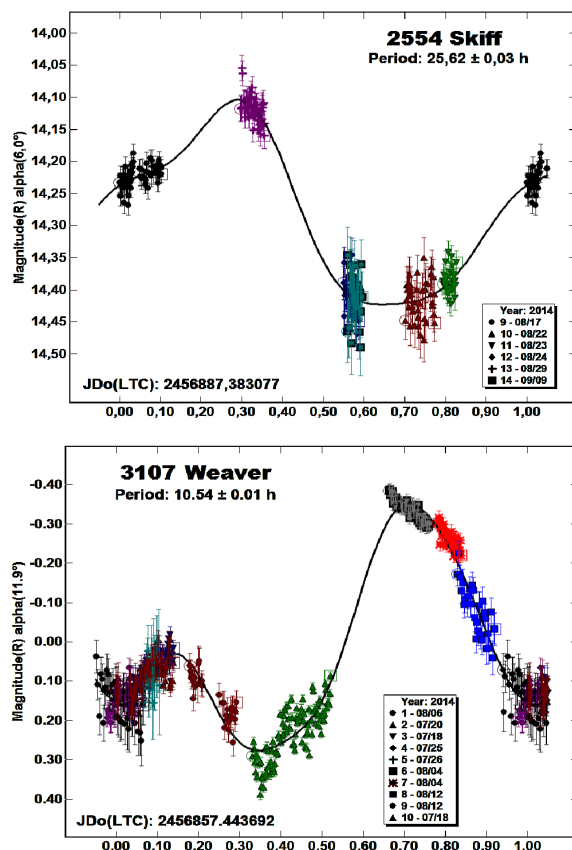




Acknowledgements

We would like to thank Maurizio Cervoni (ATA research team) for his help in taking light and dark frames during all over the period of observation.

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ASTERIODS AT ETSORN CAMPUS OBSERVATORY: 2014 SEPTEMBER - DECEMBER

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We observed ten asteroids during a three-month period in 2014. Six of the targets had no reported synodic period while four were observed in an attempt to improve their previously published periods.

Observations were obtained at the Etsorn Campus Observatory (ECO, 2014) with our three Celestron 0.35-m Schmidt-Cassegrain telescopes (SCT) on Software Bisque Paramount ME mounts (SB, 2014). Two of the telescopes used SBIG STL-1001E CCDs that have 1024x1024 24-micron pixels. The scale was 1.25 arc seconds/pixel. This provides a 22x22 arc minute field of view. The third C-14 used an SBIG ST-10XME with an Optec 0.5x focal reducer. The ST-10XME was binned 2x2, providing an image of 1092x736 13.6-micron pixels. The scale was 1.28 arc seconds/pixel. This provided a 20x16 arc minute field of view.

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 telescopes were controlled with Software Bisque's *TheSky6* (SB, 2014) and the CCDs were controlled with *CCDsoft V5* (SB, 2014). The images were dark subtracted and flat field corrected using image processing tools within *MPO Canopus* version 10.4.6.5 (Warner, 2014). 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.

All of the observed asteroids were selected from the lightcurve data base (LCDB; Warner *et al.*, 2009) as being in a favorable position to observe in three-month period. Three of the asteroids, 746 Marlu, 2649 Oongaq, and 4909 Couteau have known periods with a U value of less than 3 (see Warner *et al.*, 2009). Information about asteroid discovery dates and names were obtained for the JPL small bodies Database, JPLSDB (2014).

746 Marlu is a main-belt asteroid discovered by F. Kaiser at Heidelberg on 1913 Mar 1. It also known as 1913 QY, 1926WA, 1975 XN. We observed it on five nights between 2014 Oct 6-15. We obtained a *synodic* period of 7.787 ± 0.001 h and an amplitude of 0.22 ± 0.05 mag. The data covered the complete lightcurve. Harris *et al.* (1992) obtained a period of 7.787 h with an amplitude of 0.23 mag. Hanus *et al.* (2011) obtained a *sidereal* period of 7.787 ± 0.005 h with no mention of an amplitude.

