

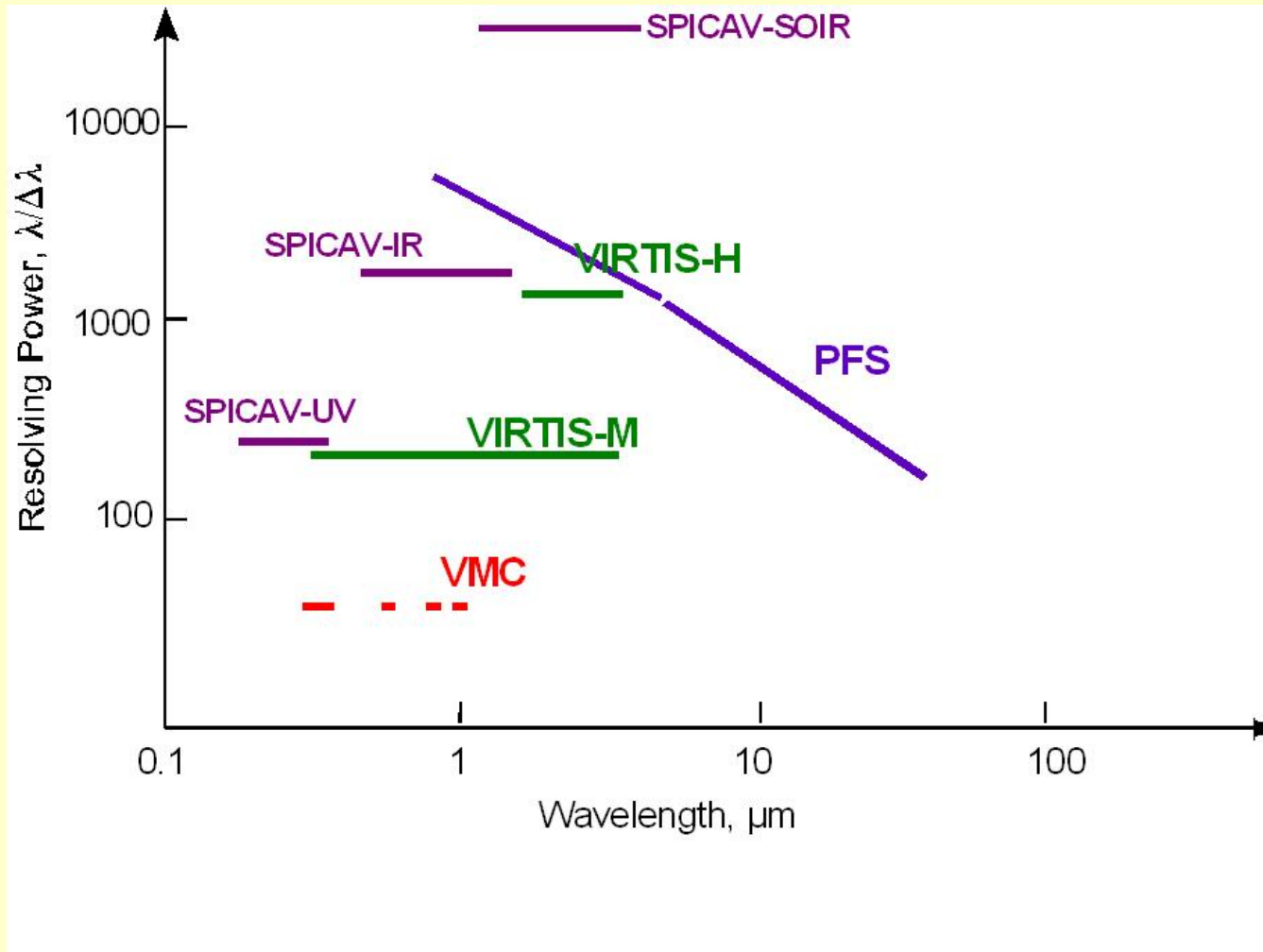
Venus Express Status  
Presentation at the 2<sup>nd</sup> VEXAG meeting  
Pasadena, 1-2 May 2006

