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INFRARED IMAGING OF THE LARGE MAGELLANIC CLOUD STAR-FORMING REGION HENIZE 206

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ABSTRACT

Henize 206 is a region of star formation in the Large Magellanic Cloud of the approximate scale of the Orion belt and sword. Our *Spitzer Space Telescope* infrared images and Cerro Tololo Inter-American Observatory (CTIO) optical images show that the region is experiencing very energetic star formation. The radiation from young stars has excited strong polycyclic aromatic hydrocarbon (PAH) emission throughout Henize 206, except on the side of the nebula with the prominent young supernova remnant. As is also seen in early *Spitzer* observations of M81, star formation rates calculated from Hα for Henize 206 may miss the deeply embedded young stars, compared with star formation rates calculated from far infrared emission. For one of the highest surface brightness regions of Henize 206, we obtained snapshot exposures with the Thermal-Region Camera Spectrograph on Gemini South to explore the complex structure. A few percent of the total flux from this brightest region in Henize 206 emanates from infrared peaks of subparsec scale.

Subject headings: infrared: galaxies — infrared: stars — Magellanic Clouds — stars: formation

1. INTRODUCTION

Henize 206 (He 206; aka LHA 120-N 206 and DEM L 221) is a high-mass star-forming region on the outskirts of the Large Magellanic Cloud (LMC) that surrounds the star-forming cluster NGC 2018 (LHA 120-N 206A). It was first cataloged in an Hα objective prism survey by Karl Henize in 1956 (Henize 1956). The current star formation is taking place around an X-ray superbubble, which is a result of either stellar superwinds or a supernova (Dunne et al. 2001). As there are no obvious stars producing superwinds at this time, it is more likely a supernova remnant. There is an H I shell that is coincident with the X-ray superbubble that has an expansion velocity of 22.5 km s^{-1} (Kim et al. 1999), leading to an estimate for the age of the shell of 2.8×10^6 yr. Bica et al. (1996) used *UBV* photometry to set an upper limit of 10 Myr for the age of the stars in the region; therefore, if the star formation was triggered by the impact of the shock wave from the supernova, their ages must be somewhere between $\sim$2 and 10 million yr old.

What is intriguing about He 206 (and all star formation in the LMC) is the fact that the LMC has lower metallicity than the Milky Way ($[\mathrm{Fe/H}] = -0.31 \pm 0.04$ or 49% of solar; Rolleston et al. 2002). However, unlike young, high-redshift, starburst galaxies, the LMC is close enough for us to pick out individual star-forming regions and study them in great detail at a wide range of wavelengths. This proximity, combined with the resolution and sensitivity of the *Spitzer Space Telescope*, provides a great opportunity to study low-metallicity star formation at distances of kiloparsecs instead of gigaparsecs.

2. OBSERVATIONS

Both the Infrared Array Camera (IRAC; Fazio et al. 2004) and the Multiband Imager and Photometer for *Spitzer* (MIPS; Rieke et al. 2004) were used to create a multiwavelength image of He 206. For IRAC (3.6, 4.5, 5.8, and 8 μm); a four-column by five-row mosaic was created to cover a final region $20' \times 20'$, with three, 12 s dithers, resulting in a total exposure time of 36 s at each location and at each wavelength. The IRAC images were reduced using the standard *Spitzer* Science Center (SSC) data pipeline to produce Basic Calibrated Data (BCD), which were then mosaicked to get the final images. The final IRAC photometry is accurate to 10%.

The MIPS scan map observations were taken at a medium scan rate, consisting of eight scan legs with 148$''$ offsets between each pair of legs. The final MIPS images cover $0\overset{\circ}{.}5 \times 20'$ and have a total exposure time of 80, 40, and 8 s per point for 24, 70, and 160 μm, respectively. The MIPS images were reduced using the MIPS Instrument Team Data Analysis