

# VARIABLE STAR BULLETIN

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## AW Gem : A New SU UMa Star

S. Fujino(Hamamatsu), M. Nakai(Yokosuka),  
M. Iida(Nagano), M. Moriyama(Sasebo), N. Makiguchi(Hatano)  
and  
T. Kato(Kyoto, Compiler)

AW Gem is known to show long and short outbursts which are demonstrated in Figure 1. The latest long and short outbursts are also shown in Figure 2, a and b, respectively. This star has been suggested to be an SU UMa candidate (Szkody, 1987). Howell and Szkody (1988) observed the star at quiescence and detected 105 min modulation in brightness which is interpreted as the orbital period.

AW Gem showed a long outburst in early February, 1989 (Fig. 2, a). The outburst started on Feb.2, and continued at least for 11 days. Visual observation on Feb. 4 by Iida and on Feb. 5 by Makiguchi showed no appreciable variation in the light maximum. However, photographic observation by Fujino on Feb. 6, 7 and 10 showed superhumps with amplitude of 0.3 magnitude (Figure 3, a and b). The light curves of superhumps were asymmetric and the rise was steeper. The superhumps became less prominent during the outburst. The same feature was independently observed by Nakai photographically and visually, and by Moriyama visually. The instruments and the times of superhumps are summarized in Table 1.

Periodogram analysis strongly favors a period of 0.07867 days. One day aliases, such as 0.07303 days, are ruled out because they give much larger residuals to the observed times of superhumps.

Using the relationship between the orbital period and the superhump period, it is empirically derived that the orbital period of this system lies between 0.0756 days and 0.0762 days, which is well within the error range of the photometric period by Howell and Szkody(1988). This period also places the star in a narrow region which is crowded with SU UMa systems rather than polars.

This outburst is thus identified as a superoutburst. We also searched such outbursts in the past. The result is summarized in Table 2 (a part of light curve is shown in Fig.1). The interval between outbursts varied from 58 to 157 days, and is 98 days in average, although several short ones may have been possibly missed. The interval between superoutbursts varied from 364 to 489 days, and is 410 days in average. 330 day period in GCVS may refer to this periodicity.

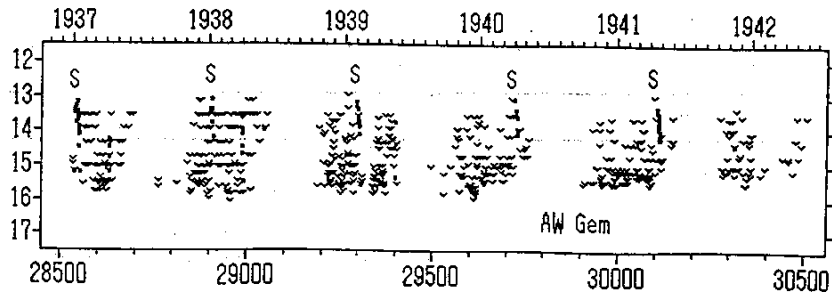


Figure 1. Light curve of AW Gem. Superoutbursts are marked as S.

