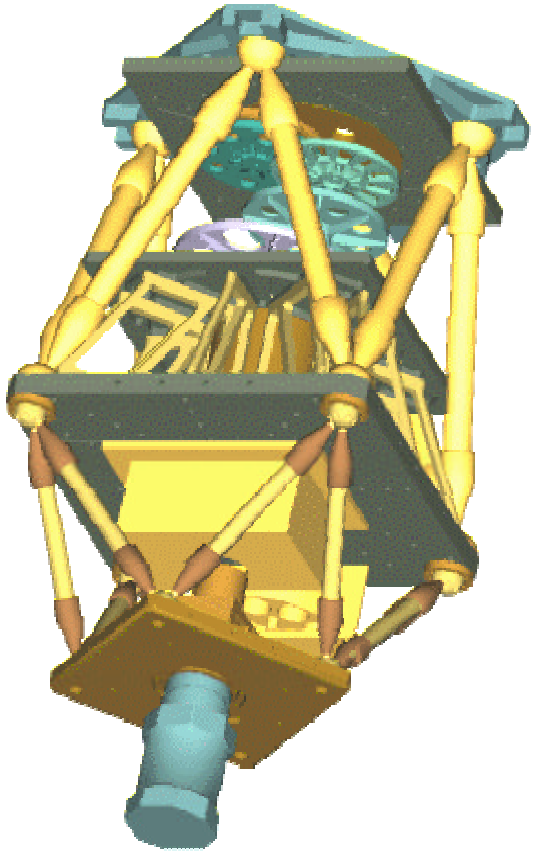
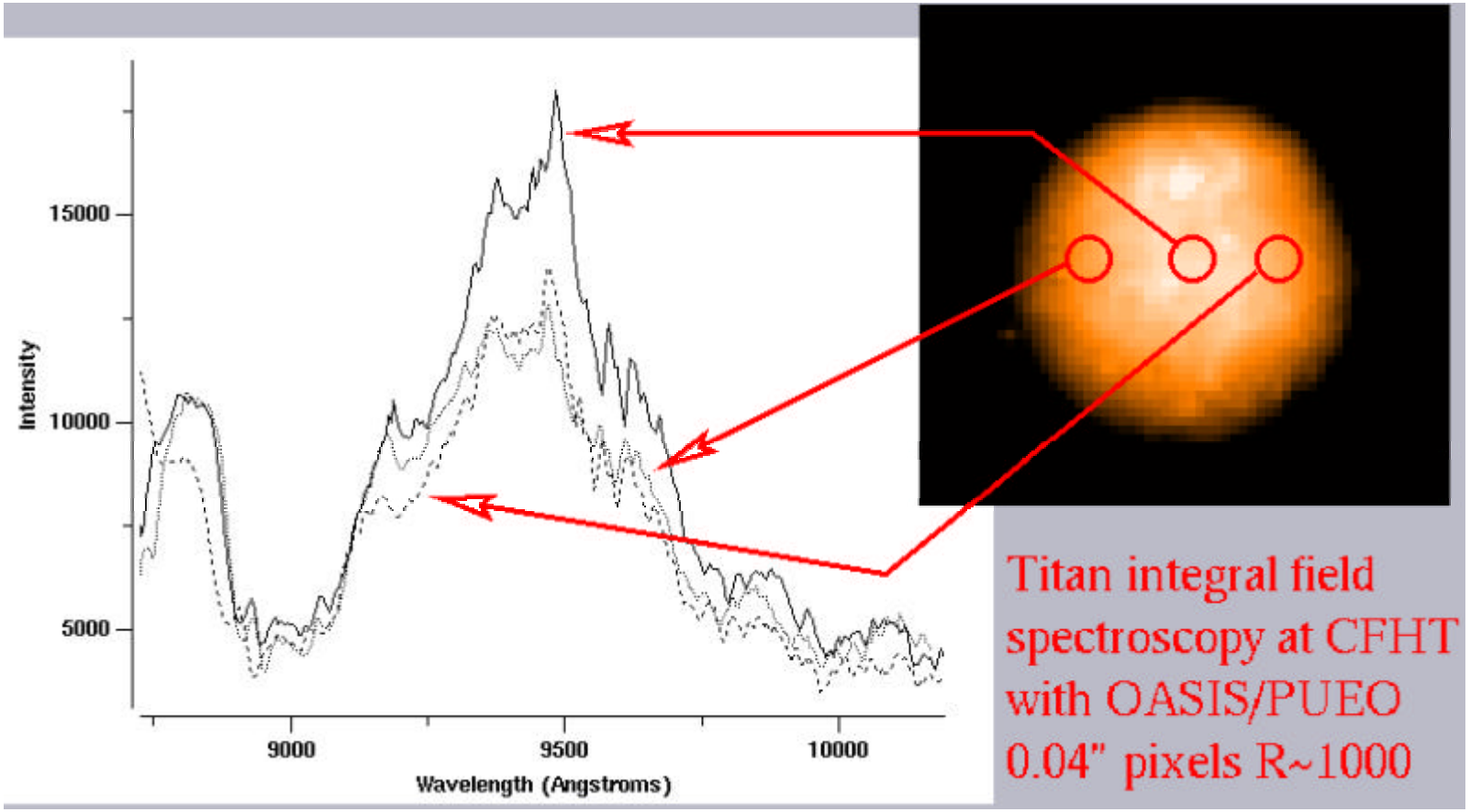
Hirtzig, Coustenis, Lai, Emsellem, Pecontal,Rannou, Negrao

