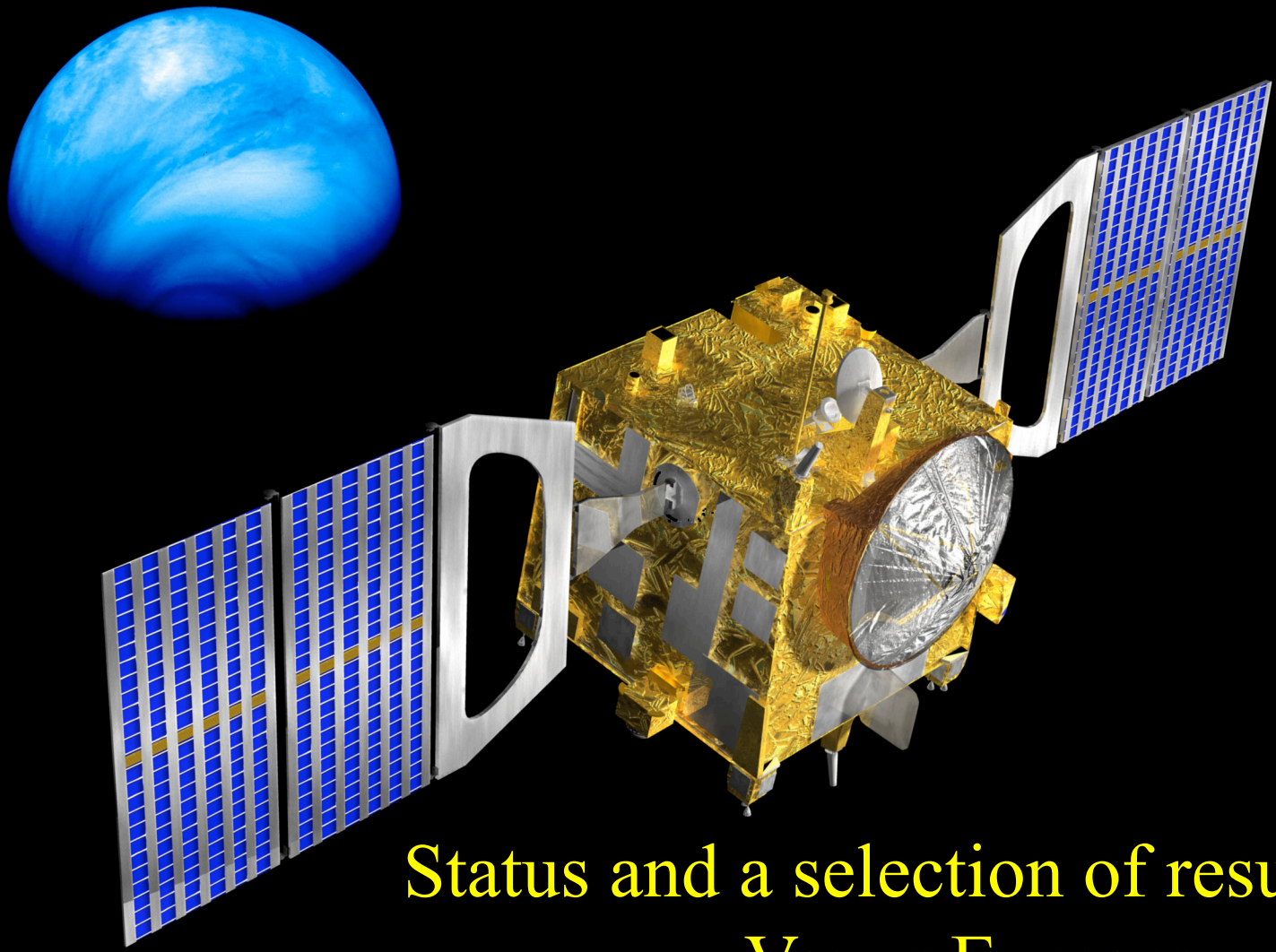
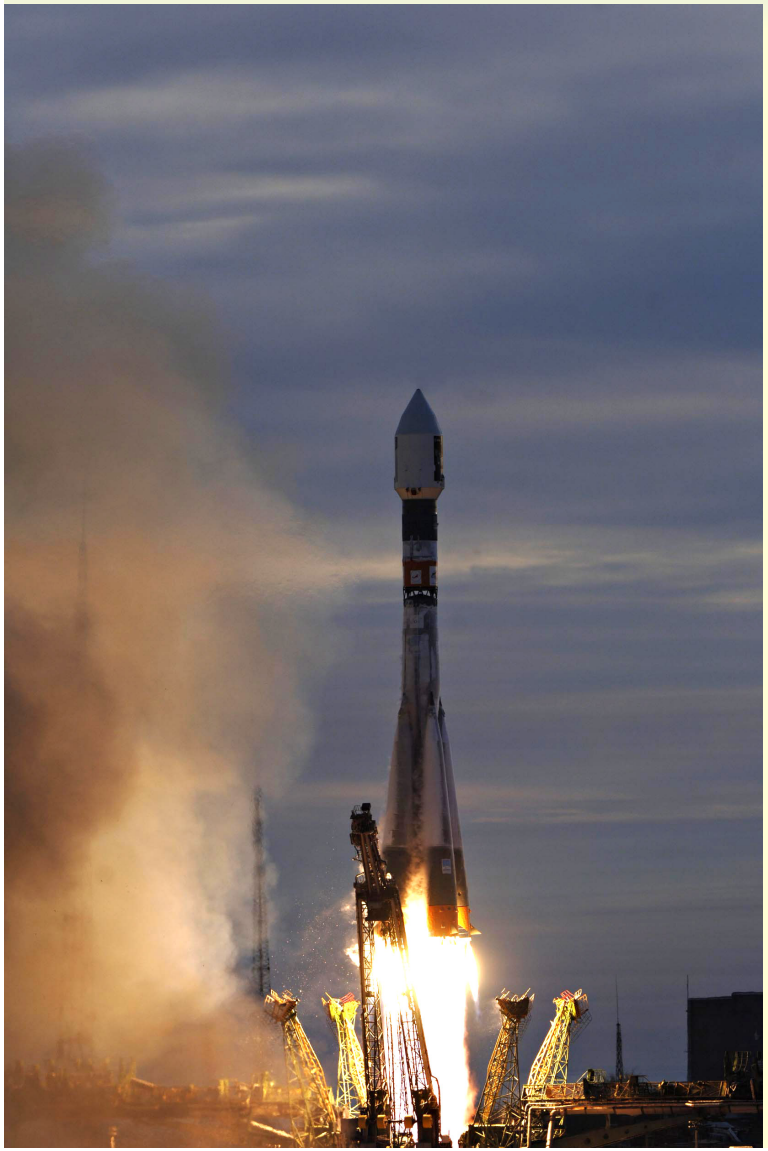


