

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 3437

Konkoly Observatory
Budapest
2 March 1990
HU ISSN 0374 - 0676

CHANGES IN THE LIGHT CURVE OF AB DORADUS (HD 36705)

The rapidly rotating single star HD 36705 (AB Dor) has been under observation by the Monash group for approximately ten years. Presented here (see fig.1) are the V and B-V light curves recorded during October/November 1989 at Siding Spring observatory. Results were obtained with a cooled extended-red S-20 tube and a motorized filter box on the 0.6 m Boller and Chivens telescope. Calculated phases for AB Dor are in accordance with epoch and period HJD 2444296.575 and 0.51479 day as discussed by Innis et al. (1988), with the main comparison star being HD 35537. The data were transformed to the standard UBV system via a set of calibration equations obtained by the author in June 1989 on the same instrument.

From fig.1(a) it can be seen that the light curve is dominated by a large decrease in brightness at an approximate phase of 0.2, presumably due to the effect of a large starspot (or group of smaller spots) at this phase of the star's rotation. The portion of the curve between phases 0.7 and 0.9 is unusually flat, possibly indicating either the immaculate (unspotted) surface of the star, or a uniformly spotted section of the stellar surface. There may also be a small dip in the light curve at phase 0.6, but a lack of complete phase coverage prevented confirmation of this. The B-V curve in 1(b) shows that AB Dor is slightly redder at minimum light.

The most interesting aspect of these data becomes apparent when it is compared with previous light curves from

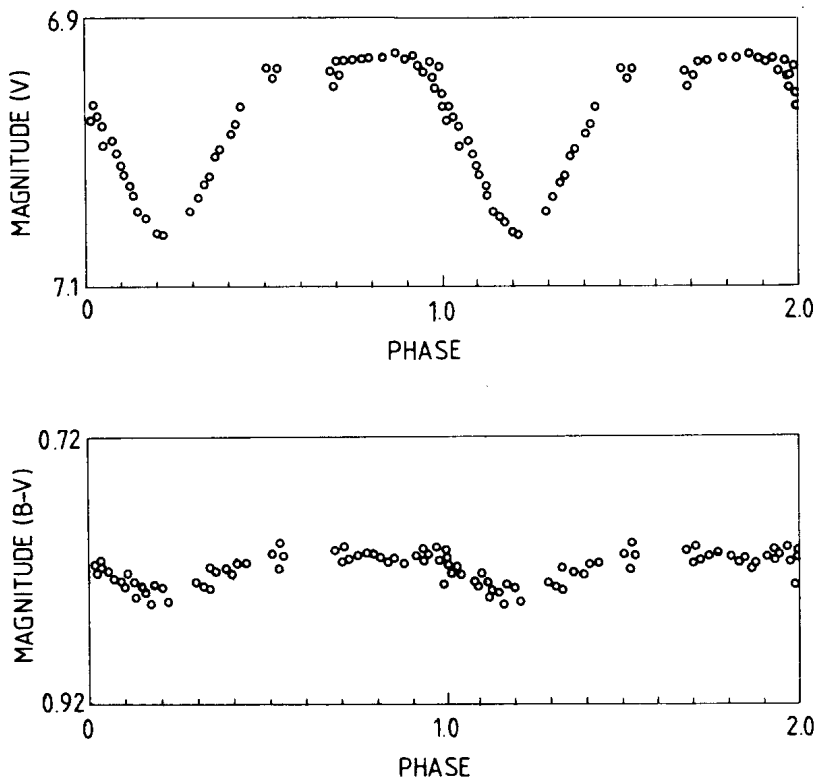


Figure 1 (a), (b) : The light curves in V and B-V for AB Dor in Oct/Nov. 1989. Phases calculated with respect to period 0.51479 d and epoch 2444296.575.

1986, 1987 and 1988 (see fig.2). From the March/April 1986 data, it can be seen that the light curve is quite flat, possessing little modulation due to starspot activity. In September/November 1986 and January 1987, however, a definite minimum is seen to emerge at a phase of about 0.5. The December 1988 data shows a significant change from this, in that the curve now exhibits a peak at phase 0.4 and a minimum at phase 0.7 (Thompson and Thompson 1988). The 1989 data, taken only 10 months later, shows quite a dramatic change in the shape of the light curve, with a deep minimum now at phase (approximately) 0.2. Since the migration of a starspot by 0.5 phase in less than a year is quite unlikely, one must