Håkan Svedhem  
ESA/RSSD

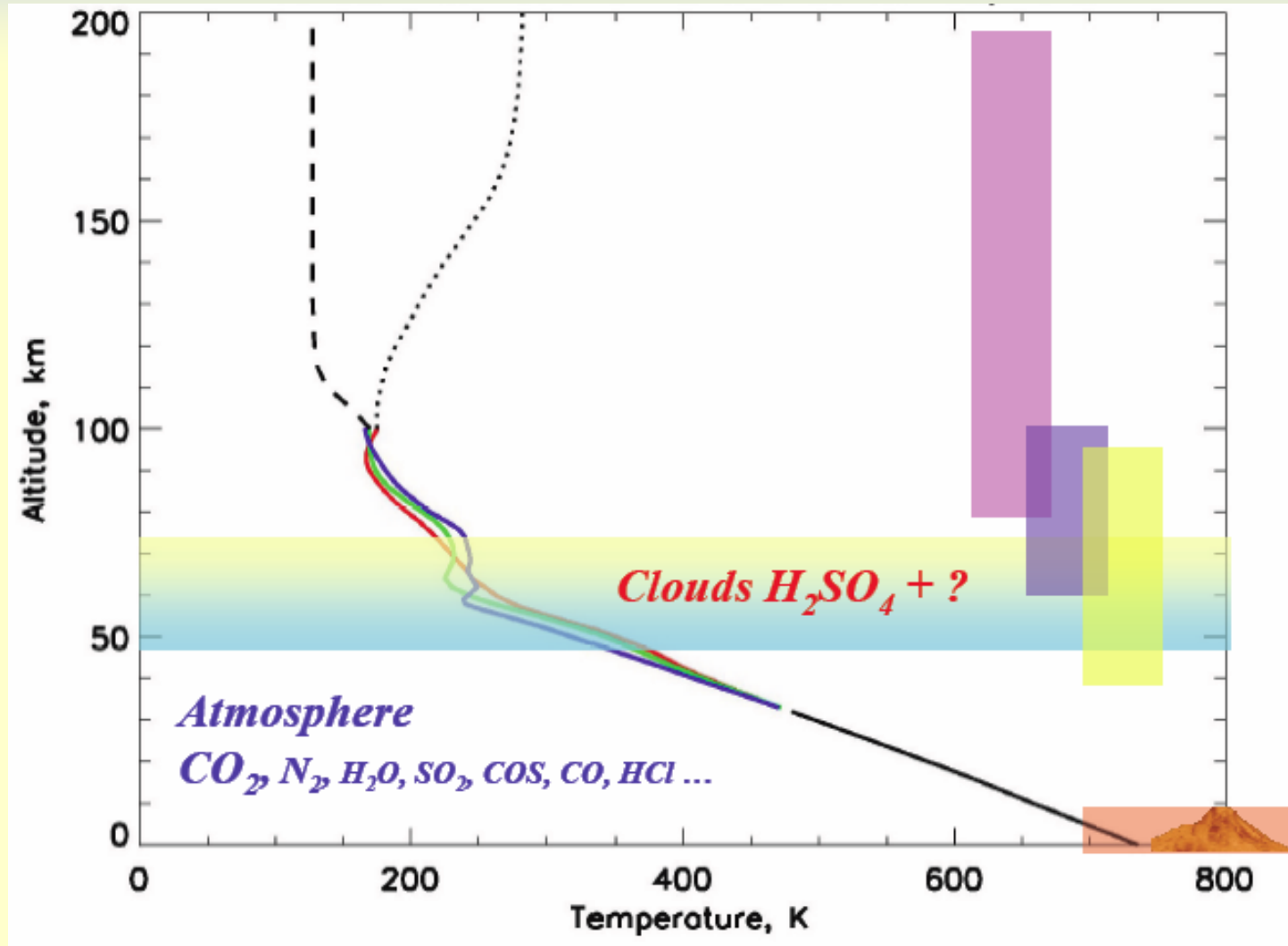
# Science Payload

<b>Name</b>	<b>Instrument</b>	<b>Principal Investigator</b>
<b>ASPERA</b>	<b>Analyser of Space Plasma and Energetic Ions</b>	<b>S. Barabash, IRF, Kiruna, Sweden.</b>
<b>MAG*</b>	<b>Magnetometer</b>	<b>T. Zhang, IWF, Graz, Austria.</b>
<b>PFS</b>	<b>Planetary Fourier Spectrometer (IR)</b>	<b>V. Formisano, IFSI-CNR, Rome, Italy.</b>
<b>SpicaV/SOIR*</b>	<b>UV-IR spectrometer for stellar and solar occultation</b>	<b>J.-L. Bertaux, SA-CNRS, Verriere, France.</b>
<b>VERA</b>	<b>Venus Radio Science</b>	<b>B. Häusler, Uni-BW, Muenchen, Germany.</b>
<b>VIRTIS*</b>	<b>UV-Vis-IR Mapping spectrometer</b>	<b>P. Drossard, Obs de Paris, Meudon, France, G. Piccioni, IASF-CNR, Rome, Italy.</b>
<b>VMC*</b>	<b>Venus Monitoring Camera</b>	<b>W. Markiewicz, MPS, Lindau, Germany</b>

