

Venus Express Present Status

Håkan Svedhem
ESA/ESTEC

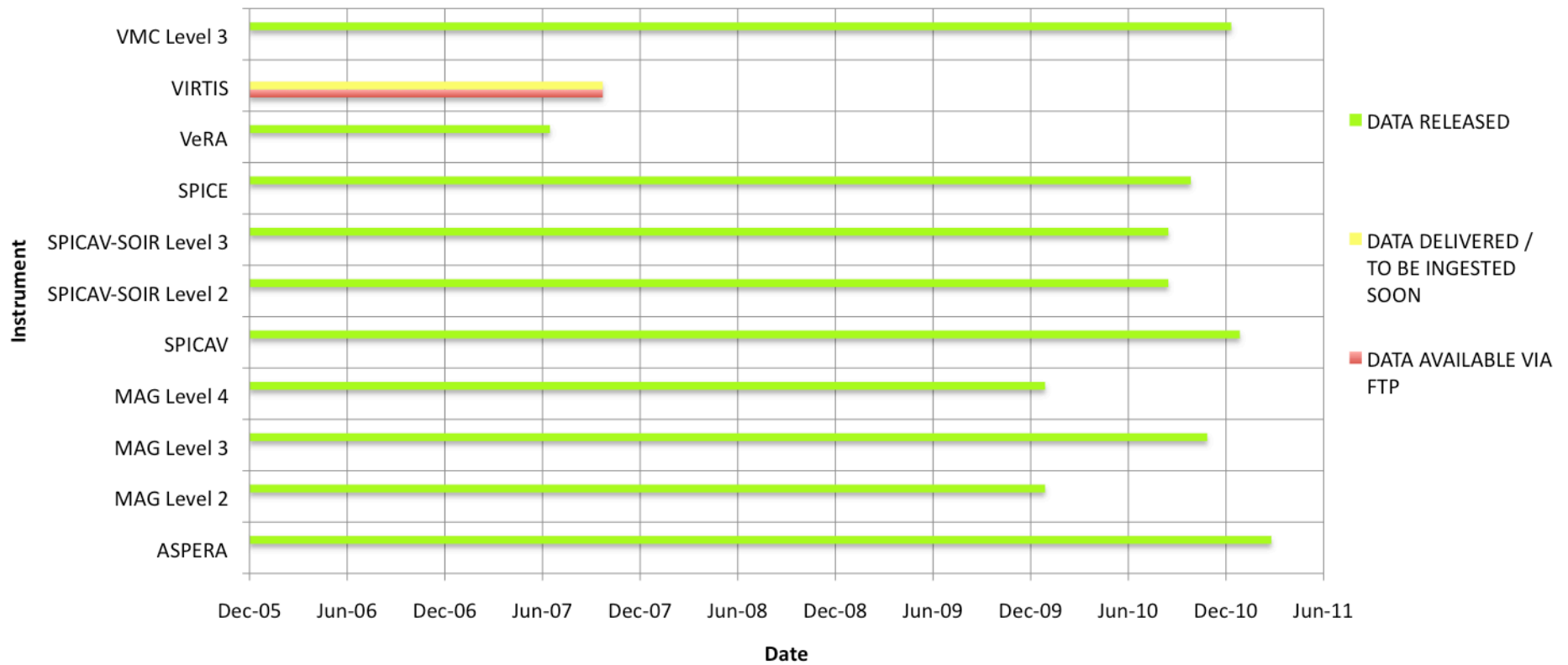
Mission Status (1)

- The spacecraft is in an excellent condition and the fuel and power situation is very good.
- The excess friction in two reaction wheels has now stabilised at a safe level
- More than 3.5 Tbit of science data has now been downloaded to ground
- 10 earth occultation seasons have taken place so far. Typically radio science observations have been carried out every 1-3 orbits
- The 5th atmospheric Drag campaign finished 3 June 2011. A set of 15 data points down to an altitude of 165km have been sampled. There seems to be a periodicity of about two days in the data, with every second day higher and every other second day lower density.

