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THE PERIOD BEHAVIOUR OF AU SERPENTIS

The variability of AU Serpentis is one of the many discoveries made by Hoffmeister (1935). The system was observed visually by Soloviev (1936, 1951). Photographic observations were made by Huth (1964). The first photoelectric observations were published by Binnendijk (1972) who produced the first light curves and classified AU Ser as a W-UMa class system.

Our observations were made during four nights in the time interval between 20 and 27 June 1982, using photoelectric equipment attached to the 38-cm reflector at Midway Observatory. The equipment and observational procedures have been described previously (Kennedy & Wisniewski, 1980; Kennedy, 1982). The observations yielded one primary and two secondary eclipses. Enough data were obtained to present an almost complete light curve (ΔV); Figure 1. Maximum light has been normalised to zero. Paucity of data near the maxima, especially the one following secondary minimum, prevents confirmation (or otherwise) of the shifts of the extreme values of light from phases 0.25 and 0.75, as recorded by Binnendijk. The observation of one of the secondary minima was interrupted by cloud, thus not permitting a reliable determination of time of minimum light. Recorded times of minima are listed in Table I.

Table I

J.D. Hel. 2,440,000 +	Min.	Epoch	Phase	(O-C)
5142.9884	I	11369.0	.9911	$-{}^{d}.0034$
5142.0227	II	11366.5	.4928	$-{}^{d}.0028$

Phases and residuals were computed from the light ephemeris:

J.D. Hel. Min. I = 2,440,748.8592 + 0.38650124 E and are plotted

versus heliocentric Julian date in Fig. 3 together with all previous recorded minima (I and II) as tabulated by Binnendijk (1972). No period diagram has been published previously.

Our observations indicate that the period of AU Ser has remained constant since J.D. Hel. 2,436,673.5930 when the system was observed by Huth (1964).

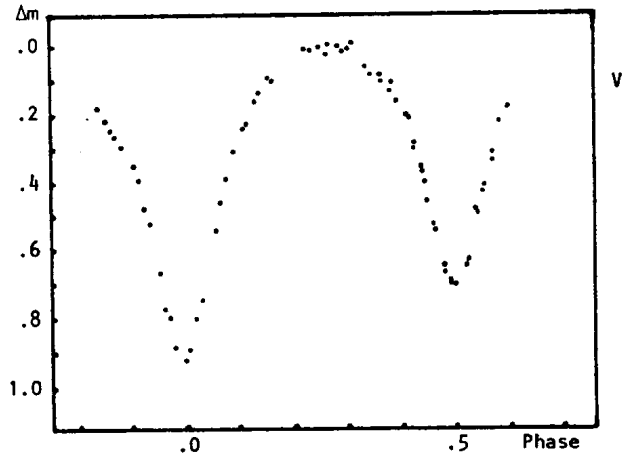

Fig. 1: The Lightcurve of AU Serpentis

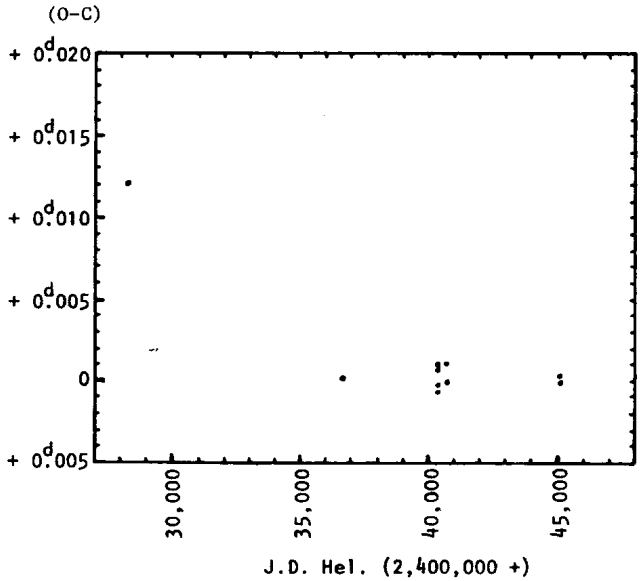

Fig. 2: Rectified Period Behaviour of AU Ser

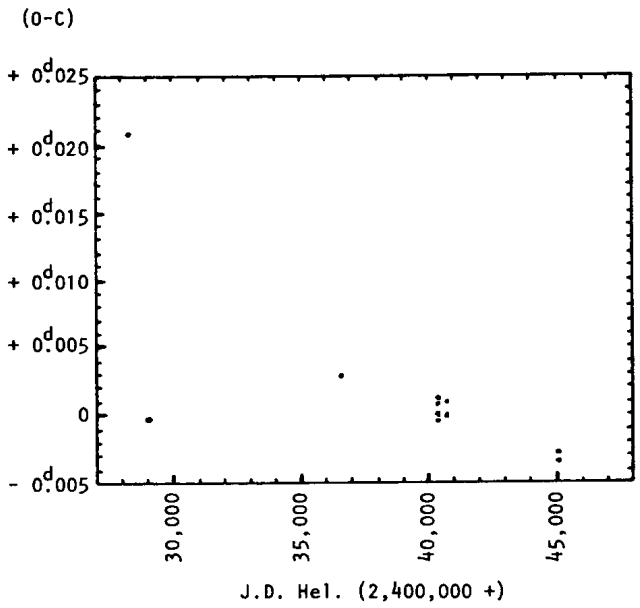

Fig. 3: Period Behaviour of AU Ser

The period diagram was rectified by plotting the steadily decreasing residuals horizontally. The rectified period diagram is shown in Figure 2 and is based on the ephemeris: J.D. Hel. Min. I = 2,436,673.5929 + $0^d.38650096$ E. The largest residual for the horizontal branch is $0^d.0009$. Residuals for primary and secondary minima, based on the above ephemeris are listed in Table II.

Table II

YEAR	$(O-C)_1$	$(O-C)_2$	Δ	REF.
1959	+ .0001	-	-	Huth
1969	$\{^{-.0003}_{-.0007}$	$^{+.0006}_{+.0009}\}$	.0012	Binnendijk
1970	.0000	+ .0010	.0010	Binnendijk
1982	- .0002	+ .0003	.0005	This paper

The different heights of the maxima (occurring at phase angles 100^{o} and 260^{o}) and the rapid variations in the shape of the light curve (Binnendijk, 1972) together with the decreasing value of $\Delta = (O-C)_2 - (O-C)_1$ appear to indicate periastron revolution. For this system, its major cause is likely to be the distortion of the close components.

The observations by Soloviev indicate that a period change may have taken place prior to J.D. Hel. 2,436,673. Unfortunately, Soloviev's observations appear to be contradictive in this respect.

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