Status and a selection of results from Venus Express

Håkan Svedhem
ESA/ESTEC

Mission Timeline



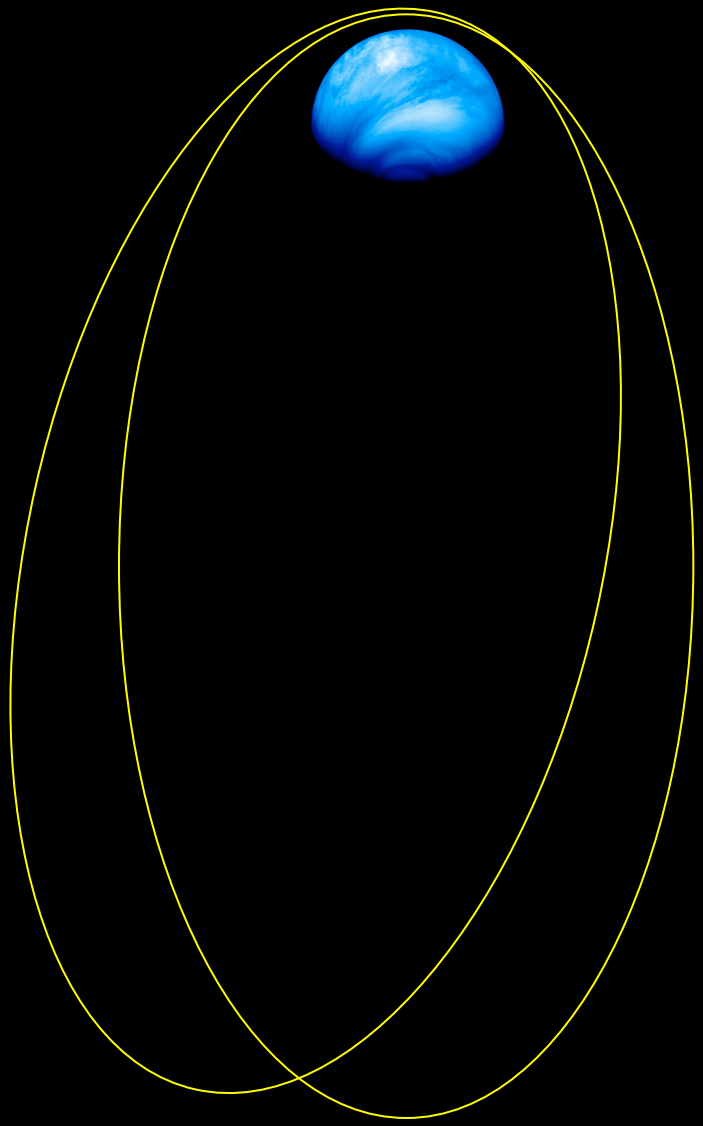
- Launch 9 November 2005
- Arrival at Venus 11 April 2006
- Start of nominal operation June 2006
- End of nominal operation/start of extended operation September 2007
- Mission presently approved until end of 2009
- In June the Science Programme Committee will consider an extension until end 2012.

Present Status

- The spacecraft and its payload in general is in a good condition, with the following remarks:
  - One of the two coolers of the Virtis instrument seems to have failed. The mapping IR channel is affected. The UV-Vis channel and the high spectral resolution channel operate as nominal. An investigation is ongoing.
  - The PFS remains out of operation.
  - One of the four reaction wheels is showing an excess friction torque. If the friction will increase further we may need to switch it off and operate on three wheels only. This will result in a slight loss of flexibility in the operations and likely two momentum off loadings per orbit in place of one.
  - The S-band chain still has a large loss and is only used occasionally for some of the radio science experiments.

Status cont.

- The mission is very robust with respect to margins for power, fuel and thermal control In the present orbit the fuel will run out end 2013.
- Preparations for aerobraking in order to reach a new orbit has started. A modification to an orbit with a shorter period could significantly extend the operational life.
- The spacecraft has experienced six safe mode transitions, all understood and recovered smoothly by VMOC. No safe mode during the last year.