1463 Nordenmarkia is a main-belt asteroid discovered by Y. Vaisala at Turku on 1938 Feb 6. It is also known as 1938 CB, 1925 UB, 1925 WJ, 1927 DC, 1930 QE, and 1950 FD. We observed it on six nights between 2014 Oct 6-16. We found a period of 5.918 ± 0.001 h and an amplitude of 0.17 ± 0.05 mag.

2390 Nezarka is a main-belt asteroid discovered by Z. Vavrova at Klet on 1980 Aug 14. It is also known as 1980 PA1, 1942 RS, A904 RC. We observed it on seven nights between 2014 Sep 24 and Oct 5. We obtained a period of 11.349 ± 0.001 h and amplitude of 0.42 ± 0.10 mag.

2649 Oongaq is a main-belt asteroid discovered by E. Bowell at Anderson Mesa Station of Lowell Observatory on 1980 Nov 29. It is also known as 1980 WA, 1933 SB1, 1959 XE and 1963 US. Behrend (2005) reported a period of 8.64 h based on data obtained by Poncy. We observed it between 2014 Oct 6-15 for five nights. We obtained a period of 7.786 ± 0.001 h and an amplitude of 0.46 ± 0.05 mag.

2693 Yan'an is a main-belt asteroid discovered by Purple Mountain Observatory at Nanking on 1977 Nov 3. It is also known as 1977 VM1, 1937 WE, 1947 XA and 1967 UF. We observed it on three nights between 2014 Nov 29 and Dec 1. We found a period of 3.841 ± 0.001 h and an amplitude of 0.12 ± 0.02 mag. Unpublished observations from 2004 obtained from R. A. Koff (2004) give the same period but with an amplitude of only 0.05 mag. The difference may be the result of looking at a different orientation of the asteroid as it rotates. The phase angle bisector longitude (L_{PAB}) and latitude (B_{PAB}) for our observations were 60.7° and $+0.7^\circ$, respectively. They were 75.1° and $+3.5^\circ$ at the time of Koff's 2004 observations.

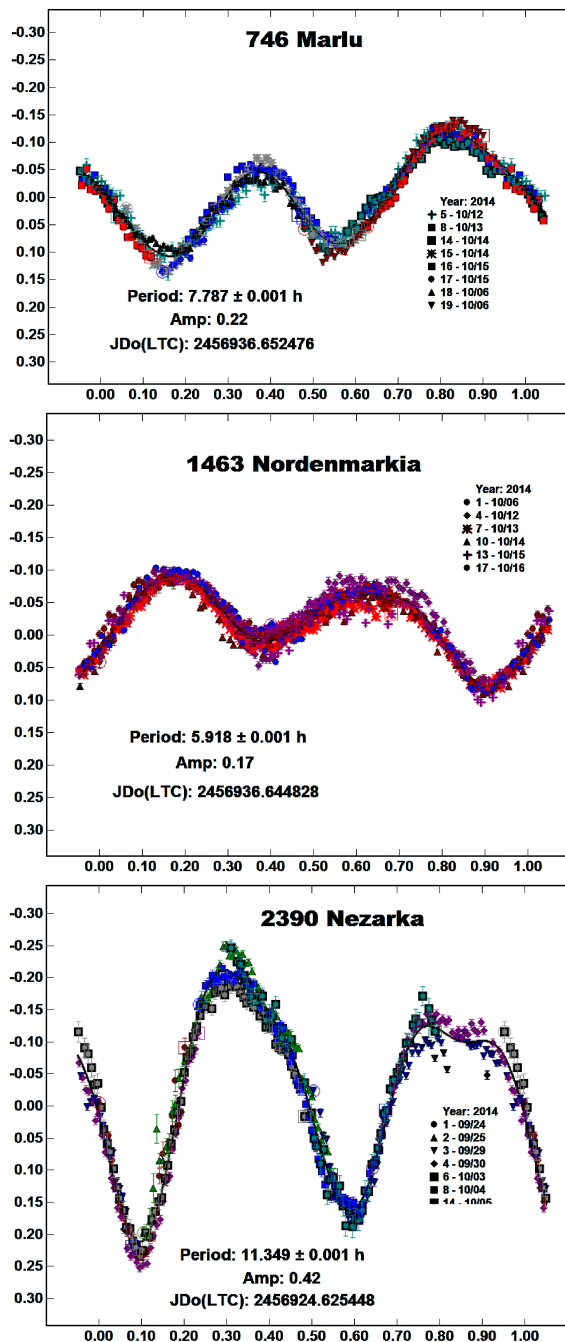
3730 Hurban is a main-belt asteroid discovered by M. Antal at Piszkesteto on 1983 Dec 4. It is also known as 1983 XM1, 1955 QB, 1962 BE, 1973 QV, 1982 OC and A919 QA. We observed it on seven nights between 2014 Oct 31 and 2014 Nov 11. We found a period of 4.649 ± 0.001 h and amplitude of 0.22 ± 0.05 mag.

