Q21a A Chemical Peculiar Component around the Circumnuclear Disk

Masato Tsuboi (Meisei Univ.), Ryosuke Miyawaki (J. F. Oberlin Univ.), Takahiro Tsutsumi (NRAO), and Makoto Miyoshi (NAOJ)

The diverse chemical properties of the circum-nuclear disk (CND) of the Milky Way galaxy and the surrounding molecular clouds are well known. Here, we analyzed these chemical properties of those using the ALMA Band 3 data (2012.1.00080.S., PI: M. Tsuboi).

We discovered that a compact molecular cloud is brightening in the C_2H $N = 1-0$ $J = 3/2-1/2$ $F = 1-0$ and $N = 1-0$ $J = 3/2-1/2$ $F = 2-1$, and c-C_3H_2 $J_{Ka,Kc} = 2_{1,2} - 1_{0,1}$ ortho emission lines near the negative galactic latitude side of the CND. These molecular emission lines are known as photon-dominated region (PDR) tracers. The brightness temperature ratio is $T_B(C_2H)/T_B(c-C_3H_2) \sim 1.3$, differs from the ratio (~ 3) usually observed in PDRs in the disk region. This cloud is also bright in the $H^{13}CO^+ J = 1-0$ and SiO $v = 0$ $J = 2-1$ emission lines. These indicate that the hydrogen molecule density of the cloud is as high as $n(H_2) \sim 10^5$ cm^{-3} and that a C-shock wave propagated through the cloud within $t \sim 10^5$ years. Since the cloud is not detected in the H42α recombination line and 86 GHz continuum emission, it does not contain ionized gas. There are no other clouds with these properties around the CND.

It is unclear how the cloud relates to the known objects in this region. Since the LSR velocity of the cloud is consistent with that of the CND, the cloud may be a part of the CND or closely related to it.