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LIGHTCURVE ANALYSIS OF 918 ITHA AND 2008 KONSTITUTSIYA

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Photometric studies of 918 Itha and 2008 Konstitutsiya were made in collaboration with observers in Australia and Argentina. The large geographic longitudinal differences between the two locations helped provide a unique solution for the synodic period for both asteroids: 918 Itha, 3.47393 ± 0.00006 h; 2008 Konstitutsiya 11.2692 ± 0.0004 h.

918 Itha was selected from the "Potential Lightcurve Targets" list on the Collaborative Asteroid Lightcurve Link (CALL) site (Warner 2011) as a favorable target for observation. Mazzone and Chapman worked on this target independently from Oey. When each learned of the other's work, a collaboration was formed. The combined data were used to derive a synodic period of 3.37393 ± 0.00006 h and amplitude of 0.30 ± 0.03 mag.

2008 Konstitutsiya. Observations of this asteroid were started when Oey selected this target from in the CALL website (Warner 2011). A request for collaboration was placed on that website. Mazzone and Colazo, who had each independently observed the asteroid target for a number of nights, responded.

We could find no previously reported lightcurve parameters for 2008 Konstitutsiya. Initial observations showed that the lightcurve was very shallow with a relatively long period that was nearly-commensurate to an Earth day. Mazzone used his *Matlab* language script software to initially reduce his and Colazo's data. These scripts incorporate a Fourier algorithm and simultaneously adjust any off-set among sessions. He found a period of 11.2688 h. However when the data were pooled with those from Oey, two periods emerged: 9.7520 ± 0.0003 h and 11.2694 ± 0.0004 h.

The Mazzone group's data were also reduced in *MPO Canopus* v10.4.0.2 using differential photometry to facilitate easy exportation. Oey used *MPO Canopus* v10.4.0.2 software for data reduction and period analysis, the latter based on the Fourier algorithm developed by Harris (Harris *et al.* 1989). Internal calibration was done using the Comp Star Selector feature in *MPO Canopus*. This uses 2MASS JK magnitudes converted to Johnson-Cousins BVRI magnitudes (Warner 2007) to allow an estimated calibration error of ± 0.03 mag in the R band. Oey imported the data from Mazzone and adjusted the off-set manually to fit into his derived magnitude lightcurve. The low amplitude of the lightcurve made the collaborative work with Oey mandatory, otherwise a unique period could not be determined.

Both groups of reduced data were exchanged between Oey and Mazzone for independent period analysis. From this process, we determined the period to be 11.2694 ± 0.0004 h with an RMS value of 0.018 mag and amplitude of 0.07 ± 0.02 mag. The period spectrum shows the relationship of the respective periods.

Name	Obs	MPC	Telescope	"/pix	Exp (s)	Sessions
Oey	Kingsgrove	E19	SCT 0.25 f/11	1.45	300	(918) 1-4
	Leura	E17	SCT 0.35 f/7	1.54	300	(2008) 11-24
Colazo	El Gato Gris	I19	SCT 0.35 f/3.2	1.54	100	(918) 8
				1.54	120	(2008) 2-10
Mazzone	Río Cuarto	I20	Schmidt-Newtonian 0.20 f/4	1.9	120	(918) 5-6
				1.9	120	(2008) 1
Chapman	Cruz del Sur	I39	Newtonian 0.20 f/4	2.43x1.9	40	(918) 7

Table I. List of observers and equipment.

All images for these projects were unfiltered and processed with library dark, bias, and flat field frames.

References

Harris, A.W., Young, J.W., Bowell, E., Martin, L.J., Millis, R.L., Poutanen, M., Scaltriti, F., Zappala, V., Schober, H.J., Debehogne, H., and Zeigler, K.W. (1989). "Photoelectric Observations of Asteroids 3, 24, 60, 261, and 863." *Icarus* **77**, 171-186.

