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Molecular clouds are the sites of stellar birth. Turbulence is a natural phenomenon in molecular clouds, which largely determines the density and velocity fields. Additionally turbulent energy dissipation can affect the gas kinetic temperature via shocks. Turbulence thus controls the mode and tempo of star formation. However, despite its important role in star formation, the properties of turbulence remain poorly understood. As part of the Taeduk Radio Astronomy Observatory (TRAO) Key Science Program (KSP), "Mapping turbulent properties of star-forming molecular clouds down to the sonic scale (PI: Jeong-Eun Lee)", we have been mapping two star-forming clouds, the Orion A and the ρ Ophiuchus molecular clouds in 3 sets of lines (13CO 1-0/C18O 1-0, HCN 1-0/HCO+ 1-0, and CS 2-1/N2H+ 1-0) using the TRAO 14-m telescope. We apply a Principal Component Analysis (PCA), which is an useful tool to represent turbulent power spectrum. We will present the preliminary results of our TRAO KSP toward two regions: OMC 1-4 in the Orion A cloud, and L1688 in the ρ Ophiuchus cloud.

[포 IM-04] Chemical properties of cores in different environments; the Orion A, B and λ Orionis clouds

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We present preliminary results of KVN single dish telescope observations of 80 dense cores in the Orion molecular cloud complex which contains the Orion A, B, and λ Orionis cloud. 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 N2H+, HCO+, H13CO+, C2H, HCN, and H2CO. The detection rates of dense gas tracers, N2H+, HCO+ , H13CO+, and C2H show the lowest values in the λ Orionis cloud. We find difference between molecular D/H ratios and N2H+/H13CO+ abundance ratios towards different clouds, and between protostellar cores and starless cores. 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, which is a hint of negative stellar feedback on core formation. The striking difference between the [N2H+]/[H13CO+] ratios leads us to suggest that there are significant evolutionary differences between the Orion A/B and λ Orionis clouds. In order to examine whether starless cores can be candidates of pre-stellar cores, we compared the core masses estimated from the 850 um emission to their Virial masses calculated from the N2H+ line data and find that most of them are not gravitationally bound in the three clouds.

[포 IM-05] Chemical and Kinematic Properties of the Galactic Halo System

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We present chemical and kinematic properties of the Milky Way's halo system investigated by carbon-enhanced metal-poor (CEMP) stars identified from the Sloan Digital Sky Survey. We first map out fractions of CEMP-no stars (those having no over-abundances of neutron-capture elements) and CEMP-s stars (those with over-enhancements of the s-process elements) in the inner- and outer-halo populations, separated by their spatial distribution of carbonicity ([C/Fe]). Among CEMP stars, the CEMP-no and CEMP-s objects are classified by different levels of absolute carbon abundances, A(C). We investigate characteristics of rotation velocity and orbital eccentric for these subclasses for each halo population. Any distinct kinematic features identified between the two categories in each halo region provide important clues on the origin of the dichotomy of the Galactic halo.