

CCD MINIMA FOR SELECTED ECLIPSING BINARIES IN 2018

NELSON, ROBERT H.

1393 Garvin Street, Prince George, BC, Canada, V2M 3Z1 ; e-mail: bob.nelson@shaw.ca

Observatory and telescope:	
Mountain Ash Observatory (MAO): 33 cm f/4.5 Newtonian on a Paramount ME Desert Blooms Observatory (DBO): 40 cm f/6.8 SCT on a Paramount Taurus 400	

Detector:	MAO: SBIG ST-10XME, 6.8 μm pixels, FOV: $34.4' \times 23.2'$, $-10^\circ > T > -30^\circ\text{C}$; DBO: SBIB STT-1603, 9.0 μ pixels, FOV: $18.3' \times 11.5'$, $-10^\circ > T > -30^\circ\text{C}$
-----------	---

Method of data reduction:	
Bias and dark subtraction, flat-fielding using light-box flats; aperture photometry—all using MIRA, by Mirametrics. Check stars were used throughout.	

Method of minimum determination:	
Digital tracing paper method, bisection of chords, curve fitting, and (occasionally) Kwee and van Woerden (1956).	

Times of minima:							
Star name	GCVS type	Time of Min HJD-2400000	Error (days)	Ecl. Type	Obs.	Filter	O-C (days)
BX And	EW/DW	58384.8386	0.0001	I	mao	c	-0.0004
LO And	EW/KW	58397.6610	0.0003	II	mao	c	-0.0346
QX And	EW	58377.8063	0.0005	II	DBO	<i>BVRI</i>	0.0013
QX And	EW	58466.6305	0.0005	I	DBO	c	0.0024
V0404 And	EA/RS	58394.6588	0.0003	I	mao	c	-0.0007
V0530 And	EB	58396.6929	0.0002	I	mao	<i>VRI</i>	0.0005
G2837-1343	na	58391.7108	0.0002	II	mao	<i>R</i>	0.0399
V1814 Aql	EA	58250.9462	0.0006	I	DBO	c	0.0002
CX Aqr	EA/SD	58377.7753	0.0002	I	DBO	c	0
SS Ari	EW/KW	58350.8589	0.0002	I	mao	c	0.0004
BM Ari	EW	58454.7159	0.0003	II	DBO	c	0.0025
BN Ari	EW/KW	58343.8804	0.0003	I	mao	c	0.0029
AH Aur	EW/DW	58396.0016	0.0003	I	mao	<i>VRI</i>	-0.0004
EP Aur	EB	58389.9048	0.0002	I	mao	c	-0.0013
V0410 Aur	EW	58394.907	0.015	II	mao	<i>VRI</i>	-0.0087
V0599 Aur	EW	58374.9446	0.0002	I	DBO	c	0.0015
TY Boo	EW/KW	58205.8350	0.0004	II	mao	c	-0.0006
TZ Boo	EW/KW	58173.8809	0.0002	I	mao	c	-0.0052
TZ Boo	EW/KW	58260.8003	0.0004	II	DBO	<i>VRI</i>	-0.006
TZ Boo	EW/KW	58261.6918	0.0004	II	DBO	c	-0.006
TZ Boo	EW/KW	58261.8426	0.0005	I	DBO	c	-0.0038
VW Boo	EW/KW	58207.9287	0.0005	I	DBO	<i>VRI</i>	0
GM Boo	EW	58208.8832	0.0003	II	mao	<i>VRI</i>	0.0003
GN Boo	EW	58175.9543	0.0004	I	mao	c	0.0009
GN Boo	EW	58213.8040	0.0007	II	mao	<i>VRI</i>	-0.0008
GN Boo	EW	58237.7821	0.0002	I	DBO	c	-0.0002
GN Boo	EW	58237.9337	0.0003	II	DBO	<i>VRI</i>	0.0006
GN Boo	EW	58251.8080	0.0003	II	mao	c	0.0011
GN Boo	EW	58291.7671	0.0003	I	DBO	c	-0.0023
GT Boo	EB	58247.7722	0.0004	I	mao	<i>I</i>	0.0004
IK Boo	EW	58171.8683	0.0002	I	mao	c	-0.0002
PU Boo	EW	58167.8911	0.0002	I	mao	<i>R</i>	-0.0037
V0339 Boo	EW	58174.0024	0.0002	II	mao	c	0.0014
V0339 Boo	EW	58210.829	0.001	I	mao	c	0.0029
CP Cam	EB	58483.6092	0.0003	I	mao	c	-0.0011
CV Cam	EB	58375.8630	0.0003	I	mao	c	0.0014
OQ Cam	EW	58396.811	0.002	I	mao	<i>V</i>	0.002
V0337 Cam	EB	58442.6576	0.0001	I	mao	c	0.0009
V0447 Cam	EB	58397.9361	0.0005	I	mao	<i>BVR</i>	0.0059
V0473 Cam	EW	58390.9625	0.0004	I	mao	<i>R</i>	-0.001
V0474 Cam	EW	58392.9503	0.0002	I	mao	<i>V</i>	0.0002
G3715-0043	E	58374.8695	0.0004	II	mao	c	-0.0027

