ROTATION PERIOD DETERMINATION FOR 870 MANTO

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A consortium of observers from Australia, Europe, North and South America have collaborated to find for 870 Manto a rotation period of 122.30 ± 0.01 hours, amplitude 0.80 ± 0.05 mag. There is no evidence of tumbling.

The only previous attempt to find a rotation period for 870 Manto is by Harris et al. (1992) who merely stated a period >24 hours without providing a lightcurve. When several sessions by first author Pilcher suggested a long and possibly Earth commensurate period, he requested collaboration which the other authors kindly provided.

Equipment, telescope and CCD, respectively, utilized by the several observers are as follows: Eduardo Alvarez, 0.3 m f/6.9 SCT, QSI 516wsg; Andrea Ferrero, 0.3 m f/8 RC, SBIG ST9; Daniel Klinglesmith and Angelica Vargas 0.35 m SCT, SBIG ST 10 and STL-1001E; Julian Oey, 0.35 m f/5.9 SCT, SBIG ST - 8XME; Frederick Pilcher, 0.35 m SCT, SBIG STL-1001E.

A total of 37 sessions obtained in the interval 2013 Aug. 8 - Oct. 22 are included in this analysis. *MPO Canopus* software was used by all observers to measure the images photometrically, construct lightcurves, and share data. This software includes a Comparison Star Selector which enables calibration stars with near solar colors to be selected from the MPOSC3 or APASS catalogs. The software also further adjusts asteroid magnitudes measured from these stars for the variation caused by changing heliocentric and geocentric distances and phase angle with an assumed phase factor G = 0.15. The magnitudes obtained from these procedure are utilized without further adjustment in the lightcurve of Figure 1. In this lightcurve slopes of corresponding phases are parallel, or nearly so, but the magnitudes themselves show misfits up to 0.2 and sometimes larger. These we attribute mostly to errors in the catalog magnitudes. The next step was to adjust the instrumental magnitudes of one session at a time through several hundred steps until a best fit is obtained, shown in Figure 2. This represents a lightcurve of the object, averaged over the full range of phase angles 25 degrees to 6.5 degrees and back to 19 degrees included in the observations. A good fit to a period 122.30 ± 0.01 hours, amplitude 0.80 ± 0.05 magnitudes is obtained. There is no indication of tumbling.

The observing cadence by FP and EA is such that a much larger number of data points were acquired there than at any of the other observatories. To make more legible the large number of data points in the segments of the lightcurve included by their observations, they have been binned in sets of five points with a maximum of ten minutes between points.

Acknowledgement

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Reference

Harris, A.W., Young, J.W., Dockweiler, T., Gibson, J., Poutanen, M., Bowell, E. (1992). "Asteroid lightcurve observations from 1981." *Icarus* **95**, 115-147.

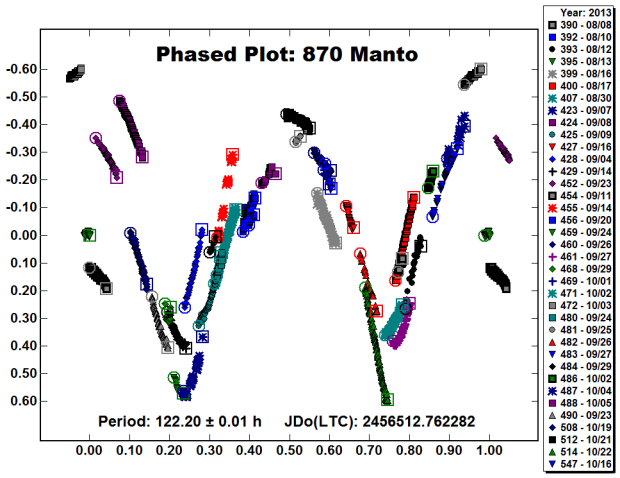

Figure 1. Lightcurve of 870 Manto based on catalog star magnitudes.

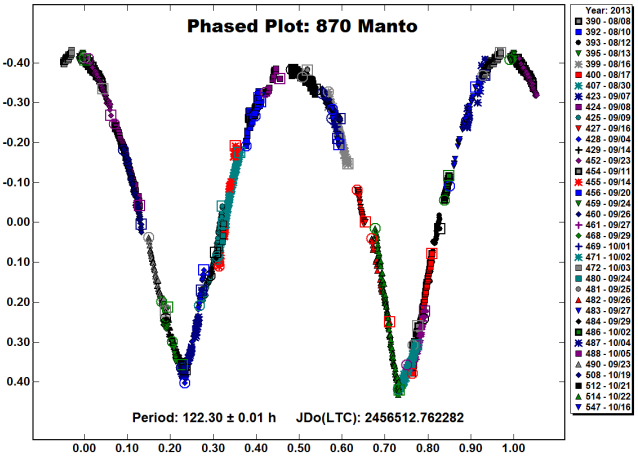

Figure 2. Lightcurve of 870 Manto with instrumental magnitudes of sessions adjusted to best fit.