

ROTATION PERIOD DETERMINATION FOR THE MARS-CROSSING ASTEROID (97514) 2000 DL1

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Photometric observations of the Mars-crossing asteroid (97514) 2000 DL1 were conducted in order to determine its synodic rotation period. The asteroid is certainly a slow rotator and the period has not been completely covered by our observations. We present the most likely bimodal solution with a period of $P = 163.6 \pm 0.3$ h, $A = 0.47 \pm 0.09$ mag.

CCD photometric observations of the Mars-crossing asteroid (97514) 2000 DL1 were carried out in 2023 February-April at the Astronomical Observatory of the University of Siena (K54). We used a 0.30-m $f/5.6$ Maksutov-Cassegrain telescope, SBIG STL-6303E NABG CCD camera, and clear filter; the pixel scale was 2.30 arcsec when binned at 2×2 pixels and all exposures were 300 seconds.

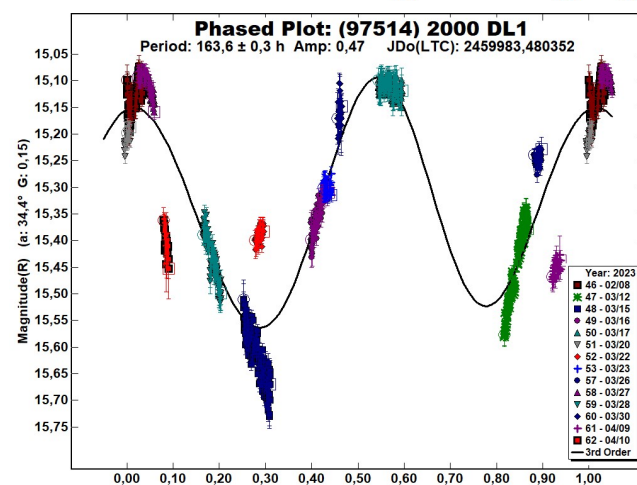
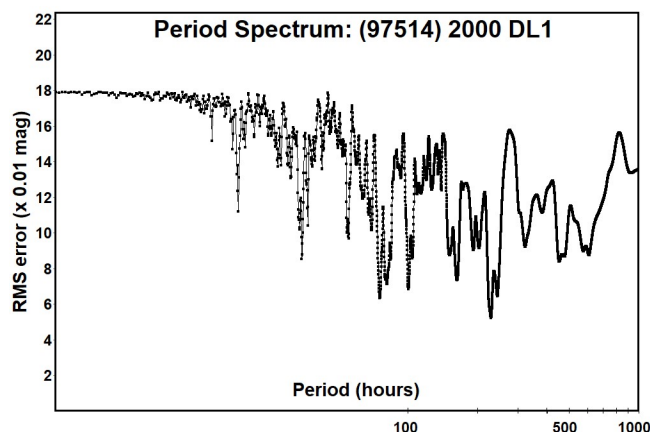
Data processing and analysis were done with *MPO Canopus* (Warner, 2018). All images were calibrated with dark and flat-field frames and the instrumental magnitudes converted to R magnitudes using solar-colored field stars from a version of the CMC-15 catalogue distributed with *MPO Canopus*. Table I shows the observing circumstances and results.

A search through the asteroid lightcurve database (LCDB; Warner et al., 2009) indicates that our result may be the first reported lightcurve observations and results for this asteroid.

(97514) 2000 DL1 was discovered on 2000 February 25 by LINEAR at Socorro. It is a Mars-crossing asteroid with a semi-major axis of 2.018 AU, eccentricity 0.272, inclination 35.375° , and an orbital period of 2.87 years. Its absolute magnitude is $H = 14.10$ (JPL, 2023). In the asteroid lightcurve database (Warner et al., 2009) we found a diameter $D = 9.46$ km using an absolute magnitude $H = 13.90$ (Alí-Lagoa and Delbo, 2017).

Observations were conducted over fourteen nights and collected 951 data points. The strongest peak in the period spectrum is situated at about 232 hours, which yields a highly “noisy” and asymmetric tri-modal solution. The mono-modal solution at about 75 hours is highly dispersed and noisy, too. There is a third prominent peak at about 100 hours, but the solution is meaningless. None of them is satisfying since the plots still have large gaps which weaken Fourier interpolation. Given our limited amount of data, we present the bimodal solution with a period of $P = 163.6 \pm 0.3$ h, $A = 0.47 \pm 0.09$ mag as the most likely. However, a few sessions

still clearly look as outliers when compared to the mean lightcurve and might suggest a more peculiar behavior of this asteroid. Further observations are strongly recommended and encouraged.



References

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Number	Name	2023/mm/dd	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
97514	2000 DL1	02/07-04/10	*34.5, 21.0	174	17	163.6	0.3	0.47	0.09	MarsC

Table I. Observing circumstances and results. The phase angle is given for the first and last date. If preceded by an asterisk, the phase angle reached an extrema during the period. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude/latitude at mid-date range (see Harris et al., 1984). Grp is the asteroid family/group (Warner et al., 2009).