A POSSIBLE LIGHT CURVE OF R CORONAE BOREALIS FOR THE NEAREST FUTURE

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Some 30 stars are included in the group of the R Coronae Borealis (RCB) type variables (Rosenbush 1996). We can follow their history during at least 100 years, and we can definitely say that the manifestations of this type of variability ceased in one of the stars (UV Cas) and appeared in another star (FG Sge). Out this fact we can roughly estimate that the RCB variability phase lasts about 3000 years.

Under such transiency of the RCB phase we can expect that some variability parameters will change. In particular, the light variation periodicity might be initially absent and thereafter appear. From the study of the historical light curve Sterne (1934) established that the moments of light minimum onset are distributed ideally irregularly. Since that study the character of R CrB's variability has changed, and a 4400-day cycle in the sequence of minima has appeared (Rosenbush 1997). The cycle is characterized by high activity in its first half and by lower activity in the second half. The existence of regularity causes that minima occur more likely in September–December (Howarth 1977, Rosenbush 1997). Now the sixth cycle is observed. Parameters of cycles are given in Table 1.

Table 1: Onset and duration of cycles in R Coronae Borealis

Cycle number	Year of the onset	Julian Date of the onset	Duration of cycle, days
I	1933	2427730	5130
II	1948	2432860	4101
III	1960	2436961	4394
IV	1972	2441355	4200
V	1983	2445555	4435
VI	1995	2449990	?
VII	2007-08	-	-

The existence of this periodicity allows us to forecast a light minimum (or the whole light curve) at least until the end of the current cycle (Fig. 1). From the fold of these light curves we may say that minima may occur before JD 2452500 in two intervals: JD 2452100–2452200 (with a probability, which is a ratio of the number of events previously observed at this phase to the number of cycles, of 1/5) and JD 2452400–2452500 (with
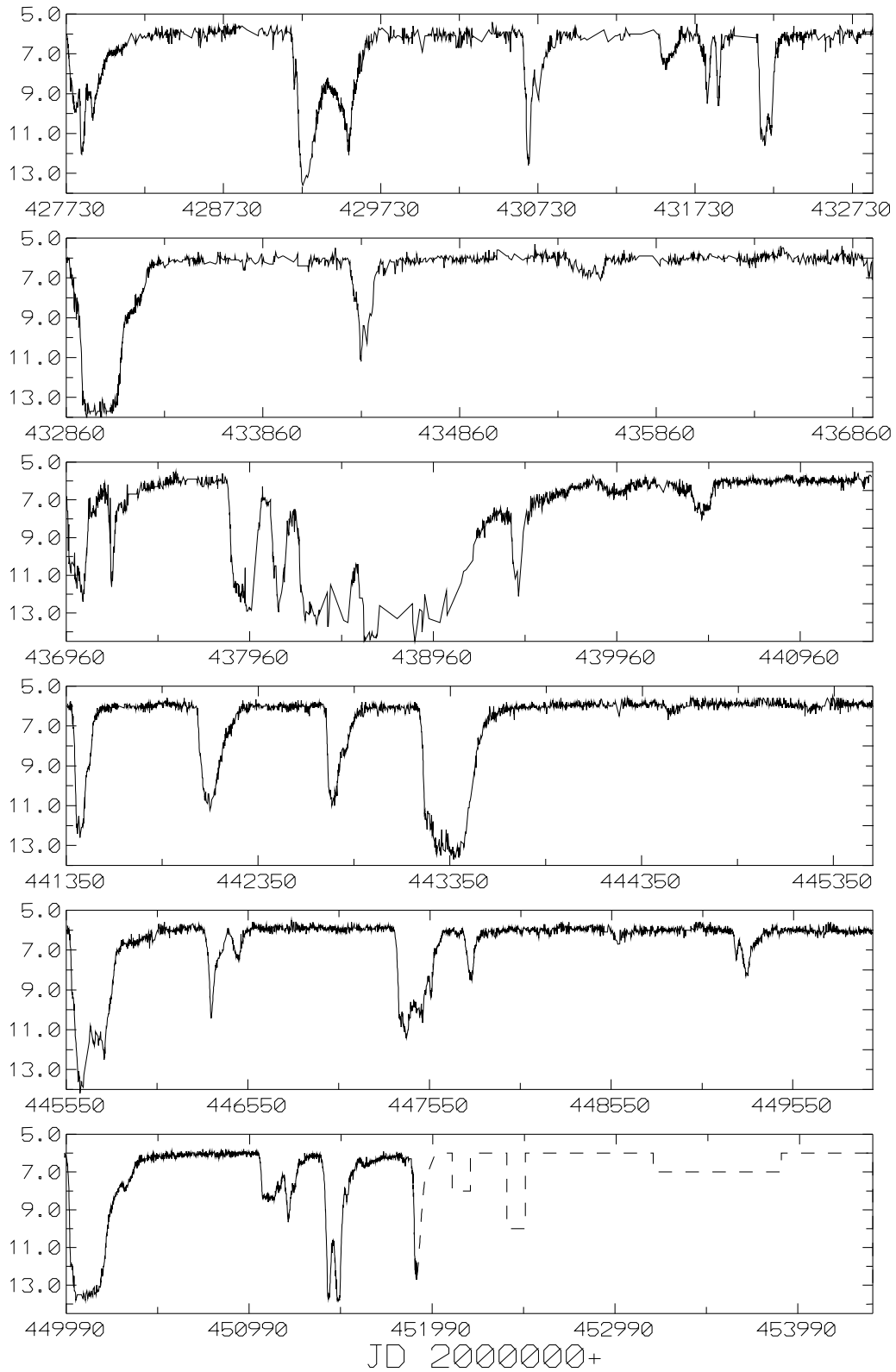
Figure 1. Light curve of R CrB separately for every cycle and normalized to the 4400-day duration in the time scale of 6th cycle according to Table 1, since 1933. Current visual observations of the VSOLJ members are given to JD 2451905

a probability of 2/5). Then a prolonged interval of relative quiescence would start, when only one shallow minimum in the JD 2453200–2453900 period is supposed to be observed. The 6th cycle will finish near JD 2454400 with the onset of the first deep minimum of 7th cycle.

The demonstrated possibility of light curve forecasting allows us to introduce an element of prediction that helps in planning future observations.

References:

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