# 30 Years of Photodissociation Regions:

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# The carbon inventory in a cold, quiescent, filamentary molecular cloud


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We present spectral line images of [CI] 809 GHz, CO J=1–0 115 GHz and HI 1.4 GHz line emission, and calculate the corresponding C, CO and H column densities, for a sinuous, quiescent Giant Molecular Cloud about 5 kpc distant along the $l = 328^{\circ}$ sightline (hereafter G328) in our Galaxy. The [CI] data comes from the High Elevation Antarctic Terahertz (HEAT) telescope, a new facility on the summit of the Antarctic plateau where the precipitable water vapor falls to the lowest values found on the surface of the Earth. The CO dataset comes from the Mopra southern galactic plane CO survey (Burton et al. 2013, Braiding et al. 2015; see also www.phys.unsw.edu.au/mopraco) and the HI from the corresponding Parkes/ATCA survey (the SGPS). Together, they provide wide-field ($1^{\circ}$ scale) panoramic imaging at good spatial and spectral resolution ($\sim 2'$ and 1 km/s) of the atomic and molecular gas of the interstellar medium. We identify a filamentary molecular cloud, $\sim 75 \times 5$ pc long with mass $\sim 4 \times 10^4\,\mathrm{M}_{\odot}$ and a narrow FWHM velocity range of just 2 km/s. The morphology and kinematics of this filament are similar in CO, [CI] and HI, though in the latter appears as self-absorption. We calculate line fluxes and column densities for the three emitting species, which are broadly consistent with a PDR model for a GMC exposed to the average interstellar radiation field. The [C/CO] abundance ratio averaged through the filament is found to be approximately unity. The G328 filament is constrained to be cold ($\mathrm{T}_{\mathrm{Dust}} < 20\,\mathrm{K}$) by the lack of far–IR emission, to show no clear signs of star formation, and to only be mildly turbulent from the narrow line width. We suggest that it may represent a GMC shortly after formation, or perhaps still be in the process of formation. This presentation reports and extends results from Burton et al. (2014).


## REFERENCES


Braiding, C. et al. (2015), PASA, submitted.
Burton, M. et al. (2013), PASA, 30, e044
Burton, M. et al. (2014) ApJ, 782, 72.