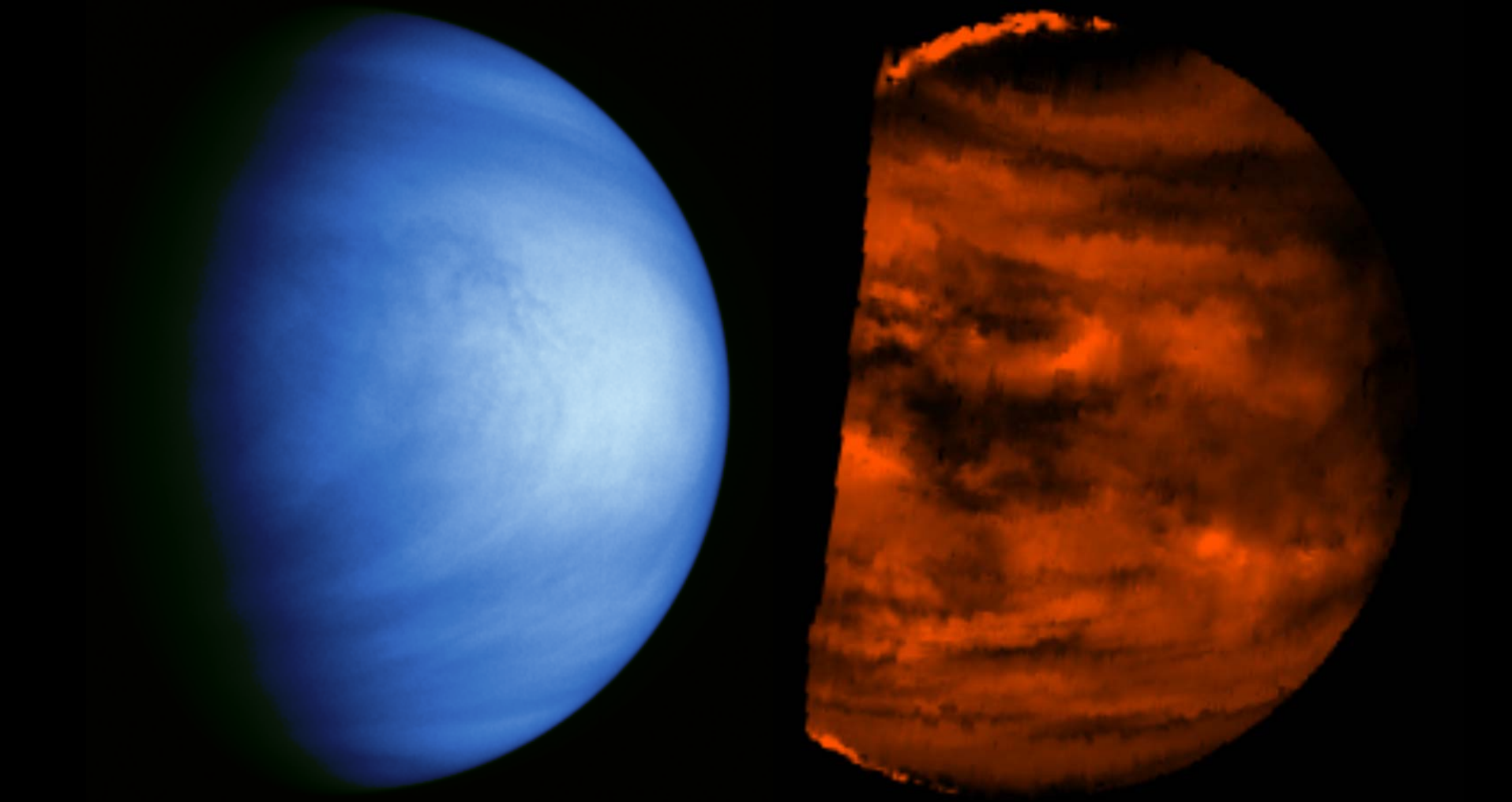
A new face of Venus from Venus Express/VIRTIS observations

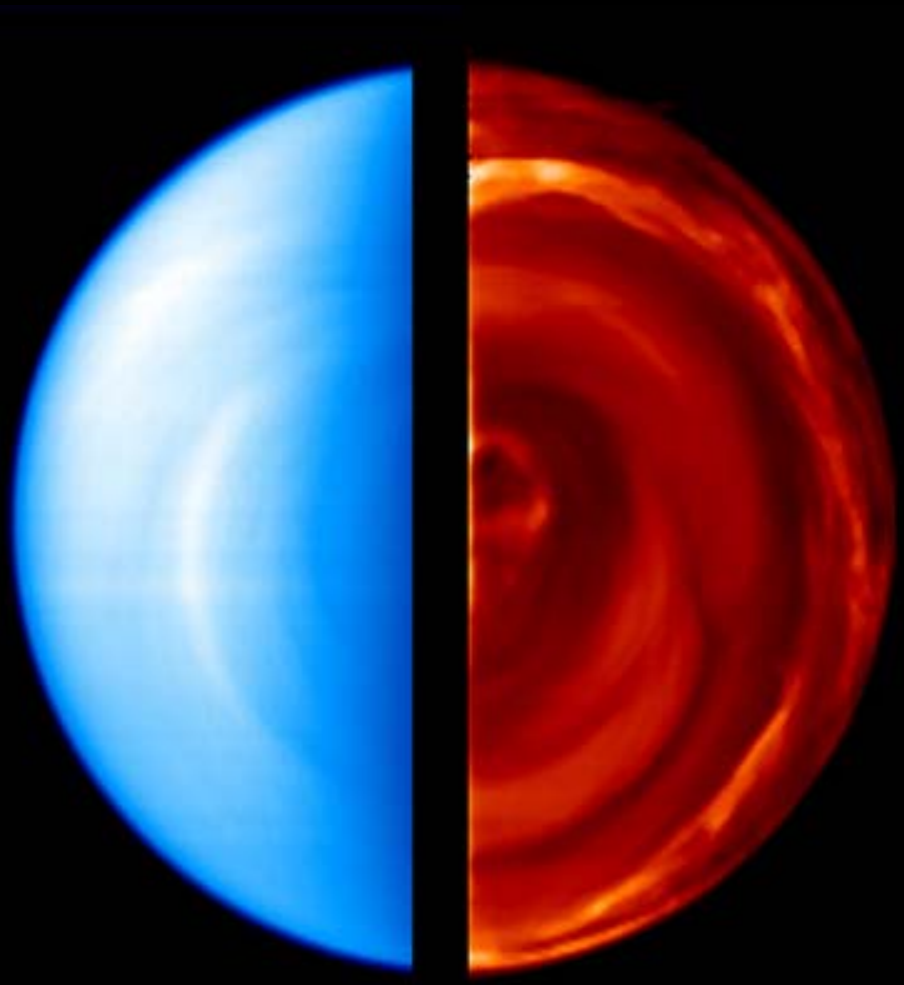
Pierre Drossart, Giuseppe Piccioni and the VIRTIS team

VIRTIS : the imaging spectrometer of Venus Express / heritage from Rosetta (A. Coradini)

First motivation for VIRTIS/Venus Express after Galileo Venus Flyby in 1990 : let us go back !

