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LIGHTCURVES AND ROTATION PERIODS OF 50 VIRGINIA, 57 MNEMOSYNE, 58 CONCORDIA, 59 ELPIS, 78 DIANA, AND 529 PREZIOSA

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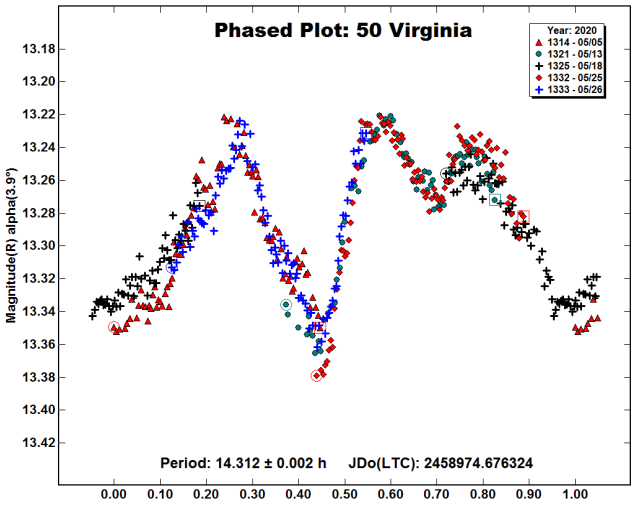
Synodic rotation periods and amplitudes were found for 50 Virginia: 14.312 ± 0.002 h, 0.14 ± 0.01 mag; 57 Mnemosyne: 25.281 ± 0.002 h, 0.10 ± 0.01 mag; 58 Concordia: 9.899 ± 0.001 h, 0.10 ± 0.01 mag; 59 Elpis: 13.672 ± 0.001 h, 0.16 ± 0.01 mag; 78 Diana: 7.2929 ± 0.0001 h, 0.06 ± 0.01 mag; 529 Preziosa: 25.943 ± 0.001 h, 0.30 ± 0.02 mag.

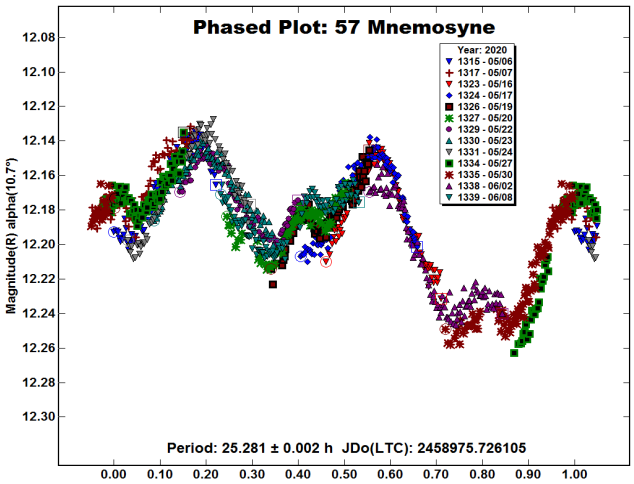
Observations to produce the results reported in this paper were made at the Organ Mesa Observatory with a Meade 35-cm LX200 GPS Schmidt-Cassegrain, SBIG STL-1001E CCD, and 60-second unguided exposures. For the bright targets 59 Elpis and 78 Diana, exposures were through the R filter. For all other targets, exposures were through the clear filter. Image measurement and lightcurve construction were with *MPO Canopus* software with all calibration star magnitudes from the CMC15 catalog reduced to the Cousins R band. To reduce the number of data points on the lightcurves and make them easier to read, data points have been binned in sets of 3 with a maximum time difference of 5 minutes.

50 Virginia. The lightcurve data base (LCDB, Warner et al., 2009; updated 2020 March) lists a period of 14.315 h based on several secure U = 3 published periods within 0.005 h of this value. New observations on five nights from 2020 May 5-26 provide a good fit to a lightcurve with a period of 14.312 ± 0.001 h, amplitude 0.14 ± 0.01 mag. This period is consistent with many previously published periods.

