The Observations of IR-excess Clouds and the Polaris Flare -The Search for Molecular Clouds and Star Forming Activity in High Galactic Latitude-

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We carried out two observational studies using Seoul Radio Astronomy Observatory (SRAO) 6-m telescope and Taeduk Radio Astronomy Observatory (TRAO) 14-m telescope. The first study is 12CO line survey toward 14 IR-excess clouds to search for new molecular clouds in high Galactic latitude. The second is the observations of molecular lines (e.g. 12CO, 13CO, CS) toward the dense region of the extensive molecular gas near the north celestial pole, the Polaris Flare, for the purpose of searching for star forming activity, e.g., gravitationally bound clumps or dense cores under infall motion.

In the first study, we detected 12CO emission from three objects among the 14 IR-excess clouds, which have been unidentified as molecular clouds previously. The CO intensities of these three objects are 2.9, 6.1, 3.6 K, respectively, and the H2 column densities of these are in the range of $9\times10^{19}\sim1.5\times10^{21}\ cm^{-2}$. Our CO detection rate is 20%, and if we consider the IR-excess clouds colder than $T_d<19K$, the detection rate is 30%. This value is less than what we expect, ~70% (Onishi et al. 2001). On the other hand, in case of DIR120-28, we found that its CO emitting region is off from IR-excess center. From this result, we consider that the IR-excess is not an effective tracer of molecular gas, but τ-excess is the more effective tracer of molecular gas. Therefore, we need to make τ-excess map over the whole sky, and then we may detect molecular clouds additionally.

In the second study, we carried out the mapping observations for PF121.3+25.5 in 12CO, 13CO, and for the peak in 13CO map, we observed in CS (J=2-1) for the purpose of searching for gravitationally bound clumps or cores under infall motion. However, we detected no CS emission, and calculate the upper limit of CS core mass, $M_{limit}\sim4\times10^{-4}M_{\odot}$. Also, we get a mass spectrum for 105 13CO clumps. The mass spectrum follows a power law form, $dN/dM\propto M^{-\alpha}$, with a spectral index, $\alpha=1.905\pm0.13$. This value of spectral index is larger than those of previous studies. On the other hand, the virial masses of each clump are in the range of $10\sim100M_{LTE}$, that is to say, any clumps is not in the virial equilibrium. Therefore, star formation in PF121.3+25.5 is not likely.