METHANOL AS A PROBE OF PHYSICAL CONDITIONS IN ORION KL AT HIGH SPATIAL RESOLUTION WITH ALMA

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The Orion Kleinmann-Low nebula (Orion KL) is a notoriously complicated region of high-mass star formation and the closest such object to Earth. The structures within Orion KL—such as the hot core and the compact ridge—have varying chemical and physical properties, making the nebula an excellent laboratory for studying the formation and subsequent chemistry of complex organic molecules in high-mass star-forming regions. Methanol (CH_3OH) is one of the simplest complex organics and can be used as a tracer of even higher degrees of complexity as well as a probe of physical conditions in the interstellar medium. Previous interferometric observations of Orion KL have elucidated chemical differentiation and large-scale variations in the physical conditions of the nebula. We conducted observations of $^{13}CH_3OH$ toward Orion KL with the Atacama Large Millimeter/submillimeter Array (ALMA) at angular resolutions of $\sim 0.3''$, complementing previous observations of Orion KL at lower resolutions that use molecules, specifically CH3OH, as a probe of the region's physical conditions. We derive velocity, temperature, and $^{13}CH_3OH$ column density maps with a spatial resolution commensurate with circumstellar disks, allowing us to probe *local* variations in the nebula. The derived maps show a velocity gradient that is likely the result of gas emanating from an explosion that took place about 500 years ago. We also report substructures of increased temperatures and slight $^{13}CH_3OH$ abundance enhancements, which may be attributed to the presence of shocked material in the nebula. Overall, our findings agree with previous observations but provide a more localized view of Orion KL, further demonstrating the utility of molecules as probes of physical structures.