Mission Status (2)

- On Sunday 5 June the star trackers lost track due to a high background noise level. Switching to the backup star tracker showed the same problem. Later it was found that also the error correction count from the EDAC on the CDMU was increasing dramatically during the same time. An extraordinary high background count was seen by ASPERA at the same time. This was most likely caused by a Solar flare.
- The study of the aero-braking with Astrium has finished. Astrium have identified a feasible case, with adequate margins, to go to 0.3-0.4 N/m². A final presentation was given 6-6-2011.
- The data archive (PSA) has seen a dramatic improvement during the last year. Most teams are now up to date and serious research based the archived data can now be performed. Virtis is almost there...

Venus Express Science Data Archive Status August 31st 2011



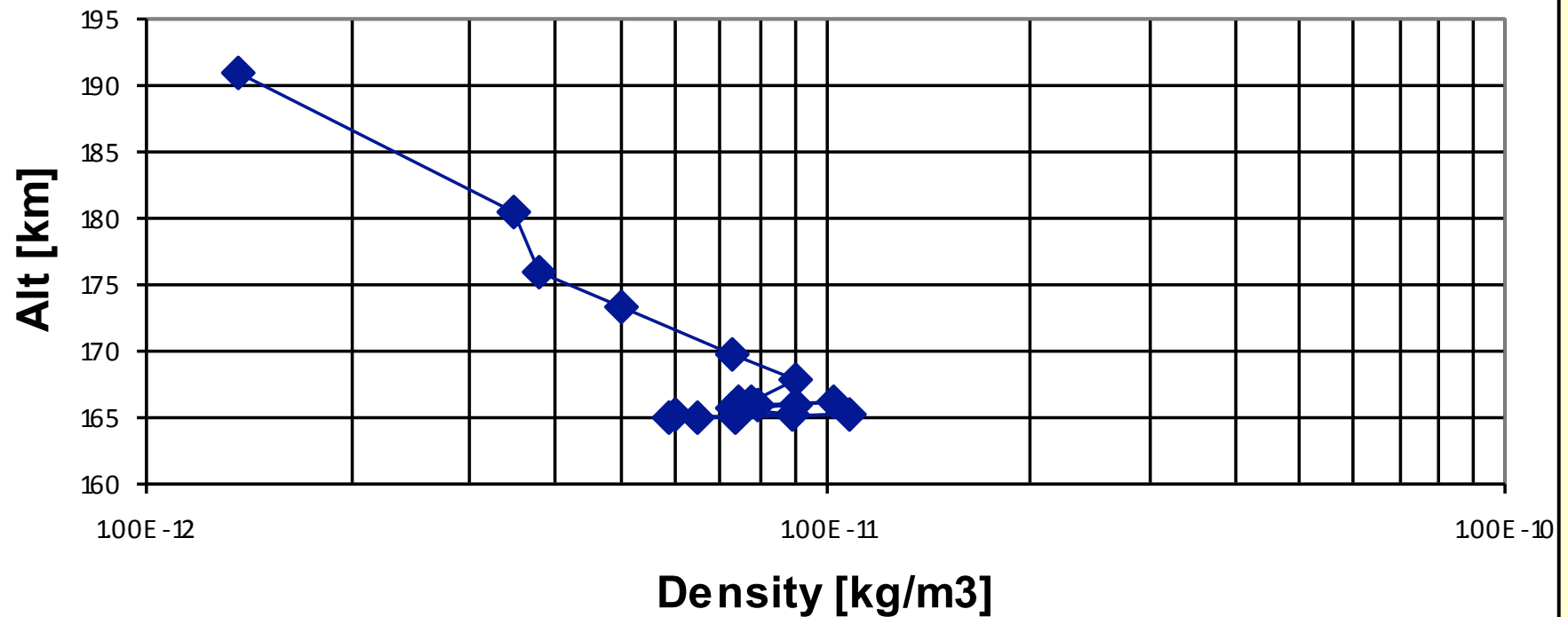
Mission Extension

- The Venus Express mission, together with all other ten missions up for extension, were extended to end of 2012 unconditionally, and to end of 2014 pending a technical review of the spacecraft capability in 2012.
- SPC and both advisory committees (SSEWG and SSAC) strongly commended all teams for the high quality of the missions and for the good work performed in preparing the cases for the extension.
- We did however get a fairly low ranking compared to the other missions, much because of the comparatively low number of publications. I tried to emphasise that the Venus community is becoming “born again” after a long era of no new data and no missions to Venus. It will be important in the near future to demonstrate that the community continues to grow and that the publication rate increases. We shall try different ways to achieve this. One way may be to organise data analysis workshops to encourage more scientists, also from neighbouring disciplines, to look at and work on data from Venus Express.

