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UBVRI OBSERVATIONS OF V350 Cep IN THE PERIOD 1998-2001

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V350 Cep is a pre-main sequence star located in the region of active star formation NGC 7129. The long-term light curve of V350 Cep resembles the FUOR type stars (Semkov et al. 1999) but its spectrum is similar to the Classical T Tauri stars (Magakian et al. 1999). FUOR outburst is a very rare phenomenon and only three stars classified as FUORs (FU Ori, V 1515 Cyg and V 1057 Cyg) have well-studied light curves. Therefore, the photometric observations of FUORs and FUOR like stars are important for theoretical models fitting.

The present photometric data are a continuation of our investigation of V350 Cep (Semkov 1993; Semkov 1996; Semkov et al. 1999). Observations were made with tree telescopes: the 2-m RCC and 50/70/172 cm Schmidt telescopes of the National Astronomical Observatory Rozhen (Bulgaria) and 1.3-m RC telescope of the Skinakas Observatory[1] of the Institute of Astronomy, University of Crete (Greece).

Observations with 2-m RCC and 1.3-m telescopes were made with Photometrics CCD cameras 1024×1024 pixels. The size of the pixel is 24 μm and scale $0''.32$/pixel for 2-m RCC telescope and $0''.5$/pixel for 1.3-m RC telescope. All frames are bias subtracted and flat fielded. Observations with 50/70 cm Schmidt telescope were made with SBIG ST-8 CCD camera 1530×1020 pixels. The size of the pixel is 9 μm and scale $1''.1$/pixel. CCD frames obtained with the 50/70 cm Schmidt telescope were dark subtracted and flat fielded. All frames ware taken through a standard Johnson-Cousins set of filters. Aperture photometry was performed using IRAF/DAOPHOT[2] routines.

Pogosyants (1991) calibrated a sequence of comparison stars in the field of V 350 Cep. This sequence is not suitable for CCD photometric observations because the stars are calibrated only in BV bands using photographic observations. In order to facilitate transformation from instrumental measurement to the standard system nine stars from Pogosyants's sequence has been calibrated in UBVRI bands. Calibration was made during ten clear nights, five with 2-m RCC telescope and five with 1.3-m RC telescope. Standard stars from Landolt (1992) were used as reference. Table 1 contains the photometric data for UBVRI comparison sequence. The corresponding mean errors of the mean and number of observations for each star are listed also. The finding chart of the comparison sequence is present in Fig. 1. The chart is a reproduction from V frame obtained with

[1]Skinakas Observatory is a collaborate project of the University of Crete, the Foundation for Research and Technology - Hellas, and the Max-Planck-Institut für Extraterrestrishe Physik.

[2]IRAF is distributed by the NOAO, operated by the Association of Universities for Research in Astronomy Inc., under contract with the NSF.

the 1.3-m RC telescope on July 15, 2001. North is at the top and east is to the left. The original designations of stars given by Pogosyants (1991) are preserved.

The results from our CCD photometric observations are given in Table 2. The table contains the Julian Date, the V magnitude, $U-B$, $B-V$, $V-R$ and $V-I$ indices and the used telescope. The mean value of instrumental errors are $0\overset{m}{.}015$(I) and $0\overset{m}{.}019$(V) for observations made with Photometrics CCD cameras and $0\overset{m}{.}022$(I) and $0\overset{m}{.}029$(V) for observations made with ST-8 CCD camera. Fig. 2 shows the long-term B/pg- and V-band light curves of V350 Cep from all available photometric observations. In the figure open triangles denote our CCD photometric presented in this paper. Other symbols are as in Semkov et al. (1999). As seen from Fig. 2 the magnitude of V350 Cep during the period of observations is still near to the maximum value. Therefore, the star has been keeping its maximum brightness in the pass 25 years. The observed amplitude in V band is only $0\overset{m}{.}64$, a value typical for Weak line T Tauri stars.

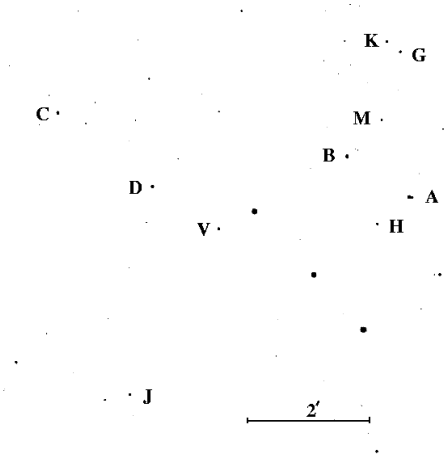

Figure 1. A finding chart of the comparison sequence in the field of V350 Cep

Table 1. Photometric data for UBVRI comparison sequence.

