

THE MINOR PLANET BULLETIN

BULLETIN OF THE MINOR PLANETS SECTION OF THE
ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS

VOLUME 39, NUMBER 4, A.D. 2012 OCTOBER-DECEMBER

203.

LIGHTCURVE ANALYSIS FOR FOUR ASTEROIDS

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(Received: July 11)

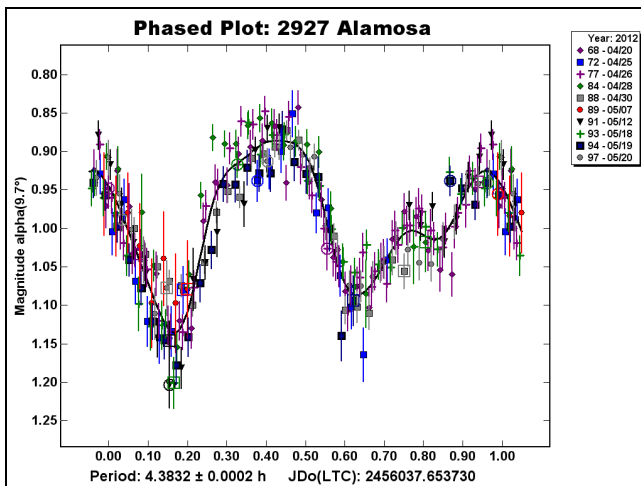
Lightcurves for four asteroids were obtained at Phillips Academy Observatory (PAO) and HUT observatory from 2012 March to May: 2927 Alamosa, 4419 Allancook, 5374 Hokutosei, and (28704) 2000 GU91.

Lightcurves for four asteroids were obtained at Phillips Academy Observatory and HUT Observatory between 2012 March and May. HUT and Phillips Academy Observatory have twin telescopes: a

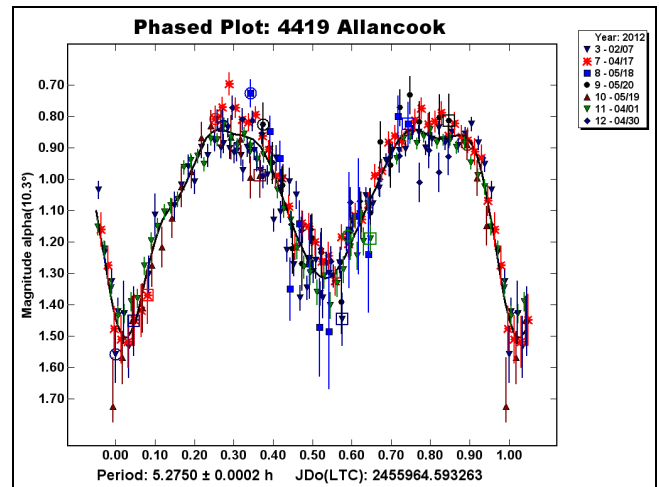
0.40-m *f*/8 Ritchey-Chretien reflector by DFM Engineering. Phillips Academy Observatory used an SBIG 1301-E CCD camera with a 1280x1024 array of 16-micron pixels. The resulting image scale was 1.0 arcseconds/pixel. Exposures were usually 450 seconds working at -25°C through a clear filter. All images were dark and flat-field corrected, guided, and unbinned. HUT observations were made with an Apogee Alta model U47 CCD. Exposures were 180 seconds working at -40°C through a Bessell R filter. Exposures were binned 2x2 for an effective image scale of 1.65 arcsec/pixel.

Images were measured using *MPO Canopus* (Bdw Publishing) with a differential photometry technique. All comparison stars were selected to have approximately-solar color by using the “comp star selector” tool of *MPO Canopus*. Data merging and period analysis was also done with *MPO Canopus*, the latter using an implementation of the Fourier analysis algorithm of Harris (FALC; Harris *et al.*, 1989). The combined data sets from both observatories were analyzed by Odden and French. A search of the Asteroid Lightcurve Database (LCDB; Warner *et al.*, 2009) and other sources did not find previously reported lightcurve results for any of these asteroids.