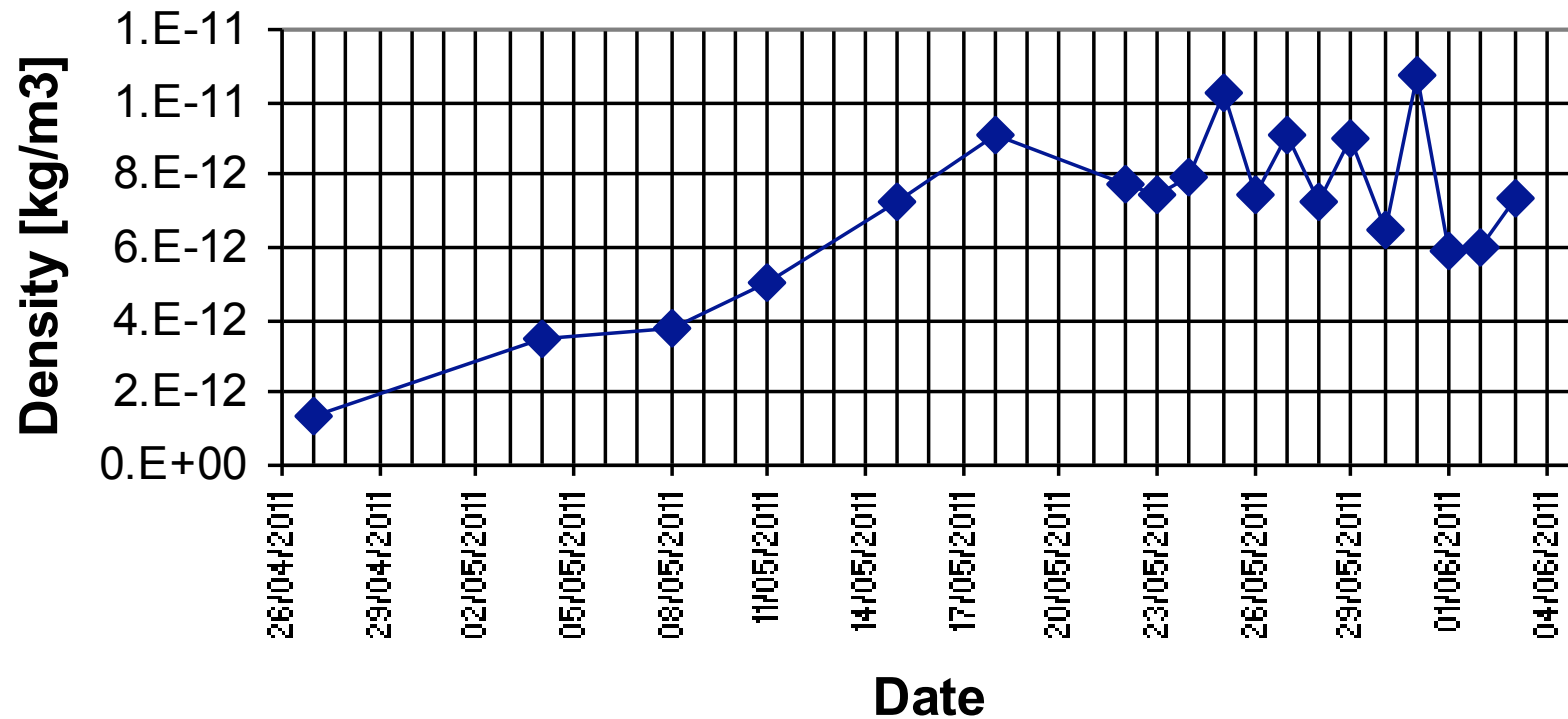
Atmospheric Measurements at 200-165 km

- The drag and torque measurements that have been carried out during several campaigns have been very successful and will continue when the opportunity arises again.
- The torque measurements have turned out very useful, with a strongly enhanced sensitivity to atmospheric density, while tilting one solar panel against the “wind” and one solar panel parallel to the “wind”. Information is provided by the reaction wheels. This provides data not only on the maximum density during the atmospheric pass but a detailed resolved track during the part of the trajectory where the altitude is below about 200 km.
- A slightly lower pericenter altitude than the last (165 km) will allow the use of the on board accelerometers for further improvement in these spatially resolved measurements.