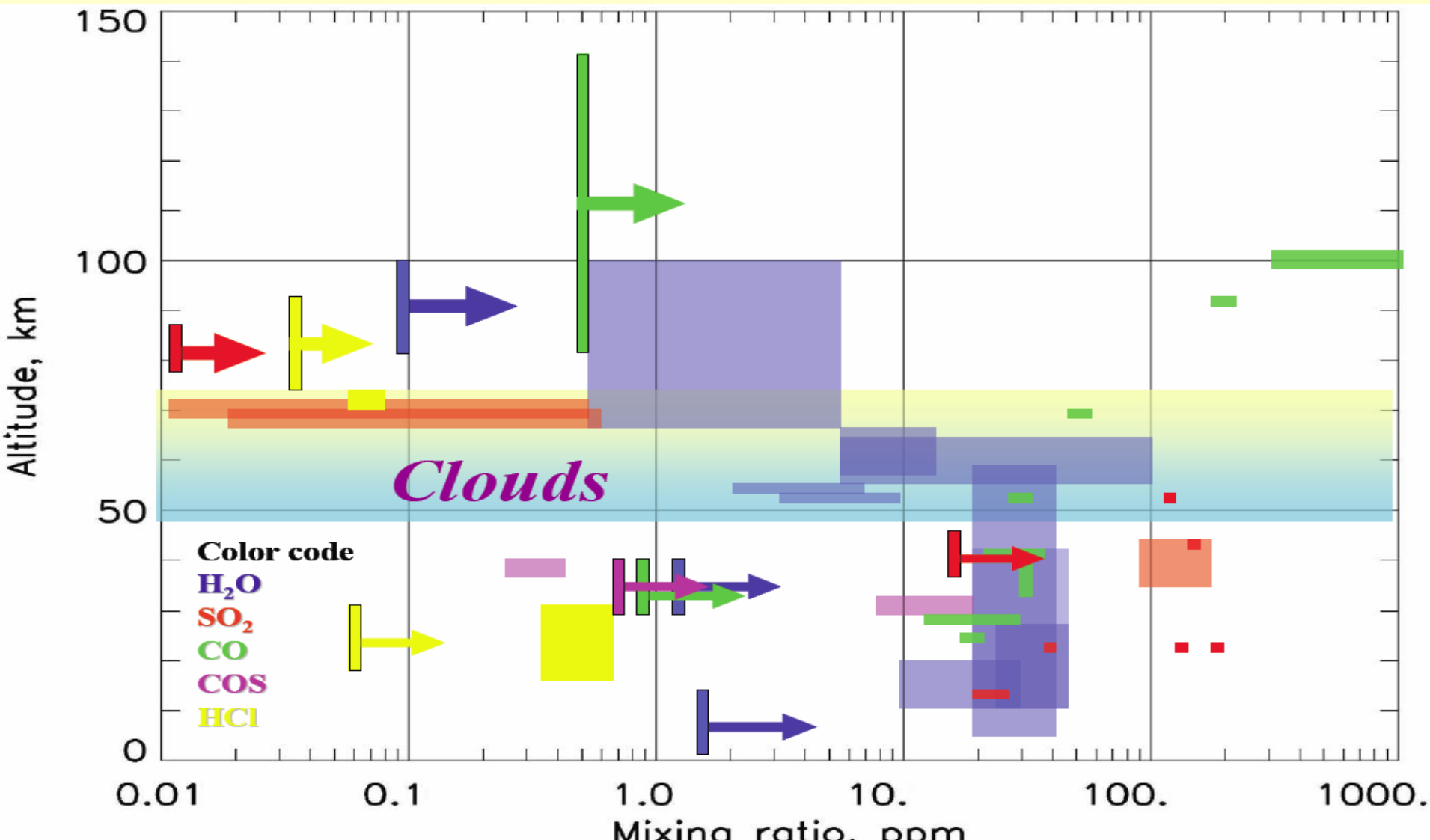
# Instrument Spectral Characteristics



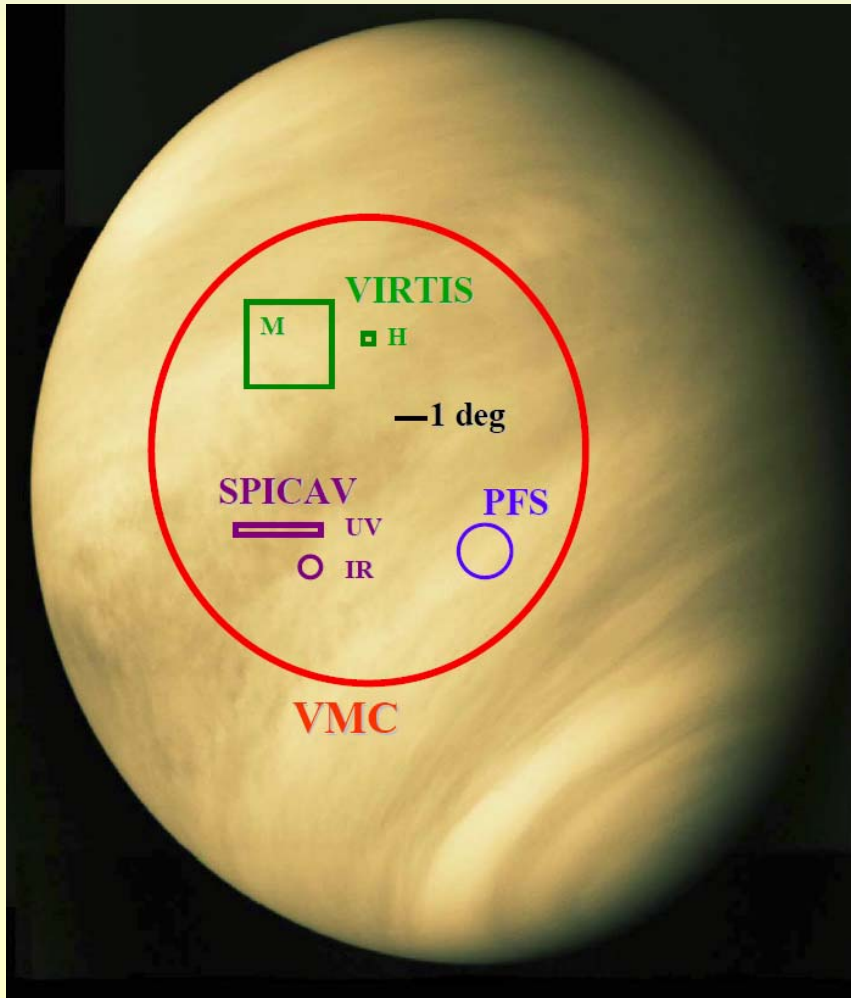
# Thermal Structure measurements



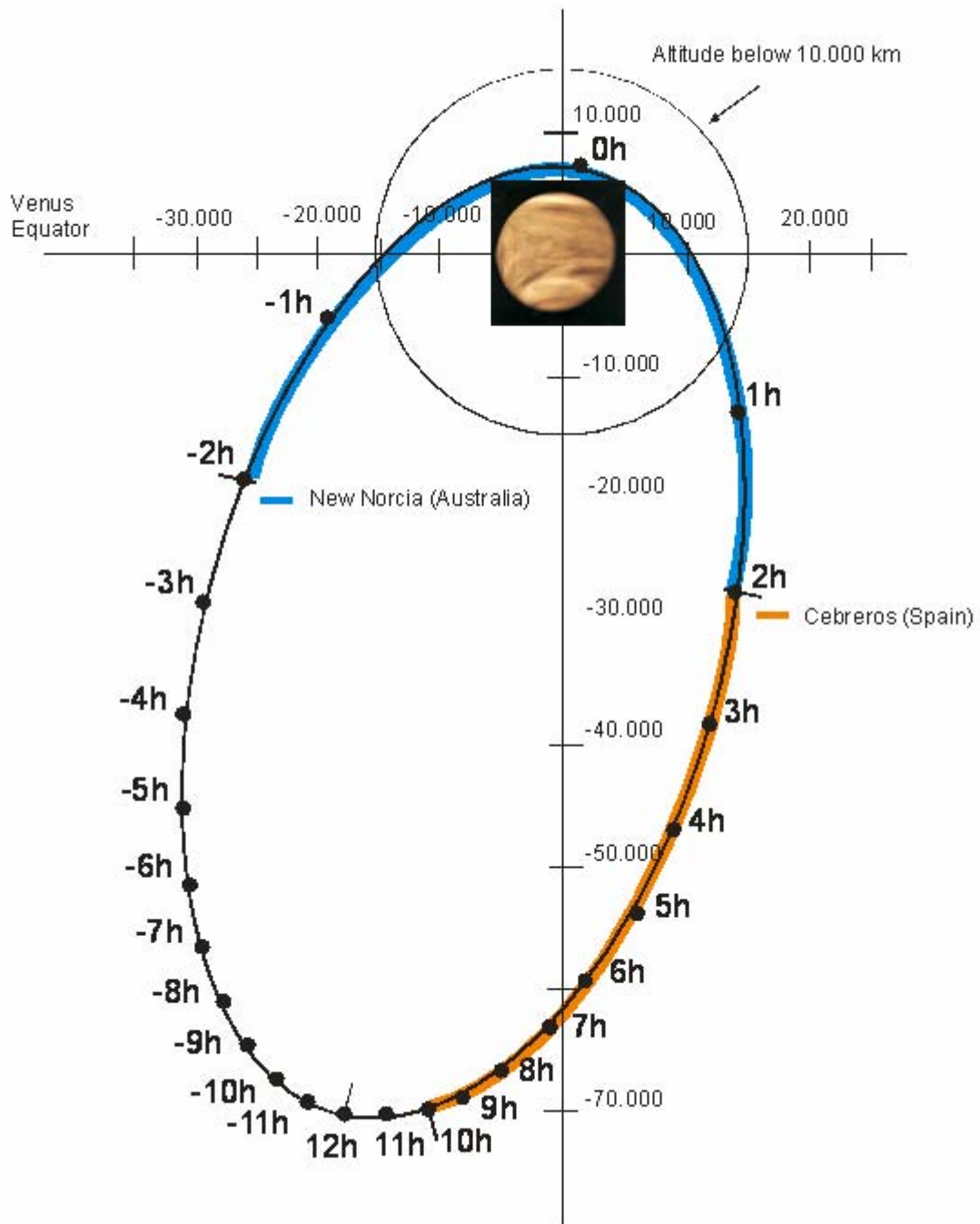
# Chemical composition capabilities



# Instrument Fields of View



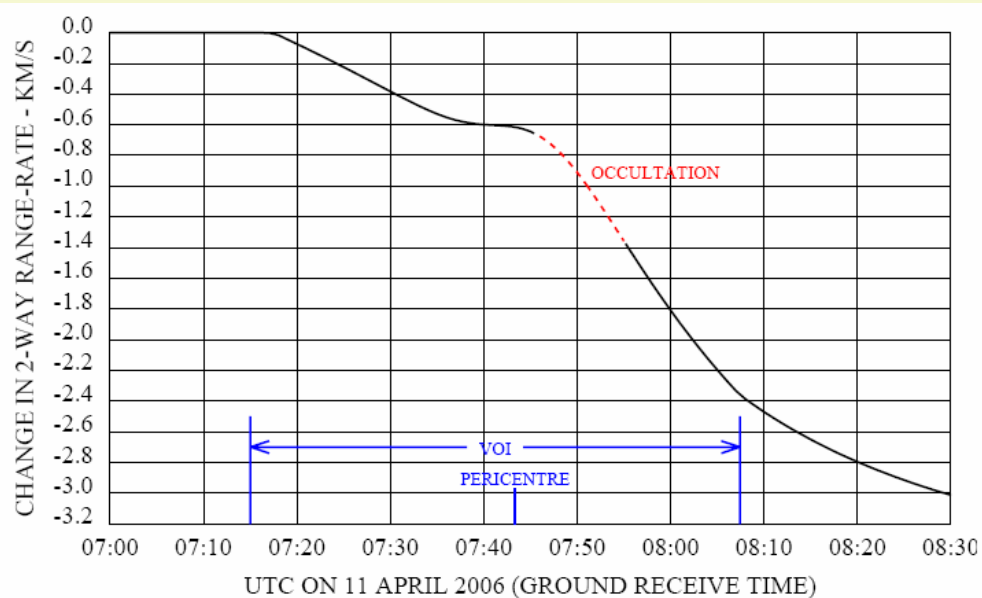
- All optical instruments are body-fixed and co-aligned
- The size of the FOV are plotted against Venus as seen from about 20000 km, i.e. 1/3 of the distance to the apocentre.
- At apocentre the whole disc is covered by VMC in one exposure and Virtis by a 3x3 raster.