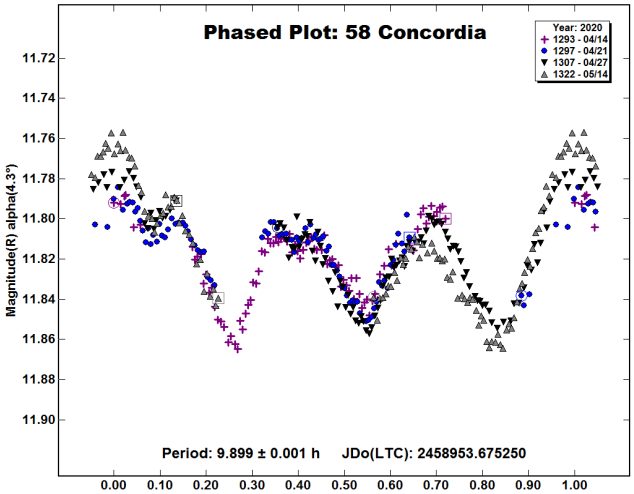


57 Mnemosyne. Earlier published periods are by Harris et al. (1992), 12.463 h; Ditteon and Hawkins (2007), 12.66 h; and Behrend (2016), 12.92 h. This author (Pilcher, 2019b) was unable to fit a lightcurve to a period near 12.5 h and found a synodic period of 25.324 h with one maximum and minimum per cycle

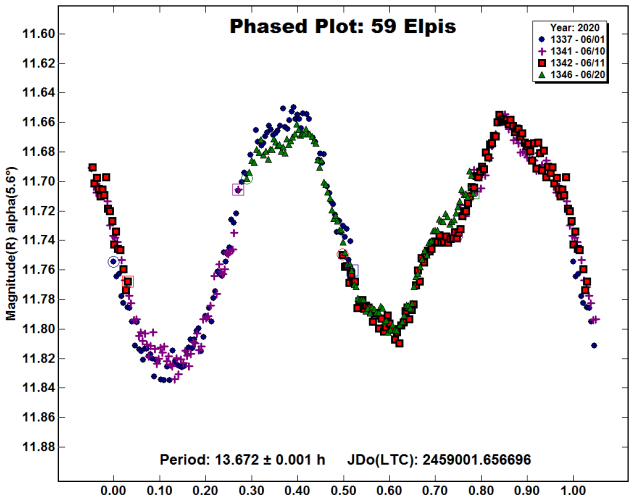
near celestial longitude 197 deg. New observations on 13 nights from 2020 May 6 to June 8, near celestial longitude 258 deg, confirm the longer period with a good fit to an irregular lightcurve with synodic period 25.281 ± 0.002 h, amplitude 0.10 ± 0.01 mag. The difference between the two synodic periods is 0.043 h, or 0.16%, which is much larger than the formal error of either. At celestial longitudes differing by 61 deg, a synodic period difference of 0.16% is not unrealistic. The results from 2019 and 2020 should be considered compatible, and their difference should be helpful toward future lightcurve inversion (LI) modeling.



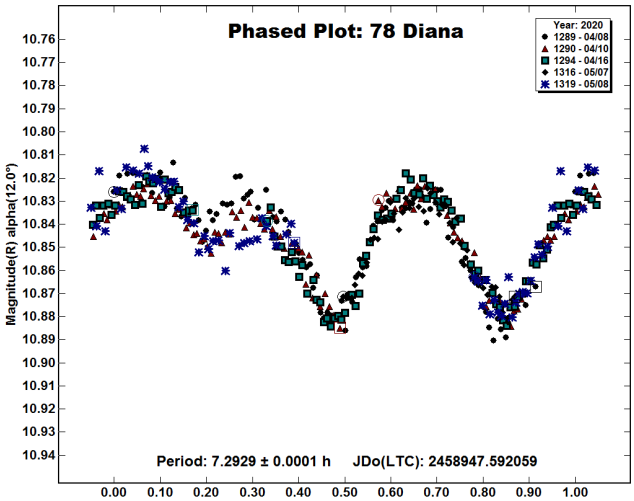
58 Concordia. Previously published periods are by Gil-Hutton (1993), >16 h; Wang (2002), 9.89 h; Behrend (2006), 9.9 h; Behrend (2010), 9.905 h; Behrend (2011), 9.904 h; Stephens (2006), 9.895 h; Pilcher (2016), 9.895 h; and Pilcher (2019a), 9.895 h. New observations on four nights from 2020 Apr. 14 to May 14 provide a good fit to an irregular lightcurve with period 9.899 ± 0.001 h, amplitude 0.10 ± 0.01 mag. A 9.899-hour period is consistent with most of the previously published values.



