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LIGHTCURVE FOR 205 MARTHA

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CCD photometric observations of the main-belt asteroid 205 Martha were obtained from Santana Observatory (MPC 646) in 2012 May - June. The period of 14.912 ± 0.001 h updates several previously reported results.

The main-belt asteroid 205 Martha was previously observed on two nights in 1995 October by Chiorny (2007), who reported a period of 9.78 h. Those two nights resulted in no overlap of the lightcurve and appears to be an alias of this result. Saylor (2012) observed Martha for two nights in 2010 January, reporting a period of 11.8 h when assuming a monomodal lightcurve with no overlap of data from the two nights. Fome (Behrend, 2012) observed Martha over four nights in 2010 July with scatter in the observations greater than the amplitude of the lightcurve and reported a period of 11.92 h. Warner (2010) observed the asteroid over seven nights and could not match either of the two previous periods, reporting a period of 39.8 h.

The data from the observations at Santana could not be phased to any of the previously reported periods. Aliases of 11.4, 17.1, and 22.4 h were present in the period spectrum. To resolve the conflicts, the lightcurve was binned so that five data points were plotted as one average data point in order to reveal subtle changes in the lightcurve. Also, Warner's 2010 data were replotted at 14.91 h after adjusting the zero points for two sessions to see if they would provide a reasonable fit. The resulting lightcurve does miss a critical maximum at 0.55 rotation phase, but it is a plausible result. The period spectrum from the 2010 data shows a strong

preference for the 14.9 h period and rejects the one near 9.8 hours as well as the additional aliases found with the 2012 data.

Given the good fit of the 2012 data to the 14.912 h period, and the 2010 data not excluding it, we prefer this period to all alternatives.

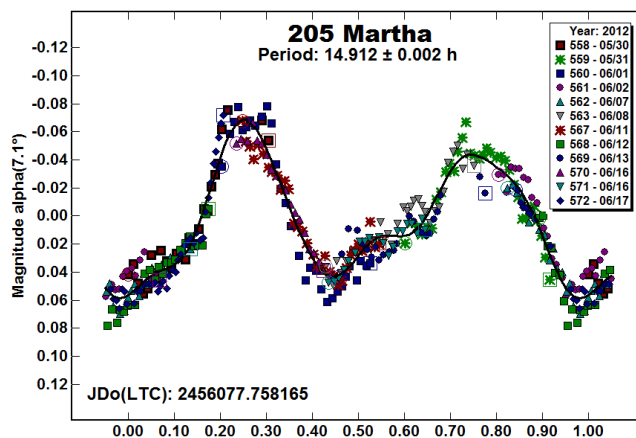


Figure 1: Lightcurve of 205 Martha using 2012 data from Santana.

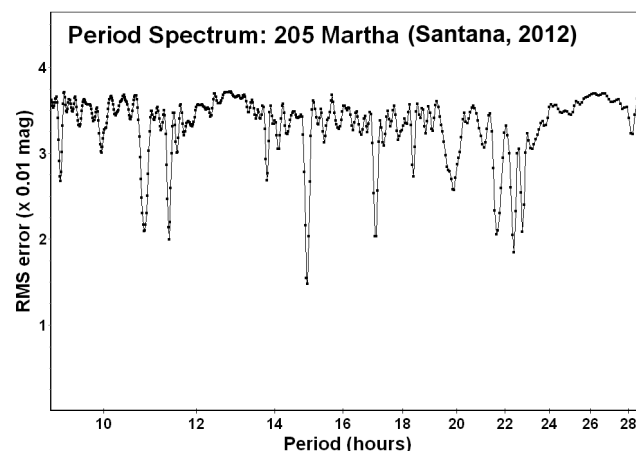


Figure 2: Period spectrum using 2012 data from Santana.