Titan's spectro-imaging by OASIS



- 3,60m CFHT
- Pass band 0,43 - 1 *m*m
- CCD 2000x2000
- Spectral resolution 3350
- Titan images:
  - band 0,865 - 1,037 *m*m
  - Disk: 300 pixels
  - R=1800

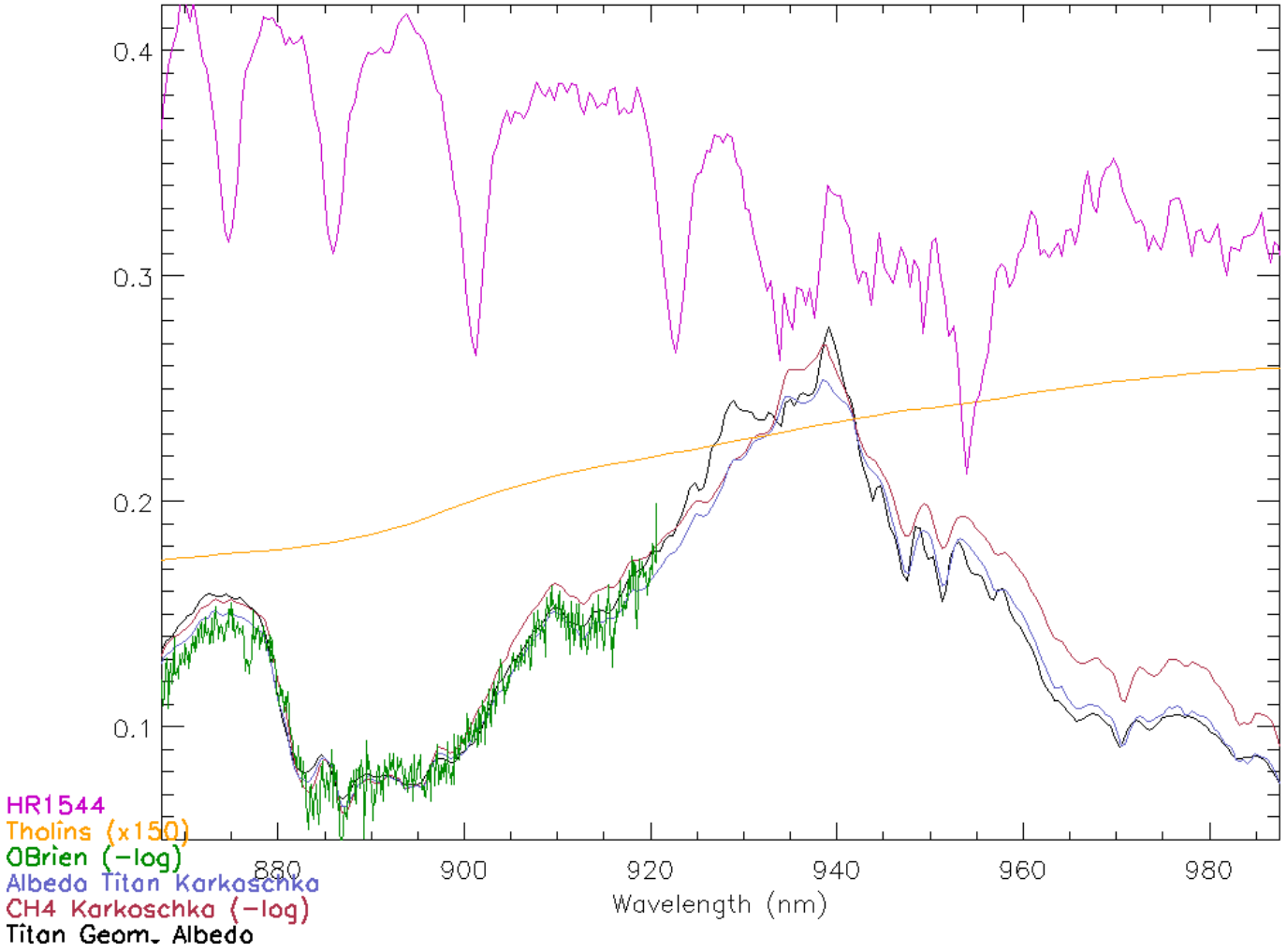
Titan with OASIS



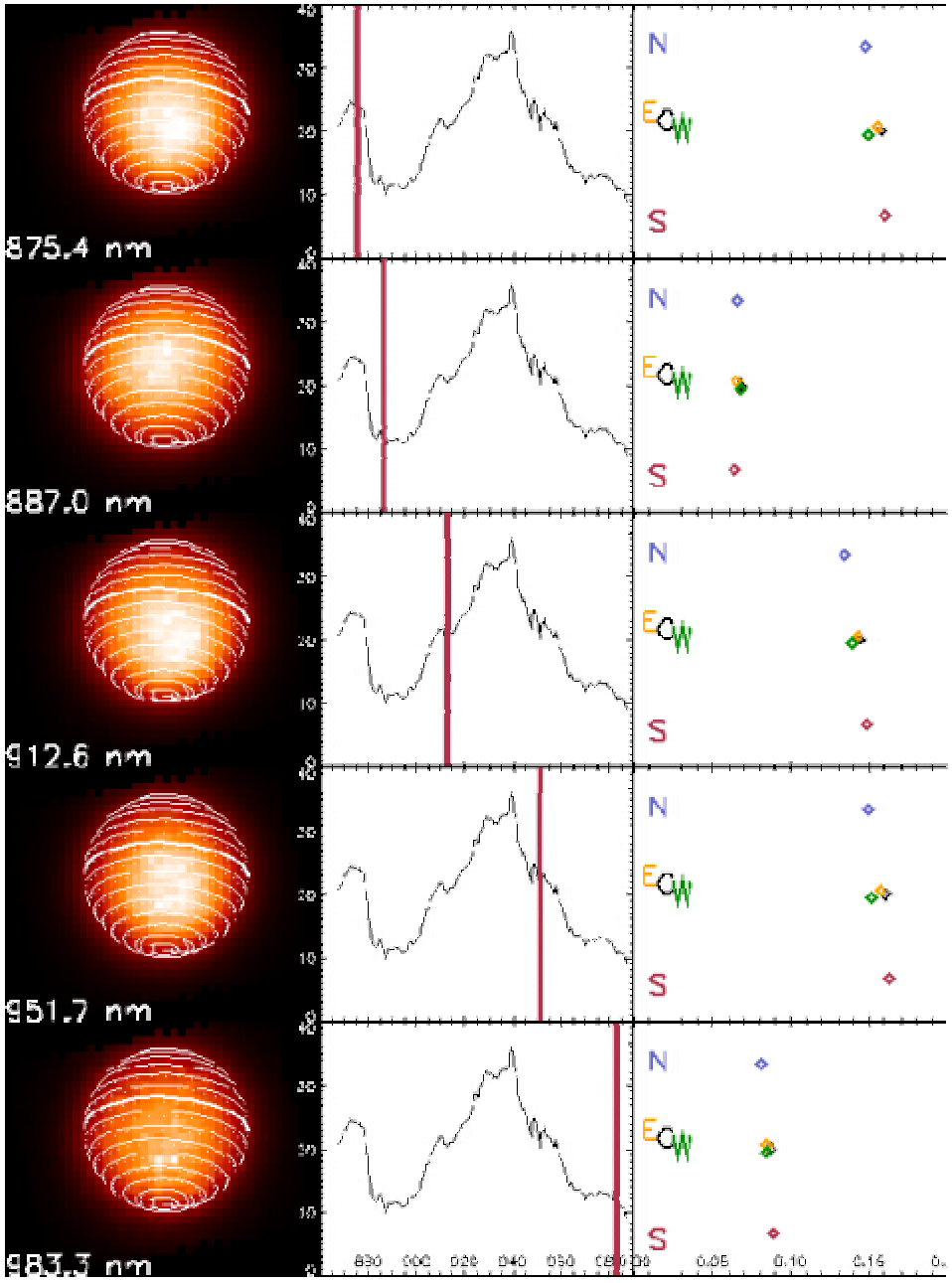
OASIS Spectro-imaging: Resolved Titan's disk :