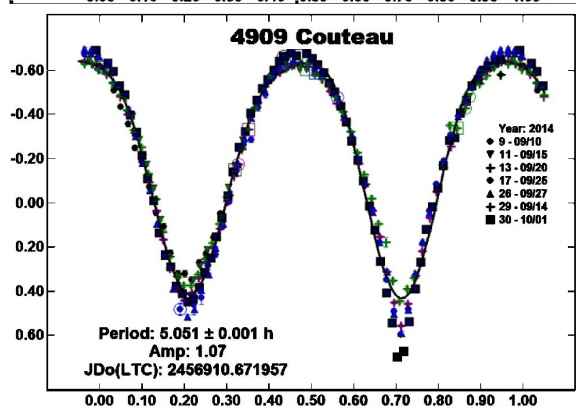
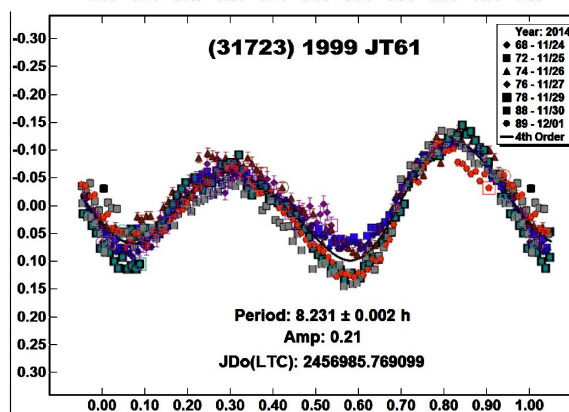
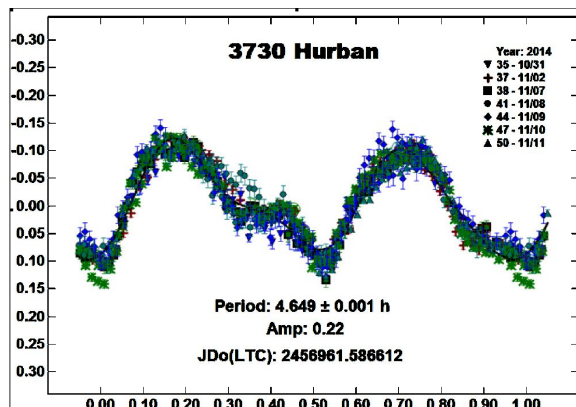
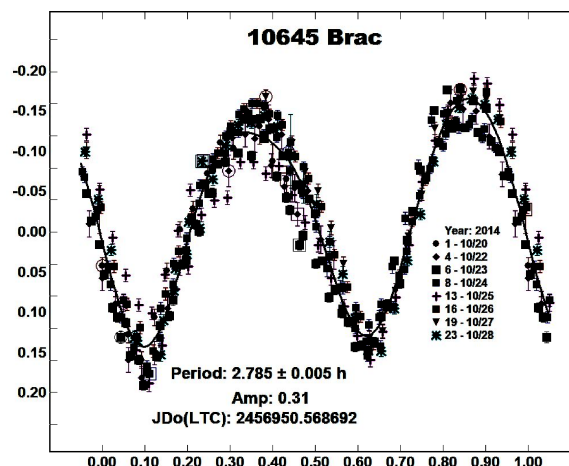
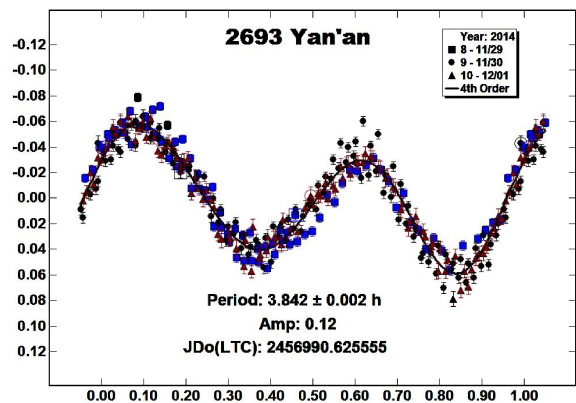
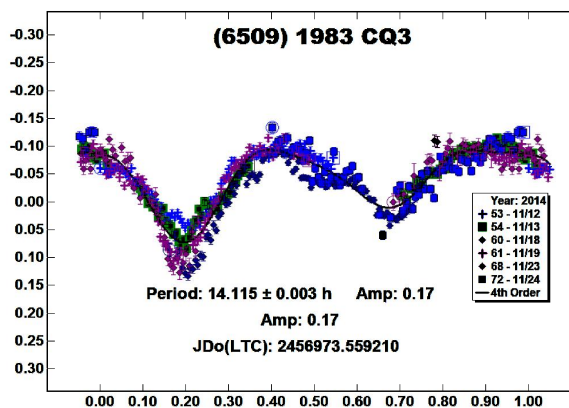
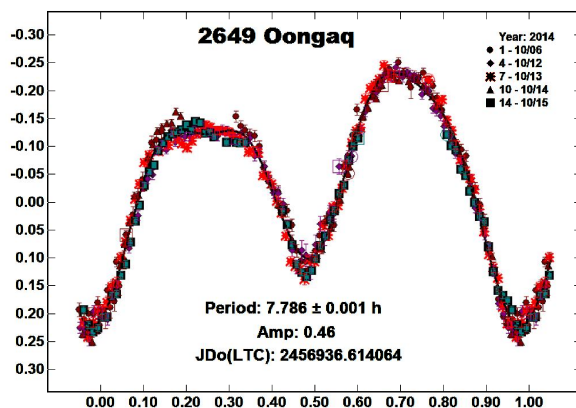
4909 Couteau is a main-belt asteroid discovered by M. Laugier at Nice on 1949 Sep 28. It is also known as 1949 SA1, 1949 SD, 1949 TJ, 1949 UG1, 1959 NK, 1966 QO, 1973 SW3 and 1990 RA. Pravec (2014) reports a period of 5.054 ± 0.001 h and amplitude of 1.05 mag. Clark (2015) reported a period of 5.0505 ± 0.0001 h and amplitude of 1.04 ± 0.03 mag. His observations were obtained 2014 Aug 3-19. We observed it on seven nights between 2014 Sep 10 and Oct 1. We found a period of 5.051 ± 0.001 h and amplitude of 1.07 ± 0.2 mag. Our magnitude uncertainty is large because of the differences in the deeper minimum at a phase of 0.7.