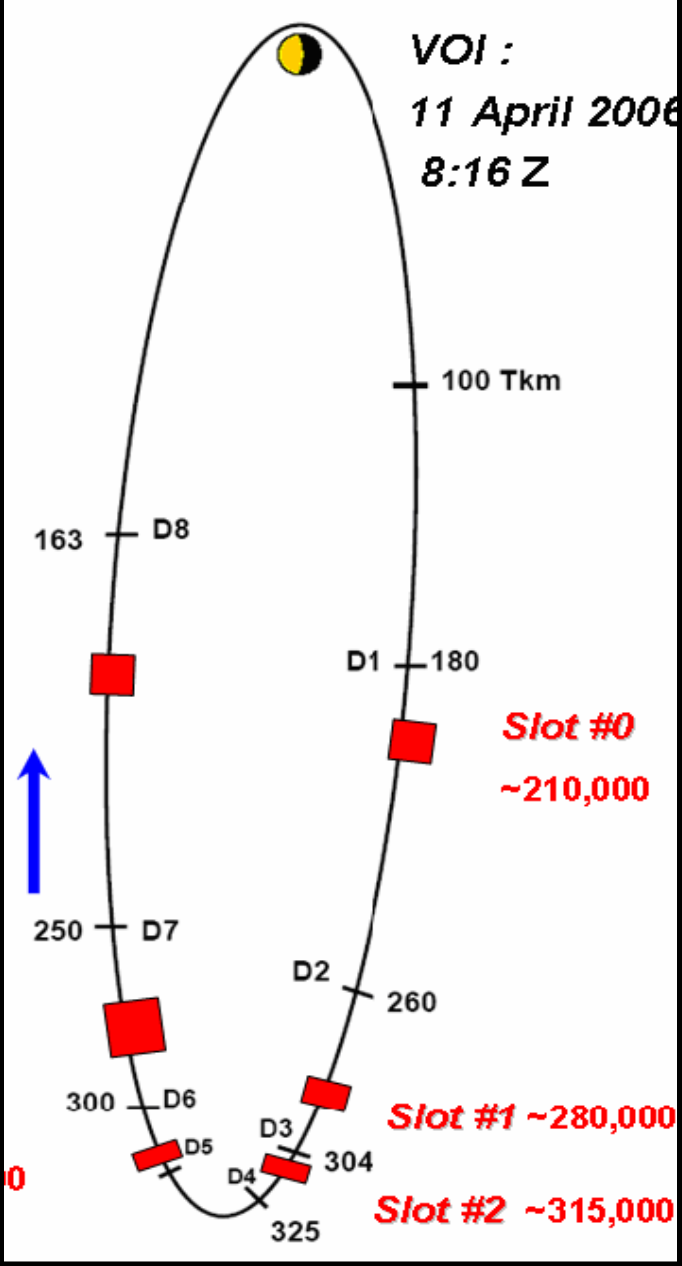


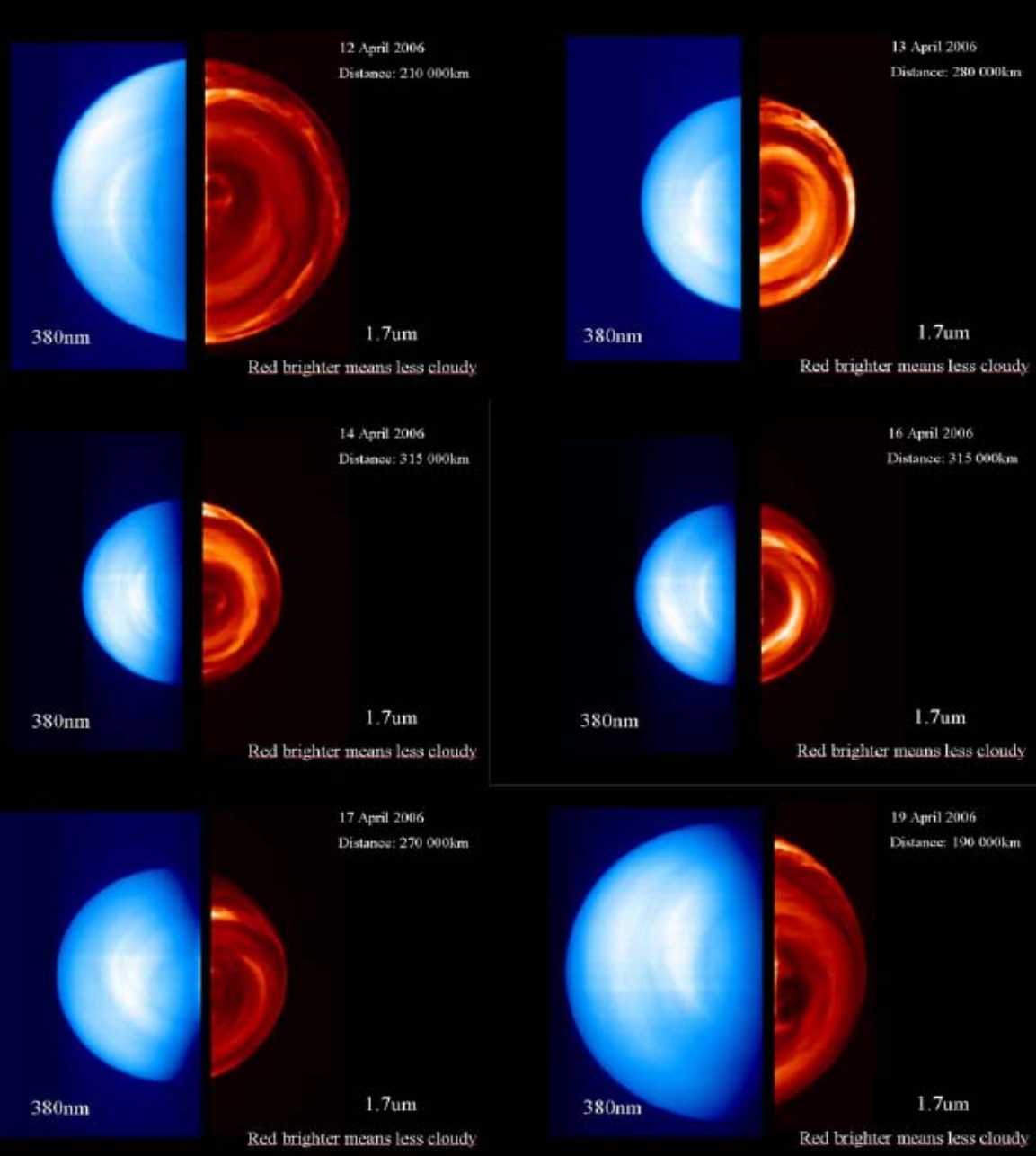
The new face of Venus



12 April 2006
Distance 210 000 km

First VIRTIS observation on Venus Express
12 April 2006
Venus Orbit Insertion

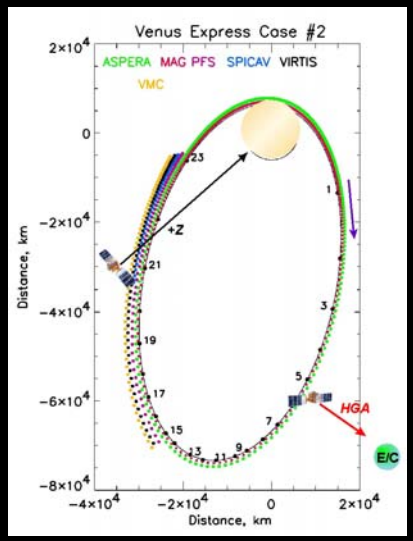




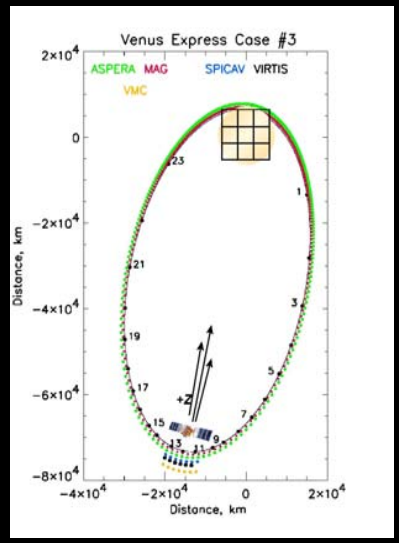
Moscow / 2 October 2007 /
P. Drossart VIRTIS-Venus
Express