Hirtzig et al. (2004, submitted for publication)

Titan's calibrated albedo



Titan's albedo (black) is extracted from the central pixel on the disk. Observed albedo by Karkoschka (blue), CH4 absorption coefficients by Karkoschka (red) or CH4 coefficients by O'Brien (green) are adjusted to our observations to insist on the features observed. The tholins reflectivity index (gold) is exaggerated to show a visible trend. The spectrum of the reference star HR1544 (pink) is shown here in wavelength vs flux (in arbitrary units) to attest the presence of telluric absorption features, particularly around 935 nm. Finally, the image of the 939.6 nm section from the merged datacube is drawn below the methane window.



Spatial analysis

Composite image of Titan's atmosphere at five different wavelengths (875.4, 887.0, 910.3, 951.7 and 981.0 nm).

The contrast is enhanced by a square law, and a coordinate system is added to each image.

The spectra shown here are flux (10^{-16} erg/s/cm^2/Angst/arcsec^2) vs wavelength (nm), taken from the central pixel on Titan's disk, with a reddish cursor indicating the current wavelength probed. The left column displays an arbitrary latitude indicator vs the corrected albedo, for each of the five regions.

Titan’s surface

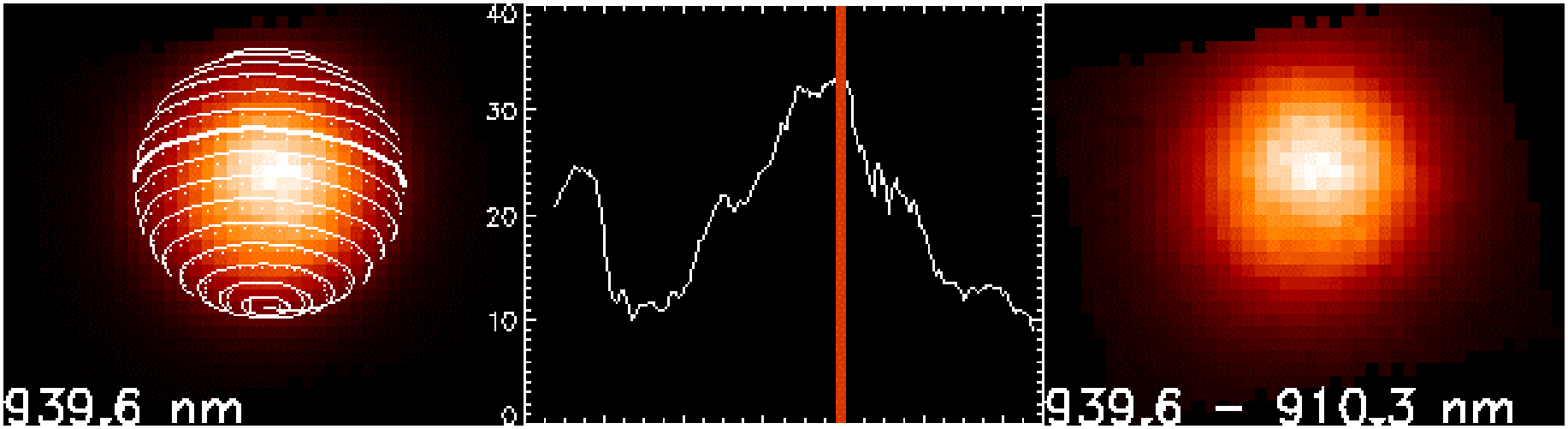
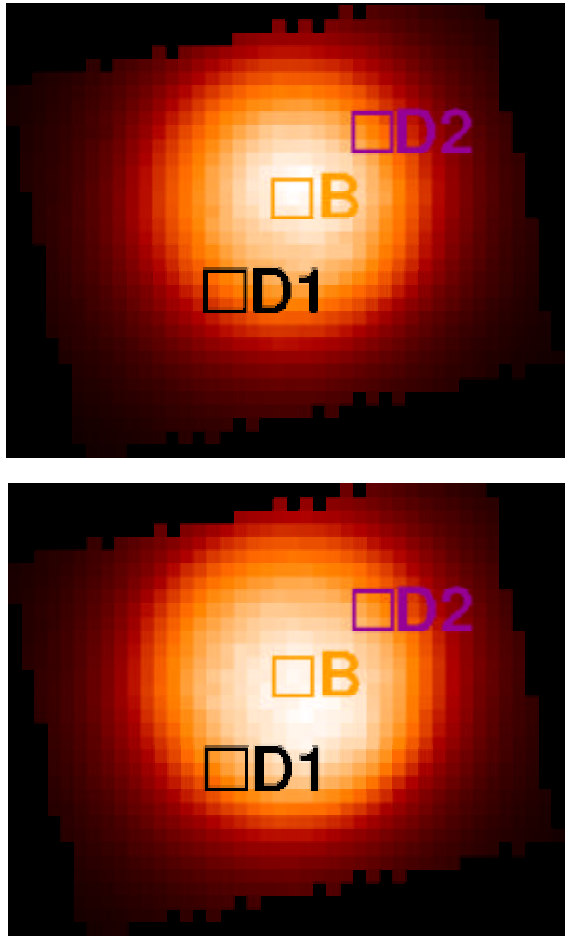


Image of Titan's surface in the center of the methane window (at 939.6 nm). Contrast (left image only) is enhanced by a square law. The spectrum shown here is in flux (10^{-16} erg/s/cm^2/Angst/arcsec^2) vs wavelength (nm), taken from the central pixel on Titan's disk, with a reddish cursor indicating the current wavelength probed in the center panel. The third panel returns the image in the methane window after the subtraction of an atmospheric image (here 910 nm).

