COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 4435

Konkoly Observatory
Budapest
6 February 1997

HU ISSN 0374 – 0676

SUDDEN PERIOD CHANGE IN THE CONTACT BINARY AW UMa?

The orbital period change of the contact binary AW UMa was firstly reported by Woodward et al. (1980). Hrivnak (1982) considered it as a sudden decrease of the period from one constant period (0.43873231 days) to another one (0.43872917 days), which occurred around 1976 or as a continuous decrease. Due to the lack of observations it was impossible to decide, which type of period change occurred.

Our UBV photoelectric observations were carried out at the Stará Lesná Observatory (SL) in 1995-1997, Skalnaté Pleso Observatory (SP) in 1992 and 1996 and Kryonerion Station of the National Observatory of Athens (K) in 1982 and 1986. The telescopes and their equipments are described in Hric et al. (1991). BD +31°2270 was used as the comparison star. U, B, V light curves of AW UMa based on the 1995 and 1996 data are depicted in Figure 1. Mid-eclipse brightening was registered in the secondary minimum (Pribulla and Chochol, 1997). Derman et al. (1990) and Bakos et al. (1991) reported pronounced light and colour variations of AW UMa in 1989-90. Our light curves show that AW UMa is in a quiet phase now. The times of minima and their standard errors, determined using Kwee and van Woerden's (1956) method are given in Table 1.

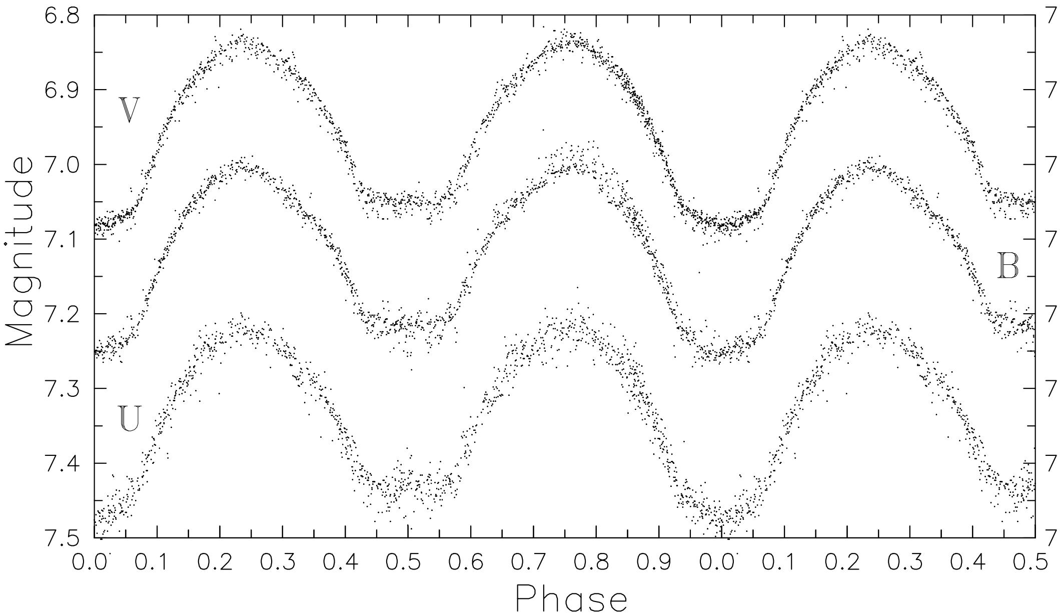

Figure 1. U, B and V light curves obtained at Stará Lesná Observatory in 1995 and 1996. Phases were calculated using the ephemeris (2).

Table 1. Times of minima of AW UMa

JD_{hel} 2400000+	σ $\times 10^{-4}$	Min.	Obs.	Filt.	JD_{hel} 2400000+	σ $\times 10^{-4}$	Min.	Obs.	Filt.
45107.4766	2	I	K	BV	50139.4693	2	II	SL	UBV
45108.3531	4	I	K	BV	50141.4447	3	I	SL	UBV
46514.4813	10	I	K	BV	50161.4076	3	II	SL	UBV
46515.3586	3	I	K	BV	50421.571	10	II	SP	UBVR
48683.5554	5	I	SP	V	50423.5438	4	I	SL	UBV
49778.3977	2	II	SL	UBV	50428.5918	1	II	SL	UBV
49862.4120	5	I	SL	UBV	50430.5640	3	I	SP	UBV
50096.478	10	II	SL	UBV	50461.4979	4	II	SL	UBV
50097.5706	2	I	SL	UBV	50465.4433	1.5	II	SL	B
50098.4489	0.2	I	SL	UBV	50471.5855	1	II	SL	V

