

Radio observation of molecular clouds around the W5-East triggered star-forming region

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1. Introduction & Motivation

It is known that most of stars are formed as clusters (Lada & Lada 2003, *ARAA* 41, L57) and clusters are formed by triggering. However, the relationships of molecular clouds' conditions and properties of formed stars by triggering is not well studied. To clarify differences between triggered and spontaneous star formation through physical properties of molecular clouds (e.g. mass, density, morphology), we observed the W5-East HII region. The W5-East HII region is located at 2 kpc and has a 10 pc extent of HII region. This region has 3 Bright Rimmed Clouds (BRCs; Sugitani *et al.* 1991, *ApJS* 77, S59), which are interface between HII regions and molecular clouds, and known as sites of triggered star formation. The molecular clouds surround the W5-East (Karr *et al.* 2003, *ApJ*, 595, 900), thus we expect molecular clouds morphology is affected by the HII region and the cloud evolution is supposed to be dominated by the expanding HII region.

2. Observation

We have carried out observation of the W5-East HII region by the Nobeyama Radio Observatory 45m telescope (HPBW = 15.6'') in ^{13}CO ($J = 1 - 0$) and C^{18}O ($J = 1 - 0$) with the observing grid spacings in ^{13}CO and C^{18}O of 40'' and 10'', respectively, and the observed areas are 0.6 deg² and 0.16 deg², respectively.

3. Main results

We identified 8 ^{13}CO molecular clouds (3 of them are associated with BRCs) and 9 C^{18}O molecular cloud cores. The masses of the clouds and cores range from 50 - 3000 M_{\odot} and 13 - 140 M_{\odot} , respectively. The peak ^{13}CO column densities of the clouds facing the HII region are twice as large as the others. They have steep density gradients toward the HII region. We identified 18 protostellar IRAS sources and 155 2MASS sources with IR excess as YSO candidates and investigated their spatial distributions. 7 IRAS point sources are located at integrated intensity peaks of ^{13}CO , while the majority of the 2MASS sources are distributed in the front sides of BRC arcs close to the exciting star. These alignments of the YSOs and molecular clouds in the order of their ages indicate that triggered star formation occurs in the W5-East HII region. From the column densities of ^{13}CO and the spatial distribution of YSOs, we identified a new BRC candidate in the west side of the W5-East HII region.