

OB Associations in IC1613

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INTRODUCTION

- We have developed our own code to automatically search for OB associations, based on the Path Linkage Criterion (Battinelli 1991).
- We have used it to find the OB associations of IC1613, and to study its young massive stellar population.
- IC1613 is a Magellanic Irregular of the Local Group
- Nearby, no crowding and low foreground reddening ($EBV=0.02$ and $m-M=24.27$ Lee et al. 1993) \rightarrow ideal to study resolved stellar populations.
- On-going star formation, most prominent at the NE lobe where young blue massive stars have blown spectacular bubbles.

In this work we present a summary of our work on IC1613: method, resulting associations and age distribution. This work will be published momentarily in García et al. (2008).

THE PARAMETERS OF THE CODE

- Before running the code it is necessary to decide the value of 2 parameters:

 - D_s : the distance between 2 stars to be considered to belong to the same association. D_s is set to the value that maximizes the number of associations found (see Figure 2).
 - N_{min} : the minimum number of elements of an association. We use 3, and then we confirm the association by examining its CMD.

THE MAKING OF

- The catalog of OB associations is produced in three steps:

 - Make the input list of OB stars.
 - Decide the parameters to run the friends-of-friends algorithm, and make the catalog of associations.
 - The color-magnitude diagram (CMD) of the association is examined to check that the asterism has actually a physical origin. High resolution images were also examined to unveil blended or impostor members (f.i. background galaxies).

- The catalog of OB stars was made out of our deep photometric and astrometric catalog of IC1613:
 - 2.5m Isaac Newton Telescope
 - WFC, $FOV=34' \times 34'$, $0.33''/px$
 - UBVRI down to $V < 26$
- The candidate OB stars were chosen from their photometric colors out of the targets with the smallest photometric errors.
 - $err-U, err-B, err_V < 0.05$
 - $-2.0 < Q < -0.4$ where Q is the reddening free parameter $Q = (U-B) - 0.72(B-V)$
- The selected stars are expected to have O- or B-types.
- The success of the photometric target selection criterion is shown in Figure 1, where we compare it with the spectral types derived by Bresolin et al. (2007).

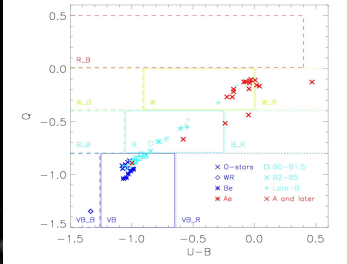


FIGURE 1. Photometric search criteria for blue massive stars. Horizontal bands correspond to 'Very Blue', 'Blue', 'White' and 'Red' classes. Since Q univocally increases towards later spectral type up to -0.4 (corresponding to late B-stars), we expect to find OB stars in VB and B strips. We have included the spectral types derived for a sample of stars in IC1613 by Bresolin et al. 2007. They confirm our selection criteria.

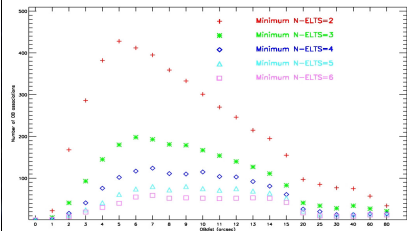


FIGURE 2. Number of associations found as a function of D_s . Different colors indicate different values of N_{min} .

OB ASSOCIATION AGES

- To check that the OB associations are true stellar populations, we studied their CMD and compared them to the theoretical isochrones of Maeder & Meynet (1994).
- In the process we determined the ages of the associations, shown in Figure 3.
- Some associations display an age dispersion. In Figure 3 we include the minimum (squares) and maximum (circles) of the age interval.
- The highest concentration of young OB associations is found in the bubble region.
- Very young associations are located on the rims of the bubbles, as previously found by Lozinskaya et al. (2002).
- Surprisingly, very young associations are found on the outer and seemingly inactive edges of the galaxy.

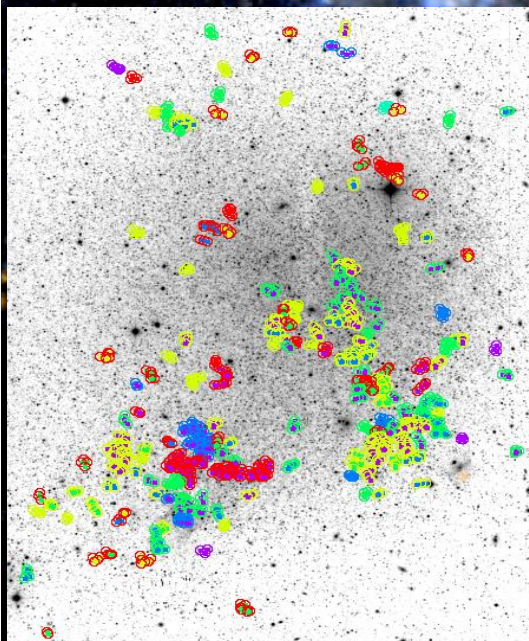


FIGURE 3. Derived ages for the OB associations found in this work. Color-code: $\log \text{age}[10^6 \text{yr}] = 6.5, 6.6, 6.7, 6.8, 6.9, 7.0, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7$

THE OB ASSOCIATIONS OF IC1613

The OB associations found in this work are outlined in red.



CONCLUSIONS

- We have found a total of 168 associations in IC1613, by running a friends-of-friends algorithm on a deep photometric catalog.
- We have used $N_{min}=3$, $D_s=6''$ (Borissova et al. 2004 used $6.6''$)
- The ages of associations range from 6.5 to 7.7 in logarithm, and the youngest associations concentrate around the bubble area.
- Most associations have radius smaller than $10''$, with a peak at $3''$ ($1'' \sim 3.5 \text{pc}$). Mean diameter is $\sim 11''$ (or 33pc) (Borissova et al. 2004 found a mean diameter of 63pc)

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