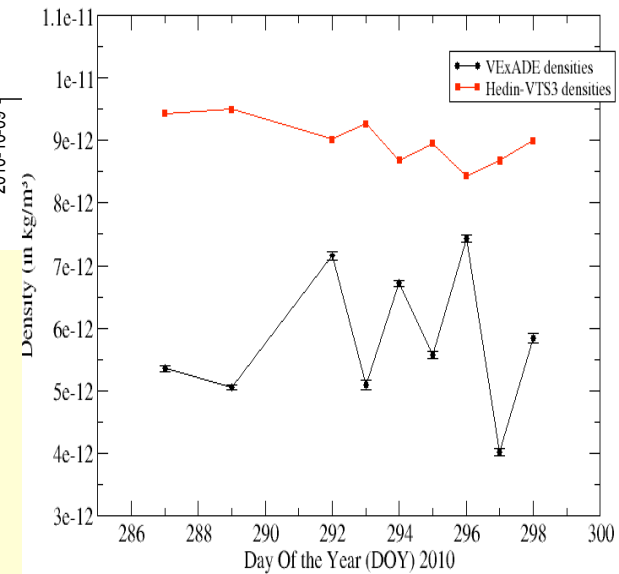
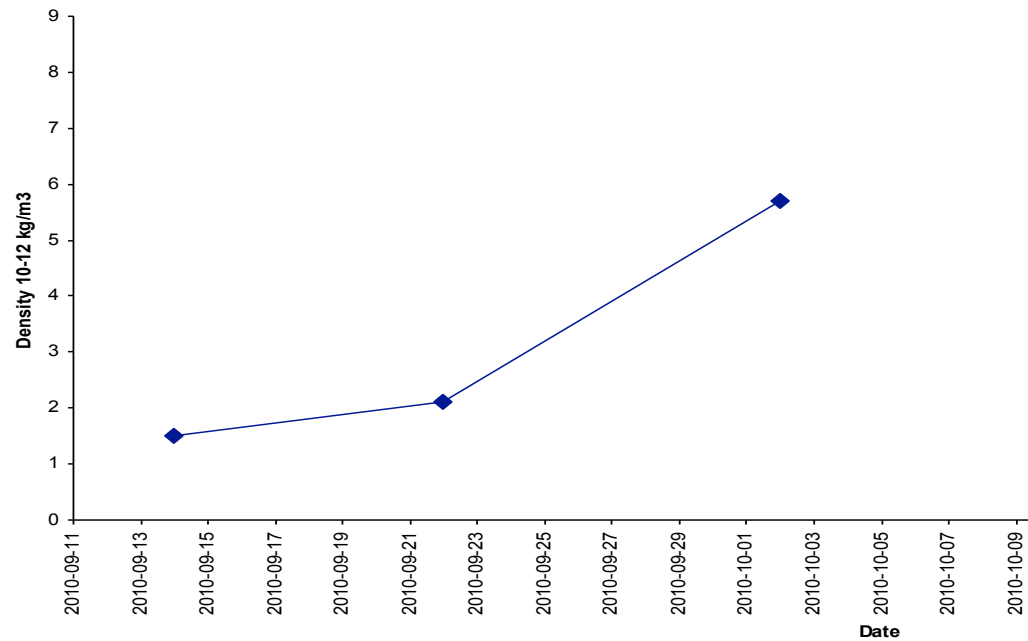
Density from torque measurements ADE#5



