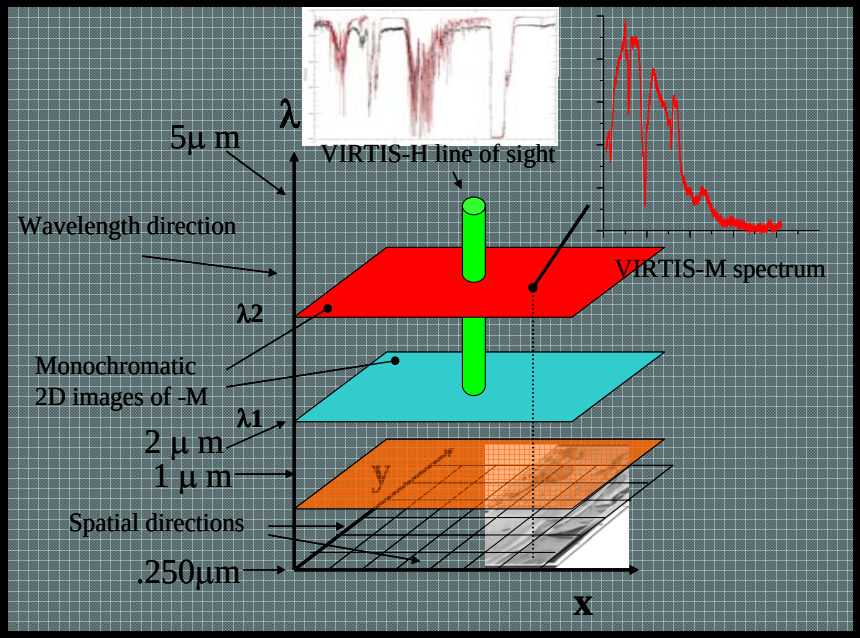
Venus atmosphere from Venus Express/VIRTIS

What is new since January Vexag meeting ?
Presentation made from material of
16th Venus Express Science Working Team meeting
(Moscow, 2d October

Pierre Drossart, Giuseppe Piccioni and the VIRTIS team



Instrumental characteristics

Parameter	VIRTIS-M		VIRTIS-H
	Visible	Infrared	
Spectral Range [μm]	0.27-1.1	1.05-5.19	1.88-5.03
Spectral sampling [nm]	1.9	9.8	0.6
FOV	64mrad x 64mrad		0.58mrad x 1.75mrad per px
IFOV	0.25mrad x 0.25mrad		N/A
Pupil Diameter [mm]	47.5		32
F#	5.6	3.2	2.04

Technical status

- No problem until 13 August 2007
- Some problems with cryocoolers (successively –H and –M IR channels)

Current increase

Mechanical degradation ?

Sensor degradation ?

Electronic

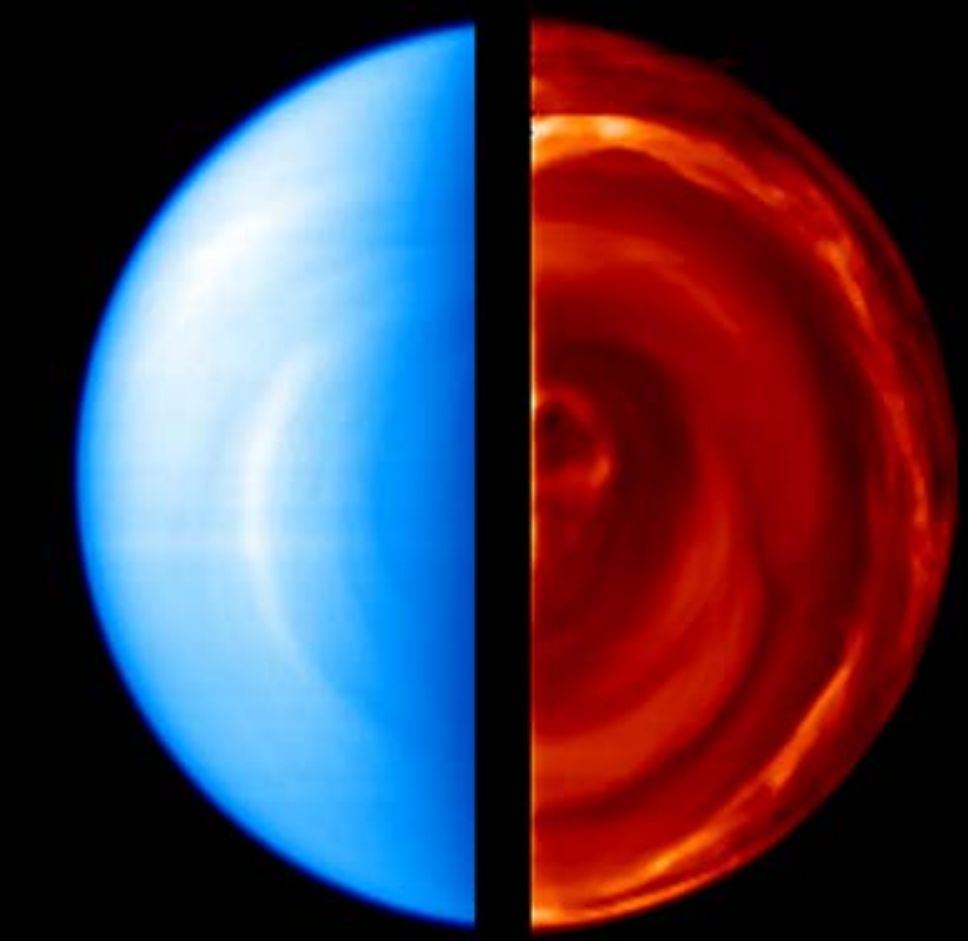
Probably minor, not affecting the lifetime at short term . Decision to re-operate after interruption.

