Geophysical Research Abstracts
Vol. 20, EGU2018-8109, 2018
EGU General Assembly 2018

Seasonal evolution of Titan's stratosphere near the poles during the Cassini Solstice mission

Athena Coustenis (1), Donald Jennings (2), Richard Achterberg (2,3), Georgios Bampasidis (4), Conor Nixon (2), Panayotis Lavvas (5), Valeria Cottini (2,3), and F. Michael Flasar (2)

(1) LESIA, Observatoire de Paris, CNRS, UPMC Univ. Paris 06, Univ. Paris-Diderot, 92195 Meudon Cx, France (athena.coustenis@obspm.fr), (2) Planetary Systems Laboratory, Goddard Space Flight Center, Greenbelt, MD 20771, USA, (3) Department of Astronomy, University of Maryland, College Park, MD 20742, USA, (4) Faculty of Physics, National and Kapodistrian University of Athens, Panepistimioupolis, 15783 Zographos, Athens, Greece, (5) GSMA, Reims Champagne-Ardenne, 51687 Reims, France

We will report on the monitoring of seasonal evolution near Titan's poles. Since 2010, we have observed at Titan's south pole a strong temperature decrease and the onset of a dramatic enhancement of several trace species such as complex hydrocarbons and nitriles (HC3N and C6H6 in particular) previously observed only at high northern latitudes (Coustenis et al. 2016 and references therein). This is due to the transition of Titan's seasons from northern winter in 2002 to summer in 2017 and, at the same time, the advent of winter in the south pole. During this transition period species with longer chemical lifetimes linger in the north undergoing slow photochemical destruction, while those with shorter lifetimes decrease and reappear in the south. An opposite effect was expected in the north, but not observed with certainty until now. We present here an analysis of nadir spectra acquired by Cassini/CIRS (Jennings et al., 2017) at high resolution in the past years and describe the temperature and composition variations near Titan's poles. From 2013 until 2016, the northern polar region has shown a temperature increase of 10 K, while the south has shown a more significant decrease (up to 25 K) in a similar period of time. While the south polar region is continuously enhanced since about 2012, the chemical content in the north is finally showing a clear depletion for most molecules only since 2015 (Coustenis et al., 2017, submitted for publication). This is indicative of a non-symmetrical response to the seasons in Titan's stratosphere that can set constraints on photochemical and GCM models.
References: Coustenis et al., 2016, Icarus 270, 409-420; Jennings et al., 2017, Applied Optics 56, no 18, 5274-5294.