Probing the Dragonfish star-forming complex: the ionizing population of the young massive cluster Mercer 30

D. de la Fuente (1), F. Najarro (1), J. Borissova (2,3), S. Ramirez Alegria (2,3), M. M. Hanson (4), C. Trombley (5), D. F. Figer (5), B. Davies (6), M. Garcia (1), R. Kurtev (2,3), M. A. Urbaneja (7), L. C. Smith (8), P. W. Lucas (8), A. Herrero (9,10)

1 - Centro de Astrobiologia (CSIC/INTA); 2 - Universidad de Valparaiso; 3 - Millennium Institute of Astrophysics (MAS); 4 - University of Cincinnati; 5 - Center for Detectors, Rochester Institute of Technology; 6 - Astrophysics Research Institute, Liverpool John Moores University; 7 - Institute for Astro- and Particle Physics, University of Innsbruck; 8 - Centre for Astrophysics Research, University of Hertfordshire; 9 - Instituto de Astrofisica de Canarias; 10 - Universidad de La Laguna

The Dragonfish Nebula has been recently claimed to be powered by a superluminous but elusive OB association. Instead, systematic searches in near-infrared photometric surveys have found many other cluster candidates on this sky region. Among these, the first confirmed young massive cluster was Mercer 30, where Wolf-Rayet stars were found. We perform a new characterization of Mercer 30 with unprecedented accuracy, combining NICMOS/HST and VVV photometric data with multi-epoch ISAAC/VLT H- and K-band spectra. Stellar parameters for most of spectroscopically observed cluster members are found through precise non-LTE atmosphere modeling with the CMFGEN code. Our spectrophotometric study for this cluster yields a new, revised distance of d = (12.4 +- 1.7) kpc and a total of Q = 6.70 x 10^50 Lyman ionizing photons. A cluster age of (4.0 +- 0.8) Myr is found through isochrone fitting, and a total mass of (1.6 +- 0.6) x 10^4 Msol is estimated thanks to our extensive knowledge of the post-main-sequence population. As a consequence, membership of Mercer 30 to the Dragonfish star-forming complex is confirmed, allowing us to use this cluster as a probe for the whole complex, which turns out to be extremely large (400 pc across) and located at the outer edge of the Sagittarius-Carina spiral arm (11 kpc from the Galactic Center). The Dragonfish complex hosts 19 young clusters or cluster candidates (including Mercer 30 and a new candidate presented in this work) and an estimated minimum of 9 field Wolf-Rayet stars. The sum of all these contributions accounts for, at least, 73% of the Dragonfish Nebula ionization and leaves little or no room for the alleged superluminous OB association; alternative explanations are discussed.

Reference: A&A, accepted
Status: Manuscript has been accepted

Weblink: http://arxiv.org/abs/1602.02503

Comments:

Email: delafuente@cab.inta-csic.es