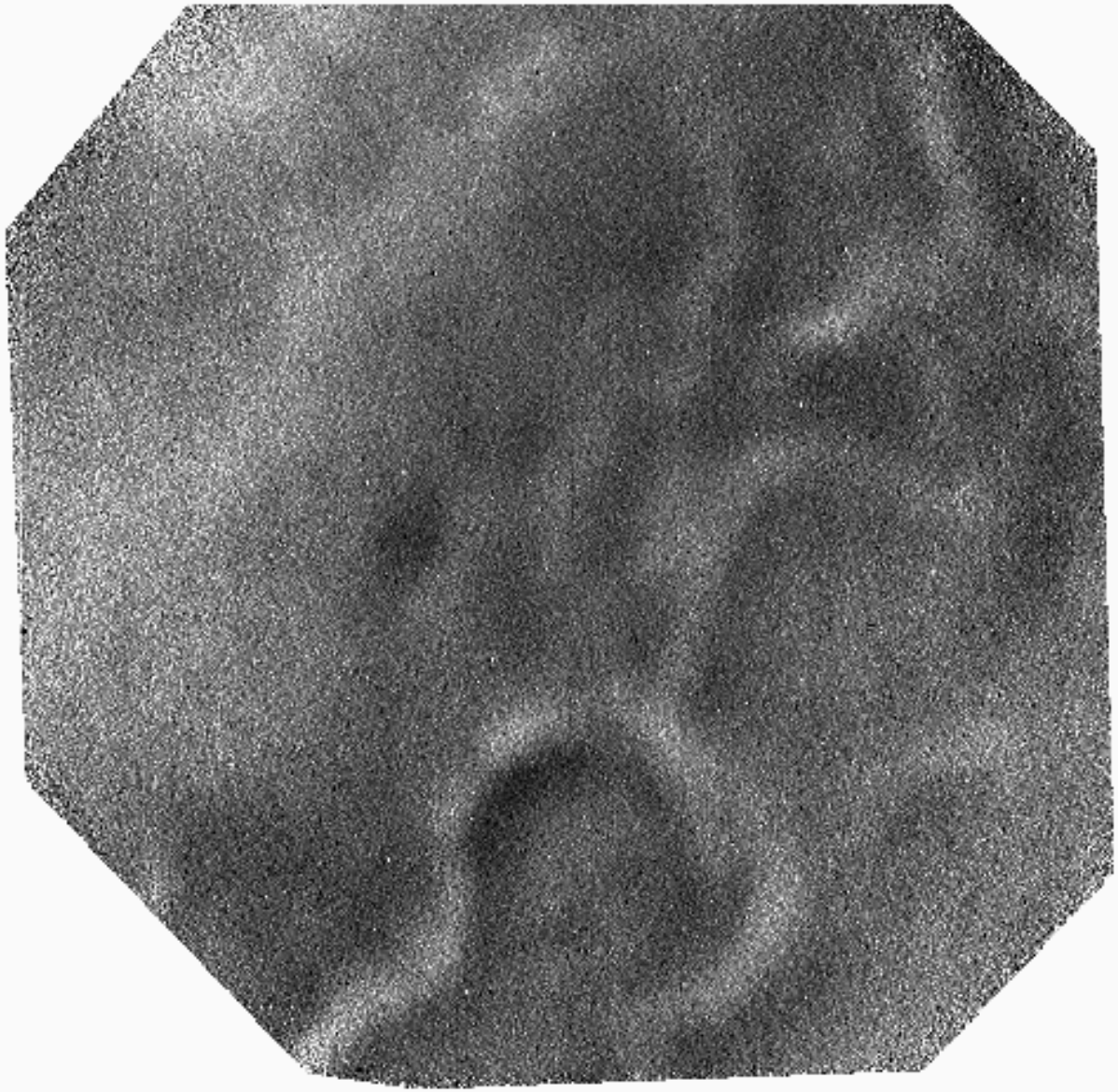
- *Polar orbit*
- *24 h period*
- *66000km apocentre height*
- *250-400km pericentre height control band*
- *Latitude of pc drifting from 78 deg N at arrival to 90 deg N mid 2009*
- *Pericentre height control band reduced to 175-275km late 2008*