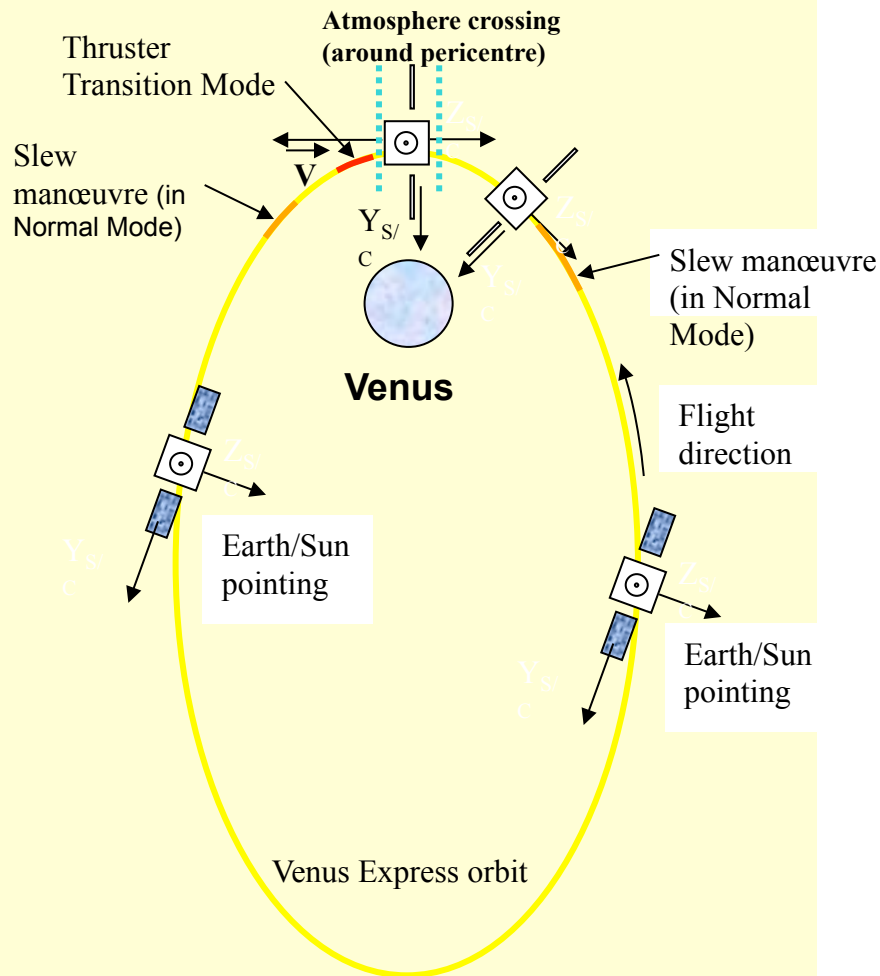
Density from torque measurements ADE#5



