Celebrating one year of atmospheric evolution on Titan since Voyager with Cassini/CIRS

A. Coustenis[1], G. Bampasidis[1,2], S. Vinatier[1], R. Achterberg[3,4], P. Lavvas[5], C. Nixon[3,4], D. Jennings[4], N. Teanby[6], F. M. Flasar[4], R. Carlson[7], G. Orton[8], P. Romani[4], E. A. Guandique[9,4]

[1]LESIA, Observatoire de Paris, CNRS, UPMC Univ. Paris 06, Univ. Paris-Diderot, 5, place Jules Janssen, 92195 Meudon Cedex, France
[2]National & Kapodistrian University of Athens, Faculty of Phys., Greece
[3]Department of Astronomy, Univ. of Maryland, USA
[4]NASA/Goddard Flight Center, USA
[5]GSMA, Univ. Reims, France
[6]School Earth Sci., Univ. Bristol, UK
[7]IACS, The Catholic University of America, Washington, DC, USA
[8]JPL, Caltech, Pasadena, CA, USA
[9]Adnet Systems, Inc., Rockville, MD, USA

athena.coustenis@obspm.fr

Seven years after Cassini's Saturn orbit insertion, we have in hand almost a complete picture of the stratospheric evolution within a Titanian year by combining Voyager 1 Infrared Radiometer Spectrometer (IRIS) measurements from 1980, Cassini Composite Infrared Spectrometer (CIRS) continuous recordings from 2004 to 2010 and the intervening ground-based and space-borne observations with ISO (Coustenis et al. 2003).
We have re-analyzed the Voyager 1/IRIS data acquired during the 1980 encounter, 30 years (one Titan revolution) before 2010, with the most recent spectroscopic data releases and haze descriptions (Vinatier et al. 2010, 2012) by using our radiative transfer code (ART). The re-analysis confirms the V1/IRIS retrievals by Coustenis & Bezard (1995) and updates the abundances for all molecules and latitudes based on new temperature, haze and spectroscopic parameters.

ART was also applied to all available CIRS spectral averages corresponding to more than 70 flybys binned over 10° in latitude for both medium (2.5 cm^{-1}) and higher (0.5 cm^{-1}) resolutions and from nadir and limb data both. In these spectra, we search for variations in temperature (following the method in Achterberg et al. 2011) and composition at northern (around 50°N), equatorial and southern (around 50°S) latitudes as the season on Titan progresses and compare them to the new V1/IRIS, ISO and other ground-based reported composition values (Coustenis et al., 2012, in prep). Other latitudes were examined in previous papers (e.g. Coustenis et al. 2010).