Star	V	σ_V	I	σ_I	$V-R$	σ_{V-R}	$B-V$	σ_{B-V}	$U-B$	σ_{U-B}	n
A	13.946	.031	13.065	.045	0.646	.051	0.770	.033	0.225	.062	7
B	14.568	.073	12.963	.066	0.815	.081	1.280	.105	0.410	.283	10
C	14.947	.054	13.935	.052	0.569	.078	0.924	.058	0.380	.084	10
D	15.332	.041	14.384	.066	0.503	.085	0.786	.050	0.205	.098	10
G	16.057	.033	14.628	.053	0.775	.091	1.202	.060	0.104	.152	6
H	16.317	.056	14.885	.068	0.746	.070	1.245	.065			10
J	16.250	.067	14.079	.050	1.004	.058	1.530	.084			9
K	16.938	.036	15.240	.061	0.857	.076	1.306	.039			6
M	16.623	.074	14.257	.068	1.193	.091	2.015	.097			10

Table 2. Photometric observations of V350 Cep in the period December 1998 - September 2001

J.D.(24...)	V	$U-B$	$B-V$	$V-R$	$V-I$	Tel.
51166.212	16.023	−0.16	1.030	0.926	2.011	2m
51225.608	16.047	−0.40	0.989	0.853	1.960	2m
51226.240	16.057	−0.22	1.008	0.919	1.948	2m
51226.593	15.946	−0.35	0.968	0.843	1.944	2m
51230.605	15.903	–	0.947	0.772	1.868	2m
51351.508	15.942	–	–	–	–	1.3m
51583.664	16.24	–	–	–	–	Scm
51611.609	16.461	–	–	–	2.183	2m
51709.524	16.287	−0.55	1.074	0.942	2.105	1.3m
51710.433	16.288	–	–	–	2.088	1.3m
51710.514	16.271	–	1.030	–	2.078	1.3m
51711.452	16.365	–	–	–	2.140	1.3m
51711.554	16.362	–	–	–	2.143	1.3m
51712.426	16.372	–	–	–	2.127	1.3m
51712.553	16.344	–	1.110	–	2.134	1.3m
51716.387	16.313	–	–	–	2.114	1.3m
51716.542	16.290	–	1.056	0.958	2.105	1.3m
51717.383	16.346	–	–	–	2.122	1.3m
51718.383	16.304	–	1.089	0.957	2.114	1.3m
51718.382	16.342	–	1.136	–	2.136	1.3m
51719.542	16.363	–	–	0.959	2.145	1.3m
51720.460	16.161	−0.20	1.085	0.934	2.022	1.3m
51736.547	16.168	−0.46	1.069	0.917	2.043	1.3m
51763.592	16.165	–	–	0.927	2.045	1.3m
51765.278	16.249	−0.25	1.093	0.961	2.111	1.3m
51765.599	16.272	–	–	–	–	1.3m
51766.274	16.261	−0.51	1.092	0.930	2.089	1.3m
51767.257	16.266	–	–	–	2.110	1.3m
51845.363	16.24	–	–	0.87	2.05	Scm
51847.310	16.28	–	1.08	0.90	2.15	Scm
51847.349	16.34	–	–	0.96	2.16	Scm
51903.322	16.11	–	1.08	0.86	2.01	Scm
52057.471	16.24	–	–	0.90	2.13	Scm
52095.530	16.264	−0.51	1.128	0.949	2.086	1.3m
52096.287	16.158	–	–	–	2.060	1.3m
52097.283	16.152	–	–	–	2.026	1.3m
52099.281	16.017	–	–	–	1.940	1.3m
52106.524	16.178	–	–	–	2.045	1.3m
52128.499	16.076	–	–	–	1.989	1.3m
52153.581	16.034	–	–	–	1.991	1.3m
52154.559	15.931	–	1.032	–	1.947	1.3m
52155.556	16.094	−0.27	0.988	–	2.011	1.3m
52156.559	15.931	−0.43	0.962	–	1.947	1.3m
52157.568	15.838	–	–	–	1.897	1.3m

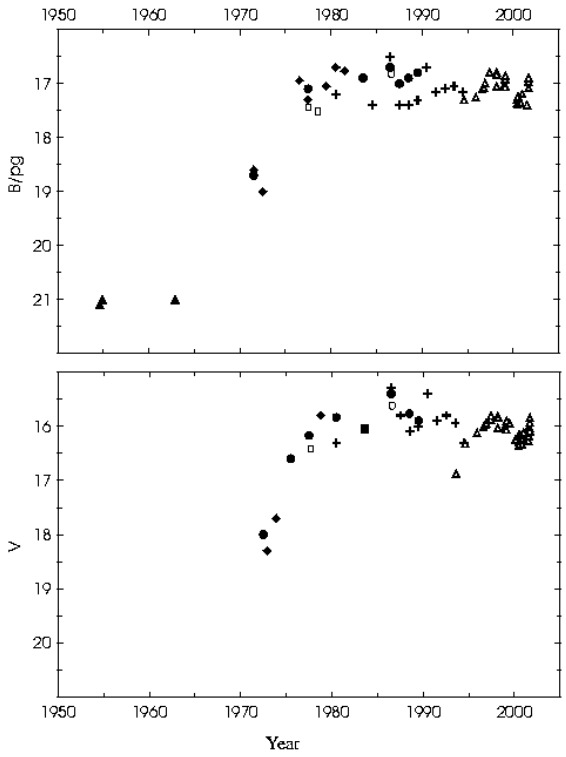

Figure 2. B/pg- and V-band light curves of V350 Cep

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