

CONNECTING PREBIOTIC CHEMISTRY IN THE LABORATORY TO PROTOSTELLAR OBSERVATIONS

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During the process of star formation, radiative and thermal processing of icy grain mantles leads to the formation of complex organic molecules (COMs). This protostellar processing produces the bulk chemical inventory which is subsequently delivered to forming planetary systems. To investigate this process, we have used the Sublimation Laboratory Ice Millimeter/submillimeter Experiment (SubLIME) on water:methanol interstellar ice analogs at a variety of ratios to study the dependence of organic molecule formation on the concentration of methanol to water. The results of these experiments will be compared to the $\lambda = 2$ mm astronomical observations of the W3 star-forming region using the Northern Extended Millimeter Array (NOEMA). From these observations, we have imaged and analyzed molecular distributions in the neighboring star-forming cores W3(H₂O) and W3(OH). By comparing the ratios of COMs produced in the laboratory ice experiments to those observed in W3, we will discuss astrochemical implications for the ice and gas composition in these active star-forming regions.