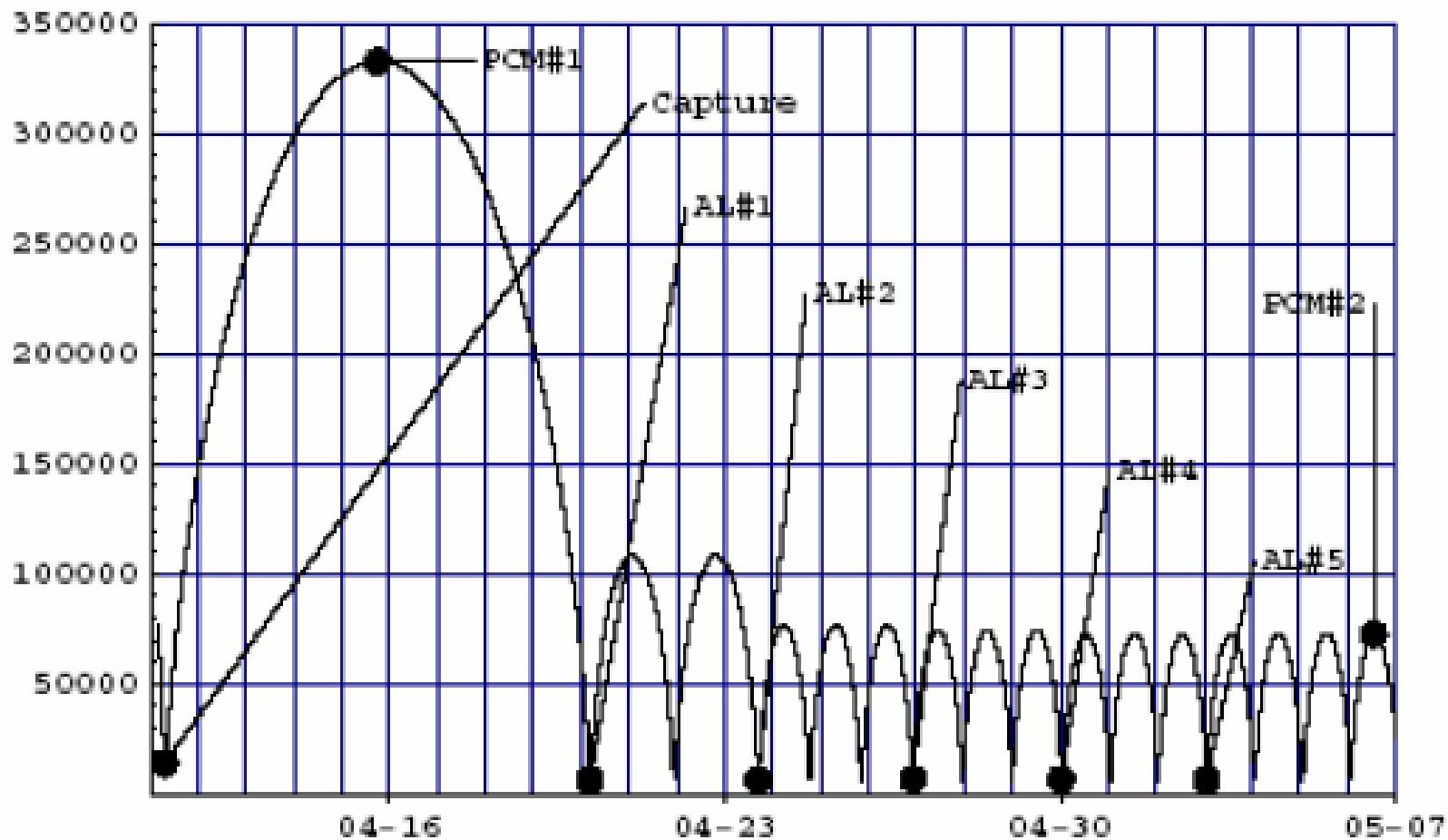
- Venus Express taking off from Baikonur at 03:33 UTC on 9 November 2005.
- The Soyuz rocket placed the spacecraft in a sub-orbital trajectory which was circularised by a 20 s burn of the Fregat upper stage.
- After approximately one orbit a second Fregat burn of 14 min duration injected the spacecraft into a interplanetary trajectory.
- The injection was near perfect and only a minor adjustment by the spacecraft thrusters was necessary.
- The spacecraft arrived safely at Venus on 11 April 2006.

# Venus orbit insertion



- Delta V=1250 m/s
- Main Engine active during 50 minutes
- All orbital parameters well within estimated error margin
- Capture orbit period 3.5 hour longer than expected (OK)
- Enables all science planned during capture orbit

# Orbit insertion sequence



# Mission status (1)

- The spacecraft has demonstrated a strong robustness and is working very well.
  - No safe modes at all so far (vs 20+ for MEX)
  - Problematic subsystems from MEX all operate well (star trackers, mass memory, power etc.)
  - The new thermal design performs according to the developed models
- The essentially perfect launch, cruise and orbit insertion have left a good margin of fuel that now will be available for enabling a mission extension or additional orbit modifications if desired

## Mission status (2)

- The Flight Control System and the Ground system, including the new Cebreros antenna, work very well
- The Science Operations activities are now transiting into a routing planning phase with a well defined standardized timeline of activities and deadlines for deliveries. A detailed Science Activity Plan has been established.
- The collaboration between the ESTEC project team, ESOC, Industry, PI teams and VSOC has been excellent throughout the development phase and during the operational phase so far.
- ESOC has established delta-DOR capability in order to improve orbit determination and applied this for the first time to Venus Express.
- Very valuable support has been given by the DSN (JPL) during the cruise and VOI activities and in assisting with the delta-DOR development. This support will continue for Radio Science.

