J. Durech (Durech, 2009) using the results of Torppa (2003) has been superimposed over the observed chords as created in *Occult4* (figures 4 and 5). Maximum duration of 10.89 seconds occurred at station 7, about 3% shorter than predicted. The actual path shifted about one path-width south from what was predicted with the predicted time a few seconds late. The profile produced using *Occult4* and its least squares fit routine shows an ellipse with dimensions of 124.9 ± 4.9 x 88.0 ± 1.3 km. Fitting the irregular shape model provided by Durech to the observations gives a least-squares equivalent diameter of 90 ± 6 km for the asteroid.

Nearly 64 rotational periods later, on 2009 November 8, in twilight at 22:47 UT, Ekard occulted the V magnitude 10.3 star TYC 0528-00946-1 in Aquarius along a path that included central NY to MA. The predicted maximum duration was 4.6 seconds. Six observers provided four positive observations and 2 misses. Of the four positive results, 3 used video techniques and 1 was visual. The maximum observed duration was 4.45 seconds at station 4, about 3% less than predicted. The path showed an approximate ½ path-width shift north. The observed chords from *Occult4* along with the same lightcurve inversion model (Torppa et al. 2003) superimposed, are shown in Figure 5. The *Occult4* profile showed a least squares profile of an ellipse measuring 88.5 ± 41.6 x 104.0 ± 31.7 km. As previously noted, the model provided by Durech gives a least-squares equivalent diameter of 90 ± 6 km for this irregularly shaped asteroid.

Conclusions

Combining observations from a variety of independent sources provides evidence for the shape of asteroids and their orientation during the time of these observations. This can be seen by the excellent agreement between occultation results and inversion models in the case of Ekard. The discrepancy noted in the Terpsichore observations is evidence of the need for more observations of all types. Even including the lightcurve and occultations in late 2009, there are not enough observations of 81 Terpsichore to obtain a reliable model through lightcurve inversion. The observations reported here will contribute toward such a model, but additional future lightcurves and/or occultations with many observed chords are required to complete the model. Future articles will continue to include occultation results in which multiple chords are observed and for which lightcurves and/or inversion models are available.

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PERIOD DETERMINATION FOR 4191 ASSESSE

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Lightcurve analysis for 4191 Assesse was performed from observations during its 2010 opposition. The synodic rotation period was found to be 5.6489 ± 0.0003 h and the lightcurve amplitude was 0.70 ± 0.09 mag.

Unfiltered CCD photometric observations of asteroid 4191 Assesse were obtained at the Observatorio Los Algarrobos, Salto, Uruguay (MPC Code I38), from 2010 May to June. It was selected among the "Potential Lightcurve Targets 2010 April - June" list that appeared in the Collaborative Asteroid Lightcurve Link (CALL) web-site (Warner, 2009) due to having a favorable sky location, a

comparatively bright magnitude, and a reported period being both relatively short and uncertain. In this last regard, this Eunomia-family asteroid had been measured in 1997 for about 4 hours on two nights (Angeli et al. 2001), providing a period of 5.4 h with a reliability code (Harris et al. 1999) of 1.

Observations were made using a 0.3-m Meade LX-200R f/10 working with a 0.63 focal reducer. The CCD imager was a QSI 516wsg NABG with a 1536 x 1024 array of 9-micron pixels. Exposures were 120 s working at –20C, unguided, and unfiltered at 2x2 binning, yielding an image scale of 1.9 arcseconds per pixel. All images were dark and flat field corrected. The images were measured using *MPO Canopus* (Bdw Publishing) version 10.1.0.7 with a differential photometry technique. The data were light-time corrected. Period analysis was also done with *Canopus*, which incorporates the Fourier analysis algorithm developed by Harris et al. (1989).

From more than 850 data points obtained during six sessions (three of them longer than 6 h), covering a phase angle from 10.6º to 3.1º, a period of 5.6489 ± 0.0003 h was determined along with a lightcurve peak-to-peak amplitude of 0.70 ± 0.09 mag. Data points from a seventh short "bad" session were not included.

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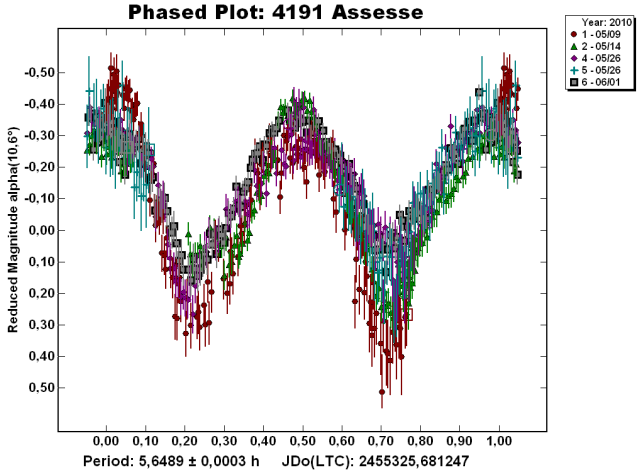

LIGHTCURVE ANALYSIS OF 188 MENIPPE

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CCD observations of the main-belt asteroid 188 Menippe at the Palmer Divide and Hunters Hill Observatories found a synodic rotation rate of 11.98 ± 0.02 h and lightcurve amplitude of 0.28 ± 0.02 mag.

CCD photometric observations were made of the main-belt asteroid, 188 Menippe, in 2010 February. Those at the Palmer Divide Observatory were made using a 0.35-m Schmidt-Cassegrain Telescope (SCT) working at f/9.1 coupled with an FLI-1001E. The resulting scale was ~1.2 arcsec/pixel. Exposures were 240 s using an R filter. Hunters Hill Observatory used a 0.35-m SCT with SBIG ST-8E. Exposures were 240 s using a clear filter. Darks and bias frames were created and merged in *MPO Canopus*. Night-to-night linking of the PDO data was accomplished using 2MASS J-K to BVRI conversions (see Warner, 2007, and references therein). Period analysis on the combined data set was also done in *MPO Canopus* using the algorithm developed by Harris (Harris et al., 1989).

The initial observations were made at PDO on 2010 February 2, 3, and 5. At this point, a period of almost exactly 12 hours was a strong possibility, meaning it would be nearly impossible for a single station or several at about the same longitude to find the period of the asteroid. A request for supporting observations was made to Hunters Hill Observatory (HHO), which is located about 135° west of PDO. Observations from HHO were made on February 9 and 16 while additional observations were made at PDO on February 10 and 11. The two sessions provided by HHO, the one on Feb 16 covering more than six hours, filled in the missing parts of the lightcurve and confirmed a final period of 11.98 ± 0.02 h. The amplitude of the lightcurve is 0.28 ± 0.02 mag. Our period agrees with the 11.974 h found by Barucci et al. (1994). On 2010 February 9, the mid-date of the observations, the phase angle (α) was 5.4° while the Phase Angle Bisector longitude and latitude were, respectively, 145° and -14°.

The "Reduced Magnitude" in the plot uses R magnitudes that are corrected to unity distance using –5 * log (Rr), with R and r being, respectively, the Sun-asteroid and Earth-asteroid distances in AU. The magnitudes were normalized to the phase angle of the earliest session (α = 6.4°) using G = 0.15.

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