

# THE 2008 PRIMARY ECLIPSE OF OW GEM

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**Abstract:** Observations of the 2008 eclipse of the rare supergiant eclipsing binary OW Gem yield new high-quality times of minima. Combining this new data with all previously published ToMs yields an improved period of 1258.581(9) days.

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The long-period eclipsing binary system OW Geminorum consists of an F2 Ib-II primary G8 II secondary. The system has a period close to 3.5 years and few eclipses have been observed since its discovery in 1988 (Kaiser, 1988). Alternating eclipses occur near solar conjunction, making observations difficult. Kaiser (1988) also determined a number of times of minima from Harvard plates dating back to the early 20th Century.

The primary eclipse in late 2008 was ideally placed for observations and a program was undertaken at the author's private observatory, Rolling Hills Observatory (RHO), to collect photometry of the event. An SBIG ST-9XE CCD with Astrodon V and B filters was used with a Meade LX200 25cm scope. Data was collected on 36 nights over a 48-day span, including an uninterrupted interval of 19 days covering the entire eclipse. An ensemble of three comparison stars was used to determine differential magnitudes for the variable. Photometry from the AAVSO Variable Star Plotter was used for these comparison stars and the check star, as shown in Table 1.

**Table 1.** Comparison/Check stars

Star	GSC	AUID	B Mag	V Mag
C1	1332-0564	000-BBL-422	9.259	9.023
C2	1332-0238	000-BBL-416	10.783	9.822
C3	1332-0578	000-BBL-425	10.238	9.913
K	1333-1070	000-BBL-429	11.278	10.810

Figure 1 shows a graph of the B, V, and B-V data from RHO for the 2008 eclipse. The B-V data shows the color shift as the F2 primary is eclipsed by the G8 secondary. The combined color index was 0.68 mag outside of eclipse, increasing to 1.06 mag at maximum eclipse as the hotter primary was partially eclipsed. The data set is included in Appendix 1, as well as being available from the AAVSO International Database.

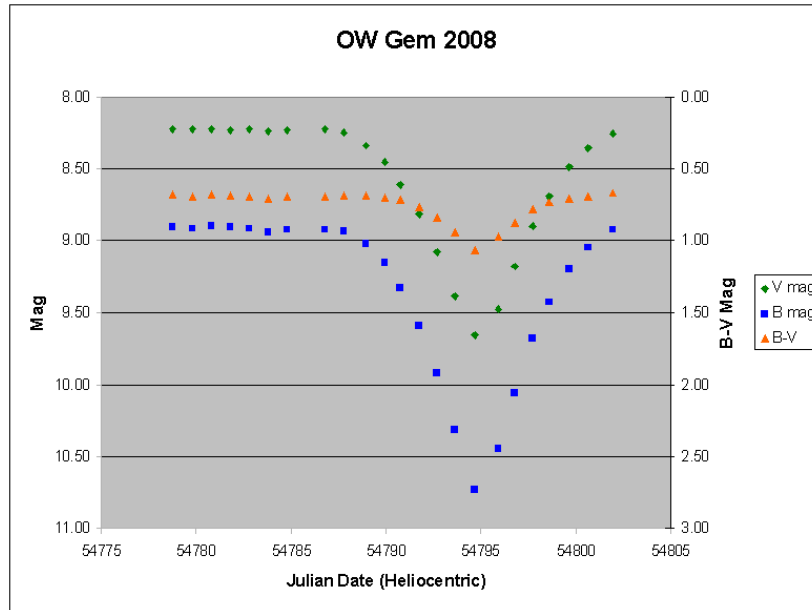


Figure 1: OW Gem B, V, and B-V photometry

The eclipse spanned 19 days, from MJD 54782 to 54802. Two times of minima, one for each bandpass, were determined from these 38 data points using the Kwee and van Worden algorithm (Kwee & van Woerdan, 1956). Error estimates from this analysis were 0.009 and 0.006 days, which are optimistic given the long eclipse duration and small number of data points. These new times of minima, along with the 15 primary eclipse times previously published in Galan et al. (2008) and one additional timing from Hanzl et al. (1992), are shown in Table 2.

A simple linear fit was applied to the times of minima in Table 2. The time of minimum for E=18 was omitted from the analysis since its O-C was -1.4 days, nearly twice that of the other data points. The improved ephemeris determined from the fit appears in Equation 1. An O-C diagram of all times of minimum is shown in Figure 2.

$$HJD_{min} = 2415779.0(2) + 1258.581(9) \times E \quad (1)$$

**Table 2.** Primary Eclipse Times of Minima

E	HJD	Error(days)	O-C(days)	Source
0	15779.4	-	+0.4	Kaiser
2	18295.8	-	-0.3	"
4	20812.5	-	-0.8	"
5	22072.5	-	+0.6	"
9	27105.6	-	-0.6	"
9	27106.9	-	+0.7	"
15	34658.0	-	+0.3	Fuhrmann
16	35916.0	-	-0.3	"
18	38435.0	-	+1.5	"
25	47243.4	0.5	-0.11	Kaiser et al.
26	48502.1	0.4	+0.00	Williams and Kaiser
26	48502.58	0.12	+0.48	Hanzl et al.
27	49760.857	0.052	+0.18	Hager
27	49760.68	0.03	+0.00	Galan
27	49760.59	0.02	-0.09	Kaiser et al.
29	52277.77	0.01	-0.07	Kaiser et al.
29	52277.73	0.2	-0.11	Derekas et al.
31	54794.907	0.009	-0.098	this paper (V)
31	54794.911	0.006	-0.095	this paper (B)

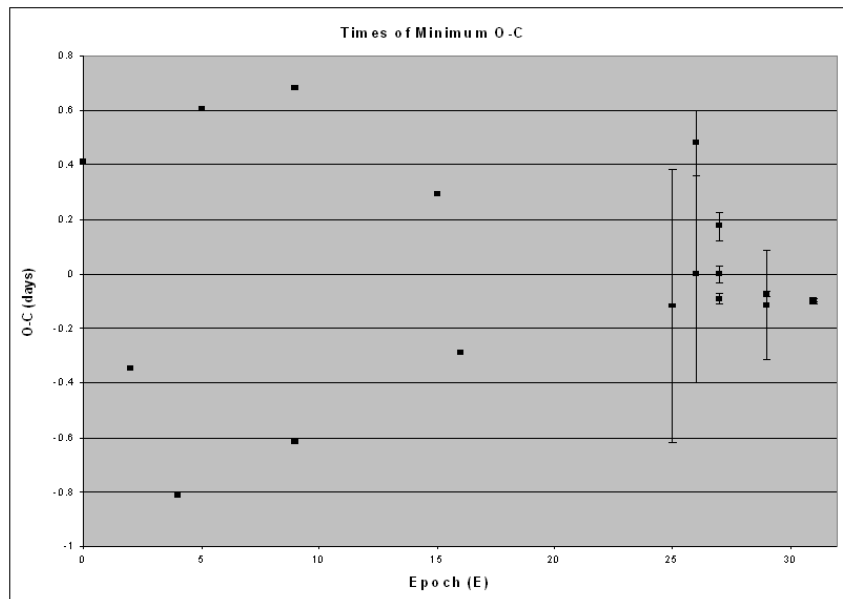


Figure 2: O-C values using Equation 1

## References

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Kwee, K. K. & van Woerden, H., 1956, *BAN*, **12**, 327 [1956BAN....12..327K](#)

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