THE 1991 ECLIPSE OF OW GEMINORUM

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Abstract

The 1991 minimum of OW Gem occurred on JD 2448502.1 ± 04 days, based on the combined visual estimates of seven observers. Eleven times of minima since 1902 are tabulated. The slightly revised light elements are

Min I(JD) = 2415779.0 + 1258.59 E.

1. Introduction

OW Geminorum (HD 258878=NSV 3005) is a long period eclipsing binary discovered photographically by AAVSO member Daniel Kaiser (Kaiser *et al.* 1988). He also examined more than 750 Harvard patrol plates, finding five minima between 1902 and 1933 and deriving a period of 3.45 years (Kaiser 1988). His light elements are:

$$\text{Min I}(JD_{hel.}) = 2415779.4 + 1258.56\ E. \quad (1)$$

The depth of eclipse was 1.8 magnitudes in both visual and photographic light, and the duration of eclipse was estimated as 12-14 days.

Fuhrmann (1989) examined 2700 Sonneberg patrol plates and found three minima between 1954 and 1964. Combining the Harvard and Sonneberg data in a least squares solution, Fuhrmann derived the "insignificantly improved" elements:

$$\text{Min I}(JD_{hel.}) = \underset{\pm 0.35}{2415779.40} + \underset{\pm 0.01}{1258.59}\ E. \quad (2)$$

These light elements predicted the next minimum on September 2, 1991, when Gemini was rather low in the east before dawn.

2. Observations

We have collected visual estimates during this eclipse of OW Gem by the observers listed in Table 1.

The light curve is shown in Figure 1. The scatter was reduced by deriving a mean magnitude for each night. We applied the tracing paper method to the resulting mean light curve and found the time of mid-eclipse at JD 2448502.1 ± 0.4 days. This mean curve also indicates that the visual amplitude of eclipse may be more nearly magnitude 1.7 instead of 1.8 and the half-duration of eclipse is closer to 6 days than 7 days.

Table 1. Observers of OW Gem

Observer	*Location*	*Number of Estimates*
Marvin E. Baldwin	Butlerville, Indiana	5
Daniel H. Kaiser	Columbus, Indiana	6
Gerard Samolyk	Greenfield, Wisconsin	8
Patrick Schmeer	Bischmisheim, Germany	8
Jean-François Viens	Charlesbourg, Quebec	8
Karl Walke	Darmstadt, Germany	14
David B. Williams	Indianapolis, Indiana	5

Kaiser (1988) reported his magnitude estimates of OW Gem during minima recorded on the Harvard plates but did not explicitly state the times of mid-eclipse deduced from these estimates. Fuhrmann (1989), on the other hand, gives the times of mid-eclipse found by graphical interpolation from the magnitude estimates during minima recorded on the Sonneberg plates. For the convenience of future investigators, Table 2 gives the times of minima we have determined from Kaiser's individual magnitude estimates, based on simple assumptions about the eclipse light curve.

Table 2. Minima of OW Gem

JD	*E*	*O-C*	*Source*
2415779.4	0	+0.41 days	Kaiser (1988)*
2418295.8	2	-0.37	"
2420812.5	4	-0.85	"
2422072.5	5	+0.55	"
2427105.6	9	-0.71	"
2427106.9	9	+0.59	"
2434658.0	15	+0.14	Fuhrmann (1989)
2435916.0	16	-0.46	"
2438435.0:	18	+1.36	"
2447243.4	25	-0.38	Kaiser *et al.* (1988)
2448502.1	26	-0.27	This paper

* Times derived by procedure described in text.

3. Discussion

Kaiser (1988) found the photographic range to be magnitude 9.0-10.8. As noted above, the half-duration of eclipse is 6 days. The period is known well enough to indicate whether a particular observation is on the descending or ascending branch of the light curve. With a photographic amplitude of magnitude 1.8, a minimum at magnitude 10.8, and a half-duration of 6 days, the variable fades or brightens by magnitude 0.3 per day and a simple calculation indicates the time of mid-eclipse either before or after any observed magnitude. As indicated by the O-C values in Table 2, this procedure produces very reasonable residuals.

Table 2 includes Fuhrmann's photographic minima and the two visual minima

observed in 1988 and 1991. The O-C values are derived from the following light elements, determined by least squares from all 11 minima given equal weight:

$$\text{Min I}(JD_{\text{hel.}}) = \underset{\pm 0.4}{2415779.0} + \underset{\pm 0.03}{1258.59}\ E. \qquad (3)$$

The next primary eclipse will occur February 6-18, 1995, when Gemini will be high in the evening sky for northern hemisphere observers. Extensive photoelectric photometry at that time will be very desirable.

4. Acknowledgements

We wish to thank each of the observers who made visual estimates of OW Gem at very early morning hours during the 1991 eclipse, and Dr. Richard A. Wade, who was then at the Steward Observatory, University of Arizona, who called our attention to the Sonneberg data and provided a translation of Fuhrmann's paper.

References

Kaiser, D. H. 1988, *Inf. Bull. Var. Stars,* No. 3233.

Kaiser, D. H., Baldwin, M. E., and Williams, D. B. 1988, *Inf. Bull. Var. Stars,* No. 3196.

Fuhrmann, B. 1989, *Mitt. Verand. Sterne,* 12, 8.

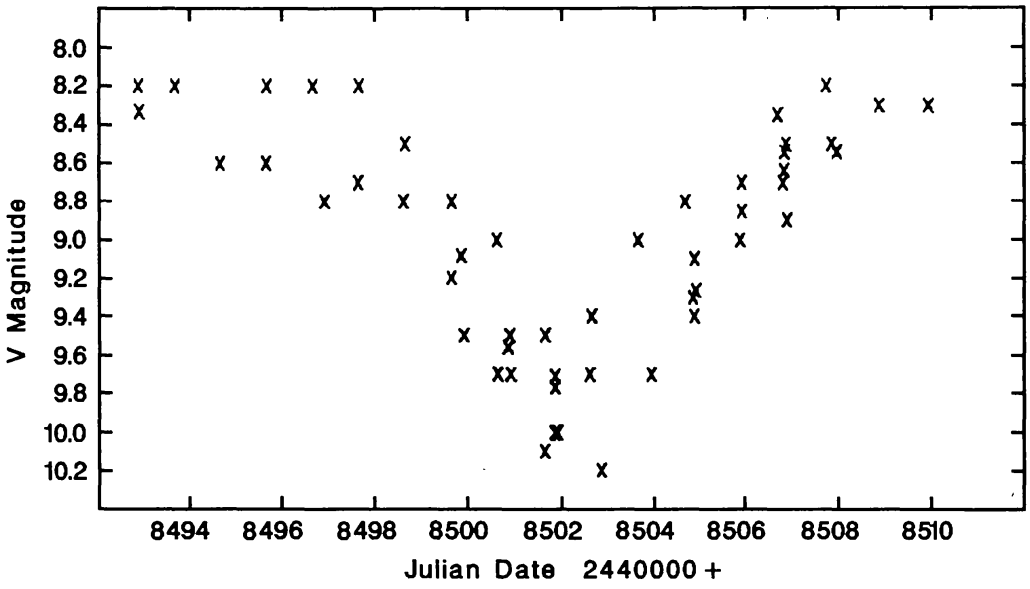

Figure 1. Primary eclipse of OW Gem observed in August and September 1991.