag, suggesting that the asteroid rotated 272 times during the period of observation.

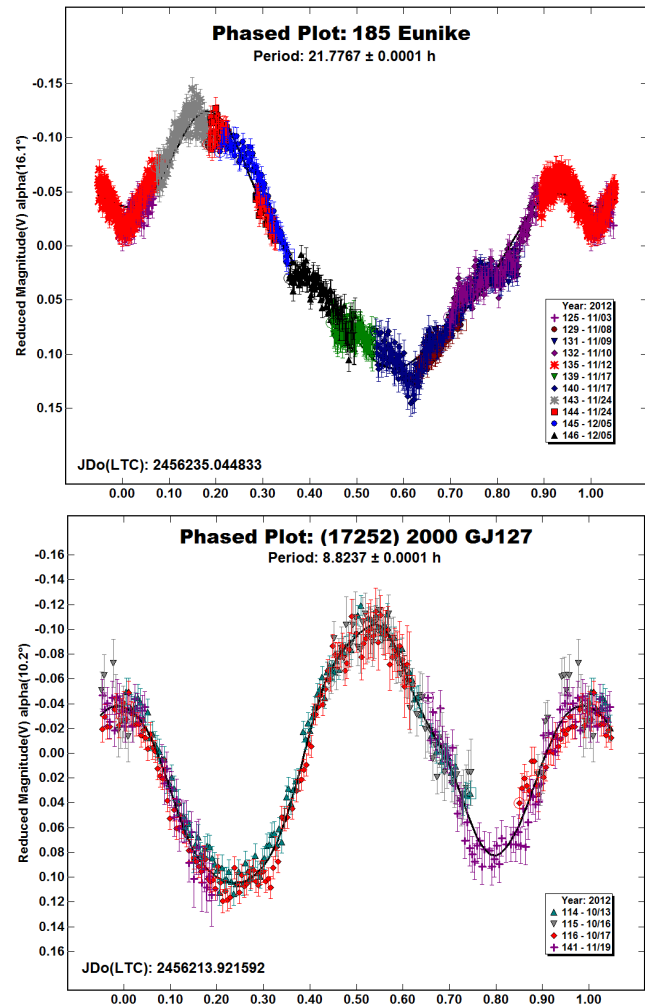
Acknowledgements

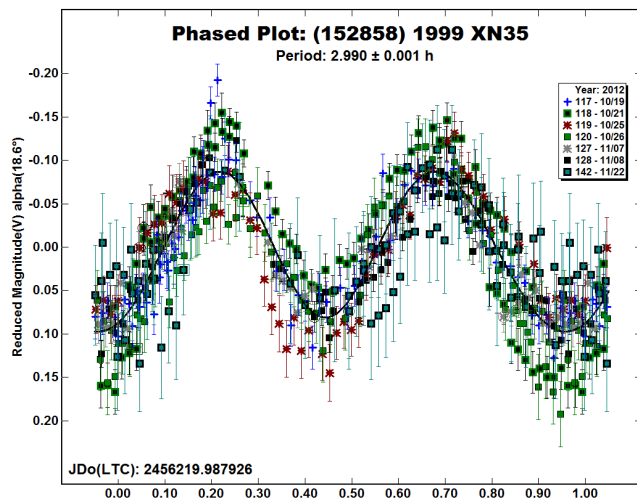
The measurements reported make use of the *AAVSO Photometric All-Sky Survey (APASS)* catalog, which is funded by the Robert Martin Ayers Sciences Fund.

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**LIGHTCURVE ANALYSIS OF MAIN BELT ASTEROIDS
1115 SABAUDA, 1554 YUGOSLAVIA, 1616 FILIPOFF,
2890 VILYUJSK, (5153) 1940 GO, AND (31179) 1997 YR2**

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Six asteroids were the subject of the lightcurve program at Shadowbox Observatory during 2012 and early 2013: 1115 Sabauda, 1554 Yugoslavia, 1616 Filipoff, 2890 Vilyujsk, (5153) 1940 GO, and (31179) 1997 YR2.

During the period 2012 May 11 to 2013 January 5, observations and lightcurve analysis were conducted on main-belt asteroids 1115 Sabauda, 1515 Yugoslavia, 1616 Filipoff, 2890 Vilyujsk, (5153) 1940 GO, and (31179) 1997 YR2. All objects were observed using a 0.3-meter Schmidt-Cassegrain (SCT) operating at $f/6.1$ on a German Equatorial mount (GEM). Details of the observing equipment, techniques and data reduction methods are in Ruthroff (2010).

Main-belt asteroids 1115 Sabauda, 1616 Filipoff and 2890 Vilyujsk were chosen for their availability in the author’s urban, “horizon challenged” environment. (5153) 1940 GO was the subject of an inconclusive lightcurve study by the author in 2009, while 1554 Yugoslavia and (31179) 1997 YR2 were in the field of another target, i.e., they were “targets of opportunity.” Previously reported lightcurve data for 1616 Filipoff and (31179) 1997 YR2 could not be found. Previous lightcurves had been obtained on 1115 Sabauda (Behrend 2005; Warner, 2006), 1554 Yugoslavia (Higgins, 2008), 2890 Vilyujsk (Koff, 2003), and (5153) 1940 GO (Behrend 2008).

1115 Sabauda. A partial lightcurve consisting of 97 data points was obtained over two nights. Lightcurves published by Behrend (2005) and Warner (2006) showed periods of 6.75 ± 0.01 h and 6.72 h respectively. My analysis shows 6.72 ± 0.01 h and an amplitude of 0.15 ± 0.06 mag.

1554 Yugoslavia. One night of observations, resulting in 74 data points, showed a period of 3.887 ± 0.001 h, these results being in good agreement with observations by Higgins (2008).

1616 Filippoff. Five nights of observations showed a period of 5.652 ± 0.001 h. An anomaly in observations from rotation phase 0.80 to 0.90 lowers confidence that this period is correct. Several reexaminations of the images reveal no reason to throw these observations out, yet they are not consistent with the stated period. No previous reported lightcurve results for 1616 Filippoff were found.

2890 Vilyujsk. This main-belt asteroid was observed by Koff (2003) who derived a period of 3.45 ± 0.01 h and an amplitude of 0.22 ± 0.22 mag. My analysis of 406 data points compiled over six nights from 2012 November 6 to 15 give the same results.

(5153) 1940 GO. This asteroid was the subject of a lightcurve study in 2009 that was motivated by an earlier work by Behrend (2008), who reported a period of 4.58 h. The results of my 2009 unpublished study were inconclusive.

My latest observations reveal a period of $9.00 \text{ h} \pm 0.01 \text{ h}$ with an estimated amplitude of $0.10 \pm 0.04 \text{ mag}$. While this period is nearly twice that offered by Behrend, his result may not be ruled out since my observed amplitude does not meet the threshold amplitude of 0.2 mag that may constrain an object to two minima and two maxima per revolution (Binzel, 1987).

(31179) 1997 YR2 was in the field-of-view (FOV) of another target on 2012 October 11 and was imaged again on October 25. The derived period was 4.829 ± 0.001 h with estimated amplitude of 0.80 ± 0.15 mag.

Acknowledgments

This paper makes use of data products from The Third U.S. Naval Observatory CCD Astrograph Catalog (UCAC3).

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