Science Payload

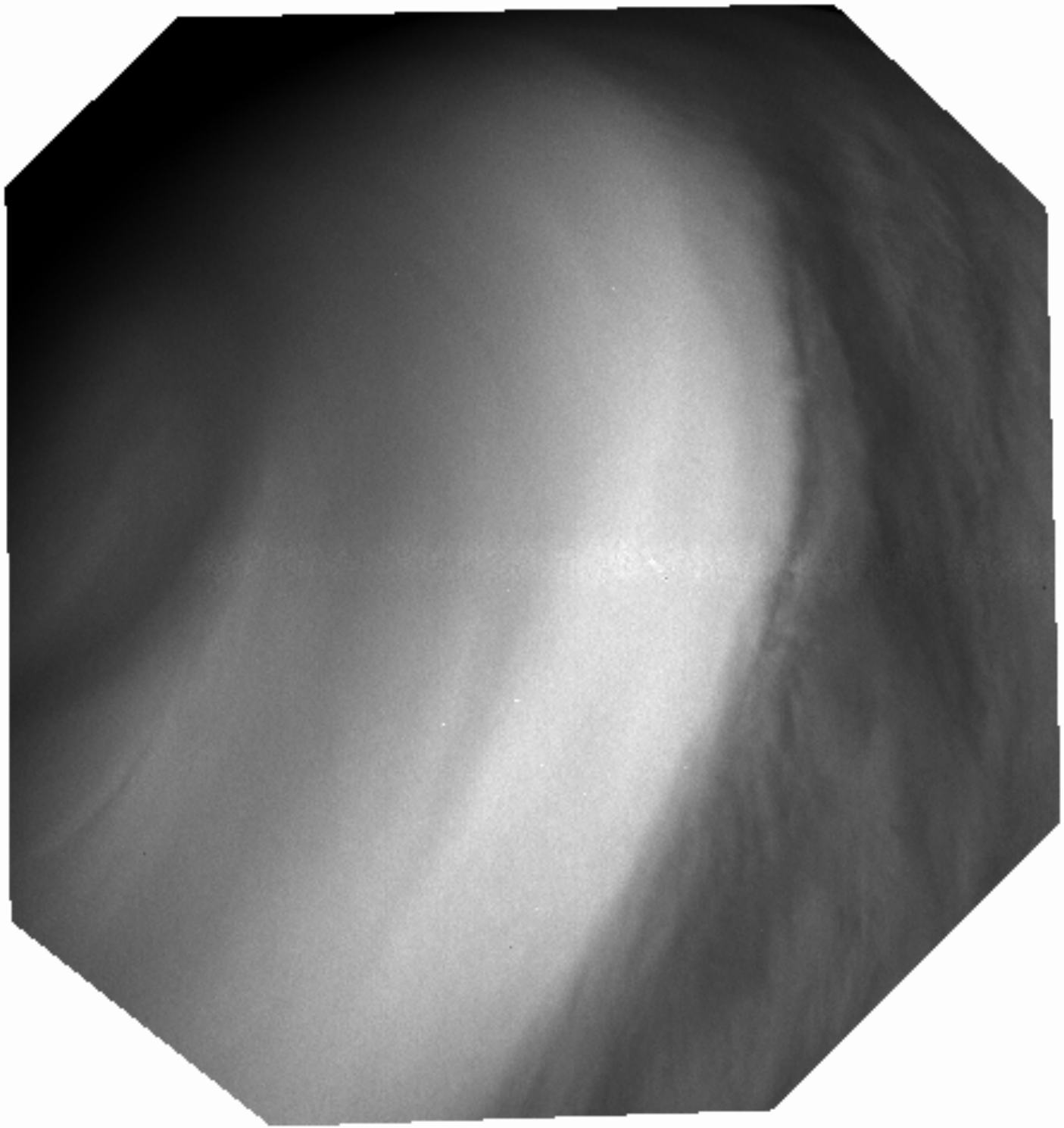
Name	Instrument	Principal Investigator
ASPERA	Analyser of Space Plasma and Energetic Ions	S. Barabash, IRF, Kiruna, Sweden.
MAG*	Magnetometer	T. Zhang, IWF, Graz, Austria.
PFS	Planetary Fourier Spectrometer (IR)	V. Formisano, IFSI-CNR, Rome, Italy.
SpicaV/SOIR*	UV-IR spectrometer for stellar and solar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

Some recent activities and results

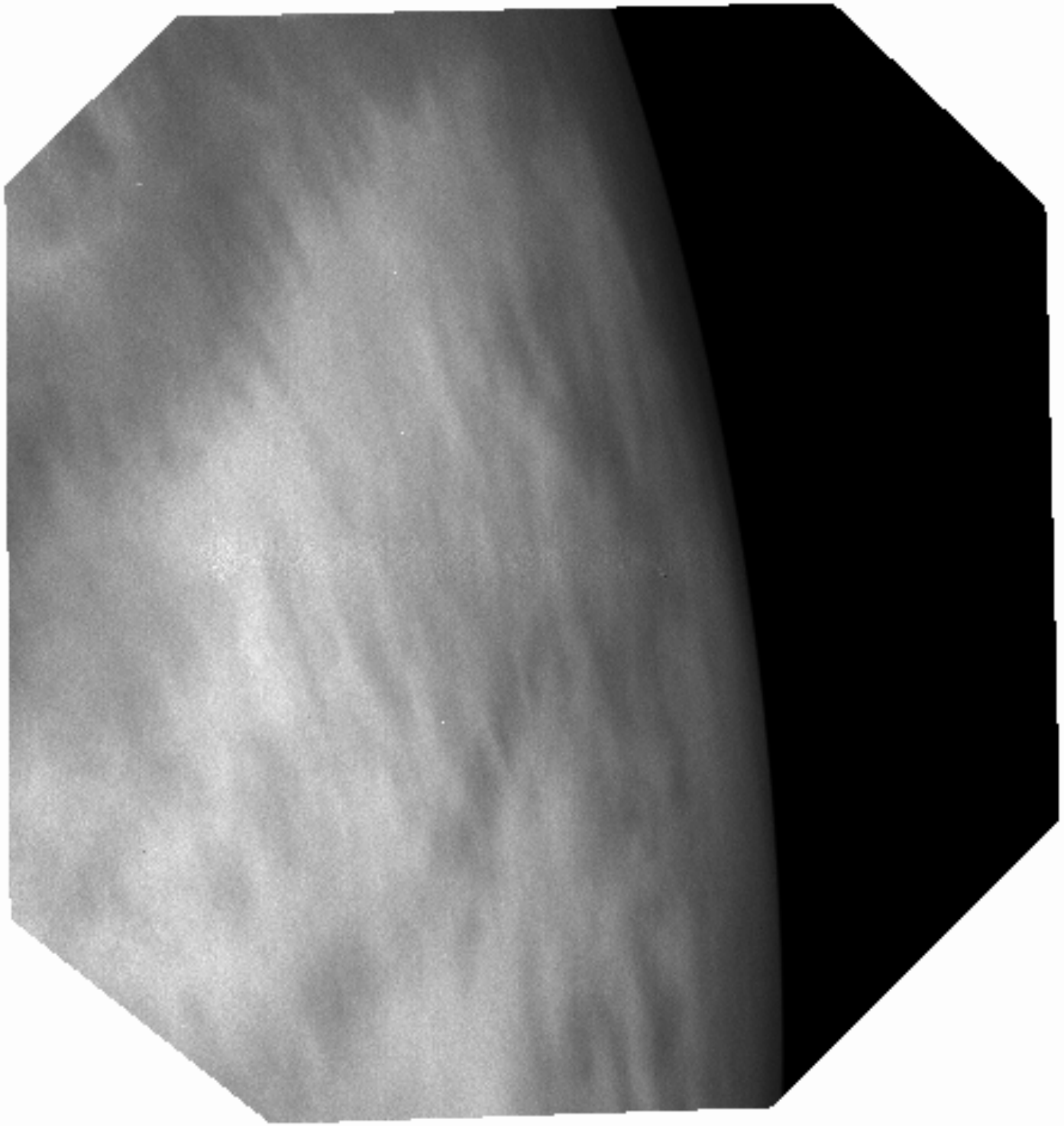
- Detection of SO_2 above the clouds by SpicaV now also in UV in addition to earlier IR detection
- Virtis is extending the NO airglow emissions at 1.2 μm as earlier seen by SpicaV
- A joint ground based-Venus Express observations campaign was held 8-22 February. Ten ground based teams covered the range from UV - Visible-NearIR -Thermal IR to Sub-mm. Analysis in progress



