

LIGHTCURVE AND PERIOD DETERMINATION FOR 582 OLYMPIA

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Minor planet 582 Olympia was observed over a period of 40 days from 9 February to 20 March 2003. More than 3000 data points from 42 sessions were obtained by 5 observers. The lightcurve obtained shows a rotational (synodic) period of 72.0 ± 0.5 hrs with amplitude of 0.20 ± 0.05 mag.

This lightcurve investigation was initially carried out at Ngunnawal Observatory located in Canberra, Australia and was my first attempt at obtaining a lightcurve of any type. After several days it became very apparent that I wasn't getting anywhere so I put out a request for collaboration. John Menke was the first to offer his assistance and after a week we had sufficient data for an initial curve to show itself. It became apparent very quickly that the lightcurve of this asteroid was a multiple of 24 hours and our 2 observing locations were insufficient to provide suitable coverage.

In the following weeks Valentino Pozzoli (201, Johnathan B Postel Observatory, Promiod, Italy), Edwin Sheridan (682, Crescent Butte Observatory, Kanab, Utah, US) and Roger Dymock (940, Waterlooville, Hampshire, UK) joined the effort. By the end of the observing period we were able to cover approximately 4/5th of the curve.

The instrumentation used in this study can be seen in Table 1. The target was selected from the list of lightcurves maintained by Dr Alan Harris (Harris 2001) and from the Collaborative Asteroid Lightcurve Link (CALL) web sites' "List of Potential Lightcurve Targets" (Warner 2003).

Olympia is a main-belt asteroid discovered on 23 January 1907 by A. Kopff at Heidelberg. It has an absolute brightness of 9.11 and a mean albedo of 0.21 (NASA PDS 1) indicating that it has a diameter of 43 km. It has a taxonomy type of S (NASA PDS 2) indicating a possible surface mineralogy of metal, olivine and pyroxene (Gaffey et al. 1989). Previous attempts have been made to determine the period and the current lightcurve list (Harris 2003) shows periods of 36.0 hrs (amplitude > 0.6 mag) and 72.0 hrs (amplitude 0.1 mag) both of which were based on incomplete curves.

Acknowledgements

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References

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Table 1

Obs	Scope	Camera	Resolution
E14	0.25m SCT	f/4.3 SX MX516 (A-30°C)	2.15"/px
201	0.31m SCT	f/10 AP7p (-48°C)	1.65"/px
682	0.35m SCT	f/5.5 SBIG ST9E(-30°C)	2.14"/px
XXX	0.28m SCT	f/6.3 SBIG ST7E(-30°C)	1.04"/px
940	0.25m Newt	f/6.4 SX MX516 (A-30°C)	1.44"/px

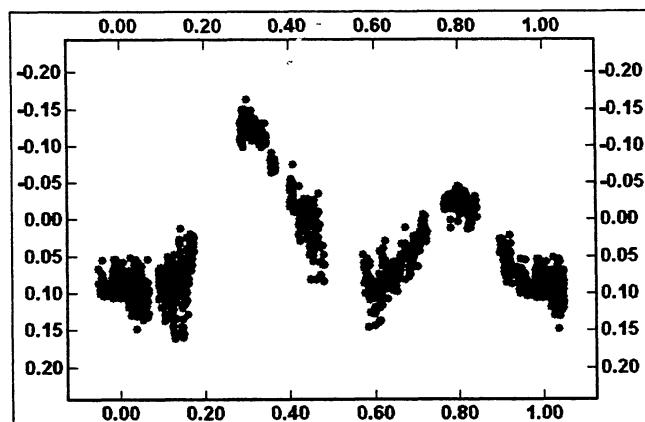


Figure 1. Lightcurve of 582 Olympia based on a period of 72.0 hrs. Zero Point of the curve is JD 2452679.61857. Ordinates are relative magnitude.

MINOR PLANETS AT UNUSUALLY FAVORABLE ELONGATIONS IN 2004

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A list is presented of minor planets that are much brighter than usual at their 2004 apparitions. Very close approaches of 4179 Toutatis, 25143 Itokawa, and 6239 Minos are the highlights of the year.

The minor planets in the lists that follow will be much brighter at their 2004 apparitions than at their average distances at maximum elongation. Many years may pass before these planets will be again as bright as in 2004. Observers are encouraged to give special attention to those which lie near the limit of their equipment.

Minor planet 4179 Toutatis will make in 2004 its closest approach to Earth of all of its series of close approaches. Observers are cautioned that brightest magnitude of 8.9 on Sept. 28 and minimum distance of 0.0104 AU on Sept. 29 occur more than a month after maximum elongation from the Sun Aug. 21. Toutatis will make additional fairly close approaches in 2008 and 2012, then not again until 2070.

Minor planet 25143 Itokawa will approach Earth within 0.013 AU on June 26, more than a month before the maximum elongation date on July 31. Southern hemisphere observers are strongly favored for this brightest apparition of the 21st century as Itokawa will be south of -32 degrees declination for the entire interval it is brighter than magnitude 15.

Minor planet 6239 Minos, maximum elongation on Jan. 11 but brightest magnitude 14.1 on Jan. 27 and minimum distance 0.056 AU on Feb. 2 is strongly favored for northern hemisphere observers, being north of +44 degrees declination for the entire interval it is brighter than magnitude 15.

There will be a moderately close approach of planet (12008) 1996 TY9 at 0.364 AU on June 10 and magnitude 12.3 on June 11. This will be the most favorable opportunity to observe 1996 TY9 until the year 2052, when the next apparition under circumstances very similar to those of 2004 will occur.

