

The FUGIN Hot Core Survey — The survey method and the initial results for L=10-20deg

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We are conducting an unbiased survey of hot cores based on the CH₃CN (6_K – 5_K, K = 0, 1, 2, 3) and HNCO (5_{0,5} – 4_{0,4}) lines included in the spectral coverage of the FUGIN Galactic survey of the ¹²CO, ¹³CO and C¹⁸O (1 – 0) lines with the Nobeyama 45-m telescope [1]. As the sensitivity of the observations has been set for the CO lines, the S/N ratio for the CH₃CN and HNCO lines are limited. We stack the five lines (four CH₃CN and one HNCO) to improve the S/N ratio and search for emission guided by the C¹⁸O emission strength and velocity. For the source candidates picked in this way, we further make separate pointed observations of a set of hot core/dense gas probes (C³⁴S, SO, OCS, HC₃N, and CH₃OH thermal/maser lines in addition to CH₃CN and HNCO lines) to confirm their existence and characterize the detected sources.

In this paper, we report the initial result for L=10-20 deg. >From the FUGIN data, we picked 64 source candidates for the confirmation observations. In the confirmation observations with the Nobeyama 45m telescope in May 2018, we made 3 by 3 maps with 50'' grid spacing centered on each candidate sources, so that we can estimate the spatial extent of the sources. From the observations, we identified 25 “hot cores” as well as 23 “dense clouds” as defined below:

- **Hot Cores:** Two or more hot core lines detected with compact (< 50'') distribution.
- **Dense Clouds:** Two or more lines detected among the hot core/dense gas probes.

Figure 1 shows the distribution of the identified sources. They are typically at 2-5 kpc from the sun. Many of the “hot cores” correspond to the ATLASGAL-based clumps [2], but there are a few new sources. From the intensity ratios of the observed lines, we see a diversity of the physical and chemical conditions among the identified sources. Further characterizations of the sources are presented in a separate paper (T. Hasegawa et al., this meeting).

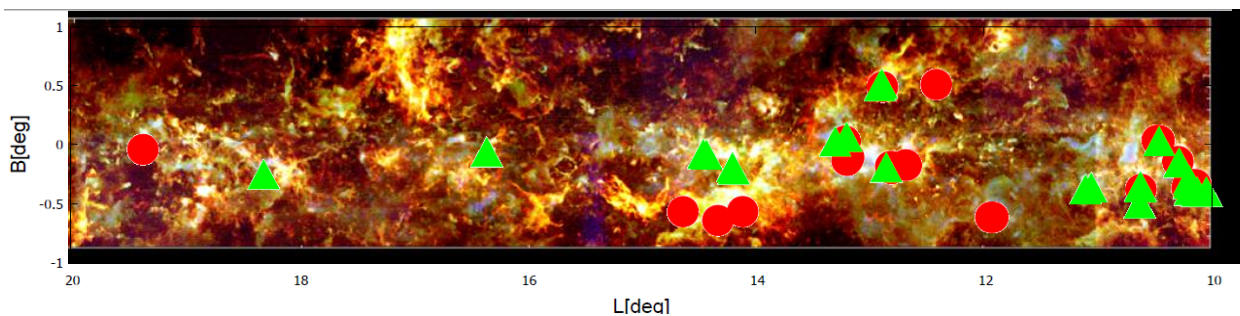


Figure 1: The location of the identified hot cores (red dot) and dense clouds (green triangles) on the FUGIN CO image.

References

- [1] T. Umemoto et al., 2017, PASJ 69, 78.
- [2] J. S. Urquhart et al., 2018, MNRAS 473, 1059.