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UBVRI OBSERVATIONS OF
THE CHROMOSPHERICALLY ACTIVE STAR HD 155555 (V824 Ara)
IN 1986 AND 1987

The RS CVn-type binary with the memorable name HD 155555 (now called V824 Ara) has a relatively short orbital period $P = 1.6817$ days and consists of components of similar mass (Bennett *et al.*, 1962, Stacy *et al.*, 1980, Fernández-Figueroa *et al.*, 1986). Its optical variability was described by Udalski and Geyer (1984) who found a typical spotted-star migration-wave with the amplitude of about 0.08 in V . The rotation period implied by the spot re-appearance was found to be 1.66 days. Udalski and Geyer gave references to the literature before 1984. The subsequent photometric publications were by Bopp *et al.*, (1986) (UBV data obtained in 1985), Lloyd Evans and Koen (1987) ($UBVR_{CI}$ data from 1979 and 1981), and Collier Cameron (1987) ($UBVR_{CI}$ data from 1979 and 1980).

The present paper contributes to the monitoring of the optical variability of HD 155555. The observations were obtained in June 1986 and in March 1987 at the Las Campanas observatory using the 61 cm telescope of the University of Toronto and the single-channel photometer. The E regions were observed to place the observations in the Cousins $UBVR_{CI}$ system. Continuously poor photometric conditions prevailed during both runs and it is rewarding that the data for comparison stars do not drastically differ from those obtained by previous observers. There may exist some systematic differences for the $B - V$ and $U - B$ colours of the comparison stars, most probably due to the redness of both stars because mean colours for the program star do not show any systematic deviations. The VR_{CI} data seem to be in good accord with the previous observations. The mean data for the comparison stars are given in Table I.

Each observation of HD 155555 was referenced to both comparison stars and a mean value was taken. These mean values are listed in Table II. The phases in that table have been computed using the ephemeris for the light minimum given by Udalski and Geyer (1984):

$$\text{Min. (JD hel.)} = 2445803.07 + 1.66 E$$

The observations for both years are shown in the graphical form in the accompanying figure. As we can see there, the time of minimum light was observed to agree with the ephemeris in 1986 but was shifted by about a half of the period in 1987. This shift can be due either to a spot migration or to an accumulated uncertainty in the rotational period. The approximate moments of the light minima in 1986 and 1987, which - in future - may help to define better the variability characteristics of HD 155555 are:

$$\begin{aligned} \text{June 1986: Min. (JD hel.)} &= 2446583.30 \\ \text{March 1987: Min. (JD hel.)} &= 2446867.95 \end{aligned}$$

Table I

THE COMPARISON STARS FOR HD 155555

$U - B$	$B - V$	V	$V - R_C$	$V - I_C$	Reference
HD 156427					
1.656	1.494	7.395	0.805	1.543	Udalski and Geyer (1984)
1.660	1.492	7.410			Bopp <i>et al.</i> , (1986)
	1.50	7.42	0.80	1.53	Collier Cameron (1987)
1.695	1.453	7.417	0.797	1.555	Las Campanas 1986
1.712	1.469	7.419	0.790	1.558	Las Campanas 1987
HD 154775					
1.962	1.587	7.589	0.865	1.744	Udalski and Geyer (1984)
2.006	1.532	7.616	0.874	1.742	Las Campanas 1986
2.056	1.555	7.615	0.865	1.734	Las Campanas 1987

Table II

 $UBVR_CI_C$ OBSERVATIONS OF HD 155555

JD(hel)	Phase	$U - B$	$B - V$	V	$V - R_C$	$V - I_C$
2446000 +						
582.590	0.590	0.303	0.776	6.728	0.451	0.910
582.709	0.662	0.302	0.783	6.749	0.452	0.909
583.608	0.204	0.265	0.805	6.773	0.451	0.897
583.705	0.262	0.281	0.795	6.757	0.451	0.897
584.625	0.816	0.286	0.786	6.774	0.450	0.898
584.738	0.884	0.265	0.782	6.761	0.452	0.903
585.607	0.408	0.298	0.786	6.717	0.448	0.885
587.659	0.644	0.287	0.789	6.725	0.443	0.886
588.620	0.223	0.329	0.790	6.798	0.457	0.906
589.626	0.829	0.279	0.788	6.744	0.444	0.885
860.878	0.234	0.317	0.805	6.801	0.457	0.916
861.852	0.820	0.338	0.799	6.729	0.446	0.904
865.865	0.238	0.274:	0.779	6.774	0.446	0.904
867.860	0.440	0.304:	0.812	6.786	0.443	0.908
868.847	0.034	0.362:	0.785	6.708	0.446	0.892
869.828	0.625	0.329	0.806	6.786	0.460	0.917
870.823	0.225	0.270:	0.799	6.755	0.445	0.899