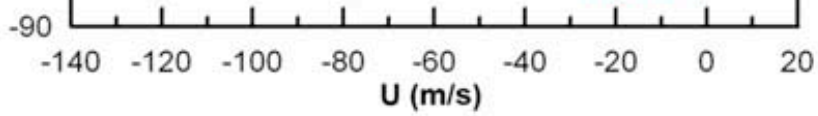
- New unfiltered images of the surface from VMC at 1.0 μm. Atahensik Corona is readily visible

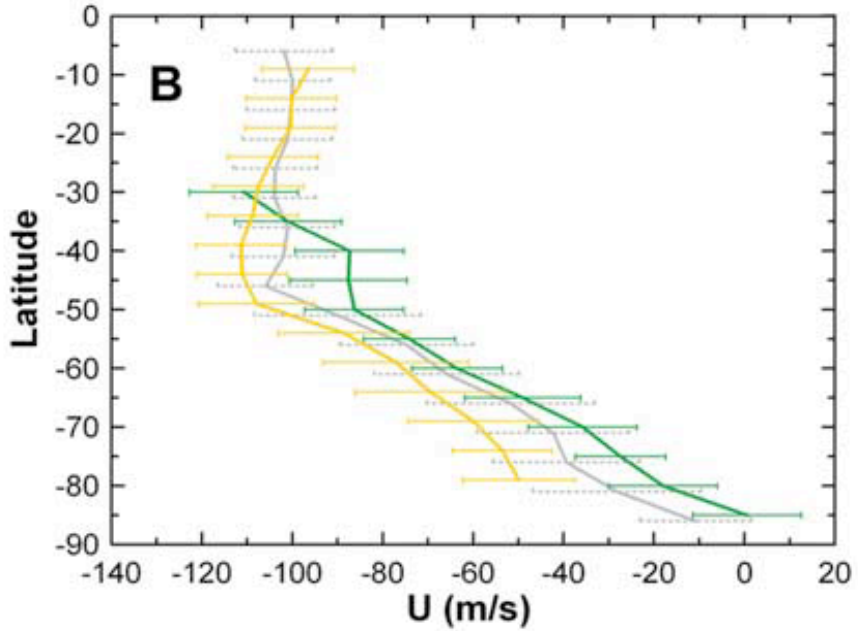


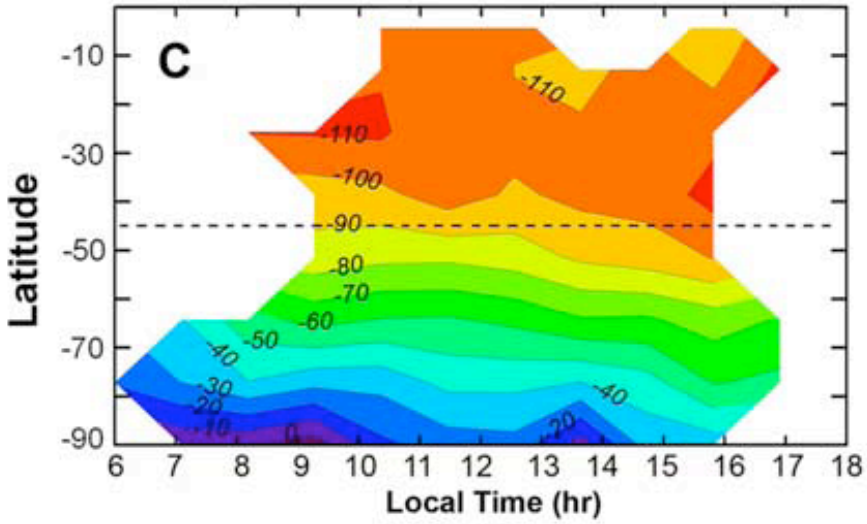
- Edge of the polar cap by VMC



- VMC Limb view in UV







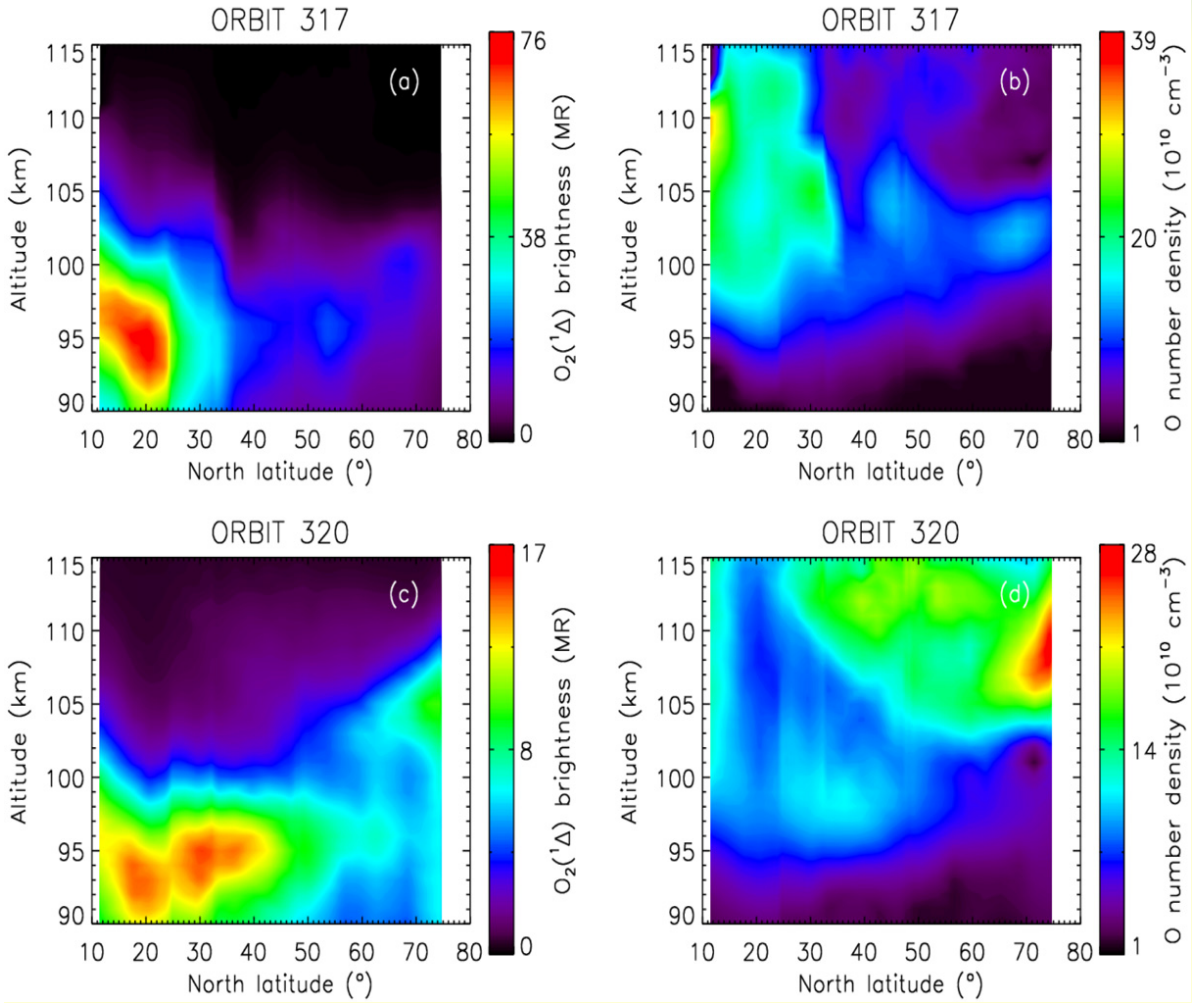
B Venus winds at 380 nm (altitude ~ 66 km) as a function of local time and latitude showing