

R03a What is a Giant Molecular Cloud? Are Observers and Simulators Discussing the Same Star-forming Clouds?

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Observations and simulations have now reached the point where the giant molecular cloud (GMCs) populations can be studied over a whole galaxy. This is immensely helpful for understanding star formation, since the cloud properties set the conditions for new star birth. Yet, are these two groups really comparing the same objects? While simulators work in position-position-position (PPP) space, observers see projected properties along the line of sight, identifying clouds in position-position-velocity (PPV) space. If these methods do not identify the same objects, then the interpretation and comparisons between the data sets may be highly misleading.

In this research we generated PPV and PPP data for a high-resolution simulated galaxy and compared the identified cloud properties in both data sets. Results show that the physical properties of molecular clouds in the individual galactic environments (bar, spiral, and outer disk) are highly similar among the two data structures. About 70% of clouds have single counterpart in each dataset, and their cloud properties scatter mostly within a factor of two. Therefore, comparing the simulated and observed GMCs are practical, and it will be the trend in the ALMA era. Simulations of GMCs observations based on the ALMA Cycle 3 capabilities will be presented.