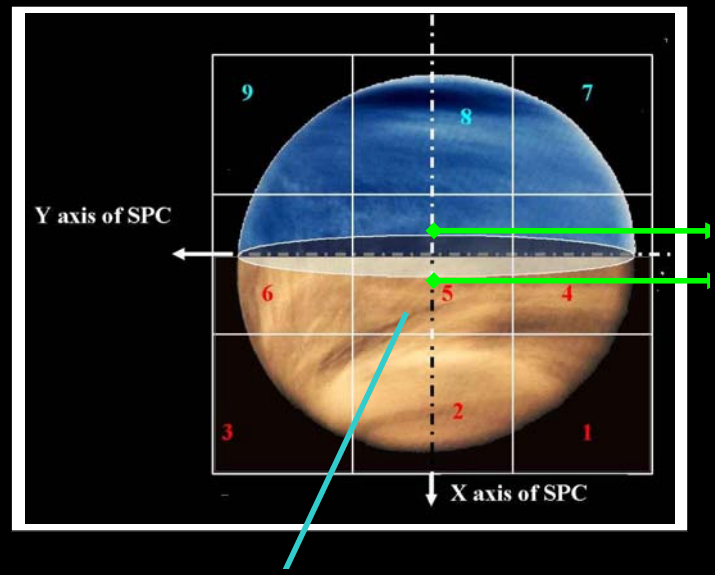
Off- Pericentre observations

#2: Ascending arc

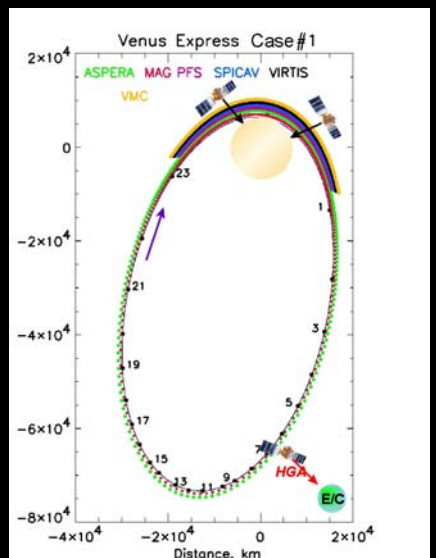


#3: Apocentre mosaic

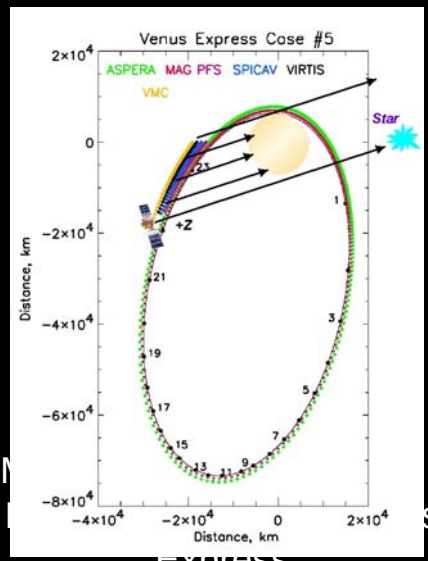




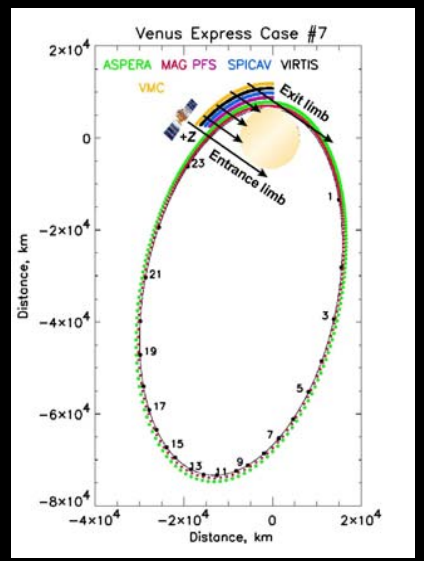
