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**PHOTOMETRIC OBSERVATIONS OF R CrB
DURING THE 1985 MINIMUM**

R Coronae Borealis is a prototype of a group of stars that exhibits drops in brightness. The times of minima of R CrB stars are irregular and completely unpredictable at present. Moreover, the depth and duration of the minima are irregular. They typically last a year or so. A 'normal' minimum comprises a comparatively rapid fade followed by a period of extreme faintness and a gradual rise to maximum. This outline, however, should not be accepted too rigidly, as many deviations from it occur. There have been broad-band photometric studies for a number of declines in light of a few brightest members of this class. Photometrically, these declines showed some degree of similarity in their overall behaviour. But it is clear from the available observations that the colour behaviour differed markedly for the various declines. It is necessary that a more thorough study of the phenomenon be performed.

This paper discusses the 1985 decline of R CrB. In Figure 1 we show the light and colour curves for this event. Circles represent the author's observational data. These data of R CrB (listed in Table 1) were obtained at an altitude of 3100 m Terskol Peak (the Caucasus) with the 0.5 m reflector, using an automatic single channel photometer. The magnitudes and colour indices of the comparison and check stars for differential observations have been reported by Goncharova (1992). In addition, in Figure 1 we plot the photoelectric magnitudes and colours which were obtained from various sources in the literature: crosses represent data taken from Fernie et al. (1986) and asterisks denote data taken from Ashoka et al. (1986).

As seen from Figure 1, the star reached a minimum of 10.3 mag., before a recovery to $V \sim 7$ mag., prior to another fade to a decline with lower amplitude. It is also clear from these observational data that the colour behaviour during the 1985 minimum differed from one of the other declines of R CrB. The event shows that, in the initial stage, both U-B and B-V colour indices increased in values (i.e. reddened) from the decline onset. As the brightness continued to fall toward the deepest minimum, however, the U-B index curve showed a rapid blueward trend and the initial reddening of the B-V index curve was followed by a plateau before finally reddening at the rising branch. In contrast, the changes in V-R and R-I colour indices occur essentially in phase with the change of V mag. Thus, at a phase of the deepest minimum the star becomes bluer in U-B and redder in B-V, V-R and R-I colour indices than at maximum light. At an early stage of the rising branch, all colours of R CrB became redder than at maximum light, as they usually do. Moreover, V-R and R-I colour indices reached reddest values near the phase of extreme light minimum, whereas the greatest values of U-B and B-V colour indices occurred at the rising branch.

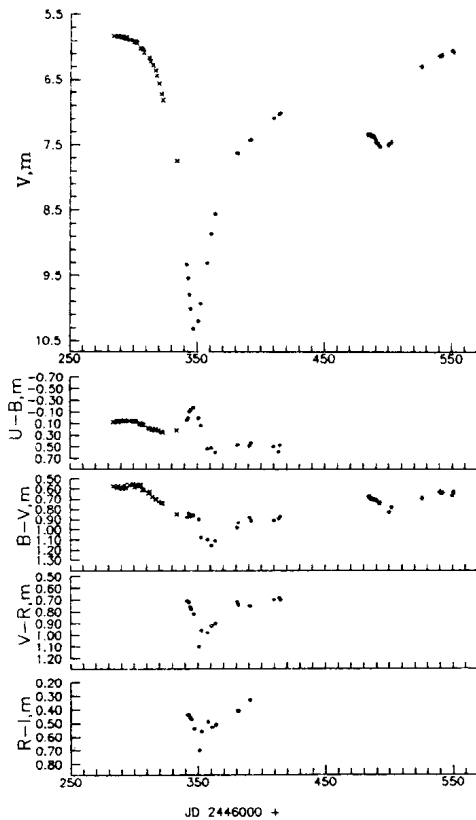


Figure 1

Cottrell et al. (1990) analysed colour curves of several declines of R CrB itself and other R CrB stars and identified two extreme types of colour behaviour: 'bluer' declines, where the U-B and B-V colour indices become substantially bluer before finally reddening, and 'red' declines, where the star reddens from the onset of the decline so that the changes in these colour occur in phase with the decline in light. The 1985 minimum of R CrB was termed as a 'red'-type by Cottrell et al. (1990), since both colour indices initially moved to redder values.

As seen from Figure 1, the real situation for the 1985 minimum of R CrB is more complex: during the initial fade in light the colour indices redden, but, as the star approaches to the extreme faintness, the U-B colour index shows blueward trend before finally reddening (i.e. 'blue'-type decline according Cottrell et al. (1990)).

It is also clear from observations (Goncharova, 1992) that the distinctive feature of the 1983 minimum of R CrB was an appreciable reddening occurred at visible wavelengths at an early stage of descending branch of the light curve.

Table 1
Photometry of R CrB

JD [†]	V	U-B	B-V	V-R	R-I	n
342.21	9.33±0.01	.04±0.03	0.82±0.02	.71±0.01	.44±0.02	3
343.19	9.54±0.01	.00±0.01	0.84±0.01	.72±0.01	.44±0.01	2
344.21	9.79±0.01	-.11±0.02	0.85±0.01	.76±0.01	.46±0.02	4
345.21	10.01±0.01	-.14±0.02	0.87±0.02	.78±0.01	.47±0.01	3
347.21	10.31±0.01	-.18±0.01	0.86±0.01	.82±0.01	.54±0.01	3
351.18	10.2 ±0.1	0±0.1	0.9 ±0.1	1.1 ±0.1	.7 ±0.1	3
353.19	9.93±0.01	.13±0.01	1.08±0.01	.96±0.01	.56±0.01	6
358.19	9.31±0.02	.53±0.02	1.10±0.02	.98±0.02	.49±0.02	3
361.18	8.86±0.01	.52±0.04	1.16±0.02	.92±0.01	.53±0.01	5
364.17	8.55±0.01	.59±0.02	1.11±0.01	.90±0.01	.51±0.01	4
381.15	7.62±0.01	.47±0.02	0.98±0.01	.72±0.03	.41±0.03	2
382.14	7.62±0.01	.46±0.03	0.93±0.02	.74±0.01	.41±0.01	4
391.13	7.42±0.01	.48±0.02	0.88±0.02	.75±0.01	.33±0.01	2
392.13	7.41±0.01	.43±0.01	0.91±0.01	-	-	2
409.62	7.08±0.01	.49±0.02	0.91±0.02	.70±0.01	-	3
413.63	7.02±0.01	.58±0.02	0.89±0.01	.68±0.01	-	4
414.62	7.00±0.01	.47±0.03	0.87±0.02	.70±0.02	-	3

[†] JD=2446000+...

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