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Star formation in the cometary HII region IRAS 17256–3631

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Abstract. IRAS 17256–3631 is a southern star forming region harboring massive protostellar candidate(s). We mapped this region at three GMRT continuum frequency bands: 1280, 610 and 325 MHz. The radio emission shows the presence of an HII region with characteristic cometary morphology. High resolution *Spitzer* IRAC images at mid infrared indicate the presence of young stellar objects. Cold dust emission at 1.2 millimeter reveals the presence of several clumps in this region.

Keywords : ISM: HII regions – infrared: ISM – radio continuum: ISM – ISM: indivudual objects: IRAS 17256–3631

1. Introduction

IRAS 17256–3631 is an HII region located at a distance of 2 kpc with an infrared luminosity of 6.4×10^4 $L_\odot$. It is identified as a region with massive protostellar candidates from molecular line (CS, $C^{17}O$) and 1.2 millimeter continuum studies (Fontani *et al*. 2005). Cold dust emission at 1.2 millimeter shows the presence of eleven clumps in this region (Beltran *et al*. 2006).

2. Results and discussions

The region is mapped using GMRT at three continuum frequency bands: 1280, 610 and 325 MHz (Figure 1). The size of radio emitting ionized region is found to be ∼5′ × 4′ (linear size 2.9 × 2.4 pc) at 610 MHz. We observe a steep density gradient towards the north-west suggesting a cometary morphology (Wood & Churchwell 1989).

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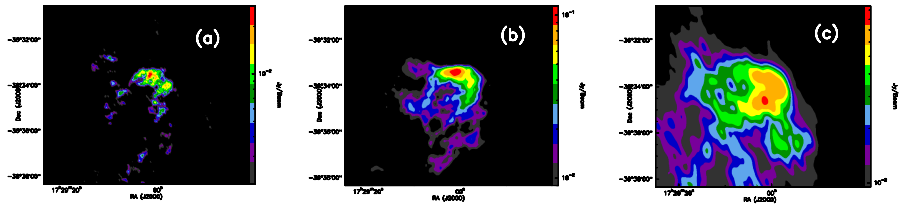

Figure 1. Emission from the ionized gas at (a) 1280 MHz (beam: 6″.5 × 3″.3) (b) 610 MHz (beam: 11″.5 × 7″.9) (c) 325 MHz (beam: 36″.4 × 15″.9)

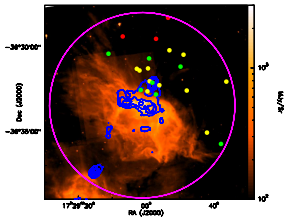

Figure 2. Distribution of IRAC YSO candidates over 8 μm emission map

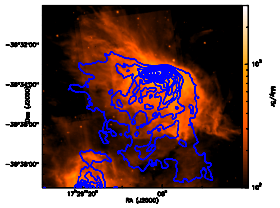

Figure 3. Overlay of 610 MHz contours over 8 μm warm dust emission from *Spitzer* IRAC

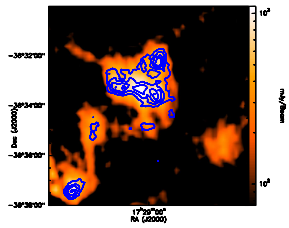

Figure 4. Overlay of ATLASGAL 870 μm contours over 1.2 mm cold dust emission

Eleven clumps are detected in the region and their masses are estimated assuming a dust temperature of 30 K and a dust opacity of 1 cm^2gm^{-1}. The clump masses range between 20 – 400 $M_\odot$. The average dust temperature of central region is estimated to be 15 K from the ratio of flux densities at 870 μm and 1.2 mm (Vig *et al*. 2007). Mass of this central region is found to be ∼2000 M⊙.

We have investigated the nature of infrared sources associated with this complex using *Spitzer* IRAC color-color diagram. We find 21 young stellar object (YSO) candidates of which there are 7 Class I sources, 11 Class I/II sources and 3 Class II sources using the models (Allen *et al*. 2004). Interestingly, the distribution of 21 detected YSOs envelopes the cometary morphology in the north-west direction (Figure 2). The morphology of emission from ionized gas matches with that of 8 μm warm dust (Figure 3). We have also used ATLASGAL map at 870 μm to search for millimeter clumps (Figure 4). The presence of an HII region, associated mid-infrared emission, IRAC YSOs and millimeter clumps point towards an active star forming region.

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