



Stratospheric composition of Titan from Cassini/CIRS observations

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We have analyzed data recorded by the Composite Infrared Spectrometer (CIRS) aboard the Cassini spacecraft during the recent Titan flybys (October 2004 - June 2005). The spectra characterize various regions on Titan from 75°S to 75°N with a variety of emission angles. We study the emission observed in the mid-infrared CIRS detector arrays (covering roughly the 600-1500 cm⁻¹ spectral range with apodized resolutions of 2.54 or 0.53 cm⁻¹). The composite spectrum shows several molecular signatures: hydrocarbons, nitriles and CO₂. A firm detection of benzene (C₆H₆) is also provided by CIRS at 674 cm⁻¹. We have used temperature profiles retrieved from the inversion of the emission observed in the methane ν₄ band at 1304 cm⁻¹ and a line-by-line radiative transfer code to infer the abundances of the trace constituents and some of their isotopes in Titan's stratosphere. No longitudinal variations were found for the gases. Information is retrieved on the meridional variations of the trace constituents and tied to predictions by dynamical-photochemical models. Molecules showing a significant enhancement at high northern latitudes are the nitriles (HC₃N, HCN) and the complex hydrocarbons (C₄H₂, C₃H₄). Some species (C₃H₈, CO₂) show hints of an abundance decrease towards both poles. The D/H ratio on Titan was also determined from the CH₃D band at 8.6 micron and found to be 1.25 ± 0.2 10⁻⁴. Constraints are also set on the vertical distribution of C₂H₂.

References : Coustenis et al., 2006. *Icarus*, submitted. Flasar et al., 2005. *Science* 308, 975 ; Teanby et al., 2006. *Icarus*, in press.