Density from Torque measurements ADE4

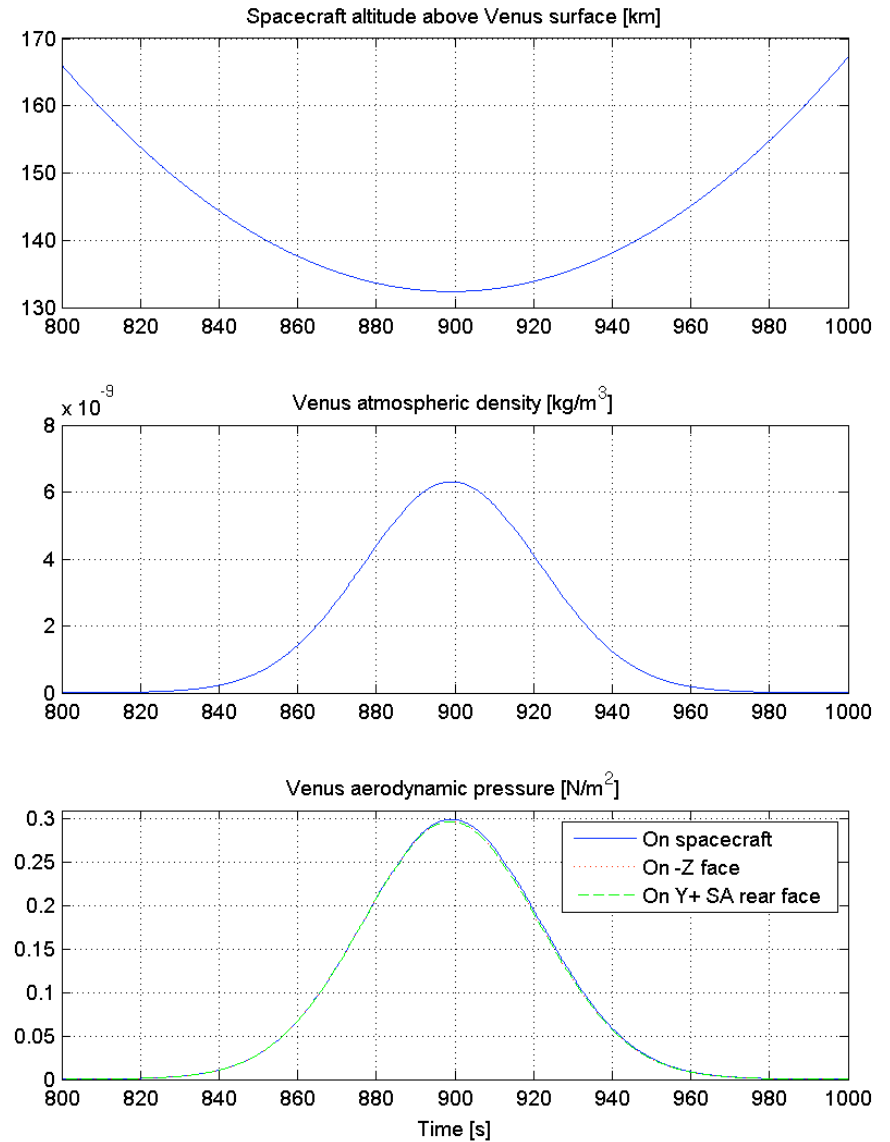


Aerobraking principle