(6509) 1983 CQ3 is a main-belt asteroid discovered by G. DeSanctis at La Silla on 1983 Feb 12. It is also known as 1983 CQ3, 1967 RD, 1972 VQ1, 1976 OG, 1990 HF5 and 1991 YB. We observed it on six nights between 2014 Nov 12-24. We obtained a period of 14.115 ± 0.003 h and amplitude of 0.17 ± 0.10 mag. The minimum magnitude at phase 0.2 variation is on the order of 0.10 mag. The minimum was getting deeper with time.

10645 Brac is a main-belt asteroid discovered by K. Korlevic at Visnjan on 1999 Mar 14. It is also known as 1999 ES4, 1962 TN, 1968 BF, 1975 TJ1, 1980 YK, 1986 EH5 and 1988 SX4. We observed it on eight nights between 2014 Oct 20-28. We found a period of 2.785 ± 0.005 h and amplitude of 0.31 ± 0.10 mag.

(31723) 1999 JT61 is a main-belt asteroid discovered by Linear at Socorro (MPC 704) on 1999 May 10. It is also known as 1992 UV3, 1998 GZ1. We observed it on seven nights between 2014 Nov 24 and Dec 1. We obtained a period of 8.231 ± 0.002 h and amplitude of 0.21 ± 0.10 mag. There appears to be a 0.07 mag. difference in the minimum at phase 0.14 and 0.6. With a much clearer separation at phase 0.6





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ASTEROIDS OBSERVED FROM CS3: 2014 OCTOBER - DECEMBER

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CCD photometric observations of 8 asteroids were obtained from the Center for Solar System Studies from 2014 October to December.

During this calendar quarter, the Center for Solar System Studies (CS3, MPC U81) focused on studying Jupiter Trojan asteroids. During the few days near the Full Moon when the Trojans were too dim to observe, brighter asteroids further away from the moon were selected to provide data for future shape modeling. These targets were selected where exposures could be kept short and the project can be completed in a few days.

All images were made with a 0.4-m or a 0.35-m SCT using an FLI-1001E or a SBIG STL-1001E CCD camera. Images were unbinned with no filter and had master flats and darks applied to the science frames prior to measurement. Measurements were made using *MPO Canopus*, which employs differential aperture photometry to produce the raw data. Period analysis was done using *MPO Canopus*, which incorporates the Fourier analysis algorithm (FALC) developed by Harris (Harris *et al.*, 1989). Night-to-night calibration of the data (generally ± 0.05 mag) was done using field stars converted to approximate Cousins V magnitudes based on 2MASS J-K colors (Warner 2007). The Comp Star Selector feature in *MPO Canopus* was used to limit the comparison stars to near solar color.

453 Tea. This asteroid has been studied several times in the past, often with the amplitude so low as to make the reported period ambiguous. The two most secure results found in the Asteroid lightcurve database (LCDB; Warner *et al.*, 2011) are 6.811 h from Kryszczunska (Kryszczunska *et al.*, 2012) and 6.812 h from Licchelli (Licchelli 2006). Licchelli reported a bimodal curve with an amplitude of 0.30 mag. The result from this opposition only has an amplitude of 0.12 mag, suggesting that its orientation may be somewhat pole-on. That said, the resulting lightcurve and period is in good agreement with the Kryszczunska and Licchelli results.

475 Ocello. Ocello has previously had a dense data, high amplitude result published (Pilcher 2011). This result is in good agreement with that previously published result.

549 Jessonda. Behrend (Behrend 2014) reported a period of 2.97 h in 2002 and 2.9709 h in 2009. Warner revised his previously

Numbe	Name	2014 mm/dd	Pts	Phase	L _{PAB}	B _{PAB}	Period	P.E.	Amp	A.E.	Grp
453	Tea	11/07-11/08	209	21.2, 21.4	357	-1	6.799	0.005	0.12	0.01	FLOR
475	Ocello	11/03-11/04	232	8.3, 8.9	30	0	7.29	0.005	0.19	0.01	MC
549	Jessonda	11/05-11/06	298	20.5, 20.1	78	4	2.964	0.002	0.06	0.01	MB-M
757	Portlandi	11/05-11/06	590	16.2, 16.6	13	0	6.579	0.002	0.03	0.02	V
802	Epyxa	11/07-11/08	326	15.2, 15.6	17	2	4.389	0.001	0.55	0.02	FLOR
6500	Kodaira	10/10-10/12	251	17.8, 18.5	341	11	5.4	0.001	0.78	0.02	MC
18899	2000 JQ2	05/31-07/08	1028	11.3, 30.0	245	19	222	0.5	0.13	0.03	PHO
31832	2000 AP59	09/26-10/03	941	6.3, 8.9	90	8	-				MC