Massive Stars Near and Far
Proceedings IAU Symposium No. 361, 2024
J. Mackey, J. S. Vink, & N. St-Louis, eds.
doi:10.1017/S1743921322002368

Alicante Survey of Massive Stars in H II regions (A-SMASHER)

A. Marco[1], I. Negueruela[2], D. de la Fuente[1,5], L. R. Patrick[2], A. Herrero[3,4] and S. S. Eikenberry[5]

[1]Departamento de Física, Ingeniería de Sistemas y Teoría de la Señal, EPS, Universidad de Alicante, Carretera de San Vicente s/n, E03690, San Vicente del Raspeig, Spain
email: amparo.marco@ua.es

[2]Departamento de Física Aplicada, Facultad de Ciencias, Universidad de Alicante, Carretera de San Vicente s/n, E03690, San Vicente del Raspeig, Spain

[3]Instituto de Astrofísica de Canarias, Vía Láctea s/n, E38200, La Laguna, Tenerife, Spain

[4]Departamento de Astrofísica, Universidad de la Laguna, Avenida Astrofísico Francisco Sánchez, s/n, Facultad de Ciencias, E38200, La Laguna, Tenerife, Spain

[5]CREOL, The College of Optics and Photonics, University of Central Florida, USA

Abstract. The aim of this survey is the homogeneous characterization of a large sample of H II regions with active star formation in order to detect observational trends supporting the two main models of massive star formation.

Keywords. stars: formation, stars: massive, stars: fundamental parameters, – open clusters and associations – Hertzsprung-Russell and colour-magnitude diagrams

1. Introduction

Two main theories exist to explain the formation of massive stars: (a) **Monolithic core accretion**, which is a scaled-up version of classical low-mass formation theories, where very high opacities allow infalling material to overcome the radiation pressure (Krumholz et al. 2009) and (b) **Competitive accretion** where massive stars are formed in cluster cores, benefiting from the gravitational potential of the whole cluster to accrete more material (Bonnell & Bate 2006).

2. Methodology

The sample was carefully selected from existing radio catalogues and consists of targets that have not been previously studied and contain near infrared point sources consistent with a massive star. We obtained deep near infrared photometry of one hundred such H II regions with WHT/LIRIS and we have carefully analyzed the corresponding color-magnitude diagrams.

3. Results

An initial separation has been made between regions containing obvious clusters and those that seem to include single sources (about 25%). For this latter subsample, we have already obtained intermediate-resolution spectroscopy with GTC/EMIR, while the clusters will be observed with multi-object configurations. Examples of the preliminary

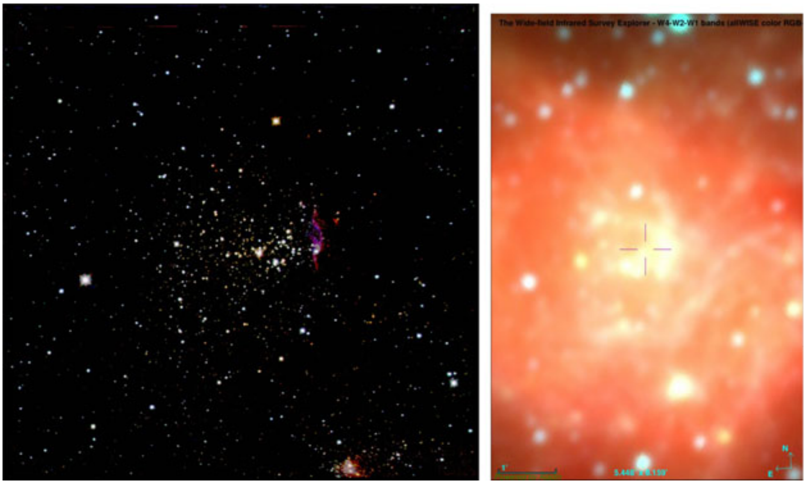

Figure 1. *Left*: J, H and K_S composite image (WHT/LIRIS) for a large cluster. *Right*: WISE image for the large cluster.

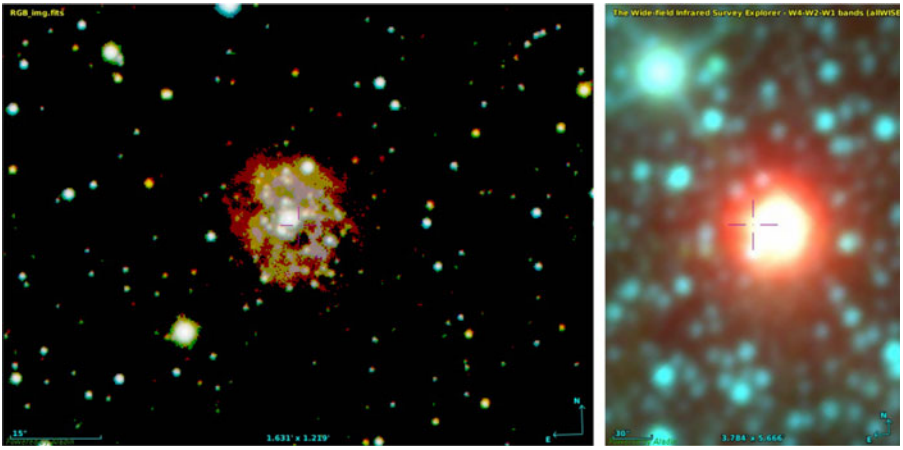

Figure 2. *Left*: J, H and K_S composite image (WHT/LIRIS) for a small cluster. *Right*: WISE image for the small cluster.

study of four H II regions with single sources can be seen in de la Fuente et al. 2022 in these proceedings.

4. Conclusions

The statistical study of the properties of the populations contained within the H II regions in relation to the physical characteristics of the region itself and Galactic environment will provide novel insights into the conditions leading to (relatively) isolated or clustered massive star formation. Below, we show two examples corresponding to two very different H II regions, one containing a large population of massive stars (Figure 1) and the other, only a few members (Figure 2). There are two images for each object: a composite J, H, K_S image (WHT/LIRIS), where we can see the stars inside the H II region (left), and the image from WISE enhancing the content of gas (right).

https://doi.org/10.1017/S1743921322002368 Published online by Cambridge University Press

Acknowledgements

This research is partially supported by the Spanish Government under grants PGC2018-093741-B-C21/C22 (MICIU/AEI/FEDER, UE), and by the Generalitat Valenciana under grant PROMETEO/2019/041.

Supplementary material

To view supplementary material for this article, please visit http://dx.doi.org/10.1017/S1743921322002368.

References

Krumholz et al. 2009, *Science*, 323, 754
Bonnell & Bate, 2006, *MNRAS*, 370, 488
de la Fuente et al. 2022, Proceedings IAU Symposium No. 361, 2022