# Capture orbit observations

Pointing:

Slot #0: 2h nadir

Slot #1:

- ASPERA in Earth pointing
- 3h nadir

Slot #2: 2h nadir

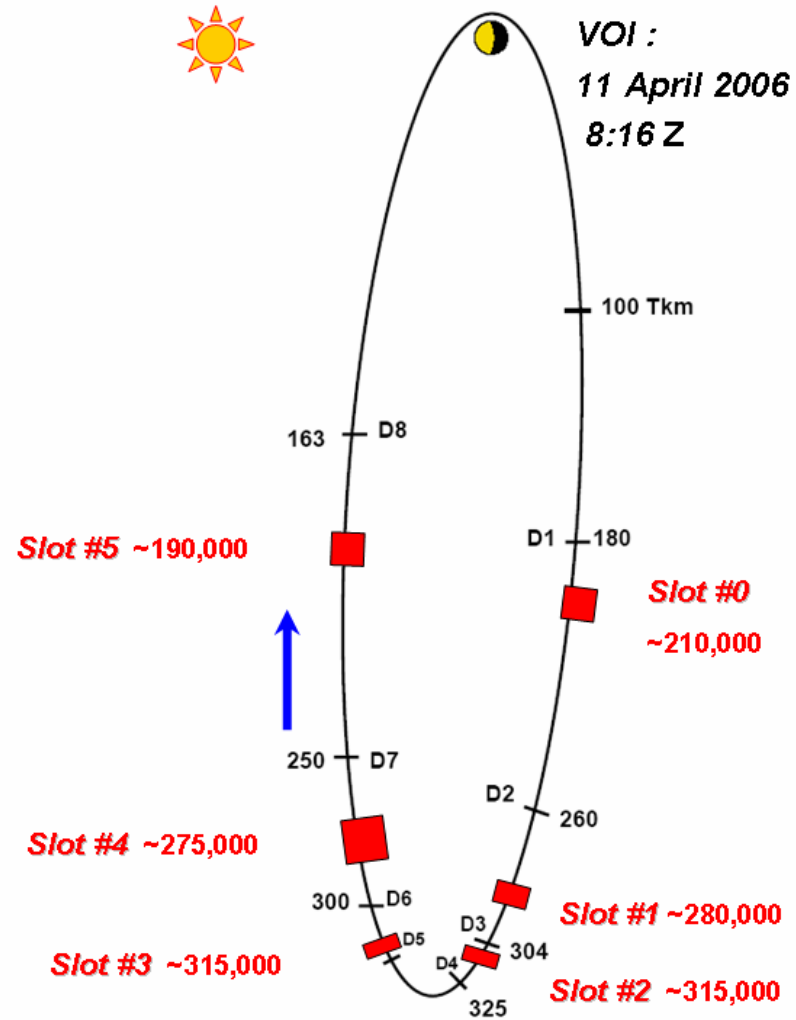
Slot #3:

- 1h nadir
- Slew
- 2h20 nadir

Slot #4:

