UBVRI IMAGING PHOTOMETRY OF THE η CARINAE REGION

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RESUMEN

Se presentan resultados preliminares de un estudio fotométrico en las bandas *UBVRI* de los cúmulos Tr 14, Tr 15 y Tr 16 en la Nebulosa de Carina basado en imágenes CCD.

ABSTRACT

Preliminary results of a CCD photometric study in the *UBVRI* bands of the clusters Tr 14, Tr 15 and Tr 16 regions are presented.

Key words: **OPEN CLUSTERS AND ASSOCIATIONS — STARS: EVOLUTION**

CCD-Images of the η Carinae Nebula covering an area of some 30 × 60 arcmin are presented. The observations were made in March 1993 with a TEKTRONIX 1024 × 1024, blue sensitive CCD on the 1-m Swope Telescope of Las Campanas Observatory in Chile. The images were sampled to 0.68 arcsec per pixel. During the observing run, the average seeing was of the order of 1.3 arcsec. Each region was observed in each of the $UBV(RI)_{KC}$ filters with three different exposure times in order to increase the dynamic range of the photometry and to decrease the noise. The photometry of the northern part of NGC 3372, covering the clusters Trumpler 14, Trumpler 15 and Trumpler 16, was obtained using DAOPHOT with point-spread function fitting and ALLSTAR routines in order to secure good precision even in crowded and variable nebular emission regions. A few thousand stars were measured in each colour. Although climatic conditions were in general not photometric, each individual frame was calibrated by using a number of isolated stars with published photoelectric photometry (Feinstein, Marraco, & Muzzio 1973; Feinstein, FitzGerald, & Moffat 1980) as standards. The accuracy for the great majority of the stars was better than 0.06 mag in all filters and comparison of the results for common stars in different frames in overlapping regions indicate an average scatter of the same magnitude.

Our photometric survey has a dynamical range of more than 8 mag and includes stars to a limit of $m = 18 - 19$ in B, V, R and I and $m = 17 - 18$ in U. Due to high obscuration by molecular clouds associated with the Carina Nebula, relatively few background stars are detected and only at the reddest wavelengths. The resulting colour-colour and magnitude-colour diagrams for the clusters Tr 15, Tr 14 and Tr 16 are presented in Figures 1 to 3. A well defined main sequence down to approximately 1.0 $M_\odot$ (for d = 2.5 kpc) is observed. In accordance with previous results, the extinction is found to be extremely variable from star to star, with a larger scatter in Tr 14 and Tr 16.
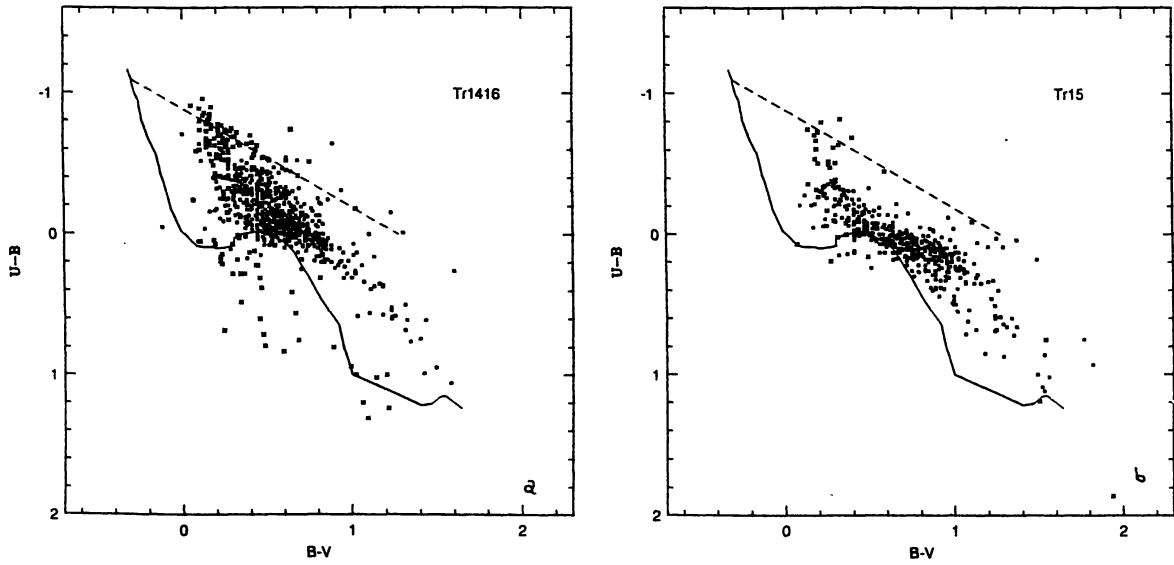
Fig. 1. $U - B$ vs. $B - V$ diagrams for the region containing Tr 14 and Tr 16 (a), and Tr 15 (b). Squares are data from the present work and crosses are photoelectric photometry data by (Feinstein et al. 1973, 1980). The continuous line represents the main sequence and the broken line the reddening vector.
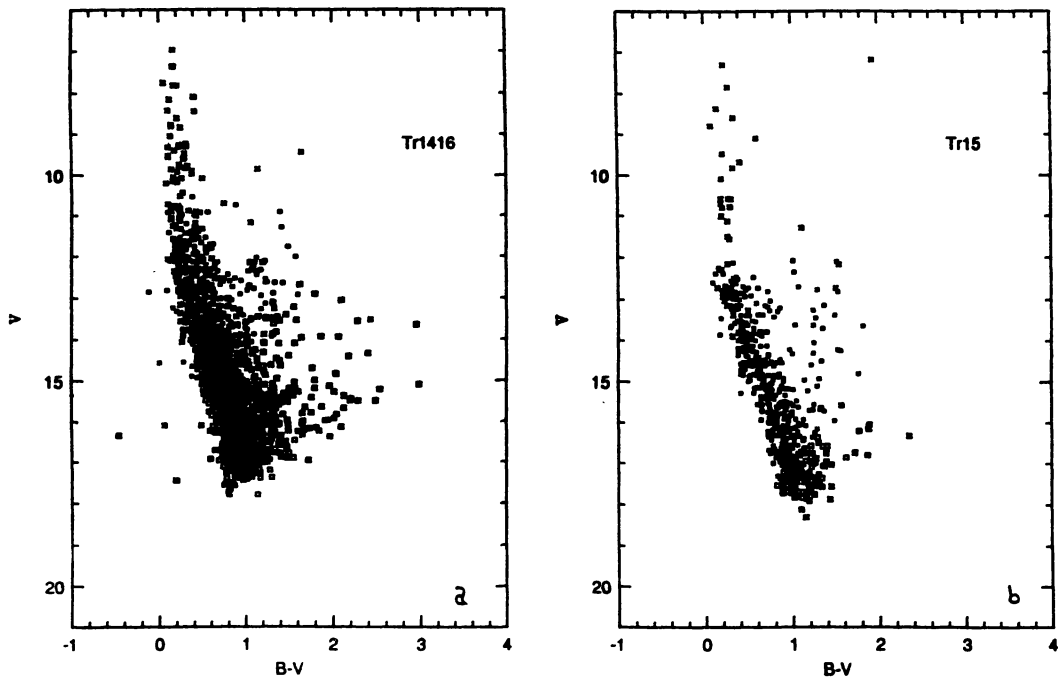