Science : List of VIRTIS papers

- ESA –SP1295 Piccioni et al
- PSS paper : Drossart et al. October 07

  Related papers :
  - Nov. 06 : Bougher et al, Baines et al
  - October 07 : Lopez-Valverde et al
- 2 Nature papers
  - Piccioni et al (polar vortex)
  - Drossart et al (upper atmosphere)
- GRL : Gerard et al (accepted) : O_2 airglow
- JGR special issue : many papers in preparation
- *+ Many conferences presentations since COSPAR (DPS, AGU, EGU, EPSC, IUGG, …)*

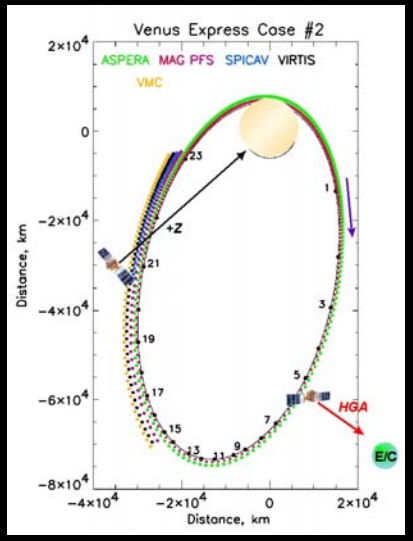
The new face of Venus from VIRTIS observations



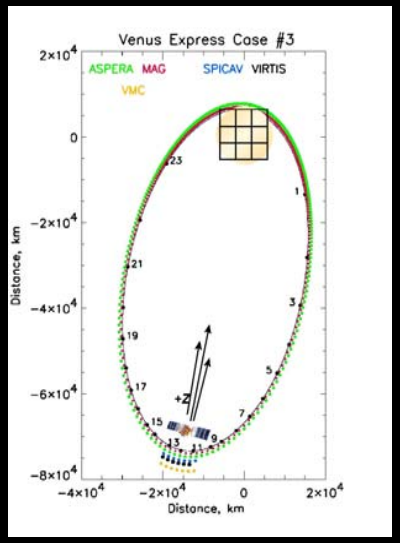
First VIRTIS observation on Venus Express 12 April 2006 Venus Orbit Insertion (distance 210 000 km)

