

Processing of ices in a massive star-forming region

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Infrared absorption spectroscopy toward dense molecular clouds suggests that the bulk of heavy elements exist in the solid phase as ices and dust. Understanding the effect of star formation activities on properties of ices is one of the key issues for interstellar ice chemistry since chemical reactions in the solid phase play an important role in the chemical evolution of star- and planet-forming regions.

This study aims to clarify the effect of star formation activities on the chemical evolution of circumstellar and interstellar ices. For this purpose, spatial distribution of ices in a nearby high-mass star-forming region, Cepheus A, is spectroscopically mapped using the Infrared Camera (IRC) on board the *AKARI* satellite. This is the first spectroscopic mapping of circumstellar ices in a continuous 2–5 micron wavelength region. As a result of observations, infrared absorption bands due to major ice species such as H₂O, CO₂ and CO, are detected from various regions in Cepheus A (Figure 1). Based on the spectral fitting, column densities of each molecular species are derived to map the spatial distribution of ices. We find that ice column densities are centrally concentrated toward the high-mass protostellar object HW2 located in a central part of Cepheus A. This suggests that observed ices are located in the envelope of HW2. We also find that the column density ratio of CO₂/H₂O ices does not vary significantly within a 0.1 pc region around HW2, suggesting that the chemical compositions of ices are less affected by protostellar radiation. In this poster, we discuss the effect of radiation and jet from the protostellar object on the chemical and physical properties of circumstellar ices.

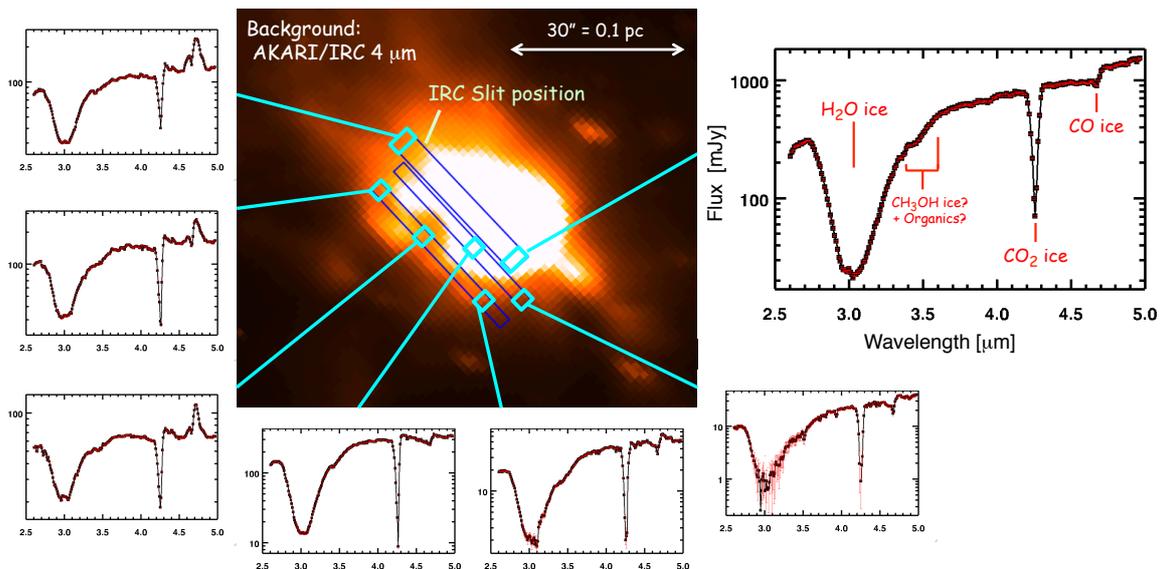


Figure 1: Examples of *AKARI*/IRC near-infrared spectra observed toward the Cepheus A region. The positions of detected ice absorption features are labeled in the upper right panel. The observed slit positions are shown by the blue rectangles in the central panel; the background is *AKARI*/IRC 4 micron image of Cepheus A.