Due to the large amplitude variations related with phase angle, using, respectively, maximum, minimum and mean light points, we derive different values for H-G parameters (Figure 5).

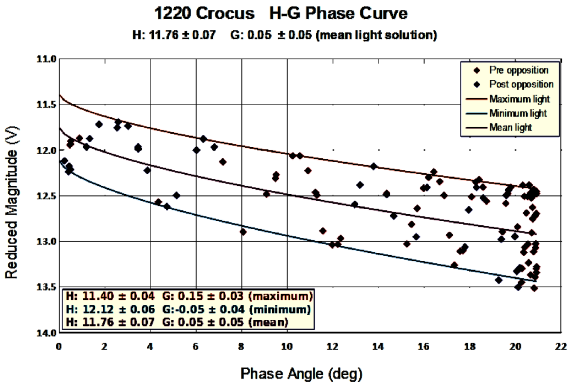

Figure 5. H-G plots for 1220 Crocus for maximum, minimum and mean light data points, respectively.

The V mag values were used by adding the color index V-R = 0.47 to the R mag. For *H-G* determination we choose the mean light values as better representing observation although the maximum light values have a more solid geometric foundation. The mean light values are used in the JPL and MPC databases. The results are $H = 11.76 \pm 0.07$ mag and $G = 0.05 \pm 0.05$.

Our *H* value is close to $H = 11.72$ published on the JPL Small-Body Database Browser (JPL, 2015), while our value for *G* is fairly different from the published value of $G = 0.23$. Both our color index (V-R) and *G* values are compatible with a low- to medium-albedo asteroid (Shevchenko and Lupishko, 1998).

Finally, in Figure 6 we report the fit of the observed data-points with 3rd order Fourier model with phase corrected amplitude.

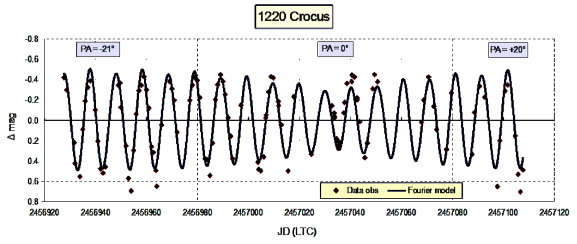

Figure 6. Raw plot of fit of observed data points for 1220 Crocus with 3rd order Fourier model applied to phase corrected amplitude.

Acknowledgments

The authors thank Petr Pravec for analyzing our data and finding no evidence of either a rotating satellite or tumbling behavior. The Etscorn Campus Observatory operations are supported by the Research and Economic Development Office of New Mexico Institute of Mining and Technology (NMIMT). Student support at NMIMT is given by NASA EPSCoR grant NNX11AQ35A, the Department of Physics, and the Title IV of the Higher Education Act from the Department of Education. Author AWH acknowledges support from NASA grant NNX13AP56G and NSF grant AST-1210099.

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[Editorial handling for this manuscript was performed by the Assistant Editor, who notes: The authors are to be congratulated for this finest of examples of a well-conceived and executed collaboration among several observers. Their careful attention to detail in data acquisition and analysis of a difficult target should serve as an inspiration and guide to all those doing asteroid photometry.]

LIGHTCURVE ANALYSIS FOR 30 URANIA

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ROTAT and SATINO Observatories (C95)

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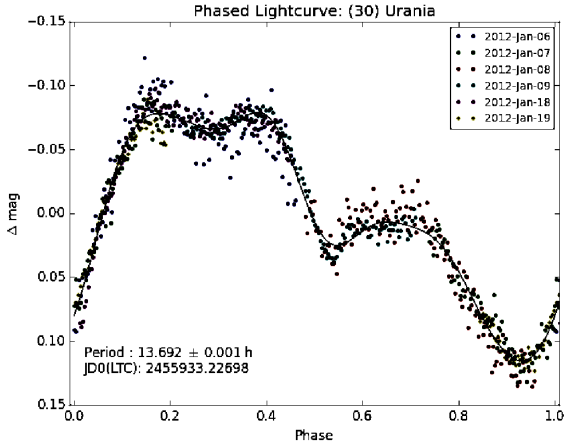
CCD photometric observations of main-belt asteroid 30 Urania were made over six nights in 2012 January. The lightcurve shows a synodic period of 13.692 ± 0.001 h with an amplitude of 0.19 mag.

