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Propagation of Highly Efficient Star Formation in the North American Nebula (NGC 7000)

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Abstract. We mapped the molecular cloud associated with the North American Nebula in the NH_3 lines and the H_2O maser using the Kashima 34-m telescope. The line ratio shows the molecular gas is cold. For the clumps and subclumps in the cloud we also estimate the star forming efficiency (SFE). The east end of the cloud shows the highest SEF, 0.62, and the other end is the lowest, 0.06. The 3 dimensional structure derived using the published Hα map suggests the east end is in the HII region and it should be a reason why the SFE is high there.

Keywords. ISM: individual (North American Nebula) — ISM: molecules — radio lines: ISM

We mapped the molecular cloud L935 in the NH_3 (1,1), (2,2), and (3,3) lines and searched the H_2O maser with the 1.6' beam (Toujima *et al.* 2011). The NH_3 distribution is elongated NE-SW and its eastern end looks intruding into the HII region. We found two clumps and the eastern clump, or clump A, is composed of 3 subclumps. The sizes and masses of the clumps are about 1 pc and $100-400M_\odot$, respectively, and those of 3 subclumps are about $0.2-0.3$ pc and $10-20M_\odot$, respectively. Each clump and subclump shows the similar $T_{\rm rot}$ of NH_3 ranging $11-15$ K

However, they have different star-formation activities. T-Tauri type stars strongly concentrate to the subclump at the eastern end. We found a H_2O maser source only in clump A. As a result, the star formation efficiency is estimated to be as high as $0.36-0.62$ for clump A, although it is lower than 0.06 for the other clump, or clump B.

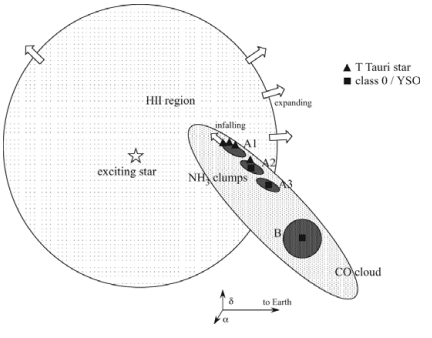

Figure 1. A schematic view of the cloud.

Detail investigation of Hα emission velocity maps (Fountain *et al.* 1983), we concluded that this NH_3 cloud deeply intrudes the HII region actually (fig.1). The high star formation efficiency should be triggered by the pressure and/or shock due to the HII region.

References

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