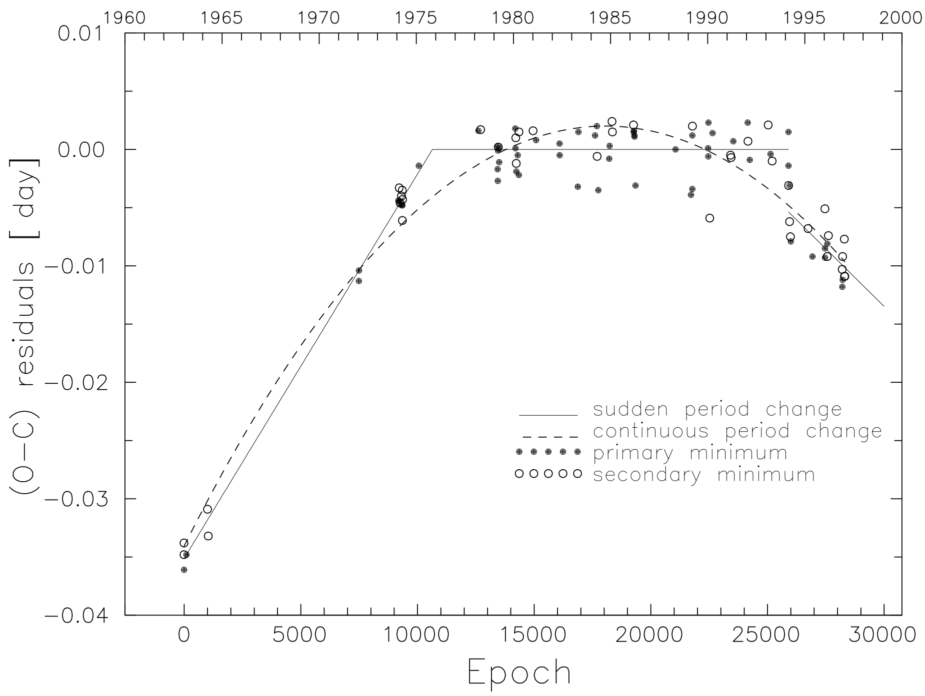

Figure 2. The O−C diagram

The times of minima given in Table 1 together with the data published by Yim and Jeong (1995) and Müyesseroğlu et al. (1996) as well as the data compiled from literature by Bakos et al. (1991) and Demircan et al. (1992) were used to study period change. The O−C residuals (Figure 2) were calculated using the ephemeris:

$$\text{Min I} = HJD\,2\,438\,044.8164 \;+\; 0\overset{d}{.}43872901 \times \; E. \qquad (1)$$

As it is apparent from Figure 2, the data could be explained either by two sudden period changes, which occurred in 1976 and 1994 or by a continuous period change. The linear ephemeris between the two sudden period changes (1975-1994) is identical with ephemeris (1). The period 0.43873231 days determined by Hrivnak (1982) and our ephemeris (1) indicate a period jump $\Delta P/P = 7.5 \times 10^{-6}$. The minima after the second jump are defined by the following linear ephemeris:

$$\text{Min I} = \text{HJD}\,2\,438\,044.8625 + 0\overset{d}{.}43872703 \times E \qquad (2)$$

The corresponding period jump ($\Delta P/P = 4.4 \times 10^{-6}$) is smaller than the first one. The data in Figure 2 fitted by a parabola (continuous period change) are represented by the following ephemeris:

$$\mathrm{Min\,I} = \mathrm{HJD}\,2\,438\,044.7824 + 0\overset{\mathrm{d}}{.}43873301 \times E - 1.105\ 10^{-10} \times E^2 \qquad (3)$$

The sum of squares of the residuals for the three linear fits ($2.5\ 10^{-5} d^2$) is half of that for the quadratic fit ($5.0\ 10^{-5} d^2$), therefore the sudden period change seems to be more probable than the continuous one.

Acknowledgements. This work was partly supported by a NATO grant (No. 960322) and by a VEGA grant 1282/1997.

T. PRIBULLA
D. CHOCHOL
Astronomical Institute
Slovak Academy of Sciences
059 60 Tatranská Lomnica
Slovakia
e-mail: pribula@auriga.ta3.sk

H. ROVITHIS-LIVANIOU
Section of Astrophysics,
University of Athens,
GR 15784 Zografos,
Greece
e-mail: elivan@atlas.uoa.gr

P. ROVITHIS
Astronomical Institute,
The National Obs. of Athens,
P.O. Box 20048,
GR 11810 Athens,
Greece

References:

Bakos, G.A., Horák, T.B., Tremko, J., 1991, *Bull. Astron. Inst. Czechosl.*, **42**, 331
Demircan, O., Derman, E., Müyesseroğlu, Z., 1992, *A&A* , **263**, 165
Derman, E, Demircan, O., Müyesseroğlu, Z., 1990, *IBVS*, No. 3540
Hric, L., Skopal, A., Urban, Z., 1991, *Contrib. Astron. Obs. Skalnaté Pleso*, **21**, 303
Hrivnak, B.J., 1982, *Astrophys. Journal*, **260**, 744
Kwee, K.K. & van Woerden, H., 1956, *Bull. Astron. Inst. Neth.*, **12**, 327
Müyesseroğlu, Z., Gürol, B., Selam, S.O., 1996, *IBVS*, No. 4380
Pribulla, T., Chochol, D., 1997, *In: Proceedings of the conference "Contemporary problems of astronomy"* , Odessa, in press
Woodward, E.J., Koch, R.H., Eisenhardt, P.R., 1980, *Astron. Journal*, **85**, No. 1, 50
Yim, J.R., Jeong, J.H., 1995, *J. Astron. Space Sci.*, **12**, 44