The year 2004 also marks the perihelion passage of planet 944 Hidalgo in its highly eccentric 14-year orbit around the Sun. This object will be a magnitude brighter on Oct. 28 at 13.4 than on any occasion for the next 60 years. Hidalgo is noteworthy for being the first and brightest object discovered with a comet-like orbit of high eccentricity and inclination and a completely asteroidal appearance. Discoverer Walter Baade, on 1920 Oct. 31 at Bergedorf, set with Hidalgo the precedent for the current convention of assigning asteroidal designations to all small objects lacking gaseous comas even if their orbits have long term instability.

These lists have been prepared by an examination of the maximum elongation circumstances of minor planets computed by the author for all years through 2060 with a full perturbation program written by Dr. John Reed, and to whom he expresses his thanks. Elements

are from EMP 1992, except that for all planets for which new or improved elements have been published subsequently in the Minor Planet Circulars or in electronic form, the newer elements have been used. Planetary positions are from the JPL DE-200 ephemeris, courtesy of Dr. E. Myles Standish. Dr. Reed's ephemeris generating program, a list of minor planet elements, and the JPL planetary ephemeris are freeware which may be obtained from the author by sending a 100 Megabyte zip disk and stamped, addressed return mailer. They cannot be downloaded directly over the Internet.

Minor planets whose brightest magnitudes near the time of maximum elongation vary by at least 2.0 in this interval and in 2004 will be within 0.3 of the brightest occurring, or vary by at least 3.0 and in 2004 will be within 0.5 of the brightest occurring; and which are visual magnitude 14.5 or brighter, are included. For minor planets brighter than visual magnitude 13.5, which are within the range of a large number of observers, these standards have been relaxed somewhat to include a larger number of objects. Magnitudes have been computed from the updated magnitude parameters published in MPC28104-28116, on 1996 Nov. 25, or more recently in the Minor Planet Circulars.

Oppositions may be in right ascension or in celestial longitude. Here we use still a third representation, maximum elongation from the Sun, instead of opposition. Though unconventional, it has the advantage that many close approaches do not involve actual opposition to the Sun near the time of minimum distance and greatest brightness and are missed by an opposition-based program. Other data are also provided according to the following tabular listings: Minor planet number, date of maximum elongation from the Sun in format yyyy/mm/dd, maximum elongation in degrees, right ascension on date of maximum elongation, declination on date of maximum elongation, both in J2000 coordinates, date of minimum or brightest magnitude in format yyyy/mm/dd, minimum magnitude, date of minimum distance in format yyyy/mm/dd, and minimum distance in AU.

Users should note that when the maximum elongation is about 177° or greater, the minimum magnitude is sharply peaked due to enhanced brightening near zero phase angle. Even as near as 10 days before or after minimum magnitude the magnitude is generally about 0.4 greater. This effect takes place in greater time interval for smaller maximum elongations. There is some interest in very small minimum phase angles. For maximum elongations E near 180° at Earth distance Δ , an approximate formula for the minimum phase angle α is $\alpha = (180^\circ - E)/(\Delta + 1)$.

Table 1. Numerical Sequence of Favorable Elongations

Planet	Max Elon	D	Max E	RA	Dec	Min Mag	D	Mag	Min Dist	D	Min Dist
1	2004/01/09	171.9°	7h25m	+30°	2004/01/09	6.8	2004/01/11	1.426			
11	2004/07/09	177.4°	19h14m	-19°	2004/07/09	8.9	2004/07/12	1.225			
17	2004/06/23	174.1°	18h 7m	-17°	2004/06/23	9.9	2004/06/22	1.129			
49	2004/11/05	175.1°	2h38m	+20°	2004/11/05	10.6	2004/11/03	1.377			
62	2004/12/10	177.4°	5h 9m	+20°	2004/12/10	12.1	2004/12/05	1.666			
81	2004/10/22	173.3°	1h42m	+17°	2004/10/23	11.1	2004/10/24	1.286			
88	2004/06/20	178.7°	17h55m	-24°	2004/06/20	9.8	2004/06/25	1.391			
93	2004/08/27	172.8°	22h34m	-16°	2004/08/26	10.8	2004/08/22	1.485			
100	2004/07/15	177.4°	19h38m	-18°	2004/07/15	10.9	2004/07/17	1.590			
106	2004/12/05	178.5°	4h49m	+23°	2004/12/05	10.9	2004/12/01	1.730			
128	2004/10/23	172.2°	2h 3m	+4°	2004/10/23	10.5	2004/10/21	1.413			
156	2004/05/15	177.6°	15h26m	-21°	2004/05/15	10.7	2004/05/13	1.127			
166	2004/10/09	159.2°	1h38m	-12°	2004/10/10	12.5	2004/10/11	1.164			
175	2004/09/06	176.7°	23h 7m	-9°	2004/09/06	11.2	2004/09/05	1.439			
227	2004/06/04	165.5°	16h39m	-36°	2004/06/03	12.2	2004/06/01	1.567			
265	2004/04/03	139.9°	12h27m	-45°	2004/04/08	13.3	2004/04/12	0.917			
270	2004/07/16	176.8°	19h40m	-18°	2004/07/16	10.2	2004/07/21	0.911			
273	2004/09/12	172.5°	23h37m	-10°	2004/09/11	12.7	2004/09/04	1.211			
319	2004/11/27	165.3°	4h28m	+6°	2004/11/27	13.5	2004/11/25	1.664			
325	2004/11/04	168.5°	2h27m	+26°	2004/11/04	12.3	2004/11/05	1.691			