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Vertical Distribution of Gases and Aerosols in Titan's Atmosphere Observed by VIMS/Cassini Solar Occultations

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We present the vertical distribution of gaseous species and aerosols in Titan's atmosphere through the analysis of VIMS solar occultations. We employ the infrared channel of VIMS, which covers the 1 - 5 μm wavelength range. VIMS occultations can provide good vertical resolution ($\sim$10 km) and an extended altitude range (from 70 to 700 km),
complementing well the information from other Cassini instruments. VIMS has retrieved 10 solar occultations up to now. They are distributed through the whole Cassini mission and they probe different latitudes in both hemispheres. Two main gases can be observed by VIMS occultations: methane, through its bands at 1.2, 1.4, 1.7, 2.3 and 3.3 μm, and CO, at 4.7 μm. We can extract methane's abundance between 70 and 750 km and CO's between 70 and 180 km. Regarding aerosols, the VIMS altitude range allows to get information on the properties of both the main haze and the detached layer. Aerosols also affect the transmittance through their spectral signatures. In particular, a spectral signature at 3.4 μm that was attributed to aerosols was recently discovered by the analysis of the first VIMS occultation. We will monitor the latitudinal and temporal variations of the 3.4 μm feature through various occultations. A change in the global circulation regime of Titan sets in with the approaching to the vernal equinox, and a strong decrease of the altitude of the detached layer between the winter solstice and the equinox has indeed been observed. The temporal coverage of VIMS occultations allows the study the effect of these variations in the vertical distribution of aerosol optical and spectral properties.