



## Diurnal and seasonal changes in Titan's atmosphere

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Since 1998, our team at the LESIA has explored Titan's atmosphere, gathering information before the arrival of the Cassini-Huygens mission. The data presented here relied on adaptive optics, harvesting infrared images of Titan between 0.8 and 2 micron with either PUEO at the CFHT or NAOS/CONICA (NACO) at the VLT. The imaging modes we used vary from one observing run to another : (a) narrow-band filter imaging, around each methane window at 1.3, 1.6 and 2.0 micron [1,2,3,4], (b) spectroscopy around 2 micron with a 1400 resolving power, (c) SDI imaging, probing the core and wings of the 1.6 micron methane window, and (d) Fabry-Pérot Imaging (FPI), used as a collection of 2-nm wide filters to scan the 2.0 micron window.

We will describe here the latest conclusions drawn from these 2005 runs, focusing only on the features detected in Titan's atmosphere [5]: it displays at the present era variations or new apparitions of atmospheric phenomena, such as seasonal and diurnal effects, or some very interesting features in the Southern polar region. The North-South Asymmetry (NSA) is shown to have changed since 2000 in the near-IR and to be currently organized in a brighter northern than southern pole. We report here on this evolution. From our data, we also have significant statistical evidence for diurnal effects in Titan's stratosphere, with a brighter (by as much as 19%) morning limb appearing in our images in many cases, when the phase effect is on the evening side. The southern bright revolving feature detected by many authors since 2000 cannot be seen any more since January 2005. It was a meteorological (and possibly seasonal) phenomenon, revolving around the Southern pole (confined in its motion within the 80th S parallel) and located somewhere in the upper troposphere (20-40 km of altitude). We will discuss some of its aspects.

- 1 Combes et al. (1997), *Icarus*, 129, 482-497.
- 2 Coustenis et al. (2001), *Icarus*, 154, 501-515.
- 3 Coustenis et al. (2005), *Icarus*, 177, p. 89-105.
- 4 Gendron et al. (2003), *AA*, 417, L21-L24.
- 5 Hirtzig et al. (2006), *AA*, in press.