Rotationally resolved infrared (3.0–4.0 μm) spectra of Jupiter Trojans

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Jupiter Trojans (hereafter JTs) are swarms of small bodies orbiting the Sun in the Lagrangian points of Jupiter, L_4 and L_5. Because of their orbital stability and proximity to Jupiter, a substantial amount of primitive materials (i.e., water ice and organics) has been presumed to exist either on the surfaces and/or the interiors, yet been detected directly.

Diagnostic absorption lines of such materials can be searched via reflectance spectroscopy. In the visible and near-infrared wavelengths (0.5–2.5 μm), weak overtones and combinations of the functional groups of H_2O/OH and hydrocarbons exist, but opaque elements (e.g., amorphous carbon, silicate) are too overwhelming to detect weaker absorption bands of interest. In longer infrared wavelength (particularly 3.0–4.0 μm), however, as the opaque matters become transparent and stronger fundamental bands of interest emerge, it is far more favorable to study compositions of two JTs, but severe telluric lines often degrade the quality of the spectra. Herein, we present the unpublished results of infrared spectroscopic observations of JTs using the 8 m Subaru telescope atop Mauna Kea, which cover one full rotational periods of each target with high signal-to-noise ratio for the first time. We will report the results of spectral properties (continuum slopes, possible absorption features) of JTs and any rotational variations of them. Based on the observational evidence, we will discuss the surface characteristics and their implications on the evolutionary history of the targets.