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The Star Formation Activity of Molecular Clouds in the Galactic Plane

Joseph C. Mottram[1] **and Christopher M. Brunt**[1]

[1]School of Physics & Astronomy, University of Exeter,
Exeter, Devon, EX4 4QL, UK
email: joe@astro.ex.ac.uk, brunt@astro.ex.ac.uk

Abstract. It is well known that star formation takes place within molecular clouds. However, current observational surveys and investigations usually start by selecting a sample of sites where star formation is ongoing, thus biasing against those clouds and regions with little or no current formation activity. In an attempt to identify samples of clouds both with and without star formation, and to investigate their properties, we present an automated method for associating clouds identified in new 3D CO data with far-IR/sub-mm sources. Given the large number of surveys of the galactic plane currently planned, ongoing or being released, the methods used here may prove instructive in understanding how, where and under what conditions star formation takes place throughout our Galaxy. In addition, this will allow exploration of the properties of star forming regions on a range of spatial scales.

Keywords. ISM: Clouds, Stars: Formation, Catalogs, Surveys

We present an overview of new ^{12}CO (J=1-0) and ^{13}CO (J=1-0) mapping observations taken with SEQUOIA on the FCRAO between l of 55° and 102°, 141°and 195° with $\mid$ b $\mid \leqslant 1°$. These data have a spatial resolution of 45″ and a spectral resolution of ~ 0.15 km s^{-1}. Stray radiation results in a ~ 30 % overestimate of the brightness temperatures, so we have therefore undertaken the first application of stay radiation correction to large scale galactic molecular line surveys. This results in these data being calibrated to within 10 %. We intend to release these data, along with the routines used to perform this correction, to the community in the near future. Those interested in obtaining the data sooner are encouraged to contact the authors.

We identify and catalogue clouds and clumps in the CO data using a threshold-based method, Brunt *et al.* (2003). We then assoicate sources to this catalogue with expectations that the association is a chance allignment below some threshold, as in Kerton & Brunt (2003). When associating clouds in a test region with BLAST (Chapin *et al.* (2008)) and RMS sources (Urquart *et al.* (2008)) the results produced agree well with the by-eye velocities assigned by those studies.

This method allows association of large samples of molecular clouds and sub-mm/far-IR data on reasonable timescales, which will be of particular value with SCUBA-2 and Herschel data. It will also allow us to study the star formation properties of clouds and sources on a statistical basis at a range of scales within the heirarchy of GMCs.

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