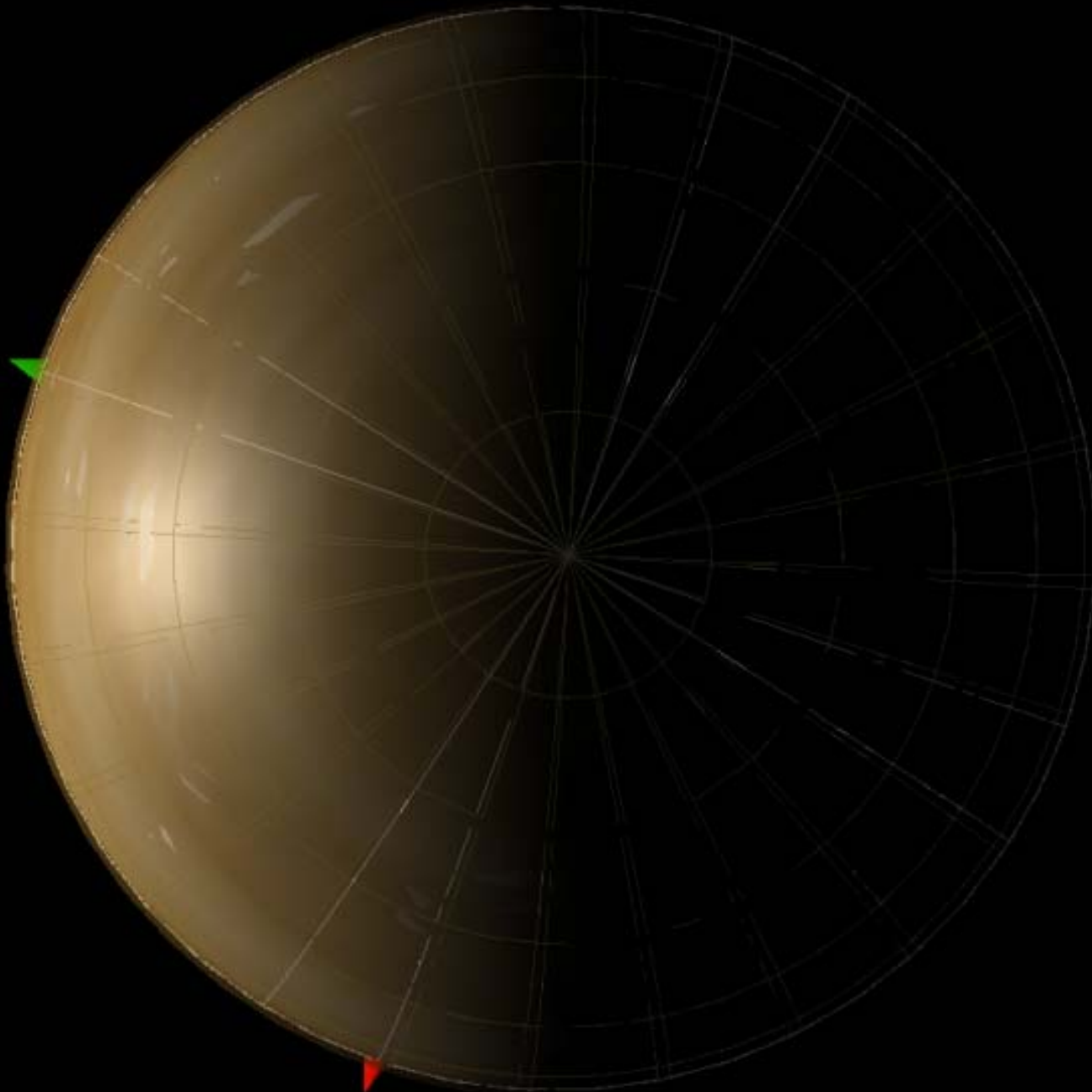
- ASPERA in Earth pointing
- 4h nadir

Slot #5: 2h nadir



# Capture orbit results

- VMC operates OK, Calibration/Flat field may need improvement
- Virtis works very well both in mapping and spectral mode.
- Spicav works very well in Nadir geometry. Stellar/solar occultation and SOIR still to be checked out.
- MAG is continuously operating, only solar wind so far.
- Aspera works well, not yet fully analyzed, in solar wind.
- VeRa USO OK, still to be characterized post VOI.
- PFS, works well internally, scanner blocked, an attempt to unblock was made last week. The result is not conclusive but indications show that it has moved a bit.



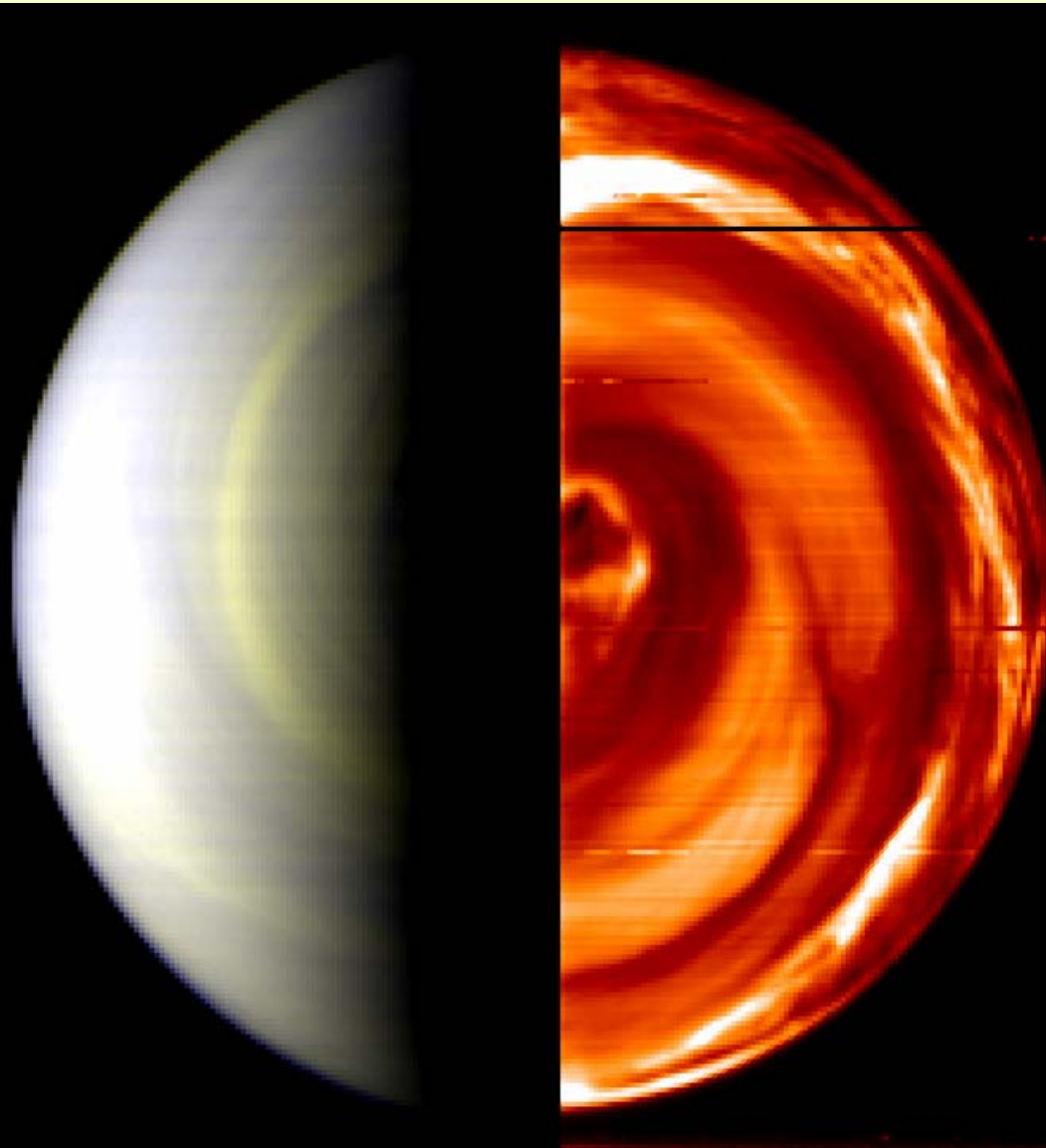
Virtis FOV  
during first  
capture orbit  
observation  
(Slot#0)