#1: Pericentre nadir

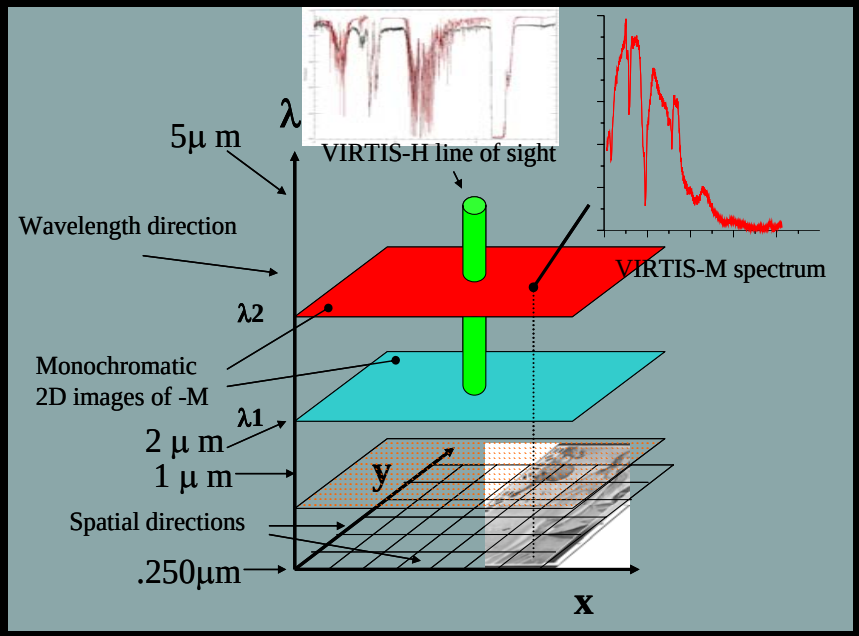


#5: Stellar occultation



#7: Limb



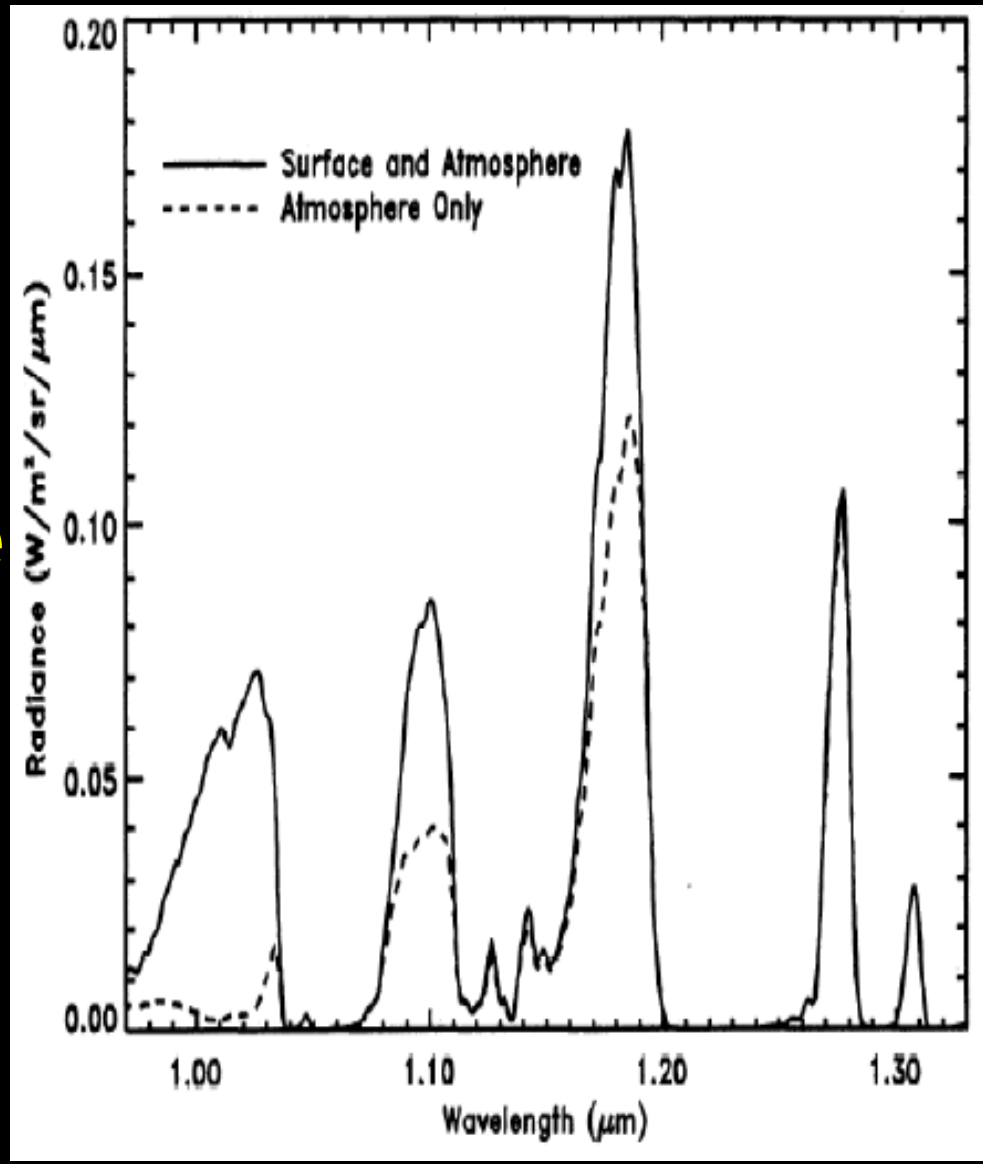


Instrumental characteristics

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