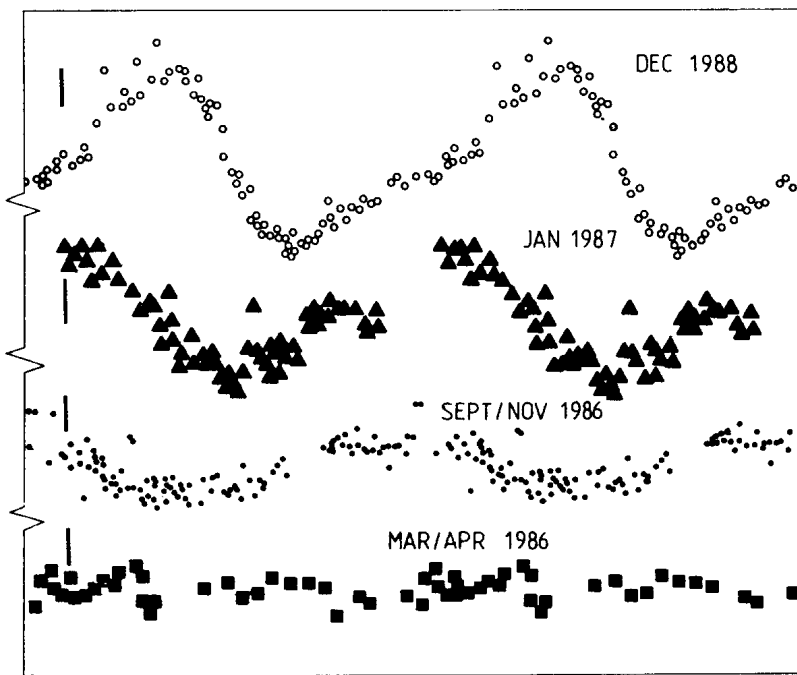


Figure 2 Light curves in V for AB Dor since March 1986. The vertical scale is given by the bar at the side of each curve which represents 0.02 mag. All data shown were collected by the Monash group, and cover two complete rotation cycles.

assume (after verifying that each set of data was correctly reduced) that the change in the shape of the curve is the result of the formation and decay of one or more spotted regions on the star.

The level of the flat portion of the 1989 light curve is quite similar to the level of the peak in the 1988 data, implying perhaps that the spot causing the minimum at phase 0.7 (1988) has completely disappeared in 1989, and a new spot has formed at phase 0.2. There was some hope that the flat part of the 1989 light curve may be indicative of the unspotted star brightness, but AB Dor has been observed as being up to 0.15 magnitudes brighter in previous years (see fig.3). The mean light level of AB Dor in 1989 further emphasizes the continual dimming of the star over the past

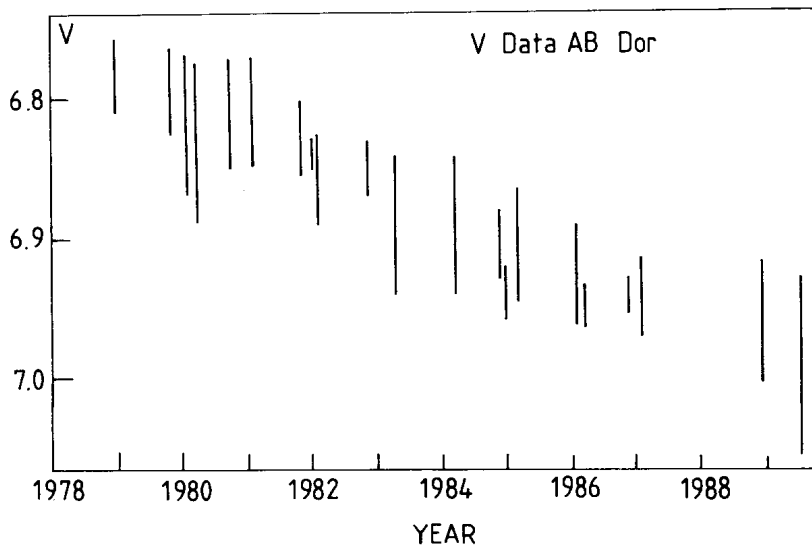


Figure 3 The variation of mean light level in V for AB Dor since 1979. The data was collected from many different sources (for references see Innis et al., 1988)

ten years, however it is yet to be seen whether this is evidence of a solar-type spot cycle.

G. ANDERS
 Dept. of Physics, Monash Univ.
 Clayton 3168, Australia

References:

Innis, J.L., Thompson, K., Coates, D.W., Lloyd
 Evans, T. (1988) Observations of active
 chromosphere stars - II. Photometry of AB Dor,
 1978-1987. Mon. Not. R. astr. Soc. 235, 1411-1422.

Thompson, K., Thompson, I. (1988)
 December 1988 Photometry on AB Dor. Inf. Bull. Var.
 Stars. No. 3320.