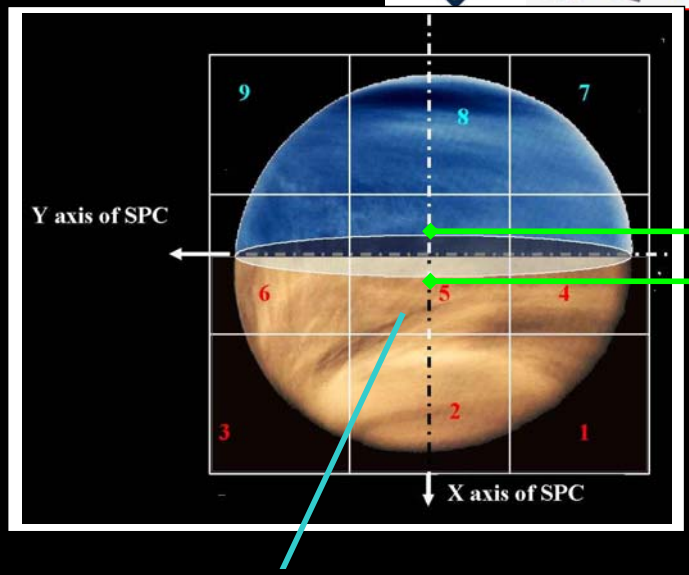
Main observation modes

#2: Ascending arc

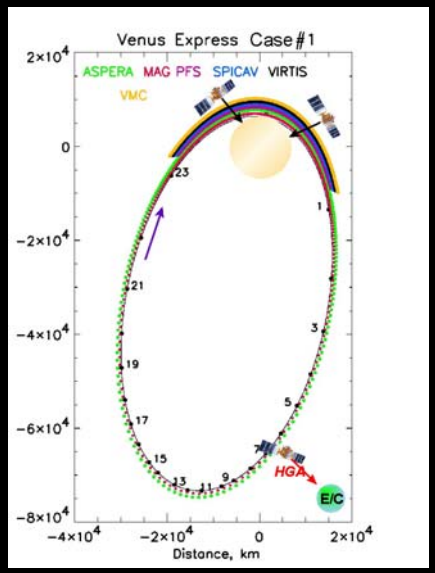


#3: Apocentre mosaic

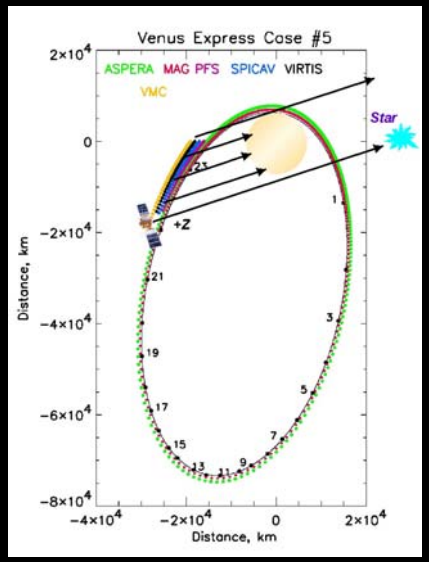




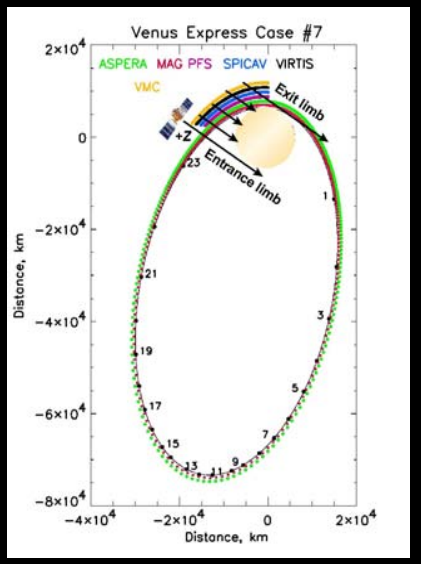
#1: Pericentre nadir

