Can we search for WR Stars with ST-6?

Abstract. He II 468nm and continuum 576nm narrow band photometry of three OB associations in the M33 galaxy are presented. Known WR stars are well separated from the other members of the associations in the colour-magnitude diagram. Based on that, a new WR candidate is suggested.

1. Introduction

During October 1993 our group has performed a study of some parameters of OB association in nearby galaxies using intermediate-band photometry. We obtain CCD images of three OB associations in M33 containing WR stars using the SBIG Model ST-6 Imaging Camera. This camera was kindly granted to the Bulgarian astronomers in the framework of the EAS/EFC support of astronomy in the Central/Eastern Europe countries.

The WR stars which are easily detectable at great distances allow us to study the processes of massive star formation in nearby galaxies (Massey & Armandroff 1991). To make correct conclusions it is necessary to know the completeness of the sample which we work with. It is accepted that almost all stars in 2.5 kpc vicinity of the Sun and in the Magellanic Clouds are known (Testor & Schild 1993). But it is not the case for the other nearby galaxies. According to photographic observations of M33 about one hundred WR stars are found (Massey et al. 1987). However CCD observations show that this sample is far from being complete (Armandroff & Massey 1985). This kind of observation is quite time consuming which makes such observations inefficient for work on large telescopes. The aim of this paper is to study the possibilities of searching for WR stars in M33 with intermediate-band filters established with ST-6 on the 2m Ritchey-Chrétien-Coude (2m RCC) reflector of the Bulgarian National Astronomical Observatory (BNAO) at Rozhen, Rodopa mountains.

2. Observations and Data Reduction

The observations were performed on the 2m RCC of BNAO on 17th and 18th October 1993 with ST-6 and two interference filters centred on He II 468.6nm (FWHM = 18.7nm) and continuum at 575nm (FWHM = 22.4nm). The observations include OB 127, OB 17 and OB 59 (Humphreys & Sandage 1980). After each image was taken the corrections were performed for CCD bias, dark current and flat-field effects. For each object all the images obtained in each filter were co-added before analysis. The image processing was performed using the ESO-MIDAS software package. The final resolution of the summed images obtained by PSF fitting procedure of DAOPHOT was 2 arcsec.

3. Results and Discussion

The mag468/(mag468-mag575) diagram for OB 127 and OB 17 is shown in Fig. 1. There is clear separation between the two known WR stars (WR8 and WR9, Massey et al. 1987) and the rest of the association members on the diagram. The stars WR8 and WR9 are marked with filled circles. The asterisk in Fig. 1 refers to the star marked in Figs. 2a and 2b. From this diagram it can be seen that (with the filters used) the segregation of the WR stars in the sample of blue objects is possible. However, the observations in only two filters do not give a full solution of the problem of the precise spectral classes and do not segregate WR stars from the other He II 4686 emission objects. On the

