Star Formation and the Molecular Interstellar Medium of Messier 33

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The molecular ISM of M33 has now been observed at high angular resolution and high sensitivity such that even small Giant Molecular Clouds (GMCs) are detected. M33 is a small spiral galaxy with a standard thin disk morphology but a roughly half-solar metallicity and more gas-rich than large local universe spirals. This makes it a unique object to study star and cloud formation in a chemically young environment without simultaneously having to account for the effect of a change in morphology. We find (articles submitted and in prep.) an extremely tight link in space and velocity between HI and CO except that the molecular gas column density distribution, unlike the HI, shows an excess at high column densities that can likely be attributed to self-gravity. Identifying molecular clouds in the datacube shows a very close spatial correlation with Young Stellar Clusters (age <= 1e7 years) but not with older clusters. Using a variety of techniques, including a sophisticated Bayesian analysis, we place constraints on the NH2/Ico ratio. An implication is that the conversion of H2 into stars is quicker in M33 than in large local universe spirals (or that the IMF is more top-heavy).