Titan's Atmospheric Composition

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Six years into the very productive Cassini-Huygens mission in the Saturnian system, we look at Titan's atmosphere. Titan, Saturn's largest satellite, is the only other object in our Solar system to possess an extensive nitrogen atmosphere, host to an active organic chemistry, based on the interaction of N_2 with methane (CH_4) and one of the main targets of the mission. The stratospheric organic chemistry comprises hydrocarbons, nitriles, a few oxygen compounds and many isotopes (see References), and is connected to the upper atmosphere by means that remain to be discovered. Titan was revealed to be a complex world more like the Earth than any other: it has a dense mostly nitrogen atmosphere and active climate and meteorological cycles where the working fluid, methane, behaves under Titan conditions the way that water does on Earth. Titan is also rich in organic molecules—more so in its surface and atmosphere than anyplace in the solar system, including Earth. These molecules are formed in the atmosphere, through which they diffuse before being deposited on the surface.

I will discuss some of the Cassini-Huygens results pertaining to Titan's stratosphere using CIRS spectra taken during the past 6 years at both medium (2.5 cm^{-1}) and high (0.5 cm^{-1}) resolutions. I will show stratospheric variations in temperature and composition as the season on Titan progresses from nadir and limb data and will compare with inferences from Voyager and ISO observations.

Keywords: Titan, Cassini-Huygens, satellites, atmospheres.

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