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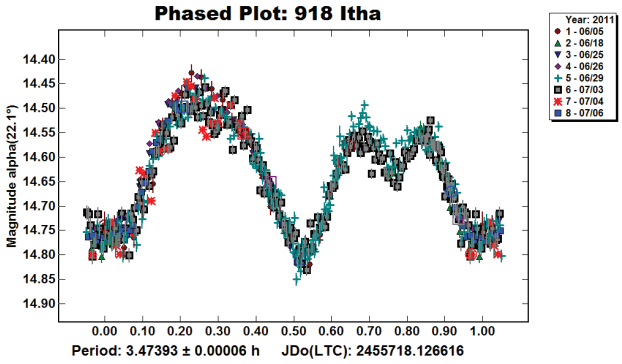

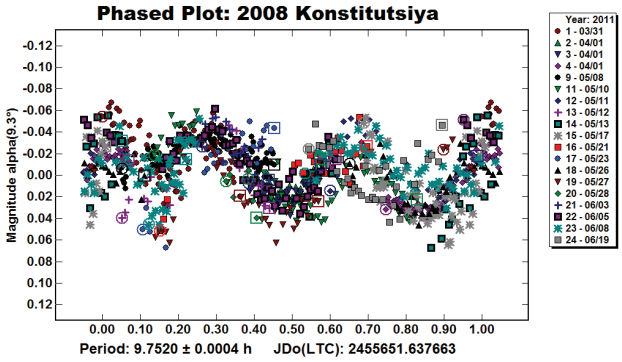

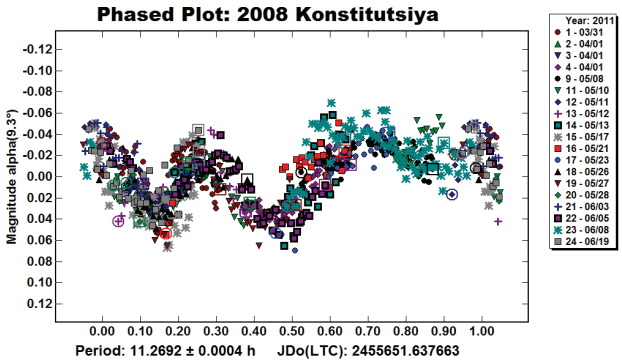

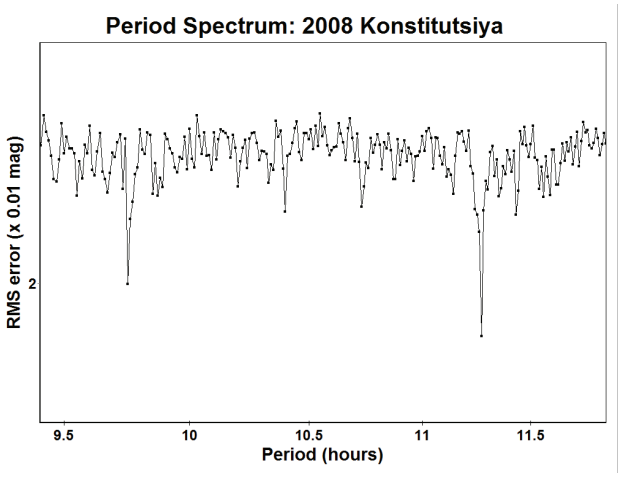

A SHAPE MODEL OF THE MAIN-BELT ASTEROID 27 EUTERPE

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We obtained dense rotational lightcurves for the main-belt asteroid 27 Euterpe during four apparitions in 2000, 2009, 2010 and 2011. The analysis indicates retrograde rotation and suggests, but does not confirm, that Euterpe has albedo features making the determination of an unambiguous spin vector and model shape difficult. Euterpe's apparent nearly spherical shape, low inclination, and pole within about 35 degrees of the plane of the solar system, caused two pole and shape solutions to be present, differing by about 180° in longitude. We found solutions of (83°, -39°, 10.40825 ± 0.00003 h) and (261°, -30°, 10.40818 ± 0.00003 h). The approximate error in the pole solutions is ± 10 degrees.

The main-belt asteroid 27 Euterpe has long been an enigma to observers. Its apparent nearly non-elongated shape and low amplitude frustrated the attempts of many observers to determine a rotational period. It wasn't until 2000 that Stephens (Stephens *et al.* 2001) published an accurate period for Euterpe. Euterpe has also been suspected of having albedo features. Bus (Bus and Binzel, 2002) reports disparities in spectra and ECAS reported colors for Euterpe.