the effects of the solar tide. The green curve represents the zonal wind profile for local time 9 ± 0.8 hr, the yellow curve the zonal wind profile for local time 15 ± 0.5 hr and the grey curve the wind profile for intermediate local times.

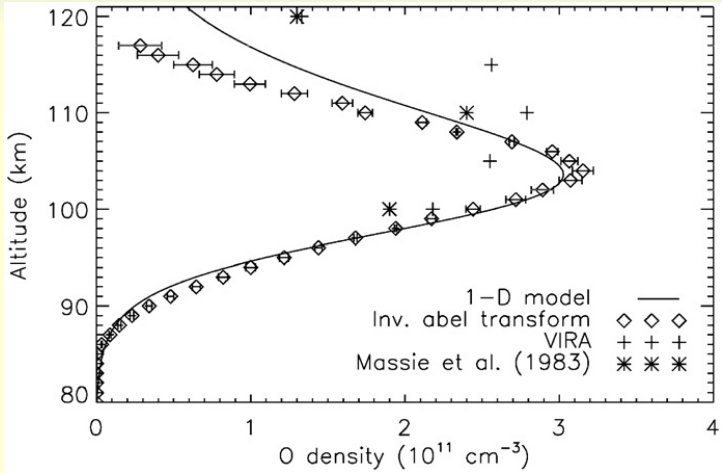
C The effect of the solar tide representing a contour plot of zonal wind profile at 380 nm as a function of local time and latitude

