IDENTIFYING LOCAL CHEMICAL ENVIRONMENTS IN ORION KL BY BROADBAND DATA CUBE ANALYSIS

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A method for visualizing large data cubes from broadband radio astronomy has been implemented. Visualizing the cube in"correlation space" where the spatial distribution images for each data channel are correlated, is an effective tool for screening co-spatial features and dumping feature-less pixels out of the data set. The technique is tested using the Expanded Very Large Array Demonstration Science data of Orion KL in the 23.6 GHz to 26.6 GHz spectral range at a spatial resolution of approximately 5"x2.". This frequency range includes the methanol E-symmetry K=2-1 Q-branch (in addition to transitions from other molecules including ammonia, SO_2, OCS, and methyl formate). This observation has a spectral resolution of 133 kHz giving a velocity resolution of 1.6 km/s. Along a particular line of sight, both thermalized and non-thermalized methanol is present in Orion KL, and the spectra can be separately analyzed. The thermalized methanol belongs to the Orion"hot core" and the broadband spectrum can be fit with a rotational temperature of 118K. The non-thermal methanol emission profiles vary throughout the molecular cloud, and each spectrum can be reproduced using a steady-state, local velocity gradient model adapted for integration into this study. Analysis of the temperature and density in different local environments of Orion will be discussed.