Star formation in the cometary HII region IRAS 17256–3631

V. S. Veena1*, S. Vig1, A. Tej1 and S. K. Ghosh2

1Indian Institute of Space science and Technology, Trivandrum
2National Centre for Radio Astrophysics (NCRA-TIFR), Pune

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: individual 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 $6.4 \times 10^4 \, L_\odot$. 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).

*email: veenagangothri@gmail.com
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$^2$ gm$^{-1}$. 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 $\mu$m and 1.2 mm (Vig et al. 2007). Mass of this central region is found to be $\sim$2000 M$_\odot$.

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 $\mu$m warm dust (Figure 3). We have also used ATLASGAL map at 870 $\mu$m 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.

References