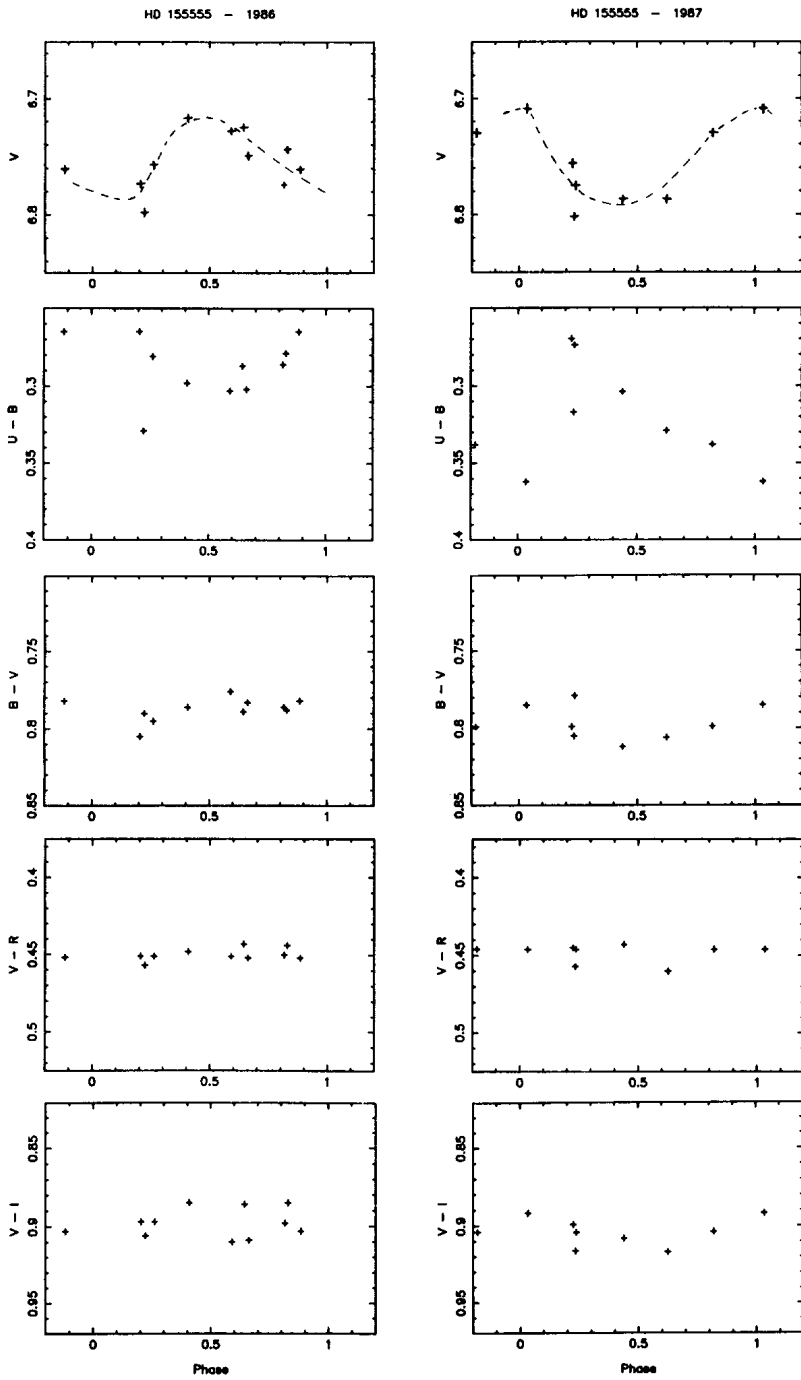


Figure 1

The mean brightness of HD 155555 during both seasons was about $V = 6.76$, i.e. by about 0.09 fainter than observed by Udalski and Geyer (1984) and by about 0.03 fainter than observed by Bopp *et al.*, (1986), but in a good agreement with the somewhat lower levels observed by Lloyd Evans and Koen (1987) and Collier Cameron (1987). The amplitude $\Delta V \simeq 0.08$ was similar to that observed by all previous observers. The mean colour data also agree very well with the previous results (notice, however, that $V - I_C$ of Udalski and Geyer deviates by about 0.05 from all other results).

The very small colour variations of HD 155555 seem to reveal a relationship which seems to be standard for spotted stars in that most of the colours (except $U - B$) become redder for the decreased brightness. This tendency is better visible in $B - V$ and $V - I_C$. The $V - R_C$ colour does not seem to change by much whereas the $U - B$ colour becomes more ultraviolet for the decreased brightness of the star. This phenomenon is also characteristic for spotted stars where dark regions are apparently surrounded by areas of increased chromospheric activity.

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