Young Stellar Objects in the Low-Metallicity Small Magellanic Cloud

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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