Data from the Virtis instrument

(A. Sa´nchez-Lavega et al. GRL, 2008)

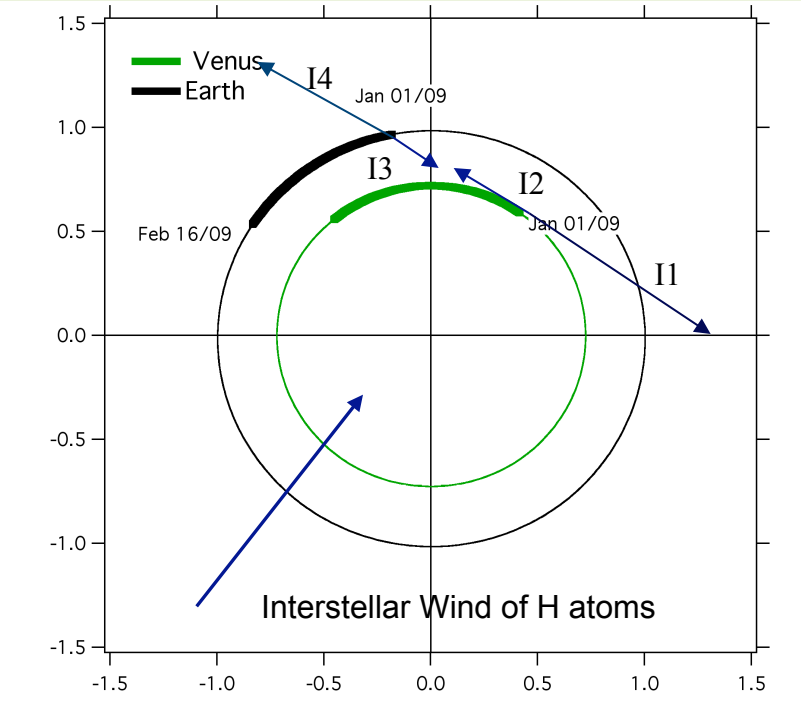
O2 airglow measurements from limb geometry by Virtis at 1.27µm





From Gerard et al, Icarus 2009

Measurements of Hydrogen in the solar system



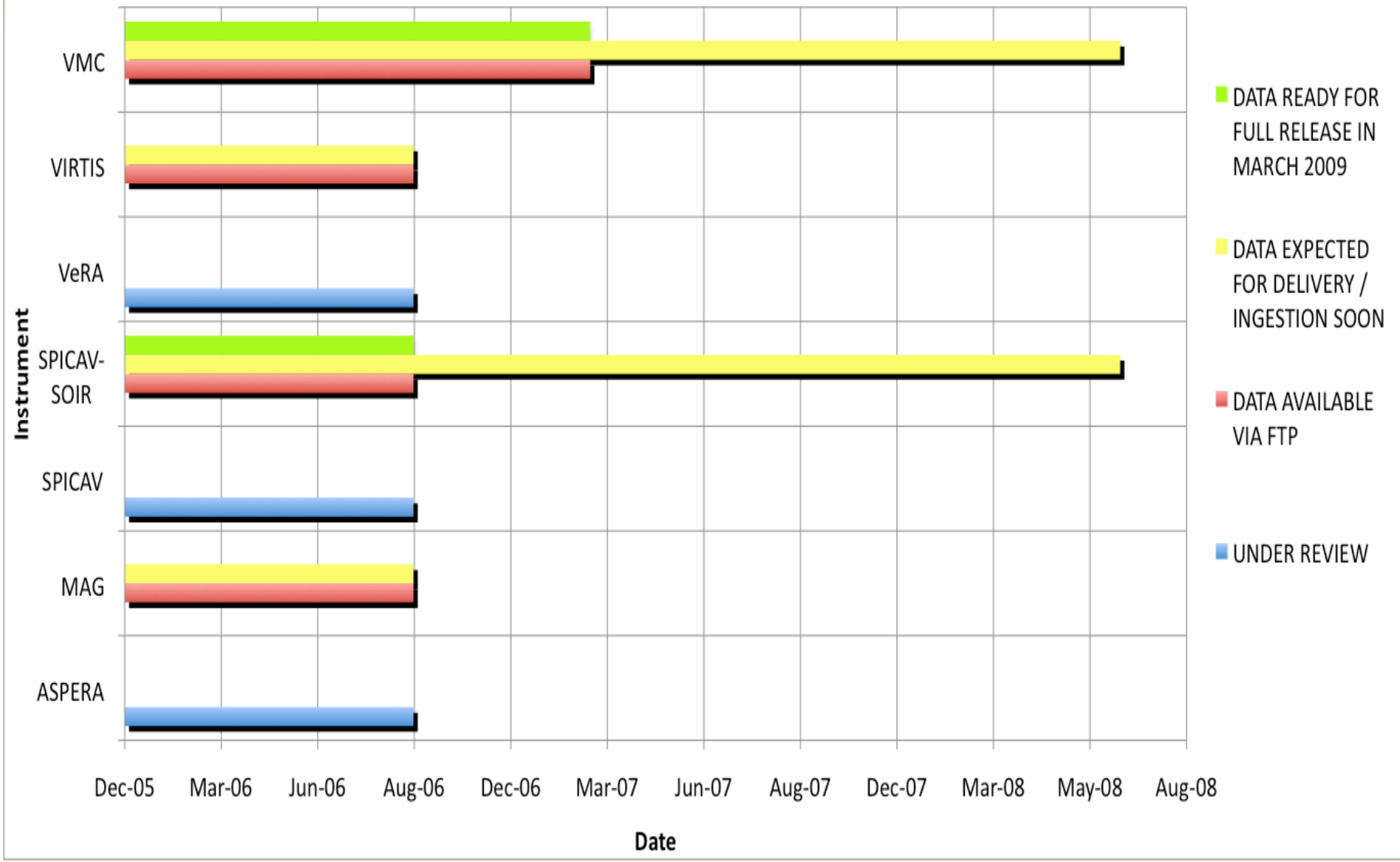
Atoms between SOHO and Venus: I2-I4 or I3-I1
Cross-calibration: I4+I3=I1+I2

