

# Mapping the distribution of crystalline water ice on the surface of Europa using high-resolution near infrared spectroscopy

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The Galilean Satellites have been studied from ground based telescopes and spacecraft [1-3]. These observations have confirmed the presence of water and other ices. The phase of water ice on these bodies is a function of temperature and radiation environment. Ion radiation causes the infrared spectrum of crystalline ice to look like that of amorphous water ice [4, 5]. With the combination of Keck's NIRC2 camera and adaptive optics we were able to obtain disk resolved spectra of Europa and Ganymede. We collected images through the H, J, and K filters and infrared spectra with the H and J filters of the leading hemisphere of both satellites. These images and spectra are at spatial resolutions of  $\sim 300$  m/pixel, vastly improving upon those of previous ground-based observations. We will create spectral maps of the distribution of crystalline water ice on the surface of these satellites using the 1.65 micron band which is indicative of the crystalline phase of water ice [6-8]. These maps can then be compared to Galileo spacecraft data to look for changes with time. More observations will be needed to construct a complete map of Europa and to determine any short term changes.

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