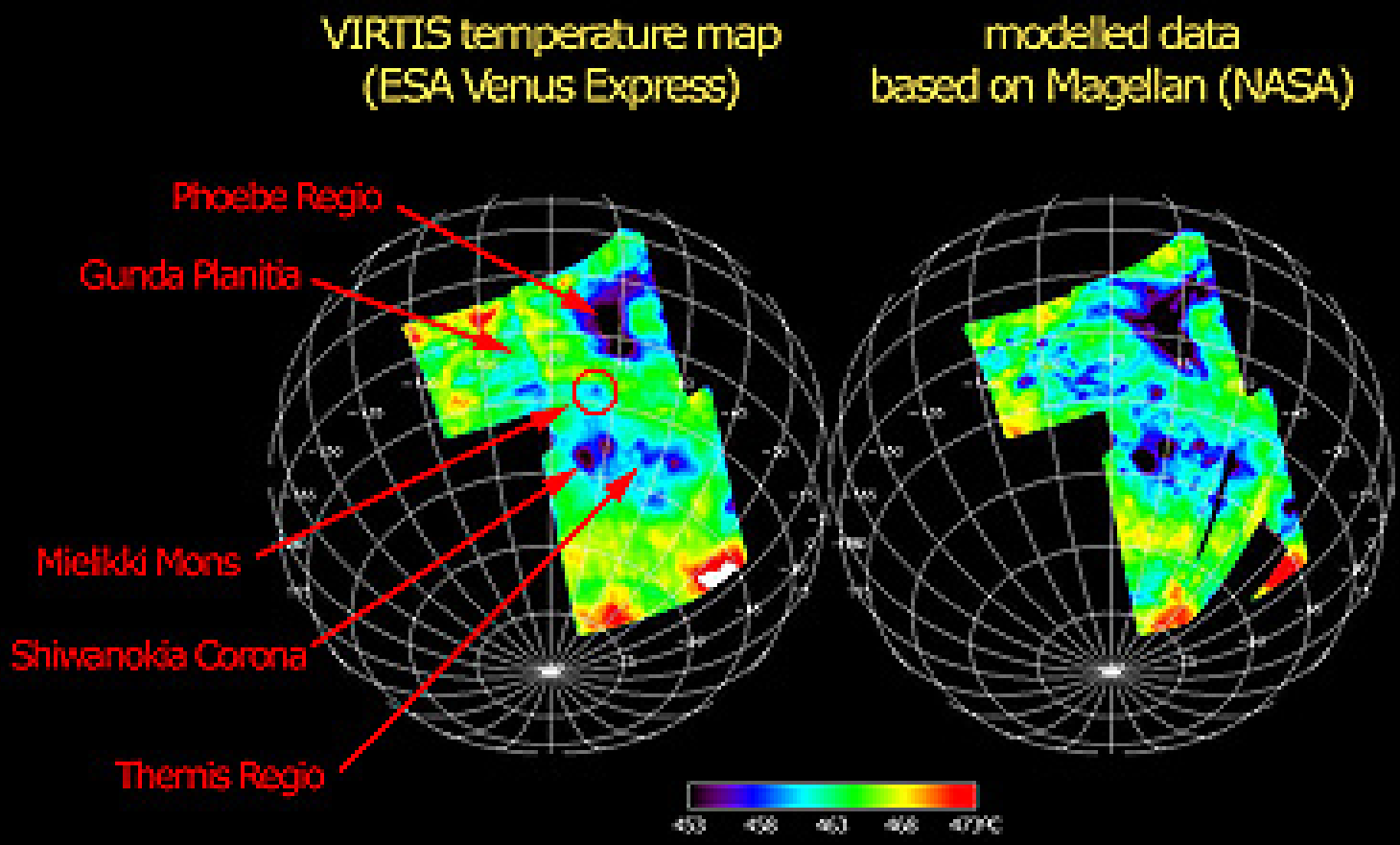
1. Venus surface

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

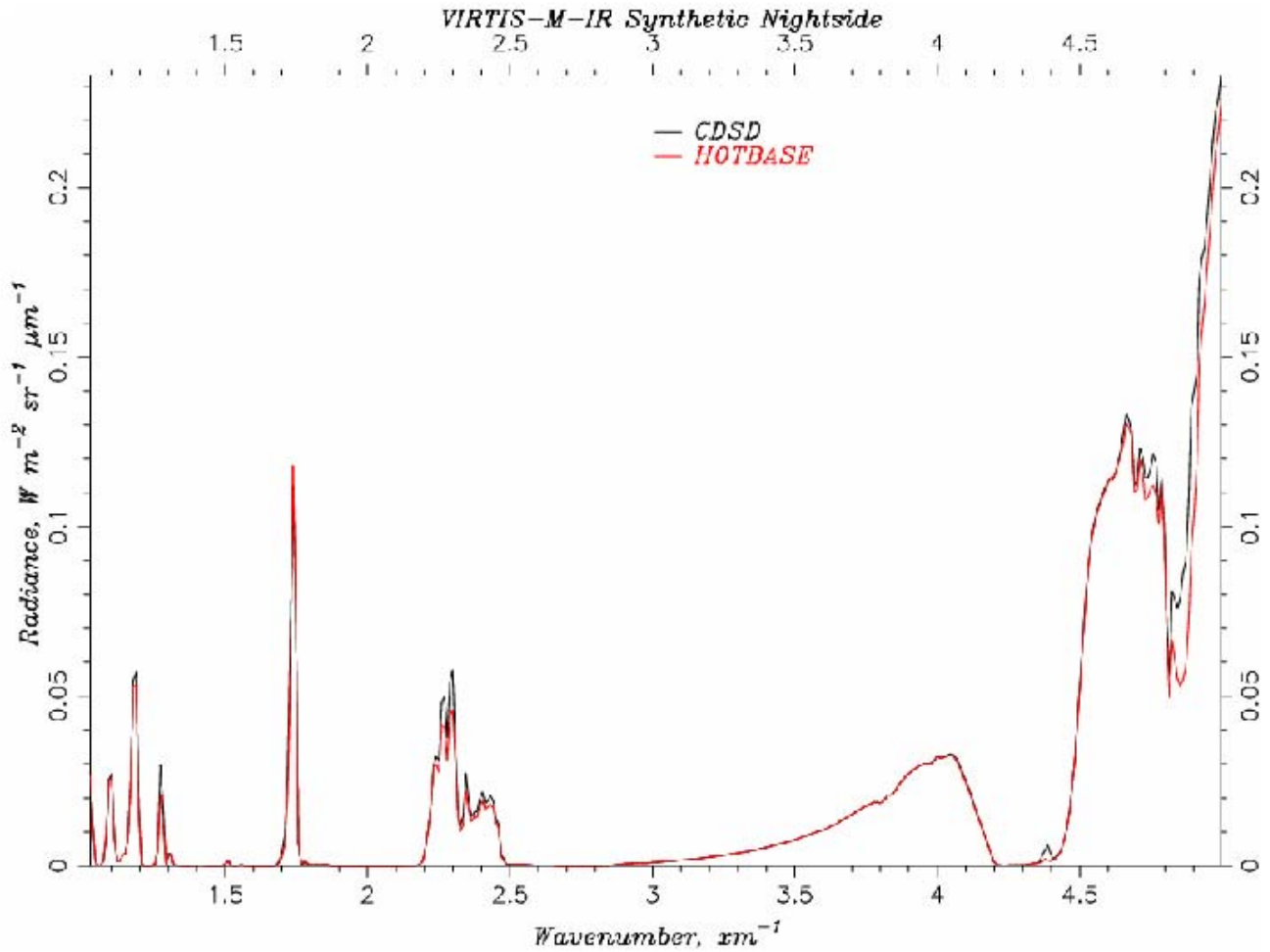


Temperature map of the surface of Venus (South pole view)

VIRTIS/Venus Express Magellan (radar)



