

THE MINOR PLANET BULLETIN

BULLETIN OF THE MINOR PLANETS SECTION OF THE
ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS

VOLUME 28, NUMBER 1, A.D. 2001 JANUARY-MARCH

1.

NEW PERIOD DETERMINATION FOR 27 EUTERPE, A COLLABORATIVE PROJECT

Robert D. Stephens
11355 Mount Johnson Court
Rancho Cucamonga, CA 91737
rstephens@foxandstephens.com

Glenn Malcolm
7430 Lippizan Drive
Riverside, CA 92509-5329
gmalcolm@pe.net

Robert A. Koff
1915 W. 101st Avenue
Thornton, CO 80260
bob.koff@worldnet.att.net

Stephen M. Brincat
Fl.5 Ent.B,
Silver Jubilee Apt.,
Ta' Zwej,
San Gwann SGN 09
Malta.
sbrincat@orbit.net.mt

Brian Warner
Palmer Divide Observatory
17995 Bakers Farm Road
Colorado Springs, CO 80908
brianw_mpo@compuserve.com

(Received: 21 September Revised: 1 October)

27 Euterpe has a previously published period of 8.5 hours. Because additional data indicated that this period could be incorrect, a collaborative effort was undertaken to remeasure the period. A revised rotational period of $10.410 \pm .002$ hours was determined from 12 nights of observations.

In mid July, Alan Harris of JPL posted a request to Brian Warner's CALL Web Page requesting measurement of 27 Euterpe. A published report by Chang in 1962 previously put the period at 8.5 hours. Lagerkvist et al, in 1988 could not determine a period. However, unpublished reports indicated that the period might be around 11 hours.

Four observatories specializing in asteroid photometry run by Brian Warner, Bob Stephens, Bob Koff and Stephen Brincat started a collaborative effort in July to measure the asteroid's rotational period. Warner was not able to get any observations due to equipment problems. Glenn Malcolm later contributed some observations to the effort. All of the images that were successfully obtained were flat fielded and dark subtracted. All of the images were taken in unfiltered light, through cameras of varying spectral responses. Data reduction and the resulting lightcurves were prepared using Brian Warner's Canopus program, portions of which were developed from Alan Harris' Fourier analysis program (Harris et al, 1989). The unfiltered images had to be calibrated against each other before being combined for analysis. This is accomplished by Canopus, which first measures the camera's response against a field of well-known reference stars, typically LONEOS Stars. This calibration is then applied against the data set obtained that night. Since these are still reported as instrumental magnitudes, only sessions containing a minimum or a maximum of the lightcurve were used. These provided a calibration point for adjusting the instrumental magnitudes reported by the various systems.

Early efforts to determine the period produced ambiguous results. Initially, it appeared that the 8.5 hour period was correct. However, that result did not hold up to subsequent observations. Midway through the observing runs, Warner analyzed the sessions and was

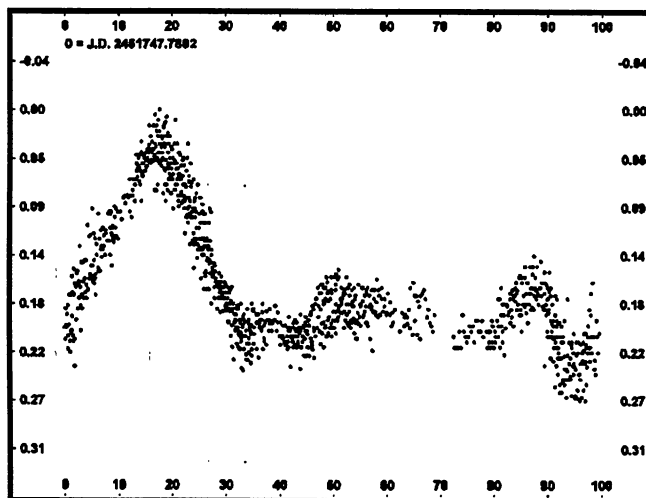


Figure 1. Lightcurve (instrumental magnitudes, unfiltered) for 27 Euterpe compiled using a period of 10.41 ± 0.002 hours.

