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TAU Cas: A VARIABLE STAR AFTER ALL?

The bright star Tau Cas (HR 9008=HD 223165; K1 IIIa) has been commonly used as a comparison star for the variable supergiant Rho Cas. It is a controversial choice: the New Catalogue of Suspected Variable Stars lists it as variable with a possible amplitude of 0.3 magnitudes. Some observers (e.g., Leiker & Hoff, 1988) have claimed recent variability, while others (Percy, 1985; Halbedel, 1989) have seen none.

Consequently, this author has continued to use Tau Cas as a comparison star for observations of Rho Cas. However, when the past two observing seasons' BV data has been examined, it became clear that there had been a slight change in its behavior. All observations were obtained with the 0.6-m. telescope of the Corralitos Observatory and two photometric systems, one based on an EMI 9924A tube and the other on an R4457. As comparison star, HR 9010 (K3 IIb; $V=5.510$; $B-V=+1.650$; $U-B=+1.810$; $V-R=+1.290$) was used.

Table 1 lists the magnitudes which have been obtained since Halbedel (1989); Figure 1 shows them graphically. It is clear that there has been a slight brightening in the last two observing seasons, as well as a gradual reddening. The extent of brightening at present is estimated to be 0.05 V magnitudes, which is in agreement with Percy's (1985) contention that if the star varies, it is only by no more than several hundredths of a magnitude.

Is this a real brightening? The astute reader will have noted that two different photometers were used to obtain the data. However, extreme care was taken with the observations of standard stars to insure that the transformations between the two systems were such that consistency of magnitude and color was maintained. Also, despite a large observing program of other stars (both early and late in spectral type), this effect was noted in no other case. Nor is it likely to be a transient atmospheric effect (e.g., Mt. Pinatubo) since it was not found in other data.

One final caution is necessary: the observations of Tau Cas have been made with respect to only one comparison star. It is possible that HR 9010 is the variable. However, that star has no history of variability or suspicions thereof. Therefore, at this point, the variability of Tau Cas must be considered as suggestive until proven by observations made with two comparison stars. At the very least, this observer will in future replace Tau Cas as one of the comparisons for Rho Cas and will observe it as a potential variable in its own right until this question is settled. However, because of the relative stability of Tau Cas in the past, all previously published magnitudes for Rho Cas by this author still stand.

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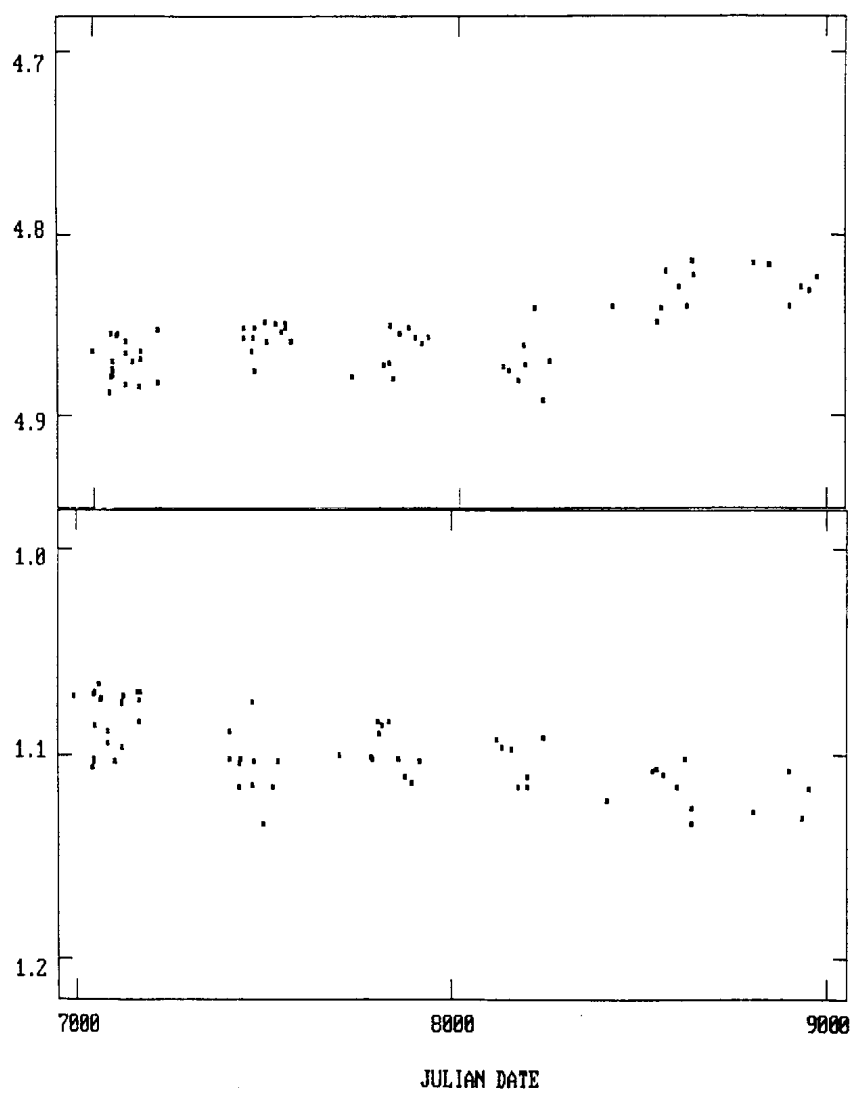


Figure 1. Magnitudes and colors for Tau Cas. The top diagram shows V, the bottom B-V. Julian Date is JD - 2440000.

Table 1

UBVR magnitudes for Tau Cas

Since only one star was used for comparison purposes,
there are no standard errors

Julian Date (2440000+)	V	B-V	U-B	V-R
7835.70139	4.854	+1.084		
7861.60486	4.851	1.102		
7878.64374	4.857	1.111		
7896.61250	4.860	1.114		
7917.59236	4.857	1.103		
8122.81875	4.873	1.093		
8133.83541	4.875	1.097		
8159.78611	4.880	1.098		
8176.69028	4.861	1.116		
8178.72639	4.872	1.116		
8201.68263		1.111		
8204.61111	4.840	1.116		
8228.62917	4.891			
8244.63819	4.870	1.092		
8535.74861	4.848	1.108		
8546.70833	4.840	1.107		
8562.69444	4.820	1.110		
8597.67292	4.829	1.116		
8620.59583	4.839	1.102		
8636.59028	4.814	1.126		
8637.59236	4.822	1.134		
8800.93056	4.816	1.128		
8842.89306	4.817			
8898.78958	4.839	1.108	+1.001	+0.995
8932.77292	4.828	1.131	1.049	0.965
8951.70903	4.831	1.117	1.029	0.999
8973.65694	4.823			

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References:

- Halbedel, E. M., 1989, *IBVS*, No. 3394
Leiker, P. S. & Hoff, D. B., 1988, *IBVS*, No. 3176
Percy, J. R., 1985, *Jour. AAVSO*, **14**, 52