Young Stellar Objects in the Low-Metallicity Small Magellanic Cloud

M. Sewiło[1], L. R. Carlson[2], J. P. Seale[3], R. Indebetouw[4], M. Meixner[3], B. A. Whitney[5], T. R. Robitaille[6], J. M. Oliveira[7], and K. Gordon[3]

[1]The Johns Hopkins University, Baltimore, MD, USA, email: `msewilo@pha.jhu.edu`
[2]Leiden Observatory, Leiden, The Netherlands
[3]Space Telescope Science Institute, Baltimore, MD, USA
[4]University of Virginia, Charlottesville, VA, USA
[5]Space Science Institute, Boulder, CO, USA
[6]Max Planck Institute for Astronomy, Heidelberg, Germany
[7]Keele University, Keele, UK

Abstract. The *Spitzer* Legacy Program "Surveying the Agents of Galaxy Evolution in the Tidally-Stripped, Low-Metallicity Small Magellanic Cloud" (SAGE-SMC; Gordon *et al.* 2011) allows a global study of star formation in the SMC at high enough resolution to resolve individual cores and protostars at a range of mid-IR wavelengths. Using the SAGE-SMC IRAC (3.6 - 8.0 μm) and MIPS (24 and 70 μm) catalogs and images combined with the near-IR and optical data, we identified a population of ~1100 intermediate- to high-mass Young Stellar Objects (YSOs) in the SMC (3× more than previously known). We investigate the properties of the YSOs and how they relate to the galaxy's structure and gas and dust distribution.

Keywords. Magellanic Clouds — stars: formation — HII regions

The proximity of the SMC (~60 kpc) and low inclination (~40°) make it ideal for star-formation studies on all scales. Our method of identifying YSO candidates is based on a combination of successful methods from the Whitney *et al.* (2008) and Gruendl & Chu (2009) searches for YSO candidates in the Large Magellanic Cloud. We perform: 1) color-magnitude cuts based on 5 color-magnitude diagrams (CMDs); 2) visual inspection of the multi-wavelength images; and 3) spectral energy distribution fitting with the YSO models (Robitaille *et al.* 2006). We calculate the likelihood of the source being a YSO. This "score" (0–10) is calculated based on the source's location in the color-magnitude space (5 CMDs) with respect to non-YSOs and scaled by the fraction of CMDs the source's photometry can produce. We define two classes of candidate YSOs. High-probability YSOs include (1) all sources with high scores (>7), and (2) sources with low scores, but well-fitted with the YSO models. Probable YSOs have low-scores and poor YSO model fits. We found that, due to polycyclic aromatic hydrocarbon emission, about half of our sources have [3.6]-[4.5] and [4.5]-[5.8] colors not predicted by previous YSO models. The YSO candidates are spatially correlated with gas tracers.

References

Gordon, K. D., Meixner, M., Meade, M. R., *et al.* 2011, *A&A*, 30, 490
Gruendl, R. A. & Chu, Y.-H. 2009, *ApJS*, 184, 172
Robitaille, T. P., Whitney, B. A., Indebetouw, R., *et al.* 2006, *ApJS*, 167, 256
Whitney, B. A., Sewiło, M., Indebetouw, R., *et al.* 2008, *ApJ*, 136, 18