RECENT APPLICATIONS AND FUTURE PROSPECTS OF METHANE SPECTROSCOPY TO THE ATMOSPHERE OF TITAN

V. BOUDON, *Institut Carnot de Bourgogne, UMR 5209 CNRS-Université de Bourgogne, 9. Av. A. Savary, BP 47870, F-21078 Dijon Cedex, France*; A. COUSTENIS, E. LELLOUCH, P. DROSSART, *LESIA, Observatoire de Paris-Meudon, 5 Place Jules Jansen, F-92195 Meudon Cedex, France*; A. NEGRÃO, *Observatorio Astronomico and Faculdade de Ciências da Universidade de Lisboa, 1749-016 Lisboa, Portugal*; C. A. GRIFFITH, *Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ, 85721 USA*.

The advent of the Cassini-Huygens mission studying Saturn's system and its largest moon Titan, has led to a renewed interest in reliable models of the absorption spectrum of methane. CH_4 is the main absorber in Titan's thick atmosphere. Although the models developed in the Dijon group still do not allow sufficently reliable simulations above 5000 cm^{-1} to reproduce all the recent data (such as Huygens/DISR spectra, for instance), the methane coefficients in the 0–4800 cm^{-1} region have contributed to a better understanding of various ground- and spaced-based data : ISO high-resolution data in the 3 μm region[a], near-infrared VLT data[b] and 2 μm VLT data of the Huygens probe landing site[c]. These coefficients have also contributed to the discovery of a polar ethane cloud on Titan[d]. Models of CH_4 hot bands by the Dijon group are also of primary importance for fluorescence calculations observed at 3.3 μm with Cassini/VIMS[e]. After a short review of these works, future prospects for line-by-line analyses of CH_4 spectra for planetary applications will also be discussed and compared to other approaches, such as the so-called band models or purely experimental approaches.

[a] A. Coustenis, A. Negrão, A. Salama *et al. Icarus* **180**, 176–185 (2006).
[b] A. Negrão, A. Coustenis, E. Lellouch *et al. Planet. Space Sci.* **54**, 1225–1246 (2006).
[c] A. Negrão, M. Hirtzig, A. Coustenis *et al. J. Geophys. Res. Planets* **112**, E02S92 (2007).
[d] C. A. Griffith, P. Penteado, P. Rannou *et al. Science* **313**, 1620–1622 (2006).
[e] R. H. Brown, K. H. Baines, G. Bellucci *et al.*, Astron. Astrophys. **446**, 707–716 (2006).