3. Night side spectroscopy

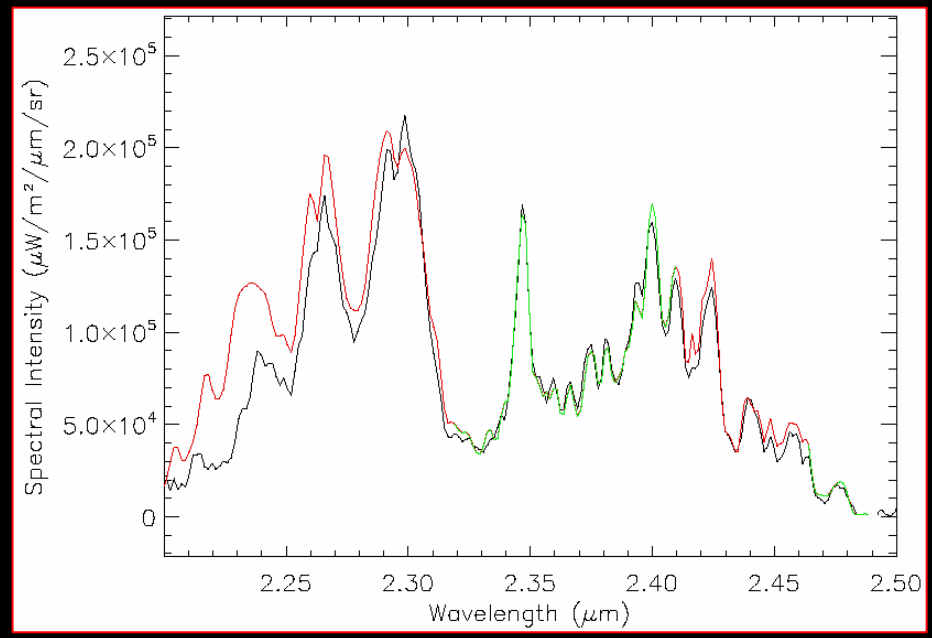


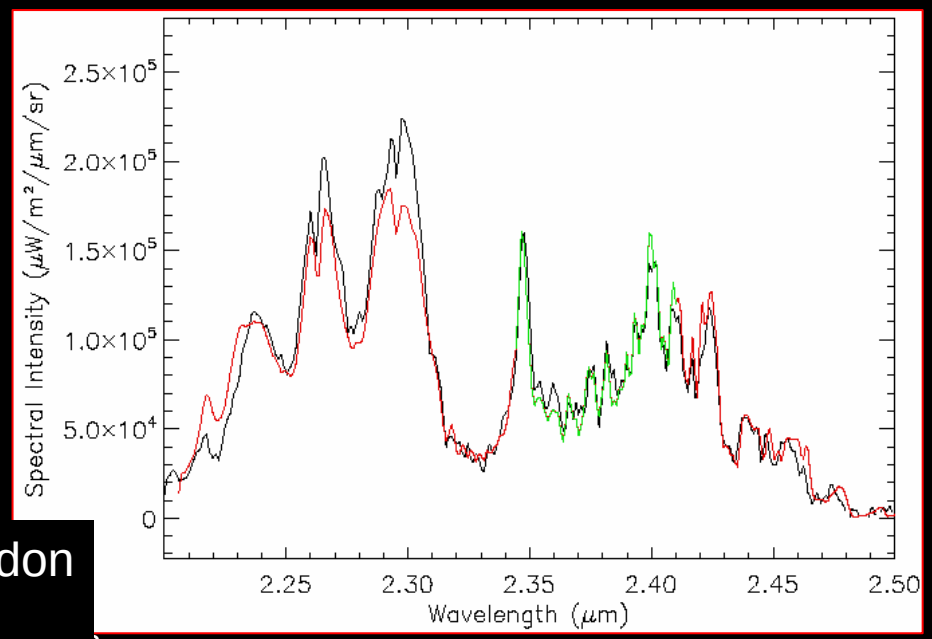
Composition measurements

Equatorial composition

- CO : 25 ppm
- OCS : 15 ppm +cut-off altitude 30 km
- H_20 : 30 ppm

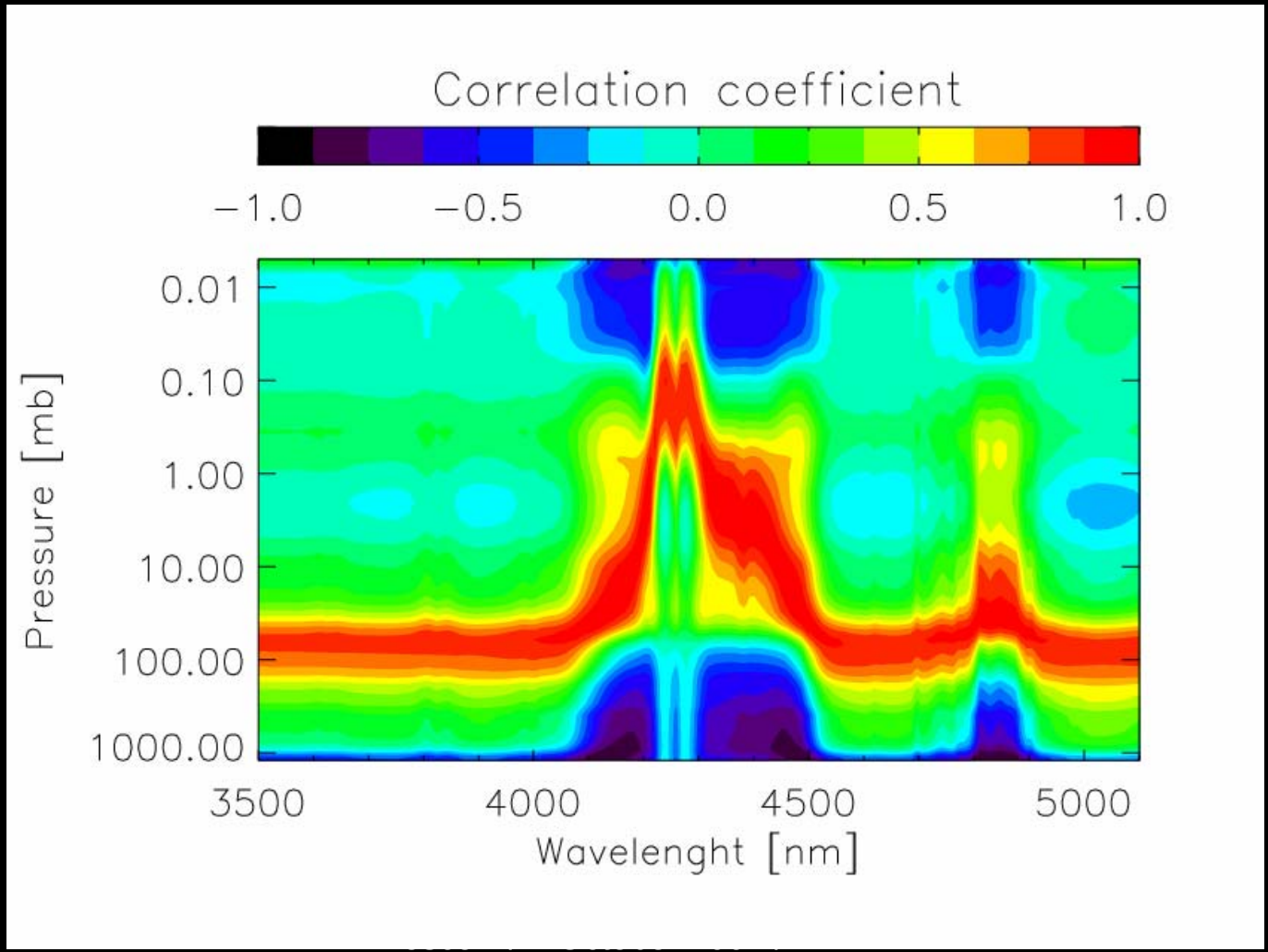
Variations of CO and OCS with latitude (+/-)





