

Near Infrared Spectroscopy on The Outburst Comet 17P/Holmes

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Abstract

The Jupiter family comet 17P/Holmes underwent a remarkable outburst on October 24 2007 UT, during which the apparent magnitude of the comet abruptly increased from 17 mag to 1.5 mag in just a few hours. We obtained near infrared (0.8 - 4.2 μm) spectroscopy on Holmes using 3.0-m NASA Infrared Telescope Facility (IRTF) atop Mauna Kea on Oct. 27, 28 and 31, 2007 UT. Two broad absorption bands were found in the reflectance spectra centered at 2- μm and 3- μm , respectively. The centers and overall shapes of these two absorptions are consistent with their formation in water ice grains in the coma. Linear and non-linear mixture models suggest that the central coma of 17P was dominated by fine ice grains of submicron size. We also detected a thermal emission excess in the spectra beyond 3.2- μm , showing the presence of abundant hot grains, for which the color temperature was about 360K (corresponding to a superheat factor ~ 2.0 at 2.45 AU). Since ice grains must remain very cold in order to be stable against sublimation, the IRTF spectra show evidence for the simultaneous presence of very hot and very cold dust grains in the coma. We will present the spectra and discuss their interpretation.