Analysis of Ices Surrounding YSOs in Taurus and Rho Ophiuchi

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Recent technological advances have sparked an exciting study of the chemistry in star forming regions. By combining Spitzer IRS and ground based observations, a more sensitive diagnostic of the composition of the material surrounding Young Stellar Objects (YSOs) can be performed. Initial studies of the material surrounding YSOs show significant differences in the volatile composition of regions with massive YSOs and regions of containing low mass YSOs. Pontoppidan (2006) found that CO_2 and CO abundances were enhanced toward the center of the cold Ophiuchus-F core, and recent results for the CO_2 ice feature at 15.3 μm also imply spatial variations within regions of star formation. Analysis of short-lived radioisotopes in meteorites indicates our solar system was seeded with material by a nearby supernova, suggesting our system formed in a region of both high and low mass star formation (Goswami & Vanhala 2000). Here we present preliminary results from data taken with the Infrared Spectrometer (IRS) on the Spitzer Space Telescope and SpeX at the Infrared Telescope Facility (IRTF) located on Mauna Kea, HI. Observations of H_2O ice, CO ice, and CO_2 ice at 3.0 μm, 4.67 μm, and 15.3 μm, respectively, are presented for the Taurus and Rho Ophiuchi star forming regions. We measured abundances and used laboratory spectra to constrain the polar/apolar composition and the thermal history of the region. In the future, additional YSOs in the Taurus and Rho Ophiuchi regions will be similarly analyzed in order to correlate variations in the volatile composition of the material surrounding YSOs due to environmental factors and evolutionary state.