Titan’s surface

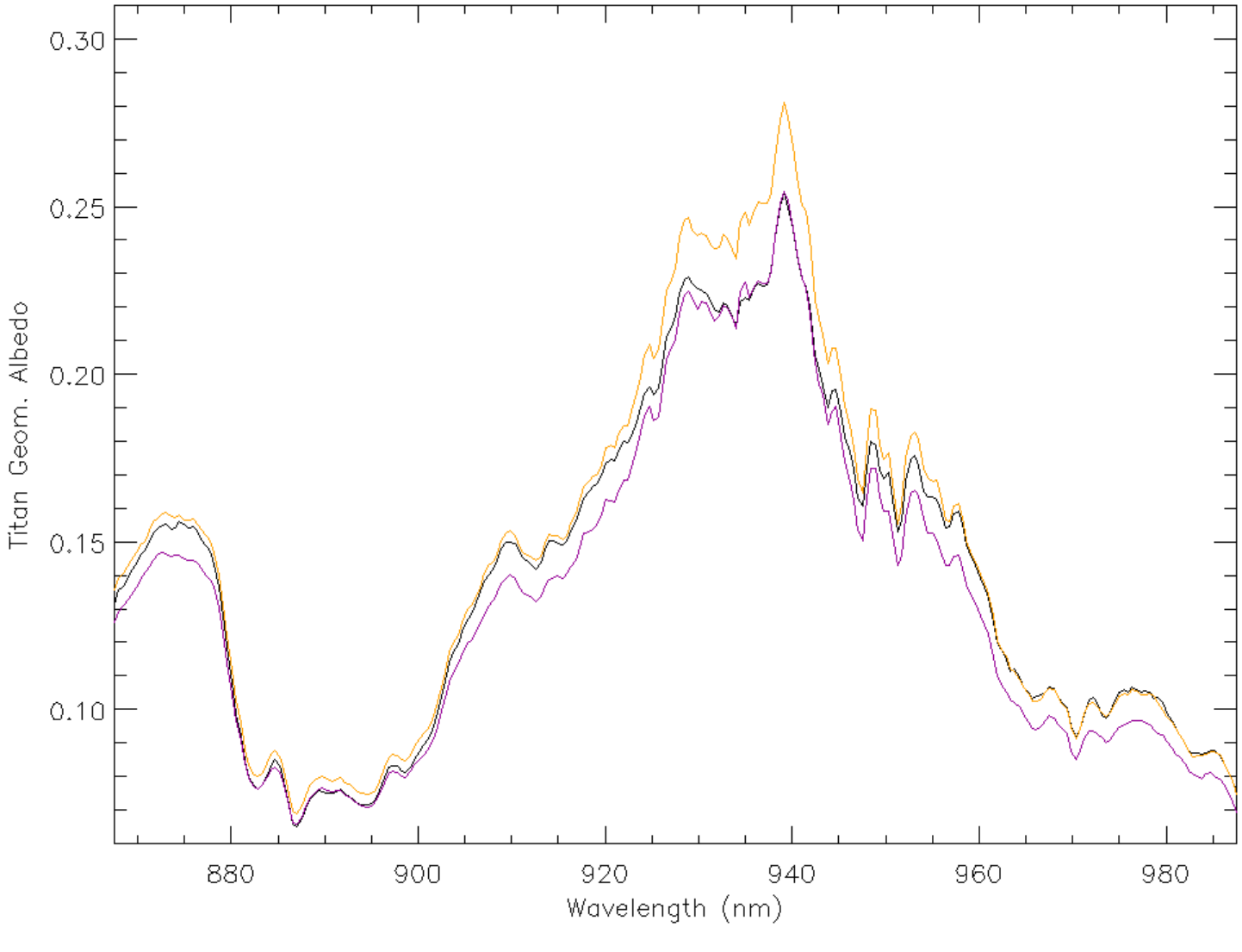


Bright and dark areas chosen on Titan's disk corresponding to :

(a) top panel: an image at 910.3 nm, diagnostic of the atmospheric contribution;

