ID de Contribution: **13**   Type: **Oral presentation**

Reanalysis of trace species in Titan's lower atmosphere measured by Cassini Huygens

jeudi 29 février 2024 12:45 (15 minutes)

In Titan, the two major gases nitrogen (N2) and methane (CH4) are ionized and/or photolyzed at high altitudes by the sunlight and the energetic particles from Saturn's magnetosphere, resulting in rich atmospheric chemistry and a wide variety of carbon and nitrogen-bearing atmospheric compounds. In the present work, we focus on studying the vertical profiles of trace species in the lower atmosphere to obtain a better insight into the atmospheric processes taking place on Titan.

To do so, we reanalyzed the data from the Gas Chromatograph Mass Spectrometer (GCMS) on the Huygens probe which executed its mission on 14th January 2005. The GCMS instrument sampled for nearly three and a half hours from a height of 146 km. It recorded data for two and a half hours in the atmosphere of Titan, then landed on the surface and kept on recording for another hour, after which the signal was lost. We analyzed the measurements made by direct sampling of the atmosphere (Niemann et al. 2010). These mass spectra obtained at different altitudes and pressure levels have been recalibrated to account for deadtime and saturation corrections to the measurements, and considered ion cross-section and transfer cross-section measurements from Cassini-Ion and Neutral Mass Spectrometer calibrations. We then analyzed the corrected mass spectra using Monte-Carlo deconvolution simulations. The simulations allow us to vary the peak intensities of fragmentation patterns of known species, which usually bears uncertainties on this kind of data, and then use a least-square fitting to deconvolve the mixed signals (Gautier et al. 2020, Serigano et al. 2020, 2022).

Astrophysics Field

Planetology (including small bodies and exoplanets)

Day constraints

Auteur principal: DAS, Koyena (LATMOS)

Orateur: DAS, Koyena (LATMOS)

Classification de Session: Session 6