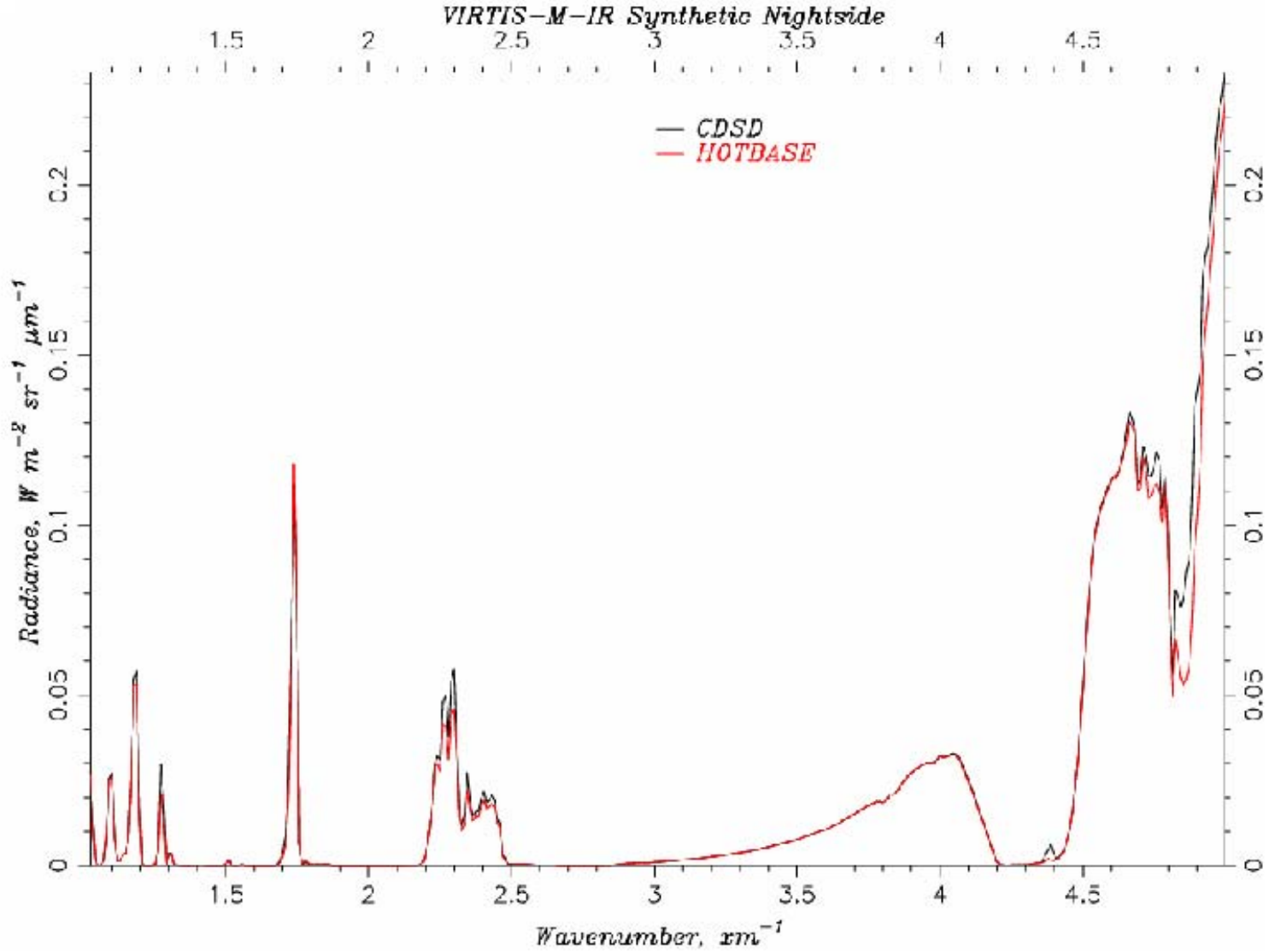


#5: Stellar occultation



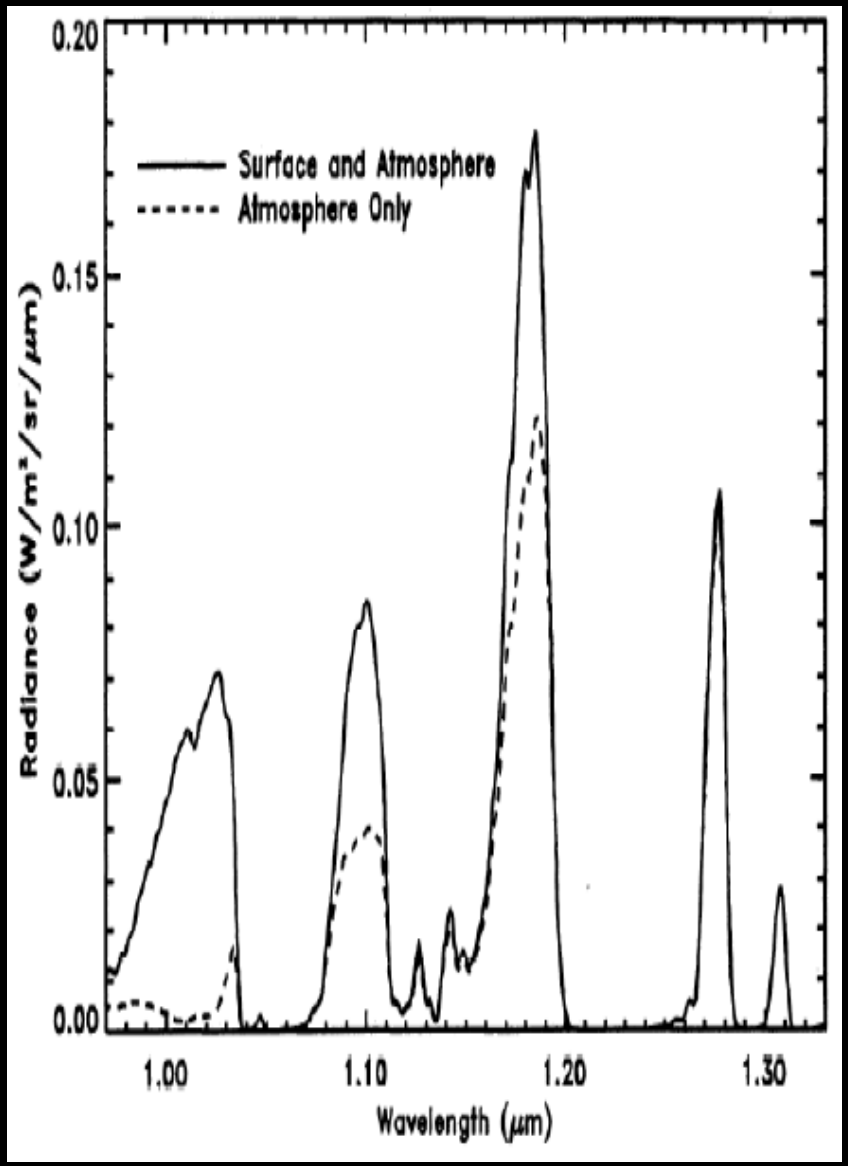
#7: Limb




VIRTIS−M−IR Synthetic Nightside
CDSD
HOTBASE
Radiance, W m⁻² sr⁻¹ μm⁻¹
Wavenumber, xm⁻¹
0
0.05
0.1
0.15
0.2
1.5
2
2.5
3
3.5
4
4.5

