[구 IM-03] CHEMICAL PROPERTIES OF CORES IN DIFFERENT ENVIRONMENTS: THE ORION A, B AND λ ORIONIS CLOUDS

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We observed 80 dense cores ($N(H_2) > 10^{22}$ cm^{-2}) in the Orion molecular cloud complex which contains the Orion A (39 cores), B (26 cores), and λ Orionis (15 cores) clouds. We investigate the behavior of the different molecular tracers and look for chemical variations of cores in the three clouds in order to systematically investigate the effects of stellar feedback. The most commonly detected molecular lines (with the detection rates higher than 50%) are N_2H+, HCO+ , $H^{13}CO$+, C_2H, HCN, and H_2CO. The detection rates of dense gas tracers, N_2H^+, HCO^+ , $H^{13}CO^+$, and C_2H show the lowest values in the λ Orionis cloud. We find differences in the D/H ratio of H_2CO and the N_2H^+/HCO^+ abundance ratios among the three clouds. Eight starless cores in the Orion A and B clouds exhibit high deuterium fractionations, larger than 0.10, while in the λ Orionis cloud, no cores reveal the high ratio. These chemical properties could support that cores in the λ Orionis cloud are affected by the photo-dissociation and external heating from the nearby H II region. An unexpected trend was found in the $[N_2H^+]/[HCO^+]$ ratio with a higher median value in the λ Orionis cloud than in the Orion A/B clouds than; typically, the $[N_2H^+]/[HCO^+]$ ratio is lower in higher temperatures and lower column densities. This could be explained by a longer timescale in the prestellar stage in the λ Orionis cloud, resulting in more abundant nitrogen-bearing molecules. In addition to these chemical differences, the kinematical difference was also found among the three clouds; the blue excess, which is an infall signature found in optically thick line profiles, is 0 in the λ Orionis cloud while it is 0.11 and 0.16 in the Orion A and B clouds, respectively. This result could be another evidence of the negative feedback of active current star formation to the next generation of star formation.

[구 IM-04] TIMES: mapping Turbulent properties In star-forming MolEcular clouds down to the Sonic scale. I. the first result.

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Turbulence is one of the natural phenomena in molecular clouds. It affects gas density and velocity fluctuation within the molecular clouds and controls the mode and tempo of star formation. However, despite many years of study, the properties of turbulence remain poorly understood. As part of the Taeduk Radio Astronomy Observatory (TRAO) Key Science Program (KSP), "mapping Turbulent properties In star-forming MolEcular clouds down to the Sonic scale (TIMES; PI: Jeong-Eun Lee)", we have fully mapped two star-forming molecular clouds, the Orion A and the Ophiuchus molecular clouds, in 3 sets of lines (^{13}CO J=1-0, $C^{18}O$ J=1-0, HCN J=1-0, HCO^+ J=1-0, CS J=2-1, and N_2H^+ J=1-0) using the TRAO 14-m telescope. We apply a statistical analysis, Principal Component Analysis (PCA), which can recover an underlying turbulent-power spectrum from an observed P-P-V spectral map. We compare turbulence properties not only between the two clouds, but also between different parts within each cloud. We present the first result of our observation program.

[구 IM-05] High-resolution Near-infrared Spectroscopy of IRAS 16316-1540: Evidence of Accretion Burst

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The high-resolution near-infrared (NIR) spectroscopy can reveal the evidence of the accretion burst (e.g., the broadened absorption features produced by the Keplerian disk motion)