

Investigation of the stellar content in the western part of the Carina nebula

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We obtained deep $UBVR_I$ $H\alpha$ photometric data of the field situated to the west of the main Carina nebula and centered on WR-22. Medium-resolution optical spectroscopy of a subsample of X-ray selected objects along with archival data sets from $Chandra$, $XMM-Newton$ and 2MASS surveys were used for the present study. Different sets of color-color and color-magnitude diagrams are used to determine reddening for the region and to identify young stellar objects (YSOs) and estimate their age and mass. Our spectroscopic results indicate that the majority of the X-ray sources are late spectral type stars. The region shows a large amount of differential reddening with minimum and maximum values of $E(B-V)$ as 0.25 and 1.1 mag, respectively. Our analysis reveals that the total-to-selective absorption ratio R_{V} is $\sim 3.7 \pm 0.1$, suggesting an abnormal grain size in the observed region. We identified 467 YSOs and studied their characteristics. The ages and masses of the 241 optically identified YSOs range from ~ 0.1 to 10 Myr and ~ 0.3 to $4.8 M_{\odot}$, respectively. However, the majority of them are younger than 1 Myr and have masses below $2 M_{\odot}$. The high mass star WR 22 does not seem to have contributed to the formation of YSOs in the CrW region. The initial mass function slope, Γ , in this region is found to be -1.13 ± 0.20 in the mass range of $0.5 < M/M_{\odot} < 4.8$. The K -band luminosity function slope (α) is also estimated as 0.31 ± 0.01 . We also performed minimum spanning tree analysis of the YSOs in this region, which reveals that there are at least ten YSO cores associated with the molecular cloud, and that leads to an average core radius of 0.43 pc and a median branch length of 0.28 pc.

Reference: 23 pages, 19 figures, 4 tables, Accepted for publication in Astronomy & Astrophysics

Status: Manuscript has been accepted

Weblink: <http://arxiv.org/abs/1406.0994>

Comments:

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