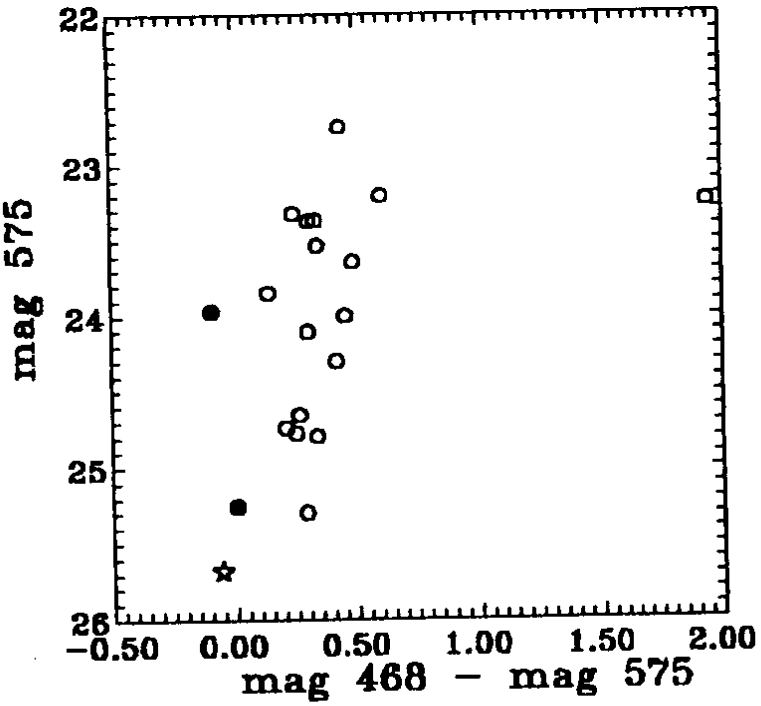

Figure 1. The diagram mag468/(mag468-mag575) for OB 127 and OB 17. The two known WR stars are marked with filled circles and the new WR candidate with an asterisk.

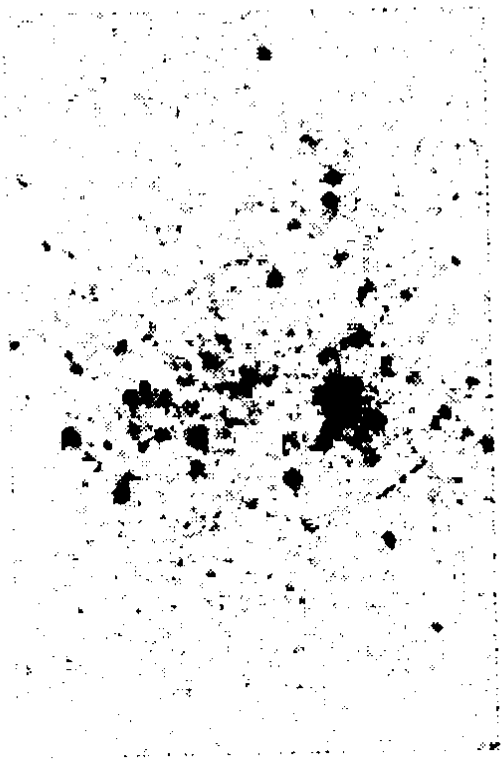

Figure 2a. The image in filter 468.6nm. North is up, east is left.

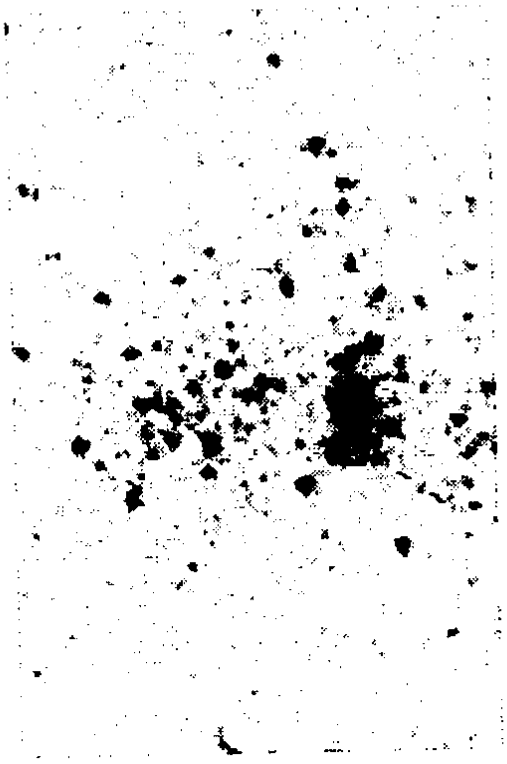

Figure 2b. The image in filter 575 nm.

the other hand the use of more and narrower filters does not give a unique solution either. Such observations always need spectral confirmation.

In Figs. 2a, b the images obtained for OB 127 are shown. In Fig. 1 the object marked comes in to the 'WR stars area'. This star is not reported by Massey et al. (1987) as a possible WR star. In the Humphreys & Sandage (1980) study there are no estimates of the B and V magnitudes either. On the 6 UBV plates obtained on the 2m RCC at BNAO (Kunchev & Nikolov, 1986), we have made eye estimations giving V = 20.3 mag, B = 19.8 mag and U-B = 0. On all plates the stellar morphology of the object can be clearly seen.

We consider that this star is a possible WR candidate, but spectral confirmation is needed.

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