A new sample of red supergiants in the Inner Galaxy

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Abstract. We carried out a pivot experiment to select distant luminous late-type stars on the basis on their 2MASS and GLIMPSE photometry. Low-resolution infrared spectra enabled us to measure the equivalent widths (EWs) of their CO band-heads at 2.293 μm, and to confirm an extraordinarily high detection rate of red supergiants (RSGs), .i.e. 61% (Messineo et al. (2016)).

Keywords. Galaxy: disk, stars: late-type, supergiants

1. Overview of our survey

RSGs are an important probe of Galaxy formation and evolution. Star formation is coupled with the Galactic potential and occurs in preferential locations, such as the two end sides of the Bar where a large number of RSGs have been detected. These are bright over-densities of RSGs in clusters, easily detectable in obscured regions. Inspired by these findings, we tried to detect individual RSGs, independently of clusters.

About hundred targets were selected from the 2MASS and GLIMPSE North I surveys, by following the prescriptions of Messineo et al. (2012) with $Q1$ and $Q2$ extinction-free colors. We selected stars with $0.1 < Q1 < 0.5$ mag and $0.5 < Q2 < 1.5$ mag. This range includes about 46% of known RSGs (Messineo et al. (2012)). Low-resolution HK spectra were collected with the ESO-NTT 4m-telescope equipped with the SofI camera. The EW of the CO band-head at 2.293 μm is a good indicator of temperature. Giants and supergiants follow two distinct relations, and late-type RSGs have broad EWs. Contaminating AGB Miras can be classified by the shape of their continuum that is highly curved. The spectroscopic analysis has resulted in an extraordinarily large number of new RSGs, obtaining a detection rate of > 60%.

Distances were assigned with surrounding clump stars (primary indicators of distance) by deriving a relation between reddening and distance for a give line-of-sight. Estimated distances vary from 3.6 to 8.6 kpc. Luminosities confirm that sample is mostly made of RSGs with initial masses from 12 to 20 $M_\odot$. In conclusion, we successfully searched for RSGs and we increased by about 25% the number of previously known RSGs with $|b| < 1°$ and $10° < l < 65°$. Only about 1.5% of these RSGs are found in clusters.

References

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