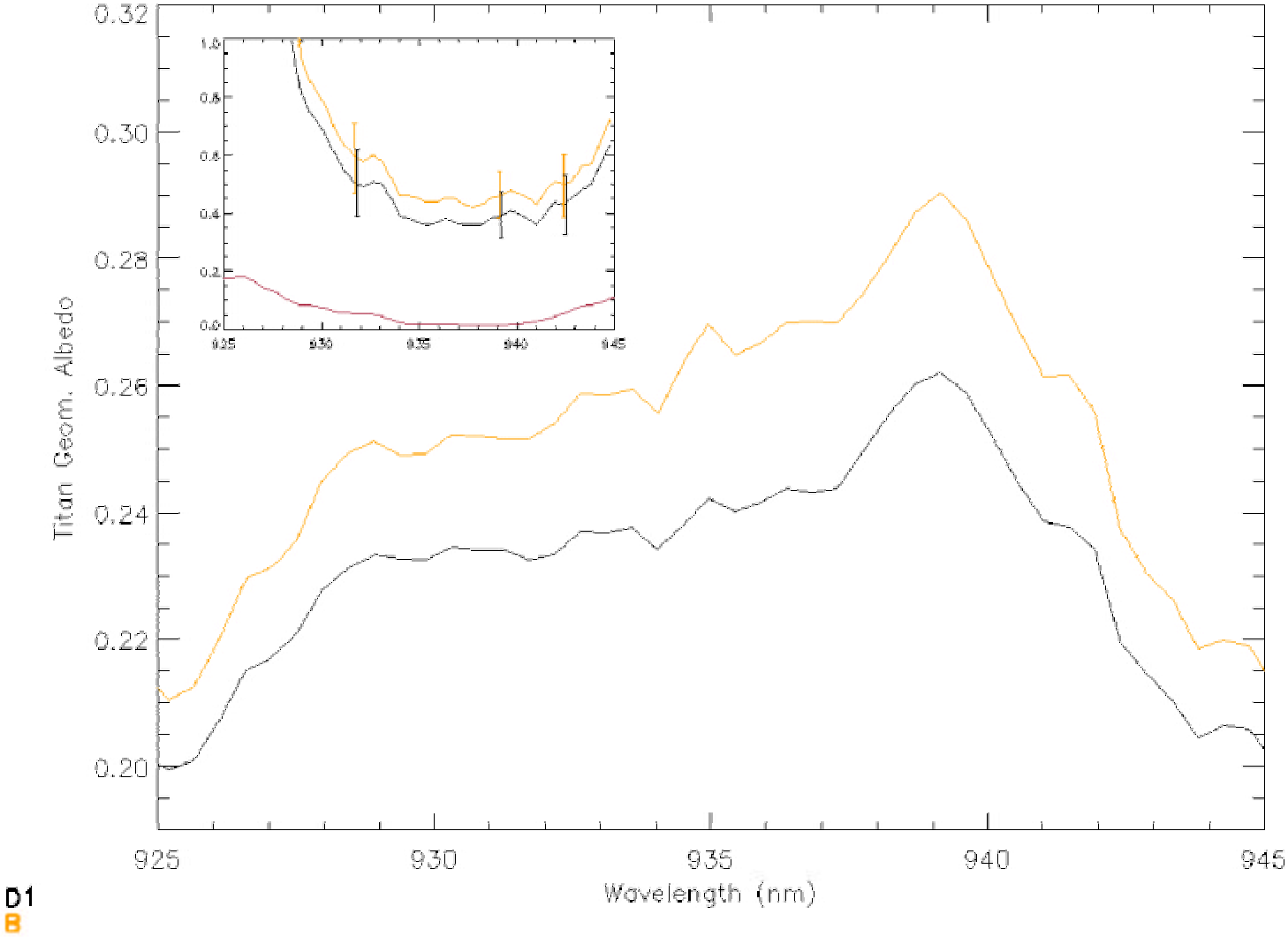
(b) bottom panel: an image at 939.6 nm, with Titan's surface.

Titan's albedo in the darkest and brightest areas



The dark areas exhibit similar albedos in the center of the window and the core of the 889 nm methane band, thus revealing close surface and upper atmospheric contents. Differences in the wings may be indicative of variations in the tropospheric aerosol budget.

Titan’s albedo



The main graph shows Titan's geometric albedos for the brightest and darkest regions on Titan.

The insert shows the surface albedos computed with our radiative transfer code for these two regions, as well as the methane spectrum as determined by Karkoschka 1994 (in $km.am^{-1}$) in red.

Titan’s surface albedo