59 Elpis. The lightcurve data base (LCDB, Warner et al., 2009; updated 2020 March) lists a period of 13.671 h and is rated U = 3, secure, based on seven previously published periods within 0.02 h of this value. New observations on four nights from 2020 June 1-20 provide a good fit to a lightcurve with period 13.672 ± 0.001 h, amplitude 0.16 ± 0.01 mag. This period is consistent with many previously published periods.



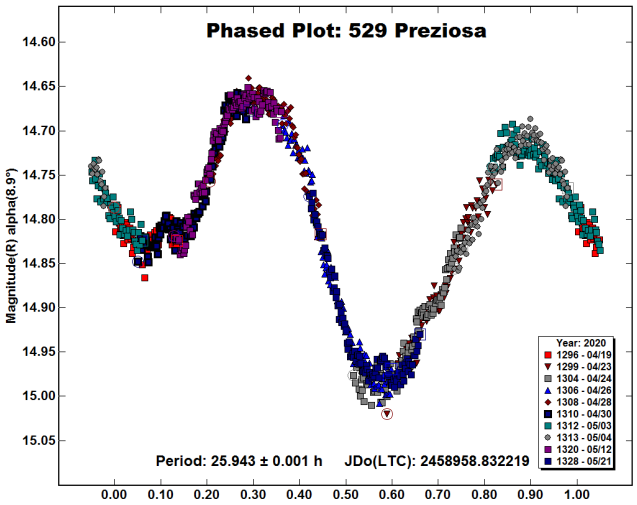
78 Diana. Previously published periods are by Taylor et al. (1976), 8 h; Harris and Young (1989), 7.225 h; Licchelli (2006), 7.300 h; Fleenor (2007), 7.346 h; and Benishek and Protitch-Benishek (2008), 7.2991 h. New observations on five nights from 2020 Apr 8 to May 8 provide a good fit to a lightcurve with period 7.2929 ± 0.0001 h, amplitude 0.06 ± 0.01 mag with 3 unequal maxima and minima per rotational cycle. A period of 7.2929 h is consistent with all of the previously published periods.



Number	Name	2020/mm/dd	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E	Amp	A.E.
50	Virginia	05/05-05/26	*3.9,4.5	234	3	14.312	0.002	0.14	0.01
57	Mnemosyne	05/06-06/08	10.7,5.3	258	15	25.281	0.002	0.10	0.01
58	Concordia	04/14-05/14	*4.3,10.2	212	5	9.899	0.001	0.10	0.01
59	Elpis	06/01-06/20	*5.6,6.5	258	11	13.672	0.001	0.10	0.01
78	Diana	04/08-05/08	12.0,21.6	179	-6	7.2929	0.0001	0.06	0.01
529	Preziosa	04/19-05/21	*8.9,2.1	235	3	25.943	0.001	0.30	0.02

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 a minimum or maximum during the period. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range (see Harris *et al.*, 1984).

529 Preziosa. The only previously published period is by Binzel (1987) who, on the basis of a sparse lightcurve, obtained a period of 27 h. New observations on ten nights from 2020 Apr 19 to May 21 provide a good fit to a period of 25.943 ± 0.001 h, amplitude 0.30 ± 0.02 mag.



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