# First VMC Image

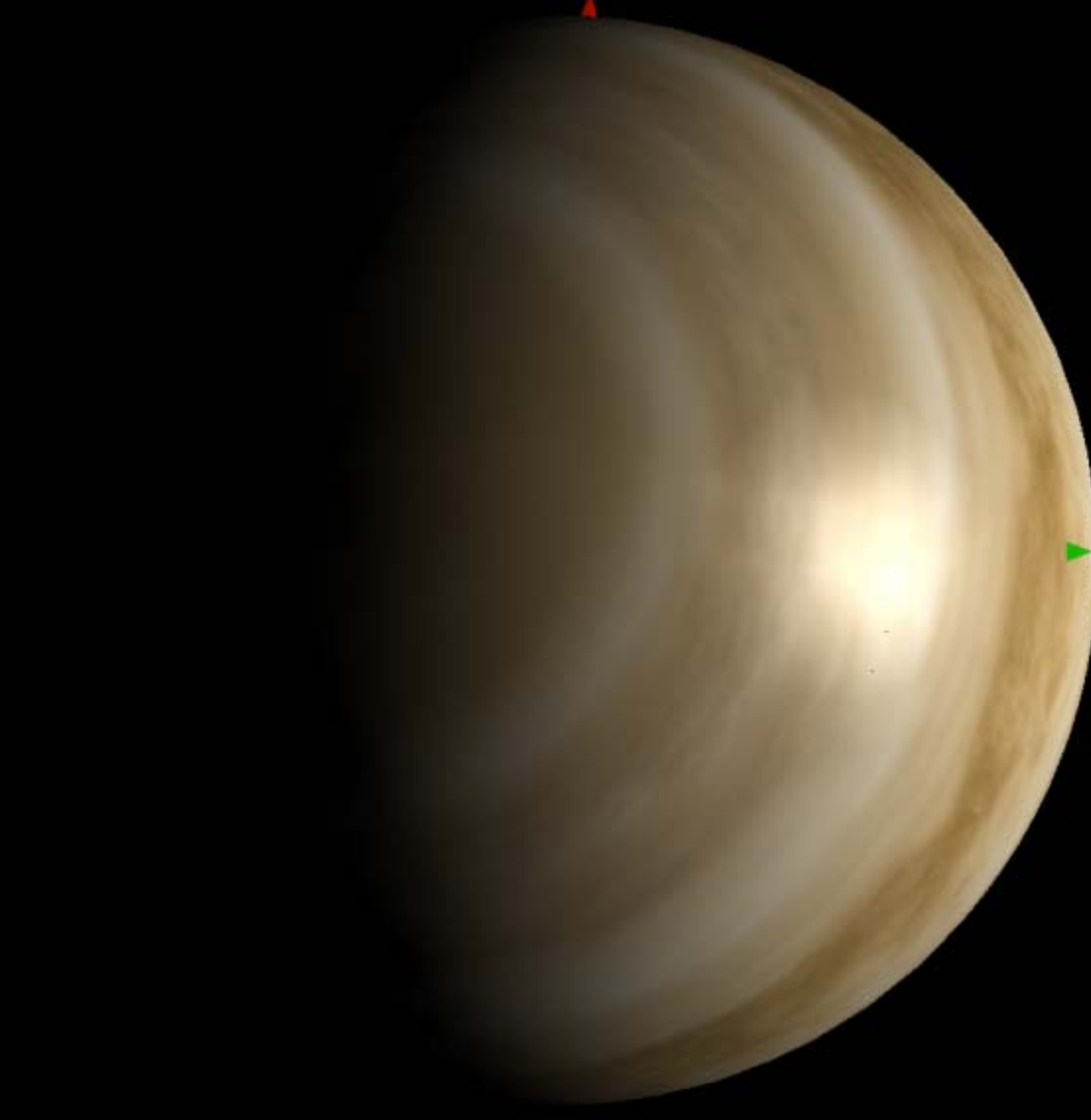


- Image from 210000km distance
- Raw but lightly tuned up UV image that shows at least one circumpolar arc
- South pole approximately at the centre of the disk
- VMC has two additional IR and one visible channel

# VIRTIS First Images



- UV image to the left shows the solar illuminated part. The arc or spiral from the VMC image is clearly visible
- IR 1.7 micron image at the right, of the dark hemisphere, shows the thermal radiation from the lower part of the atmosphere propagating up through the clouds. Polar collar and perhaps a part of a double vortex visible.



Virtis FOV  
during last  
capture orbit  
observation  
(Slot#5)

# Near Future Activities

- One more apocentre maneuver and one more pericentre maneuver is going to be executed before final orbit is achieved 7 May
- Instrument commissioning activities April-May
- Nominal mission operations start 4 June
- In Orbit Mission Commissioning Review 4 July
- First data/results to be presented at a dedicated Venus Express session at Cospar, 16 July

# Announcement of Opportunity

- An AO for Interdisciplinary Scientists (IDS) and Supporting Investigators was issued 1 February with a final date of submission 15 March.
- 15 IDS proposals have been received (incl. 9 US)
- 14 SI proposals have been received (incl. 5 US)
- The evaluation and selection process has been started and the result is expected to be announced 16 May.

# Conclusion

- The spacecraft and its payload is in a very good condition, with a question mark still for PFS.
- The spacecraft is firmly established in its intended (temporary) orbit
- The operations activities are running smoothly with very good cooperation between all parties
- → Virtis Movie