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^{13}CO OBSERVATIONS OF CMa OB1/RA REGION

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ABSTRACT

A large scale ^{13}CO(J=1-0) survey was made for CMa OB1/R1 region in $220° \leq l \leq 230°$ and $-10° \leq b \leq 10°$ with a 8′ spacing by using the 4 m radio telescope of Nagoya University. 34 isolated clouds were identified in this survey. Among them, two clouds were firstly identified by us. The observed LSR velocity indicate that almost of the all clouds are located in the Local arm, except two extreme velocity. The mass spectrum of the clouds in the Local arm is best fitted by a power-law index of 1.6.

Key Words : catalog — ISM: clouds — ISM: molecules

I. INTRODUCTION

The massive cloud complex CMa OB1 is comparable in size to Orion molecular complex. The distance is estimated as 1150 pc(Claria 1974). At 4 arc-degree west from the complex, another cloud complex is located and a massive filament structure, called 'Southern Filament of Orion', extends from the complex to the southeast edge of Mon R2.

A OB association, several reflection nebulae, H II regions, T Tauri stars, Orion population stars, bipolar outflows found in the region indicates that star formations are on-going in the region. It gave rise us to present a distribution of clouds in the region for understanding of a large scale star formations in the region.

II. OBSERVATIONS

^{13}CO(J=1-0) observations were made for CMa OB1/R1 region from February to March 1994 with using the 4 m radio telescope of Nagoya University. The observed region covers the area in $220° \leq l \leq 230°$, $-10° \leq b \leq 10°$ by 8' spacing. ^{12}CO(J=1-0) observations were made toward the positions, where ^{13}CO intensity, $^{13}T_{int}$, is greater than 1 K km s^{-1} in order to derive the excitation temperature of the CO(J=1-0) transition. The observations were made in March 1995 with the new 4 m radio telescope of Nagoya University.

III. RESULTS

The contour map of the velocity-integrated intensity for all observing region is shown in Figure 1. 34 isolated clouds were identified in the observed region. The minimum contour level(T_{int} = 1 K km s^{-1}) and severe defference of LSR velocity more than 5 km s^{-1} were based in seperating adjacent clouds. Two clouds in 'F' region of the figure are thought to be firstly detected by us. Almost all the identified clouds are located in the Galactic belt.

The observed LSR velocity indicates that almost of all clouds, except 'D' and 'E' in figure 1, are located in the Local arm. The clouds denoted by 'D' and 'E' are proposed to be located in the Perseus arm and at intermediate position between the Local arm and the Perseus arm.

The previous studies of the cloud mass spectrum were well presented by a smooth power law(see the Scalo's 1985 review),

$$dN(M_{\rm CL}) = C\ M_{\rm CL}^{-s}\ dM, \qquad (1)$$

where $dN(M_{\rm CL})$ is the number of clouds in a given mass interval, $M_{\rm CL}$ is cloud mass, C is an arbitry constant, and s is power law index. The mass spectrum for the identified clouds in the Local arm is best fitted with 1.6 power law index for the $m_{\rm CL} > 100 M_{\odot}$. This value is well accord to most previous presentations(Dobashi et al. 1995; etc). While a little lower vaules of 1.0 - 1.5 were also presented(Myers, Linke, & Benson 1983; etc).

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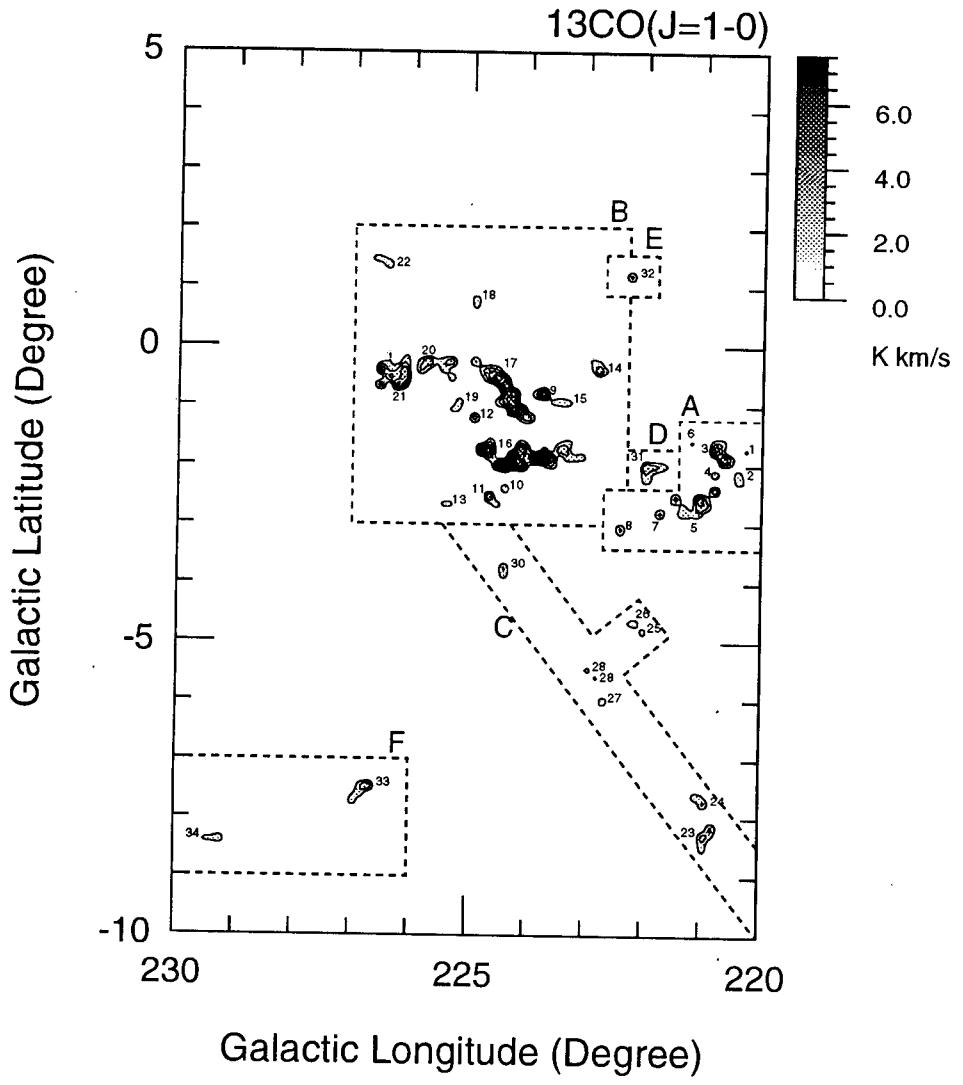

Fig. 1.— ^{13}CO(J=1-0) integrated intensity map. The clouds are classified by 6 groups designated from A to F.