Geophysical Research Abstracts
Vol. 17, EGU2015-3408, 2015
EGU General Assembly 2015

Titan's South Pole Evolution in trace gases

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Up until mid 2012, Titan's Northern atmosphere exhibited the enriched chemical compounds found at the time of Northern Spring Equinox (NSE) since the Voyager days (November 1980), with a peak around the NSE in 2009 [1,2]. Since then, a reversal in the abundances of some species from north to south has been observed with the appearance for the first time at Titan's south pole of some species such as HC3N at 663 cm-1 and C6H6 in large quantities. These species had previously been clearly observed only at high northern latitudes. Though not present in the south until February 2012, the 663 cm-1 emission appeared in CIRS spectra recorded on 24 July 2012 next to the CO_2 band at 667 cm-1 and has been increasing since then. This is another strong indication of the buildup of the gaseous inventory in the southern stratosphere, as expected as the pole moves deeper into winter shadow. Downwelling nitrile gases that accumulate in the absence of ultraviolet sunlight, evidently increased quickly during 2012 and may be responsible also for the reported haze decrease in the north and its appearance in the south from its 220 cm-1 feature [3,4]. We present analysis for temperature and composition of the trace gases in Titan's stratosphere until late 2014. HC3N has increased by 2 orders of magnitude in the south over the past 2 years, while decreasing rapidly in the north. We find other interesting, although weaker transitions, from north to south for other molecules and we will discuss HCN, C3H4 and C4H2, which need to be monitored more in the future.

References

[1] Bampasidis et al., ApJ 760, 144, 8 p., 2012.
[2] Coustenis, A., et al., Icarus, 207, 461-476, 2010.
[3] Jennings, D. E., Anderson, C. M., Samuelson, R. E., et al. 2012a, ApJ, 754, L3
[4] Jennings, D. E., Anderson, C. M., Samuelson, R. E., et al. 2012b, ApJ 761, L15