

ANALYSIS OF THE LIGHTCURVE OF 71 NIOBE

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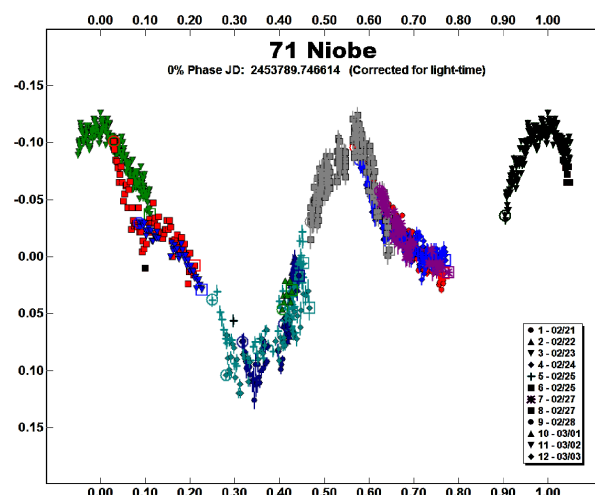
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(Received: 29 April)

The main-belt asteroid, 71 Niobe, was the target of radar observations in early 2006 by Shepard. Supporting optical observations (lightcurve) were requested. Initial optical observations by Warner indicated the previously reported period of 14.38h (Harris 1989a) may have been incorrect. Follow up observations, optical and radar, showed that a synodic period of 35.6 ± 0.1 h is more likely correct. The observed amplitude is 0.22 ± 0.02 mag.

71 Niobe had been studied several times before this latest effort. Lustig (1975) reported a period of 11.21h while Harris (1989a) and Piironen (1998) reported periods near 14.3h. The Harris period was believed to be the mostly likely correct value based on the number of data points and range of observation dates.

In early 2006 co-author Shepard began observing the asteroid as part of a study of M/X asteroids using the radar facility at Arecibo Observatory. He sent a request to Warner for optical observations in order to have a lightcurve made at about the same time as the radar observations. The lightcurve data (rotation period) was needed as part of the radar solution for the size of the asteroid, which in turn allows its albedo (and possible composition) to be estimated. Warner first observed the asteroid on 2006 Feb 21 UT. The analysis of that run indicated that the period might be 24 hours or more, based on the assumption of a bimodal curve. Subsequent observations on Feb. 22-24 supported the possibility for a longer period. Given the commensurability with the interval between observations, the assistance of observers at different longitudes was requested. Crawford (Australia) and Husárik (Europe) joined in the collaboration and provided the critical data needed to find the period. The table below summarizes the



observations that provided more than 1100 photometric measurements.

Warner	Feb. 21-25, 27-28; Mar. 03
Crawford	Feb. 25
Husárik	Feb. 27; Mar. 1-2

Crawford and Warner used MPO Canopus to measure their images. Crawford then sent the export files to Warner to merge into a common data set. Husárik provided date/magnitude pairs that were also merged into that set. The data from each session was shifted by arbitrary amounts in order to match them to a common zero point. This allowed the period analysis to proceed using the Fourier analysis algorithm developed by Harris (1989b) that is incorporated into MPO Canopus.

Based on the radar observations, a period of 14.3h indicated a maximum equatorial diameter of 38km, which was inconsistent with the published size of 83 km in the IRAS survey (Tedesco 1989). As more data became available, it was apparent that a period of 35.6 ± 0.1 h was the correct solution and not the previously reported 14.3h. Using the revised period, the radar data indicate a maximum equatorial diameter of 94 km, consistent with the IRAS diameter (an average of all three axes) if the object is modestly elongate and our aspect was equatorial.

A plot phased to the proposed period of 35.6h is shown below. The amplitude is 0.22 ± 0.02 mag. As a check, a plot was made forcing the period to 14.3h. There was no doubt that the data did not fit that solution.

Acknowledgements

The work at Ondřejov was supported by the Grant Agency of the Czech Republic, Grant 205/05/0604. The Arecibo Observatory is part of the National Astronomy and Ionosphere Center, which is operated by Cornell University under a cooperative agreement with the National Science Foundation.

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LIGHTCURVE ANALYSIS OF 1304 AROSA

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(Received: 20 June Revised: 14 July)

The main-belt asteroid 1304 Arosa was observed in late 2005 and early 2006 in a collaborative effort by observers in France, Italy and the United States. A period of 7.7478 ± 0.0001 hr with an amplitude 0.375 ± 0.011 mag was derived.

In a collaborative effort between observatories in France, Italy and the United States, lightcurve observations of main-belt asteroid 1304 Arosa were obtained during 9 nights between December 23, 2005 and February 11, 2006. Table I provides details of the observational equipment used. The geometric parameters at the extreme dates of the observation period are shown in Table II.

Observer	Telescope	Camera
Bernasconi	Takahashi CN212, 0.2m	ST-7ME
Casulli	Newtonian 0.4m	ST-9XE
Fauerbach, Bennett	OGS RC, 0.4m	AP7ap

Table I. Observer and Equipment Detail

Date	L _{PAB}	B _{PAB}	Phase
2005 Dec. 23.8	61.1	-8.3	9.6
2006 Feb. 11.8	64.3	-5.2	16.2

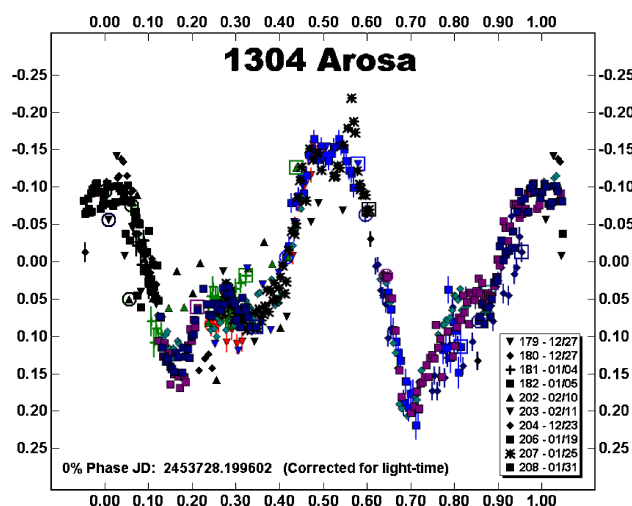
Table II. Phase Angle Bisector and Phase for 1304 Arosa

Independent analysis of the combined data was performed by Raoul Behrend using the code CourbRot (Behrend 2001) and by Thomas Bennett using MPO Canopus. A period of 7.7478 ± 0.0001 hr with an amplitude of 0.375 ± 0.011 mag was

derived by both programs. The origin of the rotational phase was chosen at 2005 Dec. 23.943 UT, light-time corrected.

References

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PERIOD DETERMINATION FOR 1484 POSTREMA

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(Received: 22 May)

Asteroid 1484 Postrema was observed on 5 nights in April thru May 2006. The lightcurve period and amplitude were 12.1923 ± 0.0005 hr and 0.20 ± 0.05 mag.

Observations of 1484 Postrema were carried out at Sandia View Observatory (MPC code H03). SVO is a roll-off roof design containing a permanently mounted 0.30m f/10 Meade SCT OTA and SBIG ST-10XME CCD camera mounted on a Bisque Paramount ME. Telescope control was handled thru *Astronomers Control Panel* (ACP) software, which handled automatic meridian flips and multiple target asteroids throughout the all night imaging sessions. The CCD was controlled via *MaxIm/DL* thru ACP. Imaging was done unfiltered to maximize signal-to-noise, with exposures of 120 seconds at bin 2 for an image scale of 0.95 arc