Table 1 - Observers participating in 27 Euterpe rotational project

	R. Stephens	G. Malcolm	R. Koff	S. Brincat
Observatory	Santana Observatory (MPC 646)	Roach Motel Observatory (MPC 856)	Thornton Observatory (MPC 713)	Flarestar Observatory (MPC 171)
Telescope	27cm (11") SCT	30cm (12") SCT	20cm (8") SCT	25 cm (10") SCT
F/ratio	F/7	F/6.3	F/10	F/2.6
CCD	SBIG ST9e	SBIG ST8	Cookbook Camera with Texas Instr 245	Starlight Express HX516
Filter	Unfiltered	Unfiltered	Unfiltered	Unfiltered
Exp.	30 seconds	60 seconds	120 seconds	60 seconds
# Obs	846	233	100	26
Nights	11	4	3	1

the first to identify the possible 10.4 hour period. Subsequent analysis of additional Stephens and Malcolm data showed that these data were consistent with the 10.41 hour period. Because of the somewhat unusual nature of the lightcurve, Stephens then explored every period between 5 hours and 18 hours in 0.01 hour increments. The Fourier analysis in Canopus identified a few possible periods for the data. All of these were quickly eliminated as candidates except for the 10.41 hour period. Adding the Koff and Brincat data further gave a good fit to the 10.41 hour period.

Asteroid 27 Euterpe has an interesting lightcurve with a single strong peak that was confirmed by multiple nights of observations. As shown in Figure 1, it also has a very weak secondary peak. That portion of the curve was also confirmed by four different sets of data. The resulting period is $10.410 \pm .002$ hours with an amplitude of 0.29 magnitudes, a result that comes from 1,205 observations from 19 different sessions on 12 nights spanning a period of 18 days.

Acknowledgements

The co-authors are grateful to Brian Warner for his continuing help and guidance, and for his continuing development of the software programs 'Connections 2000' and 'Canopus' which makes it possible for amateurs to automatically gather the data, measure and analyze the light the lightcurves. Also, many thanks to Alan Harris who suggested the 27 Euterpe project.

References

Chang, Y.C., Chang, C.-s.: 1962, Acta Astron. Sin. 10, 101-111.

Lagerkvist, C.I., Magnusson, P., Williams, I.P., Buontempo, M.E., Gibbs, P., Morrison, L.V.: Astron. Astrophys. Suppl. Ser. 73, 395-405.

Collaborative Asteroid Lightcurve Link (CALL) - <http://www.minorplanetobserver.com/astlc/default.htm>

ASTEROID-DEEPSKY APPULSES IN 2001

Brian Warner
Palmer Divide Observatory
17995 Bakers Farm Rd.
Colorado Springs, CO 80908
brianw_mpo@compuserve.com

A list of favorable appulses between asteroids and brighter deepsky objects during the year 2001 is presented.

The following list is a subset of the results of a search for asteroid-deepsky appulses meeting the following criteria:

1. The asteroid was brighter than 14.0.
2. The separation between the two was less than 360 arcseconds.
3. The phase of the moon was between mid-waning gibbous to mid-waxing gibbous
4. The event was at least 45° from the Sun.

The list below is not comprehensive by any means. However, it's a good first check. For a more complete check, the Minor Planet Center's web site at

<http://cfaps8.harvard.edu/~cgi/CheckSN.COM>

allows you to enter the location of a suspected asteroid or supernova and check if there are any known targets in the area.

The complete set from which the table below is a small subset can be found at the MPO web site:

<http://www.MinorPlanetObserver.com/htms/dso.htm>

The table gives the following data:

Date/Time	Universal Date and Time of closest approach
#/Asteroid	The number and name of the asteroid
RA/Dec	The J2000 position of the asteroid
Mag	The approximate visual magnitude of the asteroid
Sep/PA	The separation in arcseconds and the position angle from the DSO to the asteroid
DSO	The DSO name or catalog designation
Mag	The approximate total magnitude of the DSO
Type	The type of DSO: OC = Open Cluster; GC = Globular Cluster; G = Galaxy
SE/ME	The elongation in degrees from the sun and moon respectively
MP	The phase of the moon: 0 = New, 1.0 = Full. Positive = waxing; Negative = waning