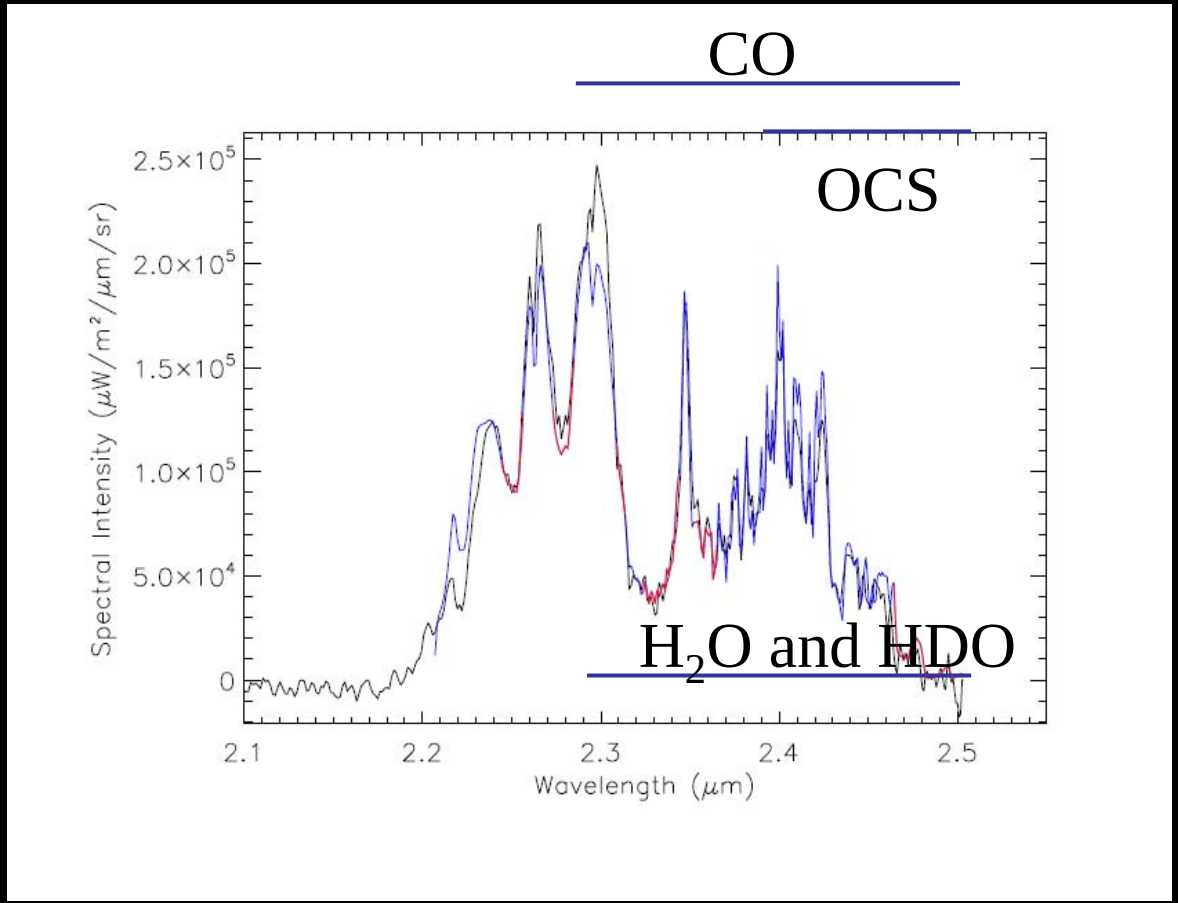
1. Venus surface

Night side spectrum and relative surface/atmosphere contribution (from Meadows and Crisp, JGR, 1996)