Times of minima:							
Star name	GCVS type	Time of Min HJD-2400000	Error (days)	Ecl. Type	Obs.	Filter	O-C (days)
ZZ Cas	EB/KE	58370.860	0.001	II	DBO	c	0.0018
GT Cas	EA/SD	58369.8164	0.0003	I	DBO	<i>BVI</i>	-0.0017
IR Cas	EB	58390.8032	0.0002	I	DBO	<i>BVRI</i>	-0.0024
IR Cas	EB	58391.8266	0.0002	II	DBO	<i>R</i>	0
MN Cas	EA/DM	58378.8299	0.0005	I	DBO	<i>R</i>	-0.0014
V0608 Cas	E:	58390.8227	0.0003	I	mao	<i>R</i>	0
XY Cep	EA/SD	58379.7395	0.0002	I	DBO	c	0.0135
V0957 Cep	EA	58367.7675	0.0003	I	mao	c	0.0041
UZ CMi	EW/DW	58464.8710	0.0003	I	mao	c	0.0049
XZ CMi	EA	58170.6598	0.0002	I	mao	c	0.0008
TX Cnc	EW/KW	58438.9332	0.0004	I	mao	<i>BVR</i>	-0.002
EH Cnc	EW	58216.6716	0.0002	II	DBO	<i>VRI</i>	0
HN Cnc	EW	58164.6977	0.0002	I	mao	<i>R</i>	0.0024
G1936-0040	ESD-EC	58450.8507	0.0007	II	DBO	c	0.0006
RW Com	EW/KW	58159.8050	0.0005	II	mao	c	0
RZ Com	EW/KW	58169.8508	0.0002	II	mao	c	0.001
RZ Com	EW/KW	58246.8611	0.0004	I	DBO	<i>B</i>	0.0008
RZ Com	EW/KW	58250.7519	0.0003	II	DBO	c	-0.0013
RZ Com	EW/KW	58253.7986	0.0002	II	DBO	c	-0.0011
CC Com	EW/KW	58196.7724	0.0001	I	mao	c	0.0003
RW CrB	EA/SD:	58189.9658	0.0003	I	mao	<i>R</i>	0.0017
AR CrB	EW	58246.7039	0.0002	I	DBO	<i>BVI</i>	-0.0007
AS CrB	EW	58206.9171	0.0006	I	DBO	c	0.0031
BX CrB	EW	58254.8370	0.0004	I	DBO	c	-0.0005
DF CVn	EW	58195.7101	0.0003	I	mao	c	-0.0009
DL CVn	EB	58190.7488	0.0005	II	DBO	<i>BVI</i>	0.0039
DR CVn	EW?	58176.0200	0.0004	II	DBO	c	0
DR CVn	EW?	58179.9638	0.0007	II	DBO	c	-0.0049
DR CVn	EW?	58180.961	0.001	II	DBO	<i>VRI</i>	-1041.5
DR CVn	EW?	58189.8349	0.0005	II	DBO	<i>R</i>	0.0051
DR CVn	EW?	58193.953	0.002	I	DBO	<i>BVI</i>	-0.0008
DX CVn	EW?	58208.7058	0.0006	II	mao	<i>VRI</i>	-0.0007
EG CVn	EW?	58195.7931	0.0002	II	DBO	<i>R</i>	-0.0021
GM CVn	EW	58271.8634	0.0004	I	DBO	<i>I</i>	-0.0015
WZ Cyg	EB	58259.8702	0.0004	II	mao	<i>R</i>	0.0002
GO Cyg	EB/KE	58256.9240	0.0002	I	mao	c	-0.0016
GO Cyg	EB/KE	58275.945	0.001	II	DBO	<i>VI</i>	-0.0014
GO Cyg	EB/KE	58279.8928	0.0005	I	DBO	<i>BVI</i>	-0.0013
GO Cyg	EB/KE	58289.9414	0.0004	I	DBO	<i>BVI</i>	-0.0014
GO Cyg	EB/KE	58293.888	0.001	II	DBO	c	-0.0025
V0401 Cyg	EW/KE	58244.9033	0.0008	I	mao	<i>BVI</i>	0.0025
V0456 Cyg	EA/SD:	58224.9254	0.0001	I	mao	c	-0.0005
V1918 Cyg	EW/KW	58251.8950	0.0003	II	mao	<i>R</i>	-0.0005

