

The Tokyo-NRO 60cm Survey Telescope and its Recent Results

Masahiko HAYASHI¹, Tetsuo HASEGAWA¹,
Toshihiro HANDA¹, Seiichi SAKAMOTO¹,
Tomoharu OKA¹ and Thomas DAME²

¹Institute of Astronomy, The University of Tokyo

²Harvard-Smithsonian, CfA

ABSTRACT

We present the current status of the Tokyo-NRO 60cm survey telescope as well as its initial results from the CO($J=2-1$) Galactic plane survey. The 60cm telescope was constructed in 1989 as a collaborative project between the University of Tokyo and Nobeyama Radio Observatory. It is a dedicated telescope for large scale survey observations with its 9 arcmin beam at 230 GHz, with a high beam efficiency of 0.93. We so far made a large scale map of the entire Orion molecular cloud complex (presented by Sakamoto at this conference), a partial map of the Galactic center molecular clouds (presented by Oka at this conference), and an initial survey along the Galactic plane with a spacing of 1° .

Comparing our Galactic plane survey in CO($J=2-1$) with the Columbia survey in CO($J=1-0$), we found a systematic gradient of the $J=2-1/J=1-0$ ratio as a function of galactocentric distance. The ratio is 0.6 in the solar neighborhood and rises to 0.8 at around 4 kpc from the galactic center. The molecular cloud complex in the Galactic center region exhibits an even higher ratio of 1.1, which is in accordance with the gradient discovered in the disk. This may suggest that an average molecular cloud in the inner Galaxy has little or no low density envelope which, in contrast, contributes significantly to the total CO luminosity from molecular clouds in the solar neighborhood as in the Orion giant molecular clouds. The higher gas temperature in the inner Galaxy may reflect that the star formation rate per unit gas mass sharply increases towards the Galactic center.