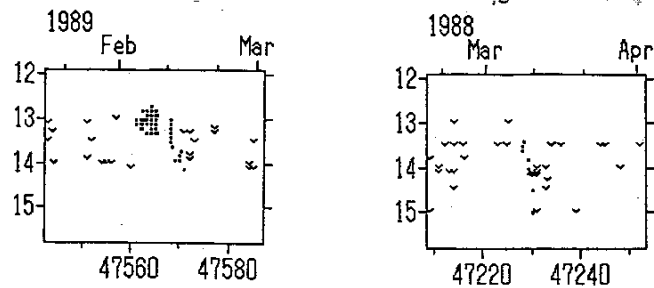


Figure 2. a. Light curve of the 1989 superoutburst

b. Light curve of a short outburst in 1988

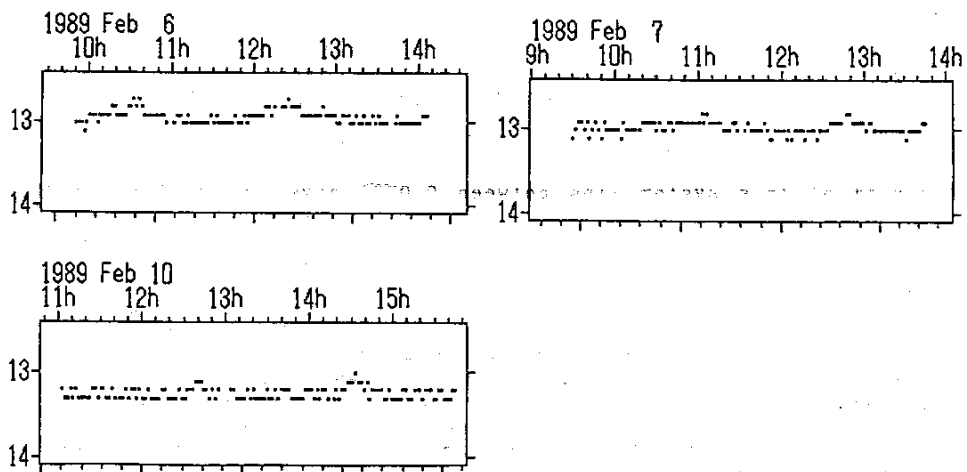


Figure 3. Photographic light curve during the 1989 superoutburst

Table 1. List of observed superhumps

Feb.UT(Geo)	E	O-C'	Observer**
6.440	0	-0.004	Fujino
6.515	1	0.000	Fujino, Moriyama
6.595	2	+0.001	Nakai
6.670	3	-0.002	Nakai
7.461	14	+0.002	Fujino
7.533	15	-0.005	Fujino
10.528	56	+0.001	Fujino
10.606	57	0.000	Fujino

\*O-C's are calculated using the following formula.

$$\text{Max. (UT)} = \text{Feb. } 6.436 + 0.07867 * E$$

\*\*Observers and their instruments are as follows.

S.Fujino: 31cm Wright Schmidt camera, Tri-X film

M.Nakai: 31cm reflector, Tri-X film with yellow-green filter

M.Moriyama: 33cm reflector

M.Iida: 26cm reflector

N.Makiguchi: 25cm reflector

Table 2. Observed outbursts of AW Gem

JD(+2400000)	mag	duration(d)	type
28540-28554	13.3	14	super
28631-28634	14.3	3	normal
28904-28910	13.1	>6	super (<14.8 on 28916)
28987-28991	14.0	4	normal
29045	14.0:	?	unconfirmed
29294-29305	13.2	11	super
29398-29401	13.8	3	normal
29723-29730	13.1	>7	super (<13.6 on 29718)
30103-30112	13.3	>9	super (<14.1 on 30115)
30315	14.4	1	normal
44725	13.3	1	normal
46184	13.6	?	(single isolated obs.)
46415	14.2	?	normal? (<15.5 on 46412 and 46419)
46821-46822	13.7	1	normal
47071-47081	12.9	10	super
47228-47230	13.4	2	normal
47468	13.3	1	unconfirmed
47560-47571	13.0	11	super

\*From the record of the Variable Star Observers League in Japan.

1937-1942: densely covered

1943-1979: no data

1980-1986: sparsely covered

1987-1989: densely covered

References:

Howell, S. B. and Szkody, P., 1988, P.A.S.P., 100, 224.

Szkody, P., 1987, Ap. J. Suppl. 63, 685.

## Recent Behavior of CY UMa

M. Watanabe(Toyama), K. Hirosawa(Inazawa), T. Kato(Kyoto),  
and H. Narumi(Ehime)

CY UMa was identified as a SU UMa system (Kato et.al.,1988).  
We here report outbursts observed in 1988 and early 1989.

### 1) 1988 Jan. outburst

The details of this superoutburst was shown in the previous report(Kato et.al.,1988). The outburst was detected on Jan.6 and lasted for 11 days. Observed maximum was 12.3 magnitude.

### 2) 1988 May outburst

The outburst was detected on May 17 at magnitude 12.8, while the star was invisible on the previous night. The star faded rapidly and was 13.5-14.0 on May 18, thereafter invisible. (Figure)

### 3) 1988 Oct. outburst

The outburst was detected on Oct.29 at 12.2 and was at 12.5 on the next night, but neither the start nor the end of the outburst was determined due to lack of observation. P.Schmeer detected this outburst at 13.0 in Nov., more than a week after the initial detection (private communication). The brightness and the duration prefer a superoutburst.

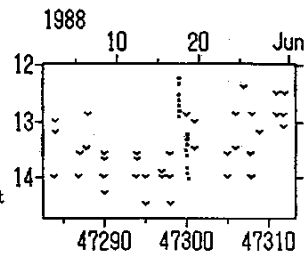
### 4) 1989 Jan. outburst

The outburst was detected on Jan.1 when the star was still brightening. Observed maximum was 12.9, and was already invisible on Jan.3. This outburst was also a very short one as observed in May, 1988.

### 5) 1989 Mar. outburst

The outburst was detected on Mar.29 at 13.2. On Mar.25 the star was invisible and on Mar.30 it was also invisible. This outburst was also a very short one.

The interval between the outbursts vary from 64 to 165 days. If the outburst in Oct.1988 was really a superoutburst, the interval between them was 297 days, which is typical for an SU UMa star. More observation is necessary to confirm these values.



### Reference:

Kato, T., Fujino, S., Iida, M., Makiguchi, N., and Koshiro, M.,  
1988, Variable Star Bull., Japan, No. 5.

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NATIONAL SCIENCE MUSEUM, Ueno Park, Taito-ku, Tokyo 110, JAPAN

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