Times of minima:							
Star name	GCVS type	Time of Min HJD-2400000	Error (days)	Ecl. Type	Obs.	Filter	O-C (days)
V2197 Cyg	E	58297.8412	0.0002	I	DBO	c	0
V2282 Cyg	EW	58242.8628	0.0002	II	DBO	<i>R</i>	-0.0002
V2282 Cyg	EW	58260.8366	0.0004	II	mao	<i>VRI</i>	0.0006
V2364 Cyg	EW	58242.9638	0.0003	II	DBO	c	0.0019
V2477 Cyg	EW	58223.9324	0.0002	I	mao	c	-0.0002
V2643 Cyg	EB	58357.755	0.001	II	mao	<i>BVI</i>	0.0086
AX Dra	EB	58169.771	0.001	II	mao	c	-0.0012
BE Dra	EB/KE	58255.8986	0.0007	I	mao	c	-0.0007
V0357 Dra	EW	58197.8948	0.0005	I	DBO	c	0.0022
V0373 Dra	EW	58255.7708	0.0004	I	mao	c	0.0019
V0374 Dra	EW	58210.9524	0.0004	II	mao	<i>VRI</i>	0.0022
V0380 Dra	EA	58272.7057	0.0002	I	DBO	<i>B</i>	-0.0041
V0402 Dra	EW	58267.8907	0.0003	II	mao	c	0.011
V0450 Dra	EW	58210.715	0.001	I	mao	c	-0.0002
V0509 Dra	EW	58270.8751	0.0003	I	DBO	<i>V</i>	0.0001
G3864-1315	E?	58210.7704	0.0003	I	DBO	c	0.0001
G3870-1172	EW	58223.8601	0.0002	I	mao	c	0.0006
G3929-1500	EW	58267.7953	0.0002	I	mao	<i>VRI</i>	0
G4449-0995	EW	58188.9538	0.0004	I	mao	c	0
WW Gem	EB/KE	58158.7042	0.0003	I	mao	c	-0.0034
GW Gem	EB/SD	58389.9731	0.0004	II	mao	c	-0.0006
V0373 Gem	EB	58460.783	0.002	II	mao	<i>BVRI</i>	0
V0404 Gem	EW	58450.7982	0.0003	I	DBO	c	-0.0006
G1886-1869	EC	58396.9663	0.0003	I	mao	c	-0.0002
SZ Her	EA/SD	58168.9725	0.0001	I	mao	c	-0.0009
V0842 Her	EW	58189.8680	0.0002	I	mao	<i>R</i>	0.0013
V0878 Her	EB	58246.8374	0.0002	II	mao	<i>V</i>	0.001
V1033 Her	EW?	58224.8852	0.0001	I	DBO	c	0.0025
V1035 Her	EA	58224.8367	0.0007	II	mao	c	-0.0015
V1047 Her	EW	58261.8062	0.0004	II	mao	c	-0.0015
V1097 Her	EW	58212.9825	0.0002	II	DBO	<i>VRI</i>	-0.0047
V1097 Her	EW	58220.9263	0.0002	II	DBO	<i>VRI</i>	0.0003
V1097 Her	EW	58253.9439	0.0001	I	DBO	<i>R</i>	0.0001
V1103 Her	EW	58195.9446	0.0002	II	DBO	c	0.0005
V1160 Her	EW	58224.7783	0.0004	II	mao	c	-0.0027
V1167 Her	EW?	58210.9671	0.0002	I	DBO	<i>VRI</i>	-0.0004
V1198 Her	EW	58289.7359	0.0003	II	DBO	<i>VRI</i>	0.0054
V1233 Her	EW	58256.7670	0.0002	II	mao	<i>R</i>	0
G2058-0753	E	58249.8858	0.0003	II	DBO	c	0.0001
G2093-1834	EB	58256.8930	0.0001	I	DBO	<i>V</i>	0
AV Hya	EB/KE	58159.889	0.005	II	DBO	c	0.0021
AV Hya	EB/KE	58172.865	0.003	II	DBO	c	-0.0065
AV Hya	EB/KE	58179.709	0.001	II	DBO	<i>VRI</i>	0.0035

