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**Proof****CONTROL ID:** 1204705**TITLE:** Spectral and vertical distribution properties of Titan's particulates from thermal-IR CIRS data: Physical Implications**PRESENTATION TYPE:** Assigned by Committee (Oral or Poster)**CURRENT SECTION/FOCUS GROUP:** Planetary Sciences (P)**CURRENT SESSION:** P33. Titan: An Earth-Like World**AUTHORS (FIRST NAME, LAST NAME):** Carrie M Anderson<sup>1</sup>, Robert Samuelson<sup>2, 1</sup>, Sandrine Vinatier<sup>3</sup>**INSTITUTIONS (ALL):** 1. Solar System Exploration Divis, NASA---GSFC, Greenbelt, MD, United States.

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**ABSTRACT BODY:** Analyses of far-IR spectra between 20 and 560 cm<sup>-1</sup> (500 and 18 μm) recorded by the Cassini Composite Infrared Spectrometer (CIRS) yield the spectral dependence and the vertical distribution of Titan's photochemical aerosol and stratospheric ice clouds. Below the stratopause (~300 km) the aerosol appears to be incompletely mixed for the following reasons: 1) the altitude dependence of the aerosol mass absorption coefficient is larger at higher altitudes than at lower altitudes, 2) the aerosol scale height varies with altitude, which implies some kind of layering effect, and 3) the aerosol abundance varies with latitude.

The spectral shape of the aerosol opacity appears to be independent in altitude and latitude below the stratopause, even though inhomogeneities in the abundance appear to be prevalent throughout this altitude region. This implies that aerosol chemistry is restricted to altitude regions above the stratopause, where pressures are less than ~0.1 mbar. The aerosol exhibits an extremely broad emission feature with a spectral peak at 140 cm<sup>-1</sup> (71 μm), which is not evident in laboratory simulated Titan aerosols (tholin) that are created at pressures greater than 0.1 mbar.

A strong broad emission feature centered roughly around 160 cm<sup>-1</sup> corresponds very closely to those found in nitrile ice spectra. This feature is pervasive throughout the region from high northern to high southern latitudes. The inference of nitrile ices is consistent with the highly restricted altitude ranges over which these features are observed, and appear to be dominated by HCN and HC3N. At low and moderate latitudes these clouds are observed to be located between 60 and 100 km, whereas at high northern latitudes during northern winter these clouds are observed at altitudes between 150 and 165 km. The ubiquitous nature of these nitrile ice clouds is inconsistent with a simple meridional circulation concept, suggesting that the true dynamical situation is more complex.

**INDEX TERMS:** [6281] PLANETARY SCIENCES: SOLAR SYSTEM OBJECTS / Titan, [5405] PLANETARY SCIENCES: SOLID SURFACE PLANETS / Atmospheres, [5422] PLANETARY SCIENCES: SOLID SURFACE PLANETS / Ices.

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