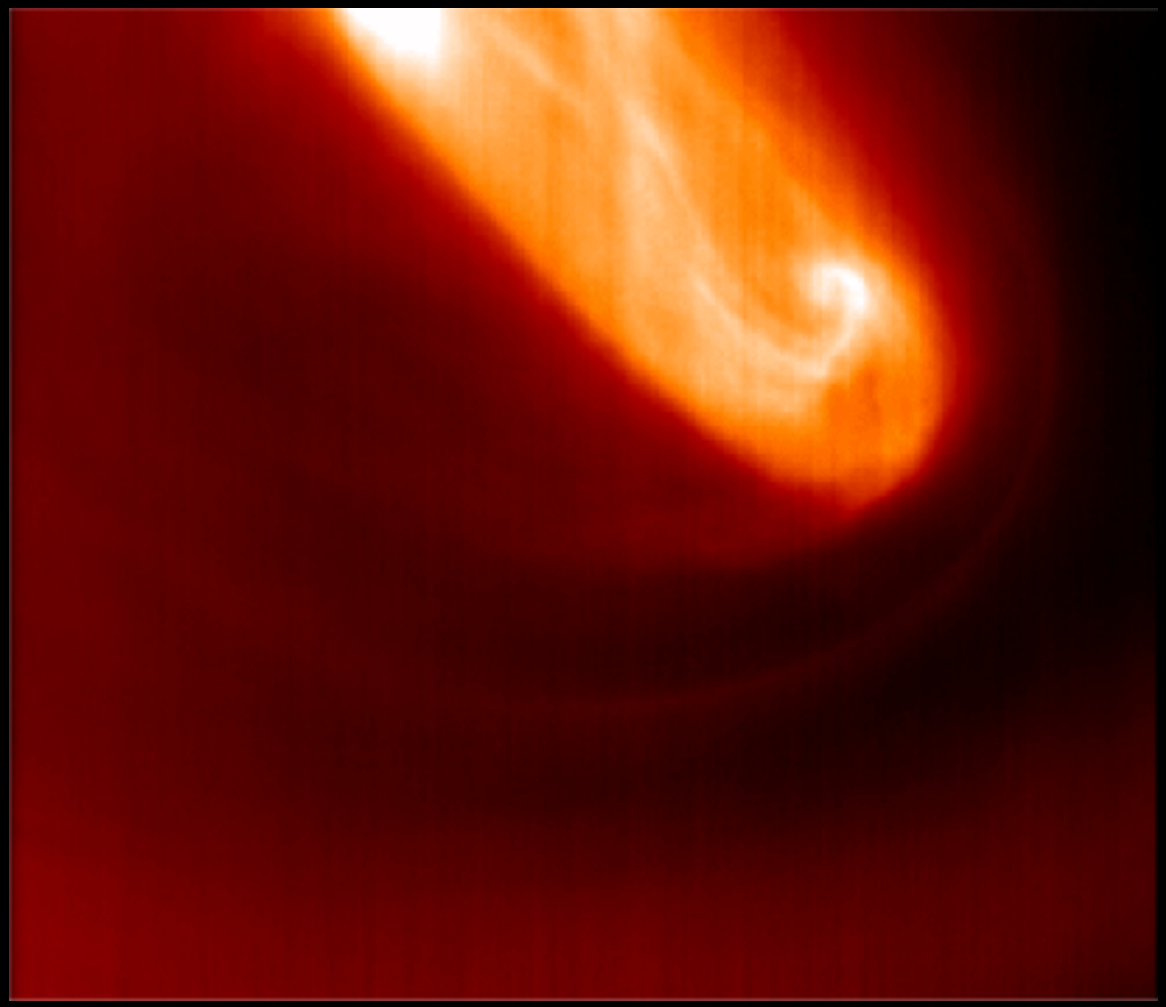
3. Night side spectroscopy

- E. Marcq, B. Bézard (Meudon
- 2.3 μm window : deep atmospheric sounding (around 35 km)
- What is new : polar geometry