Times of minima:							
Star name	GCVS type	Time of Min HJD-2400000	Error (days)	Ecl. Type	Obs.	Filter	O-C (days)
AV Hya	EB/KE	58180.7346	0.0007	I	DBO	<i>BVI</i>	0.004
AV Hya	EB/KE	58183.8052	0.0005	II	DBO	<i>c</i>	-0.0007
AV Hya	EB/KE	58193.7163	0.0002	I	DBO	<i>c</i>	0.0011
DF Hya	EW/KW	58462.9370	0.0002	II	DBO	<i>R</i>	0.0024
EU Hya	EA/DW	58187.7328	0.0005	I	DBO	<i>c</i>	0.0011
V0488 Lac	EW	58350.7507	0.0004	II	mao	<i>BVI</i>	0
Y Leo	EA/SD	58159.7092	0.0002	I	mao	<i>c</i>	0.0065
DU Leo	EA/SD	58218.7406	0.0003	II	DBO	<i>VRI</i>	0.0004
ET Leo	EW?	58171.756	0.002	II	mao	<i>c</i>	0.0004
MW Leo	EA?	58472.9151	0.0003	I	DBO	<i>c</i>	-0.0001
WZ LMi	EW	58189.7497	0.0004	II	mao	<i>R</i>	0.0036
AG LMi	EA	58162.9487	0.0002	I	DBO	<i>c</i>	0.0004
AG LMi	EA	58220.7063	0.0002	I	DBO	<i>c</i>	-0.0002
AG LMi	EA	58222.7451	0.0002	II	DBO	<i>c</i>	0.0001
AG LMi	EA	58254.6819	0.0002	I	DBO	<i>c</i>	0
SW Lyn	EA/DW	58224.7179	0.0003	I	DBO	<i>R</i>	-0.0097
V0591 Lyr	EW	58268.8121	0.0003	II	DBO	<i>R</i>	-0.0001
V0591 Lyr	EW	58269.8632	0.0002	I	mao	<i>B</i>	-0.0004
V0592 Lyr	EW	58253.8375	0.0002	II	mao	<i>c</i>	0.0008
V0653 Lyr	EW	58264.7957	0.0005	II	mao	<i>R</i>	0.0005
V0658 Lyr	EW	58369.68	0.01	I	DBO	<i>BVI</i>	-0.0045
V0664 Lyr	EW	58210.8802	0.0004	II	DBO	<i>c</i>	0
V0740 Lyr	EW	58205.939	0.002	II	mao	<i>c</i>	0.0017
G3104-1085	EW?	58258.8184	0.0004	I	DBO	<i>c</i>	0.0008
G3104-1085	EW?	58268.7924	0.0003	I	DBO	<i>c</i>	0.0006
G3104-1085	EW?	58269.8795	0.0004	II	mao	<i>BVI</i>	0.0036
V0927 Mon	EW	58168.6524	0.0002	I	mao	<i>c</i>	-0.0004
ES Ori	EA/DM	58465.8017	0.0005	I	DBO	<i>c</i>	-0.0003
V1363 Ori	EW	58483.7341	0.0003	II	mao	<i>c</i>	0.0023
V1848 Ori	EW	58437.9035	0.0003	II	DBO	<i>c</i>	-0.0001
V1848 Ori	EW	58462.8071	0.0005	I	DBO	<i>R</i>	-0.0002
V0481 Peg	EW	58370.752	0.001	I	mao	<i>c</i>	0.0017
V0619 Peg	EW	58394.7546	0.0003	II	mao	<i>BVI</i>	-0.0008
IT Per	EA/SD	58397.9225	0.0006	I	DBO	<i>c</i>	-0.0034
IT Per	EA/SD	58440.8692	0.0003	I	DBO	<i>BVR</i>	-0.0007
IT Per	EA/SD	58444.714	0.003	II	DBO	<i>V</i>	0.0099
KW Per	EB/SD	58397.7904	0.0002	I	mao	<i>c</i>	0.0003
V0873 Per	EW	58441.6127	0.0003	II	mao	<i>BVR</i>	-0.0006
V0881 Per	EW/KW	58380.8957	0.0007	I	mao	<i>BVRI</i>	-0.0045
V0881 Per	EW/KW	58474.6429	0.0003	I	mao	<i>c</i>	-0.0024
V0959 Per	EA	58441.7096	0.0002	I	mao	<i>BVR</i>	0.0004
CP Psc	EB:	58450.7422	0.0003	I	DBO	<i>c</i>	-0.001
DV Psc	E/RS	58466.5896	0.0002	I	DBO	<i>c</i>	0.0025