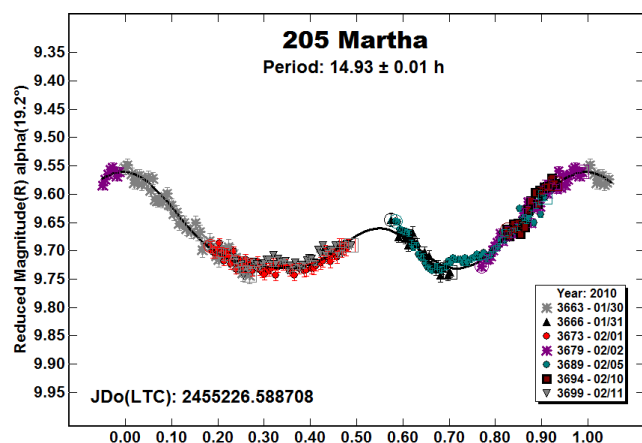


Figure 3: Warner's 2010 data forced to 14.91 h.

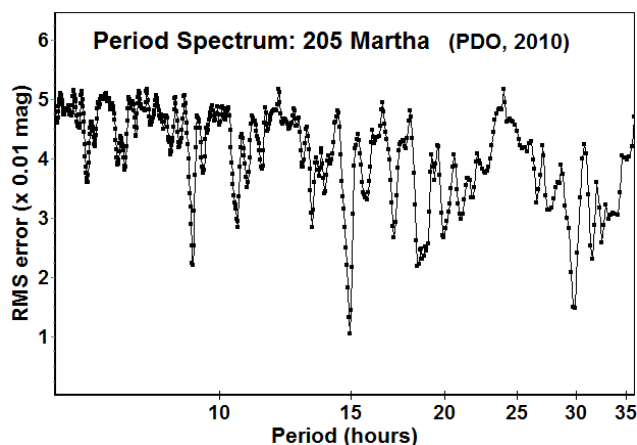


Figure 4: Period spectrum from Warner's 2010 data.

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SHAPE AND SPIN AXIS MODEL FOR 161 ATHOR

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We present shape and spin axis model for main-belt asteroid 161 Athor. The model was obtained with lightcurve inversion process, using combined dense photometric data from apparition in 1979, 1980, 1982, 2008, 2009, 2010-11 and sparse data from USNO Flagstaff. Analysis of the resulting data found a sidereal period $P = 7.280087 \pm 0.000005$ h and two mirrored pole solution at $(\lambda = 350^\circ, \beta = -6^\circ)$ and $(\lambda = 170^\circ, \beta = 4^\circ)$, with an error of ± 10 degrees.

The main-belt asteroid 161 Athor has been observed in recent years by Pilcher and Higgins in three consecutive apparitions, with wide phase angles and phase angle bisectors, optimal conditions for starting with a lightcurve inversion project. To improve the coverage at various aspect angles, we found in the literature further observations, whose lightcurves were downloaded from the Asteroid Photometric Catalogue (APC) by Lagerkvist et al. (2001) at: <http://asteroid.astro.helsinki.fi/apc>. The observational circumstances for the six apparitions are reported in Table I.

To obtain a more robust solution we have also used sparse data from USNO Flagstaff Station, as has been shown by Kaasalainen (2004), Ďurech et al. (2009). Sparse data were taken from the AstDys website (<http://hamilton.dm.unipi.it/astdys/index.php/>) for a total of 171 data points. Figures 1, 2 and 3 show respectively the PAB Longitude/Latitude distribution for the dense/sparse data and the phase curve for the sparse data. The lightcurve inversion process was performed using MPO LCInvert v.2.4. Software (Bdw Publishing), which implements algorithms and code provided by Mikko Kaasalainen and Josef Ďurech. For guidelines and a description of the modeling process see the LCInvert Operating Instructions manual and Warner et al. (2008).

Data Analysis

All data from thirty dense lightcurves and one sparse dataset were imported in *LCInvert* for analysis, assigning them a different weighting factor, respectively 1.0 and to 0.3. The first critical step is to find an accurate sidereal rotational period. For this, we started the period search centered on the average of the synodic periods found in the previously published work. The second crucial step is