- Joint observations VenusExpress-MarsExpress and VenusExpress-SOHO have been performed in Lyman-alpha during 2008 in order to measure the hydrogen between the orbits of Venus and Earth/Mars (SipcaV, SpicaM and Swan)
- Additional measurements are planned between Venus Express and Messenger (SpicaV and MASC)

Future work

- The next years will provide extended coverage in latitude and local time for the atmospheric measurements and better surface coverage of the surface temperature and emissivity maps.
- At the time of the lowest pericentre altitude atmospheric drag will be monitored by measuring the orbit decay.
- A further pericentre altitude reduction will allow atmospheric drag measurements by on board accelerometers that should give very high precision data on the density and temperature in the 150-200 km altitude range.
- Joint operations with the Japanese Venus Climate Orbiter in 2011 will enable simultaneous observations from different positions and provide improved temporal coverage.

Venus Express Science Data Archive Status
February 24th 2009

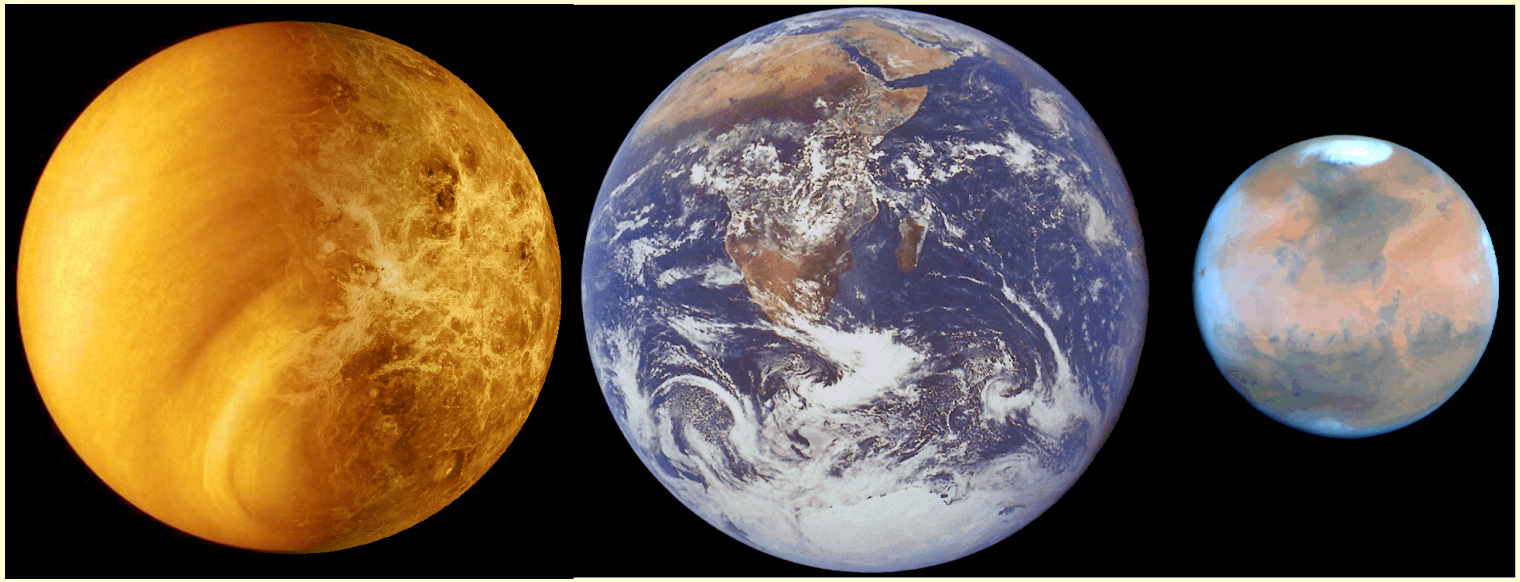


Conclusion

- Venus Express spacecraft is in a good health and very productive, but shows some signs of ageing.
- The data analysis is in full progress but the teams are still limited in manpower.
- The archive is slowly getting populated with data from all instruments.
- The mission is likely to be extended until end 2012, with as a major objective joint operations with the Japanese planet-C

International Conference on Comparative Planetology: Venus – Earth – Mars

11-15 May 2009, ESA-ESTEC



Conference website:
http://www.rssd.esa.int/eslab-2009

Please submit abstracts no later than 02 March 2009.