Times of minima:							
Star name	GCVS type	Time of Min HJD-2400000	Error (days)	Ecl. Type	Obs.	Filter	O-C (days)
HL Psc	EB/RS	58464.5964	0.0003	II	mao	c	-0.0022
AU Ser	EW/KW:	58257.7919	0.0002	II	mao	c	-0.0012
V0384 Ser	EW?	58236.9110	0.0003	I	DBO	c	0.0001
RZ Tau	EW/DW	58369.9830	0.0002	II	DBO	<i>R</i>	0.0011
RZ Tau	EW/DW	58372.8933	0.0004	II	DBO	c	0.0016
RZ Tau	EW/DW	58373.9321	0.0003	I	DBO	c	0.0012
RZ Tau	EW/DW	58378.9199	0.0002	I	DBO	<i>R</i>	0.0009
RZ Tau	EW/DW	58379.9587	0.0004	II	DBO	c	0.0005
AN Tau	EB/DM	58367.9374	0.0004	II	mao	<i>BVI</i>	0.0029
EQ Tau	EW/DW	58395.8948	0.0003	I	mao	<i>VRI</i>	-0.0016
V1238 Tau	EW	58384.9544	0.0001	II	mao	<i>BVRI</i>	-0.0056
V1369 Tau	EA	58450.9152	0.0005	I	DBO	<i>R</i>	0.0023
G1804-0539	E	58391.8365	0.0004	I	mao	c	0.0002
V Tri	EB/SD	58456.6086	0.0001	I	DBO	c	0.0023
RS Tri	EA/DM	58476.6315	0.0003	I	DBO	c	0.0072
RV Tri	EA/SD	58471.7778	0.0002	I	DBO	c	0.0009
TY UMa	EW/KW	58199.7167	0.0003	I	DBO	c	-0.0037
XY UMa	EB/DW/RS	58250.6710	0.0004	II	DBO	c	-0.0023
ES UMa	EW	58158.8296	0.0004	II	mao	<i>V</i>	-0.0002
HV UMa	EW	58161.862	0.001	II	mao	c	-0.0021
HV UMa	EW	58180.701	0.002	I	mao	<i>VRI</i>	0.0017
HV UMa	EW	58182.831	0.002	I	mao	<i>R</i>	-0.0006
HV UMa	EW	58185.6709	0.0005	I	mao	c	-0.0037
MQ UMa	EW	58461.9538	0.0004	I	mao	c	0.0039
V0354 UMa	EW	58463.0124	0.0008	II	DBO	<i>R</i>	0.005
VY UMi	EW	58188.8980	0.0002	II	mao	c	0.0057
AH Vir	EW/KW	58168.884	0.001	II	mao	<i>R</i>	-0.0025
AZ Vir	EW/KW	58196.8748	0.0003	II	mao	c	0.0081
BO Vul	EA/SD	58370.8030	0.0001	i	DBO	c	0.0003
BO Vul	EA/SD	58373.721	0.002	II	DBO	c	-0.0005

Remarks:

To save space, GSC star names have been shortened to a leading "G" only; times of minimum are heliocentric Julian dates with the leading 24 removed.

O-C values were computed using elements computed from the O-C database listed in the references (Nelson, 2016).

The observatory, Desert Blooms in Benson AZ, is described in Nelson (2017).

Acknowledgements:

Thanks are due to Environment Canada for the website satellite views (see reference below) that were essential in predicting clear times for observing runs in this cloudy locale. Thanks are also due to Attila Danko for his "Clear Sky Charts", (see below). This research has made use of the SIMBAD database, operated at CDS, Strasbourg, France.

References:

- Danko, A., Clear Sky Charts, <http://cleardarksky.com/>
- Kwee, K. K., van Woerden, H., 1956, *Bull. Astron. Inst. Netherlands*, **12**, 327
- Nelson, R.H. 2016, Bob Nelson's O-C Files, <http://www.aavso.org/bob-nelsons-o-c-files>
- Nelson, R.H., 2017, *IBVS*, No. 5224
- Satellite Images for North America, <http://gfx.weatheroffice.ec.gc.ca/>