6. Dynamics: Observations of the South polar vortex by VIRTIS

Piccioni et al., Nature, in press



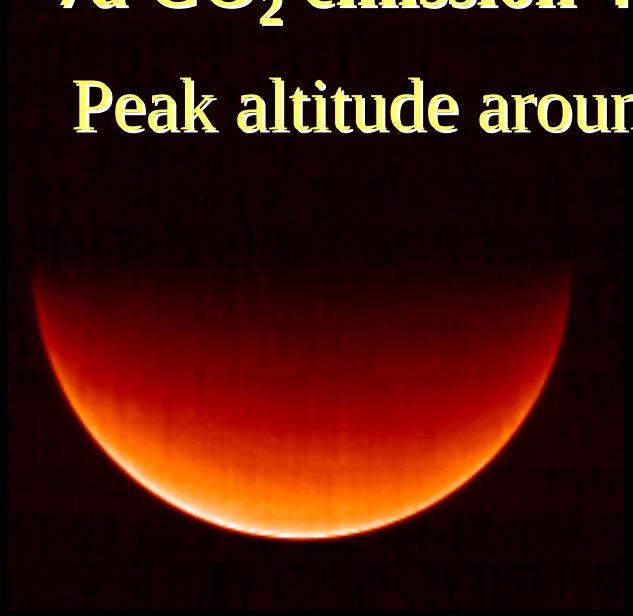
Observations at 5 microns

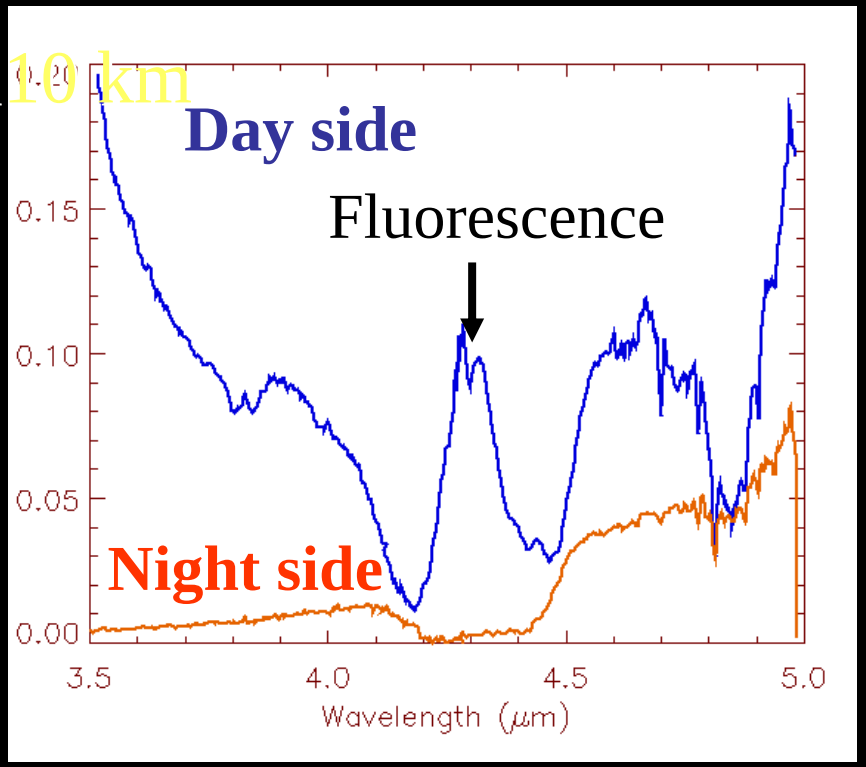
7. Upper atmosphere emission

CO_2 day side and O_2 night side

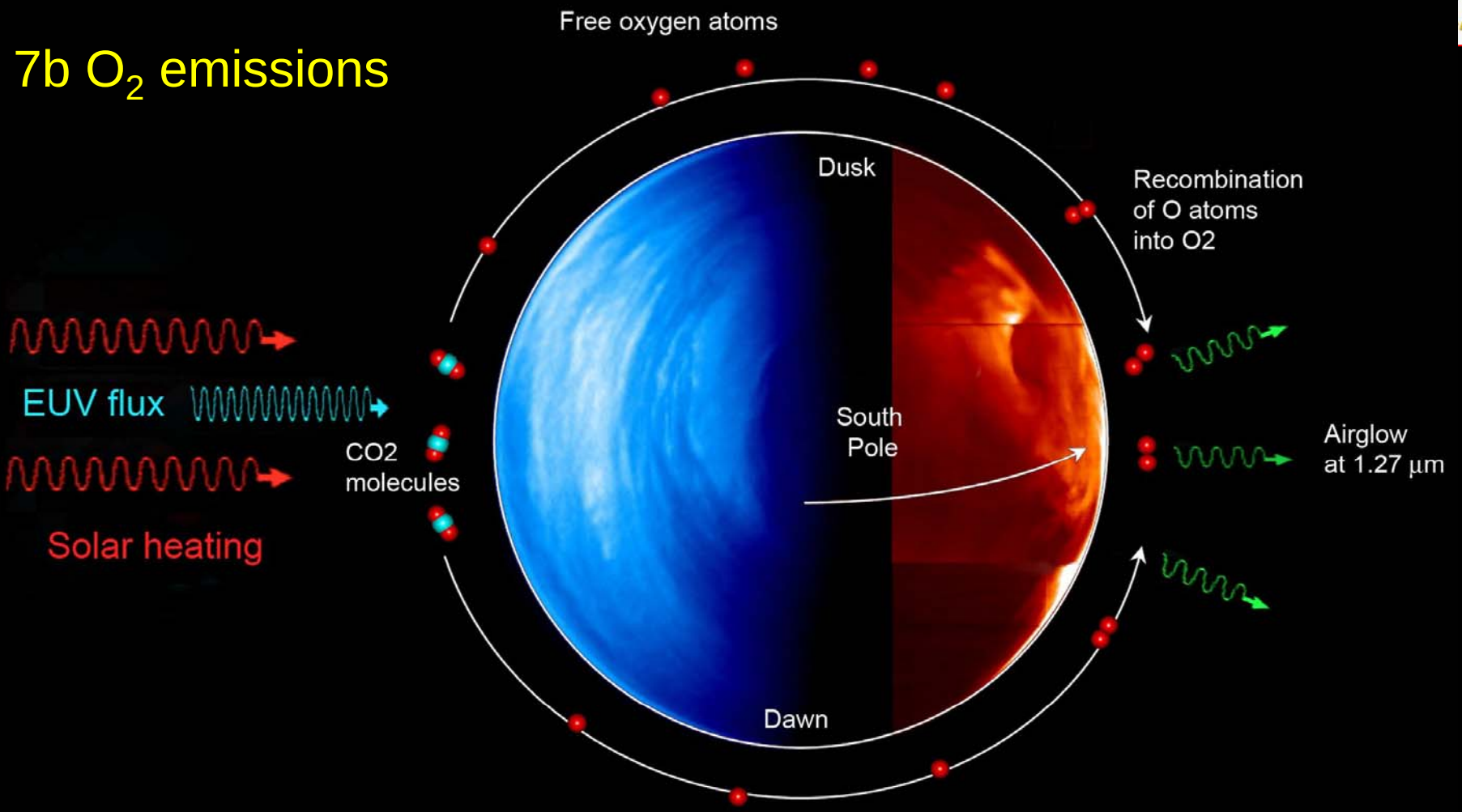
7a CO_2 emission 4.3 μm band

Peak altitude around 110 km





7b O_2 emissions



Summary of VIRTIS observations

- Data volume at orbit 422 : 110 Gigabytes
- First level analysis : routinely achieved.
  - Measurements of physical quantities (winds, Tsurf, etc.)
  - First papers submitted
  - First data set delivered ESA (Planetary Science Archive)
  - Still in work : visible channel (UV absorber spectra)
- Second level objectives : just beginning
  - General circulation : dynamics and composition
  - Radiative balance
  - Survey of potential surface variability (volcanoes)
  - Systematic survey of emissions by CO_2 et O_2 and modeling
- Extended mission starting in Septembre until 2009; and beyond ? Venus Climate Orbiter, VESPER, others ?