2001 DPS Meeting abstract submission

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Five Micron Spectrosopy of Saturn

P A Yanamandra-Fisher, G S Orton (Jet Propulsion Laboratory), John Rayner, M Cushing (Institute for Astronomy/ Univ of Hawaii), P Drossart (CNRS Observatory of Paris)

Near--infrared (2.3 -5.2 \mum) spectral data cubes of Saturn and its main ring system were acquired at the NASA/Infra Red Telescope Facility (IRTF) with a mid-resolution spectrometer (SpeX), having a resolving power of ~ 1500, on the nights of 15 - 16 October, 2000. The 5-\mum window (4.8 -- 5.2 \mum), provides remote sensing access down to the 2.5-bar level. {\em Yanamandra-Fisher et al. (Icarus, 150, 2001) indicated that striking spatial variabilty exists across the disk; however, from the low spectral resolution of their data, it is not immediately clear whether the variability arises only from the variability of the optical thickness of a deep cloud layer or whether phosphine (PH_3), the primary source of opacity at 5.2 \mum and a diagnostic trace constituent in Saturn's atmosphere, is also variable across the disk. Utilising simultaneous observations of outgoing radiances at 4.8 \mum and 5.2 \mum (the lower and upper end of the 5-mum window), it is possible to separate the contributions of the haze and deeper clouds. Ongoing radiative transfer models highlight the influence of haze {\em vs}. underlying deeper cloud opacity. Preliminary results indicate that: (a) increasing the abundance of PH_3 increases its absorption and enhances the reflected component of the outgoing radiance; (b) the influence of the upper cloud on the outgoing radiance is similar, except no increase in PH_3 absorption lines is evident; and (c) increasing the opacity of the deeper lower cloud affects the 5.1 -- 5.3-\mum radiance and continuum, but not the reflected component of the outgoing radiance.

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