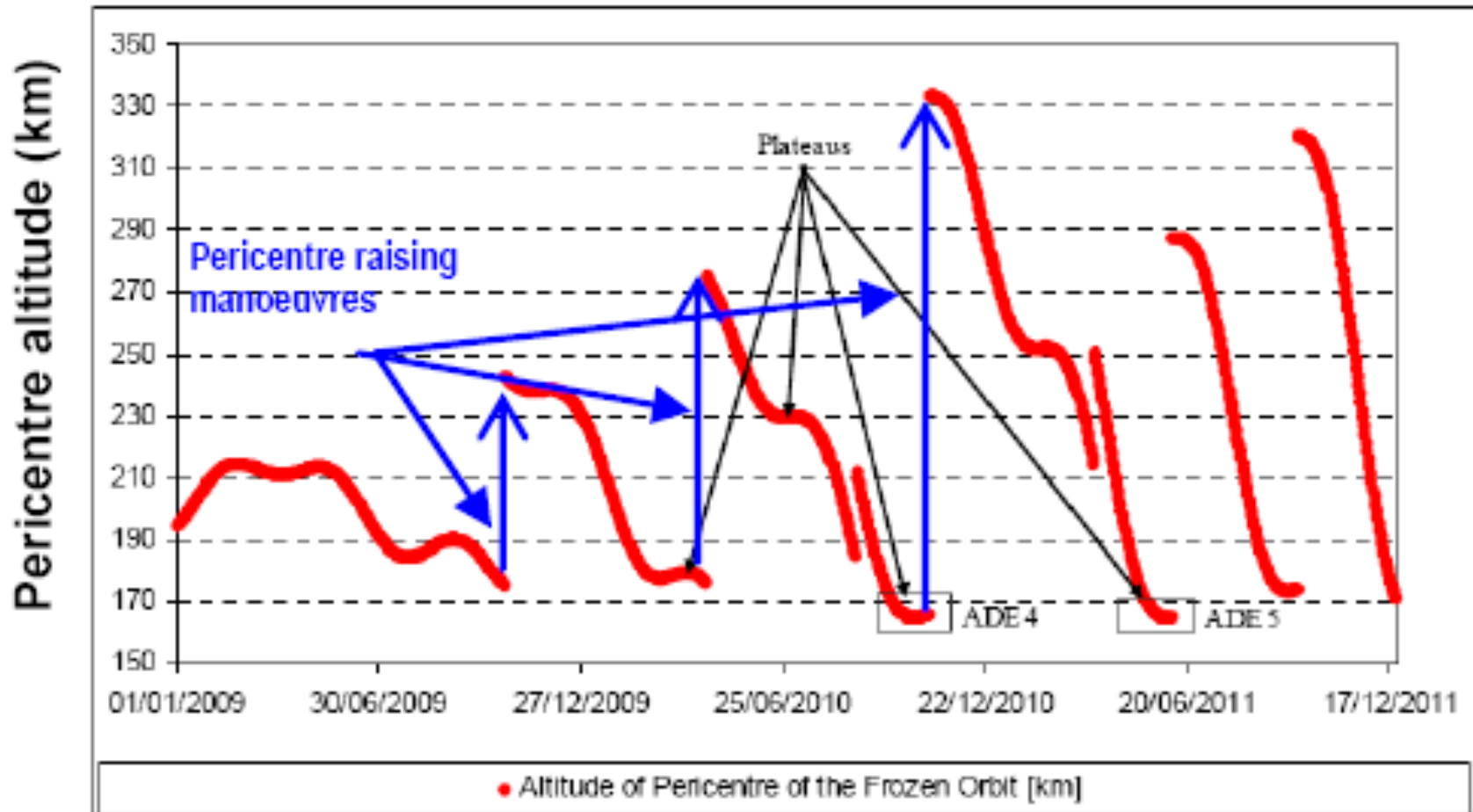


August 2011

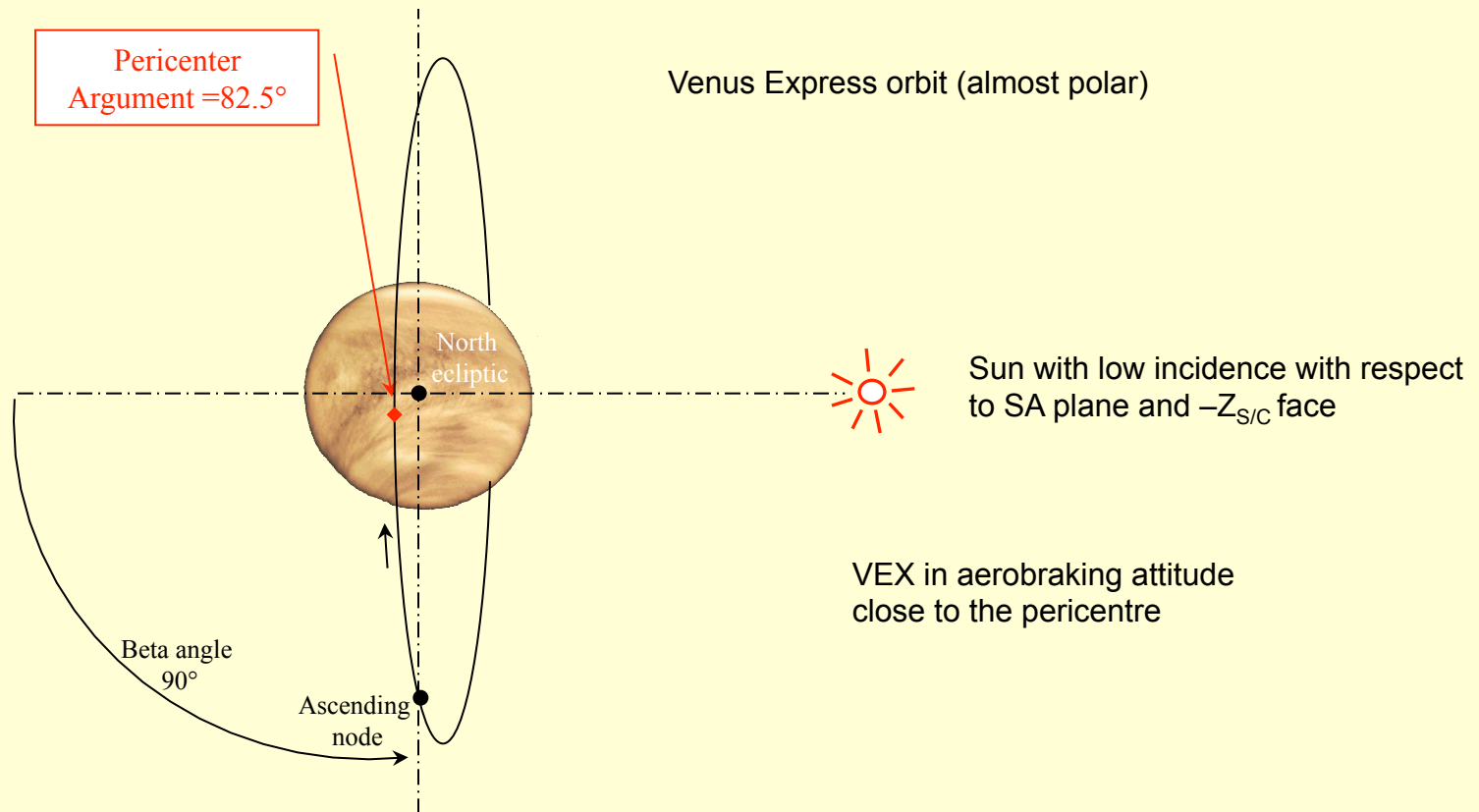