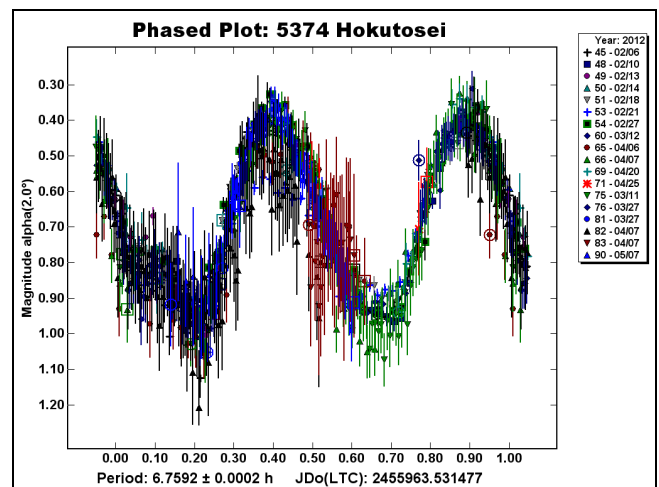
2927 Alamosa. Observations were conducted between 2012 April 20 and May 20 at Phillips Academy Observatory. The resulting lightcurve consists of 262 data points. An examination of the period spectrum between 3 and 12 hours indicates a period of 4.3832 ± 0.0002 h and amplitude 0.26 ± 0.03 mag. For trial periods in this range, the adopted period and its double gave the lowest RMS values. Other possibilities show at least one or two nights out of phase with the others and may be rejected. The resulting lightcurve is bimodal with a “wiggle” at 0.80 rotation phase angle. When the data are phased to the double period (8.766 hours), the two halves of the curve look the same within reasonable error.



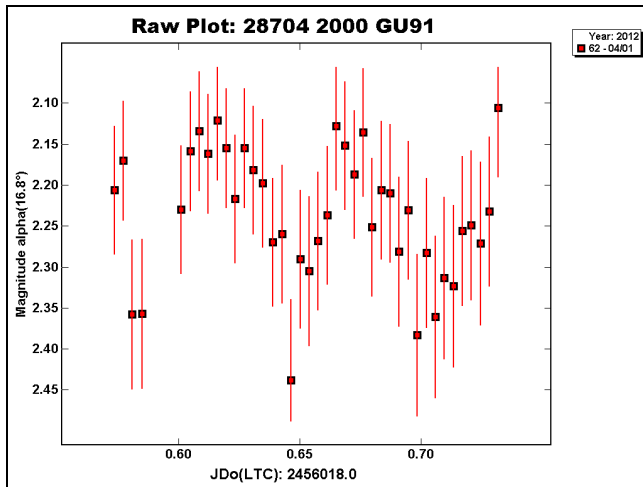
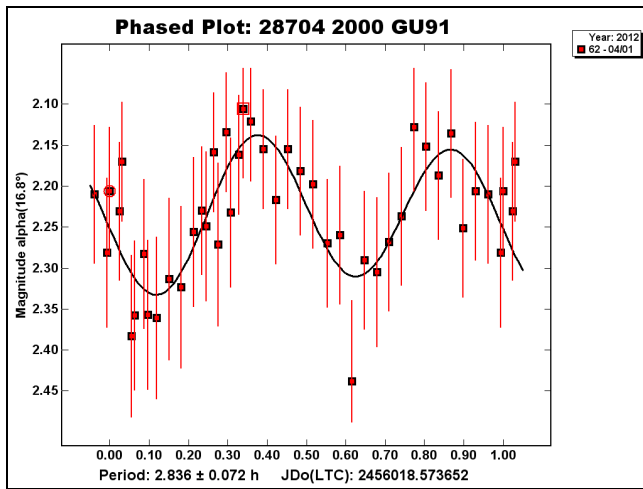
4419 Allancook. Observations of 4419 Allancook were conducted from 2012 February 7 to May 20 from Phillips Academy Observatory. Based on the amplitude of the lightcurve, 0.66 ± 0.02 mag, the bimodal solution is expected. An examination of the period spectrum between 3 and 12 hours indicates a period of 5.2750 ± 0.0002 h. Aliases of 4.752 hours and 5.928 also exhibit low RMS values, but visual inspection of lightcurves phased to those periods show at least two nights out of phase with the others and may be rejected.



5374 Hokutosei. Observations of 5374 Hokutosei were conducted from 2012 February 2 until May 7 from the Phillips Academy and HUT Observatory. The resulting lightcurve consists of 797 data points. An examination of the period spectrum between 3 and 12 hours indicates a period of 6.7592 ± 0.0002 h and amplitude of 0.60 ± 0.05 mag. For trial periods in this range, the half period, true period and double period yield the lowest RMS values. When the data are phased to the double period (13.518 hours), the two halves of the curve look the same within reasonable error. It should be noted that the authors noticed an interesting dip in the lightcurve on the evening of 2012 February 21. Additional observations failed to confirm the irregularity. We plan to follow up at the next apparition.



(28704) 2000 GU91. This was a target of opportunity that passed through the same field as 4419 Allancook. Follow up observations were not attempted until May when the asteroid was too faint to achieve a reasonable signal-to-noise ratio. Given the incomplete data set, we have included a raw plot as well as a plot phased to a bimodal solution of 2.836 ± 0.072 h. The lightcurves are based on 40 data points, and the amplitude is measured to be 0.20 ± 0.05 magnitude.



Acknowledgments

Thanks to Brian Warner and Petr Pravec for their timely and useful advice. Thanks also to Marshall Cloyd for his encouragement and support of student research at the Phillips Academy Observatory.

References

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