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The long-term photometric behavior of some luminous supergiant variables

ABSTRACT

The supergiants whose light curves are illustrated here exhibit widely different optical spectra. They are however amongst the most luminous stars known and are generally thought to have evolved from highly massive progenitors. All of these objects have well developed dust shells, presumably the result of copious mass-loss. They also display very marked variability which, in at least some cases, might be attributed to alterations of the mass-loss or to our perception of it. Quasi-periodic changes on timescales of a few hundred to about two thousand days are superimposed on secular trends. These supergiants evidently vary on timescales longer than those for which observations are yet available. The photometry shown in the accomanying illustrations is part of a monitoring program in progress at SAAO.

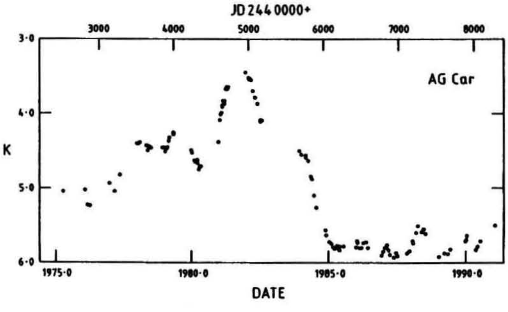

Fig. 1: AG Car. This K light curve shows the effect of the 1981 outburst which Whitelock *et al.* (1983b) attribute to a shell ejection, possibly the result of a relaxation oscillation (e.g. Maeder 1989). Low amplitude quasi-periodic variations on a timescale of a few hundred days are also evident.

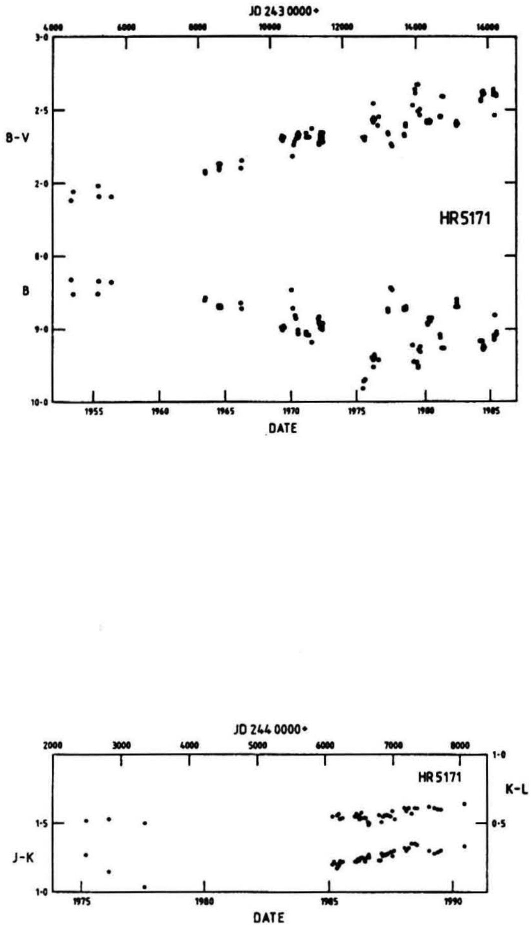

Fig. 2: HR 5171. The optical photometry for this G supergiant covers the 32 year period from 1953 to 1985 (data from Harvey (1972), Dean (1980) and unpublished material) A distinct reddening of the colours accompanies the fading of the blue light. Quasi-periodicity on a timescale of 1000 days is also evident. The near infrared colours covering a shorter time span also show a trend to redder colours.

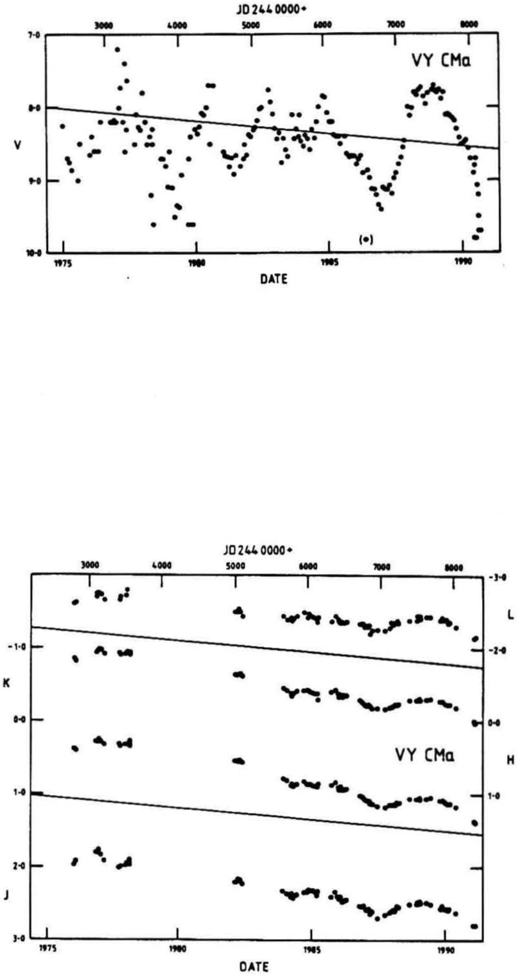

Fig. 3: VY CMa. According to Robinson (1971) VY CMa has been decreasing in brightness since about 1850 at a rate of about 0.03 mag.yr^{-1}. A line of this slope is shown superimposed on the above m_V light curve reconstructed from visual magnitude estimates (Bateson 1974-1990). This trend is however more evident on the infrared (JHKL) light curves for which the amplitude of the 1200 day quasi-periodic variations is less marked.

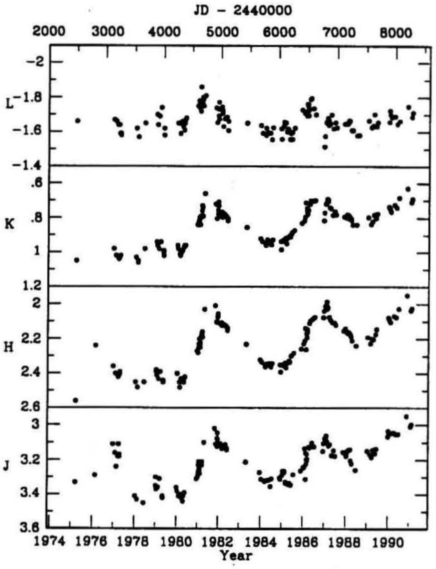

Fig. 4: η Car. The infrared (JHKL) light curves cover the period from 1975 to 1991. They show a gradual brightening at JHK superimposed on quasiperiodic changes on a timescale of about 2000 days. Very little variation is seen at the longest wavelength (L). The data are taken from Whitelock *et al.* (1983a) and unpublished photometry.

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