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Titan's Methane Hydrological Cycle: Detection of Seasonal Change

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We have acquired whole disk spectra of Titan on over 100 nights with IRTF/SpeX during the 2006-2007 Titan season. The data encompass the spectral range of 0.8 to 2.4 microns at a resolution of 375. These disk- integrated spectra allow us to determine Titan's total fractional cloud coverage and altitudes of clouds present. The near lack of tropospheric cloud activity in these spectra is in sharp contrast to nearly every spectrum taken from 1995-1999 with UKIRT by Griffith et al. (1998 & 2000) who found rapidly varying clouds covering 0.5-9% of Titan's disk. The differences in these two similar datasets indicate a striking seasonal change in the behavior of Titan's clouds. Adaptive optics observations from Keck and Gemini also show markedly decreased cloud activity in the late southern summer era compared with the period surrounding southern summer solstice (October 2002). Observations of the latitudes, magnitudes, altitudes, and frequencies of Titan's clouds as Titan moves toward southern autumnal equinox in 2009 will help elucidate when and how Titan's methane hydrological cycle changes with season.