Initial photometric observations of main-belt asteroid 30 Urania were made in order to support subsequent occultation observations. The asteroid was predicted to occult the star TYC2 1227-00620-1

on 2012 January 19, an event predicted to be visible from central to east Europe (Kretlow, 2011) although the circumstances were not very favorable. Unfortunately, mainly due to bad weather over Europe that time, no occultation observations was reported.

Small Automated Telescope for Internet Observations (SATINO) is a project established by the first author. SATINO 1 and SATINO 2 are remotely operated telescopes with 20-cm and 30-cm aperture, located on the Observatoire de Haute-Provence (OHP) site at Haute-Provence, France, about 100 km north-east of Marseille. Image acquisition was made with an SBIG ST-8 dual-chip CCD camera attached to the SATINO 2 telescope with focal reducer. This gave a scale of 2.1 arcsec/pixel with 2 x 2 binning. No filters were used. Exposure time was 300 seconds on the first night and 120 seconds for all subsequent nights. All images were measured using *MiraPro*. Dark and flat images were applied.



Period analysis was done with a Python/SciPy script developed by the second author. Magnitudes were reduced to unity distance and times were corrected for light-time. The period was calculated by a non-linear least squares fit of an n-order Fourier series (in this case n = 6) to the observations, similar to the well-known FALC algorithm developed by Harris (Harris *et al.,* 1989).

We obtained a synodic rotational period P = 13.692 ± 0.001 h with an amplitude A = 0.19 mag from this lightcurve. The period agrees with the values given in the literature and databases (Warner, 2015).

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ETSCORN OBSERVATORY LIGHTCURVE RESULTS FOR ASTEROIDS 2245, 3759, 6388, 214088

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Four asteroids were observed at Etscorn Observatory from 2014 December to 2015 January. The results from analysis are all new determinations of synodic periods and amplitudes

Observations of four asteroids were obtained at the Etscorn Campus Obseratory (ECO, 2015) with our three Celestron 0.35-m Schmidt-Cassegrain telescopes (SCT) on Software Bisque (SB) Parmount ME mounts (SB, 2015). The telescopes were controlled with *TheSky6* (SB, 2015) and the CCDs were controlled with *CCDSoft* v5 (SB, 2015).

Two of the telescopes used an SBIG STL-1001E CCD camera with a pixel array of 1024x1024x24-microns. This produced a field-of-view of 22x22 arc minutes and scale of 1.25 arc sec/pixel. The third telescope used an SBIG ST10XME with an Optec 0.5x focal reducer. The ST10XME was binned 2x2 providing an image of 1092x736x13.6-micron pixels. This gave a scale of 1.28 arc sec/pixel and field-of-view of 20x16 arc minutes.

The asteroid images were obtained through a clear filter. Exposure times varied between 3 and 5 minutes depending on the brightness of the object. Each evening, a series of 11 dome flats was obtained and combined into a master flat with a median filter. The images were dark-frame and flat-field corrected using image processing tools within *MPO Canopus* v10.4.7.6 (Warner, 2015a). The multi-night data sets for each asteroid were combined with the FALC routine (Harris *et. al.*, 1989) within *MPO Canopus* to provide synodic periods for each asteroid.

Observed Asteroids

The information about the discovery and names was obtained from the JPL Small Body Database Search Engine (JPL, 2015). 2245 Hekatostos, 3759 Piironen, and (6388) 1989 WL1 are new determinations of synodic periods and amplitudes. 214088 has also been observed by Pravec et. al. (2014) and Warner (2015b)

2245 Hekatostos is a main-belt asteroid discovered by L.I. Chernykh at Crimean Astrophysical Observatory on 1968 Jan 24. It is also known as 1968 BC, 1930 FA, 1958 XC, 1966 QV, and 1971 XC. We observed it on six nights between 2015 Jan 16-25. We obtained a synodic period of 20.61 h ± 0.01 h with an amplitude of 0.21 mag.