Fig. 2. V vs. $B - V$ diagrams for the region containing Tr 14 and Tr 16 (a), and Tr 15 (b). Filled squares are data of stars with UBV colours, open squares are data of stars with BV data only and crosses are photoelectric photometry data by (Feinstein et al. 1973, 1980).
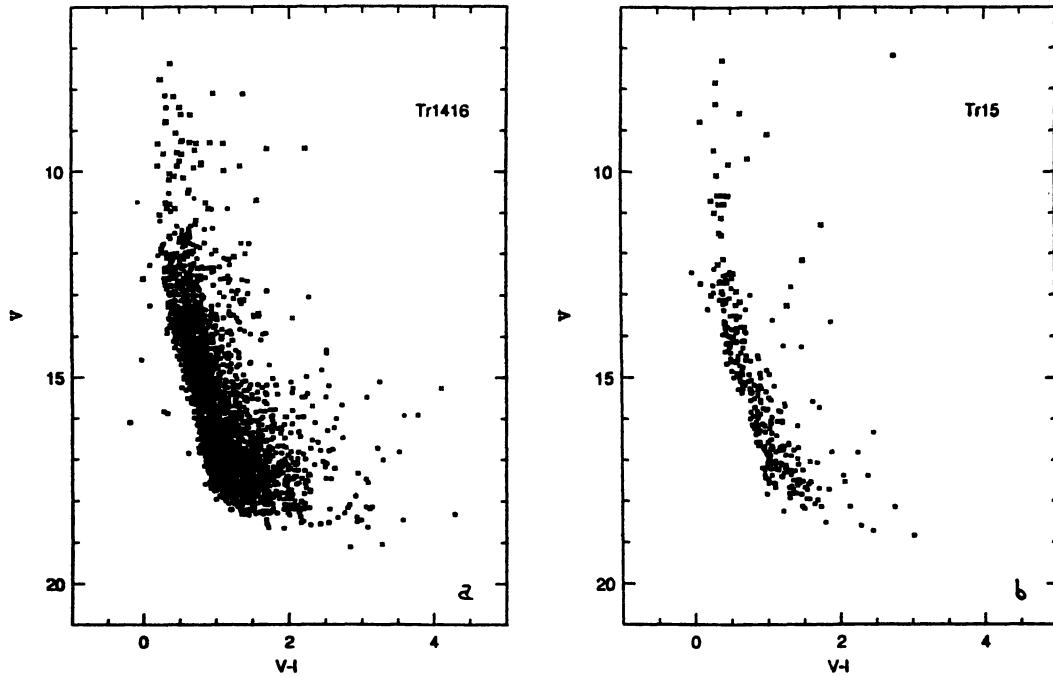
Fig. 3. V vs. $V - I$ diagrams for the region containing Tr 14 and Tr 16 (a), and Tr 15 (b). Squares are data from the present work and crosses are photoelectric photometry data by (Feinstein et al. 1973, 1980).

Analysis in progress, done together with near-infrared results by Roth et al. (1995), include: 1) Determination of average and individual extinction laws for the stars of the clusters, 2) extinction map of the region, 3) reliable HR diagrams for each cluster, 4) comparison with evolutionary (pre- and post-main sequence) models, 5) tackling the question of possible age differences among these clusters, and 6) luminosity function determinations. The detailed results will be published elsewhere.

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