E. Marcq et al, Meudon

4. Thermal profile retrieval algorithm at 4.3 µm



D. Grassi et al

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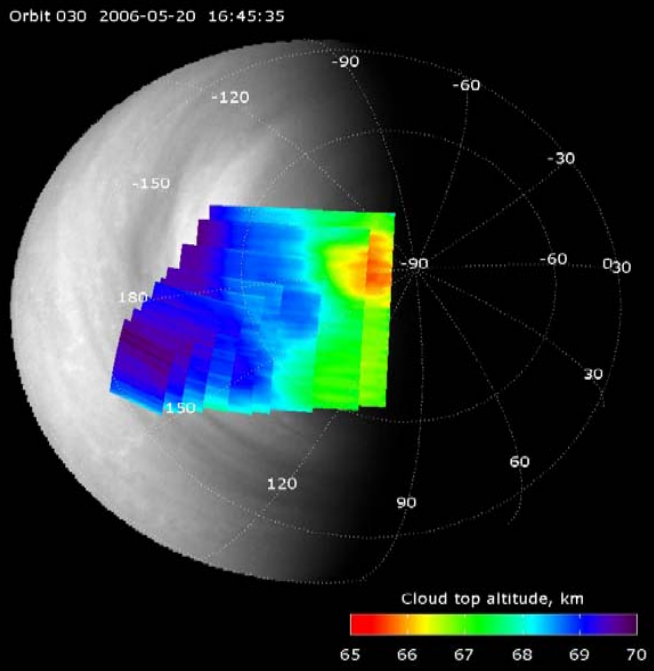
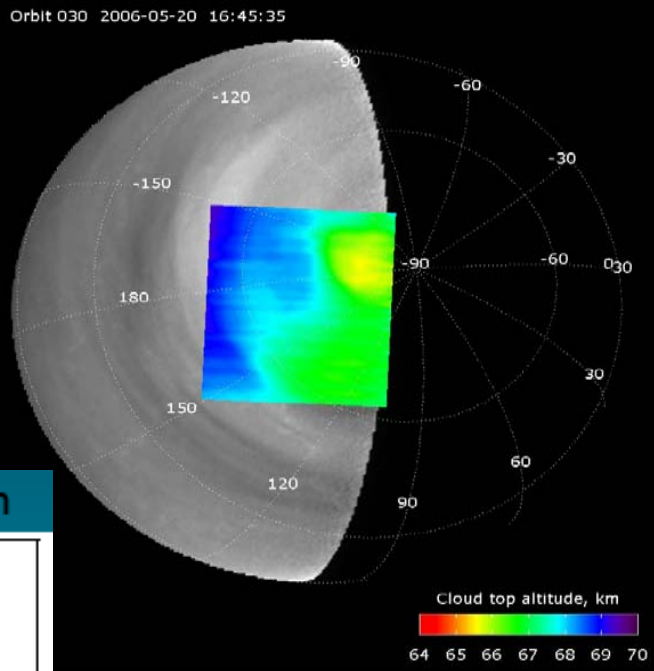
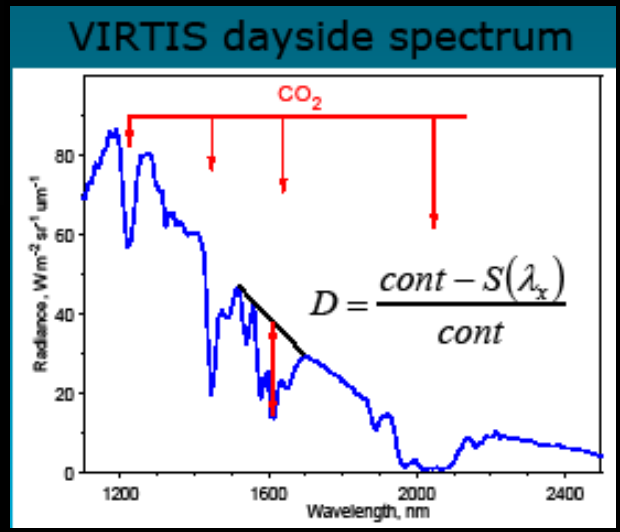
5. Cloud height measurements from CO_2 band depth

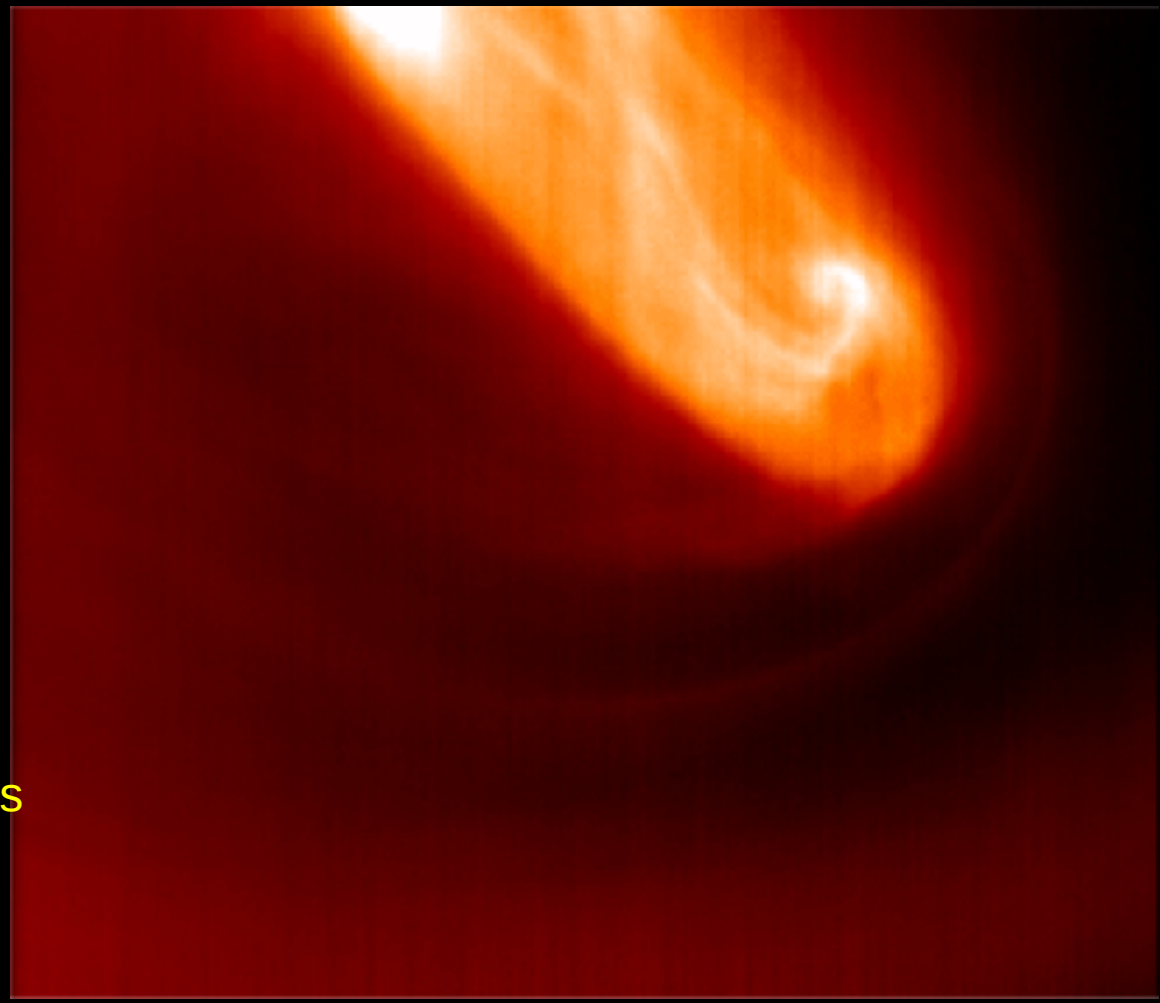






Titov et al

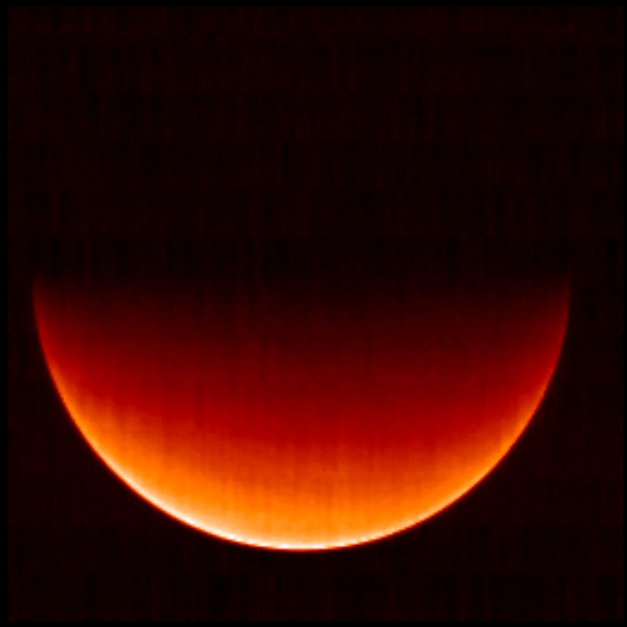
Observations of the South polar vortex by VIRTIS

