Titan observations with ISO

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Preceding FIRST, the ISO satellite offered great possibilities for observing, among other, solar system objects. In the case of Titan, Saturn's largest satellite, ISO set a milestone in our understanding of the physical processes acting in its atmosphere, but also gave us some insights on its surface.
In the spectroscopic mode, Titan was observed by ISO in 1997 by SWS, PHT-S and CAM/CVF. The combination of this data provides Titan's spectrum from 2.5 to 17 micron with resolving powers of 3000 at the most. The analysis of the spectra has provided information on Titan's atmospheric structure (temperature and composition, [1,2]) and on its surface (through the emission observed in the 2.9-micron window). In particular, ISO/SWS observations allowed us to detect for the first time the spectral signatures of water vapor near 40 micron [1]. Also, the 2.9 methane window was observed in its full shape for the first time [3].
All of this information is a valuable supplement to the optimization of the Cassini/Huygens mission, to reach Saturn's system in 2004. FIRST may well bring the required follow-up to the mission return, after 2007, with an extension of the ISO spectral region and higher capabilities.

References

1. Coustenis, A., A. Salama, E. Lellouch, Th. Encrenaz, G. Bjoraker, R. E. Samuelson, Th. de Graauw, H. Feuchtgruber, M. F. Kessler 1998. Evidence for water vapor in Titan's atmosphere from ISO/SWS data. *Astron. Astrophys.* **336**, L85-L89.
2. Coustenis, A., A. Salama, E. Lellouch, Th. Encrenaz, B. Schulz, H. Feuchtgruber, D. Gautier, S. Ott, Th. de Graauw, M. F. Kessler 2000. ISO spectroscopy of Titan. Proceedings of the Conference "ISO beyond the Peaks", Villafranca del Castillo, Spain, 2-4 February 2000, *ESA SP* **456**.
3. Coustenis, A., B. Schulz, A. Salama, E. Lellouch, Th. Encrenaz, E. Raynaud, T. Owen, P. Rannou 2000. The 3-5 micron region on Titan with ISO. *Bull. Amer. Astron. Soc.* **32**.