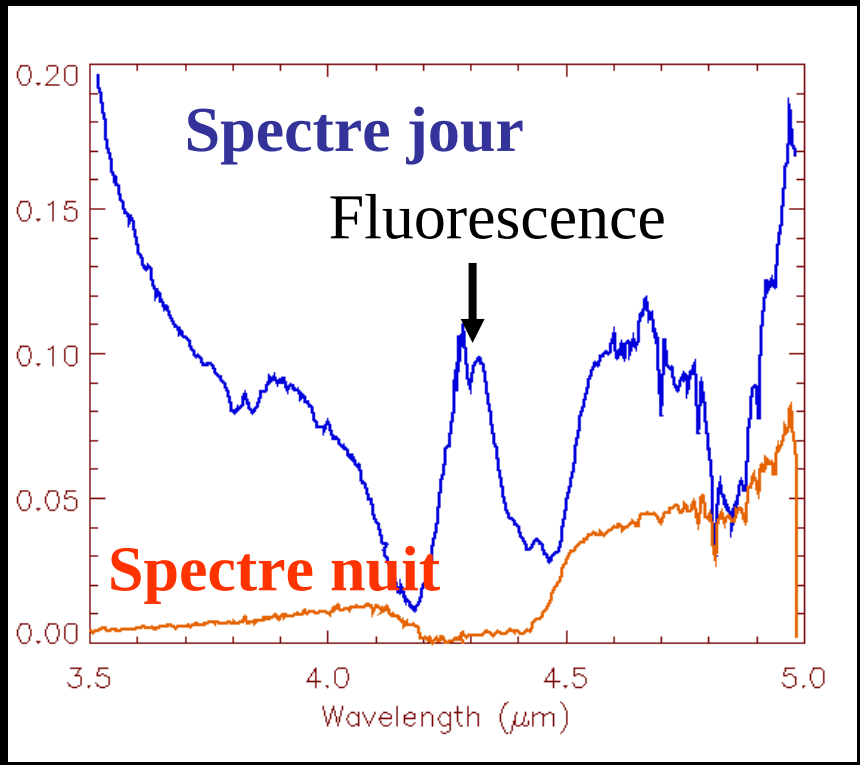


Observations à 5 microns

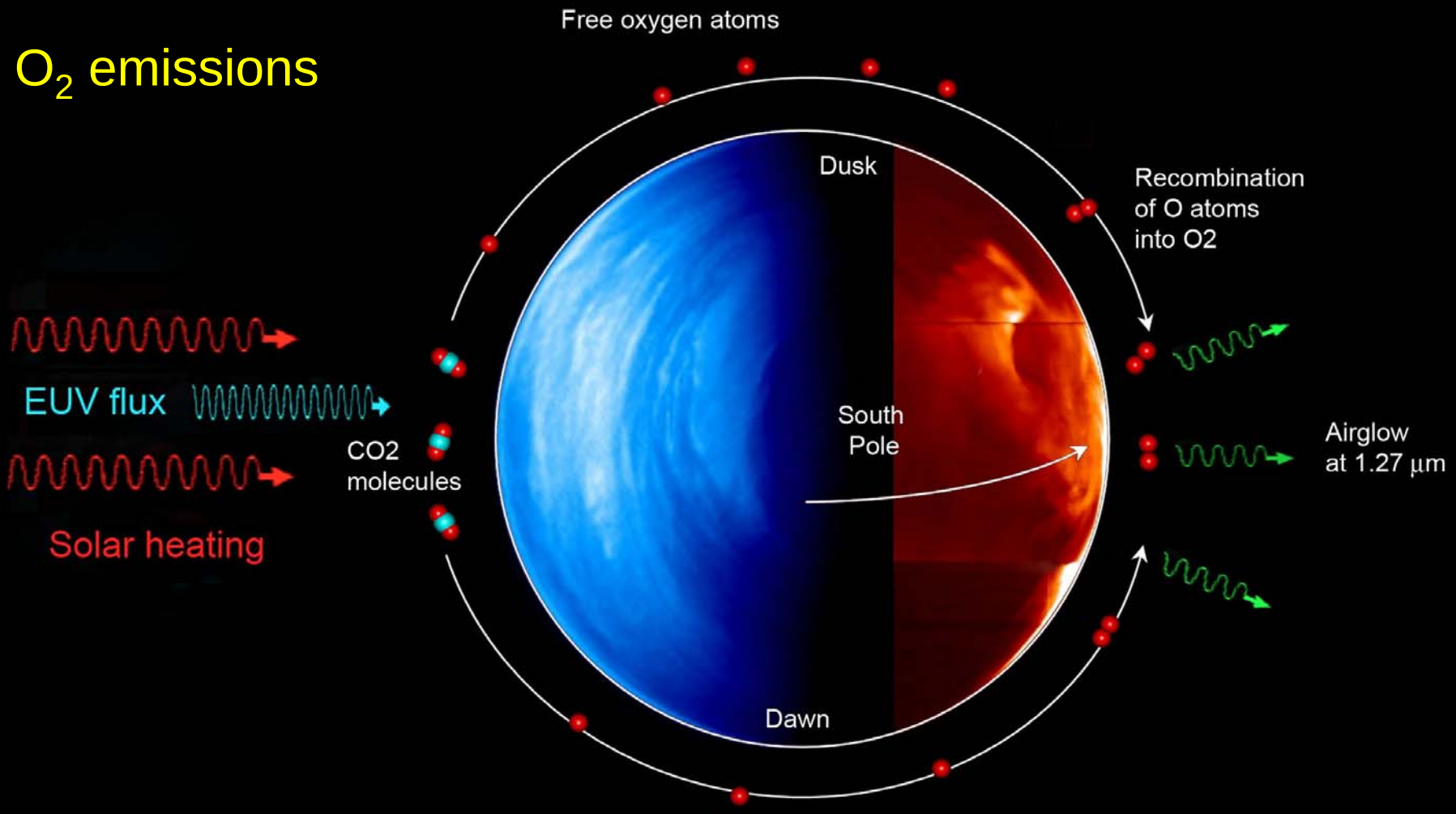
6. CO_2 emission 4.3 μm band

Peak altitude around 110 km





O_2 emissions



Summary of VIRTIS observations

- Data volume at orbit 500 : > 150 Gigabytes
- First level analysis : routinely achieved.
  - Measurements of physical quantities (winds, Tsurf, etc.)
  - First papers submitted
  - First data set delivered ESA (Planetary Science Archive)
- 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
- Next mission to come : Venus Climate Orbiter (JAXA), VESPER (NASA) ? , in situ mission ??