VEVA



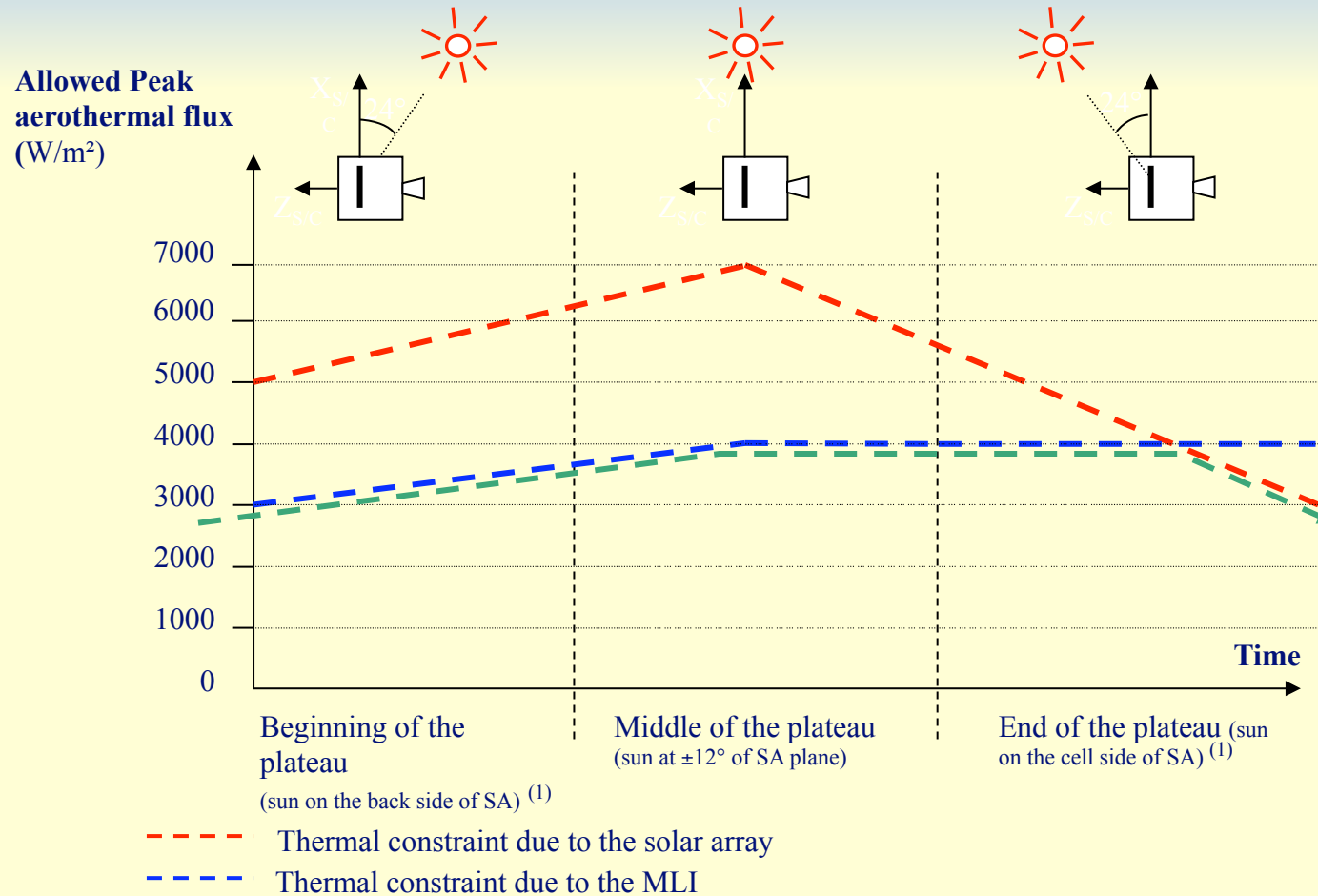
Pericentre altitude natural evolution



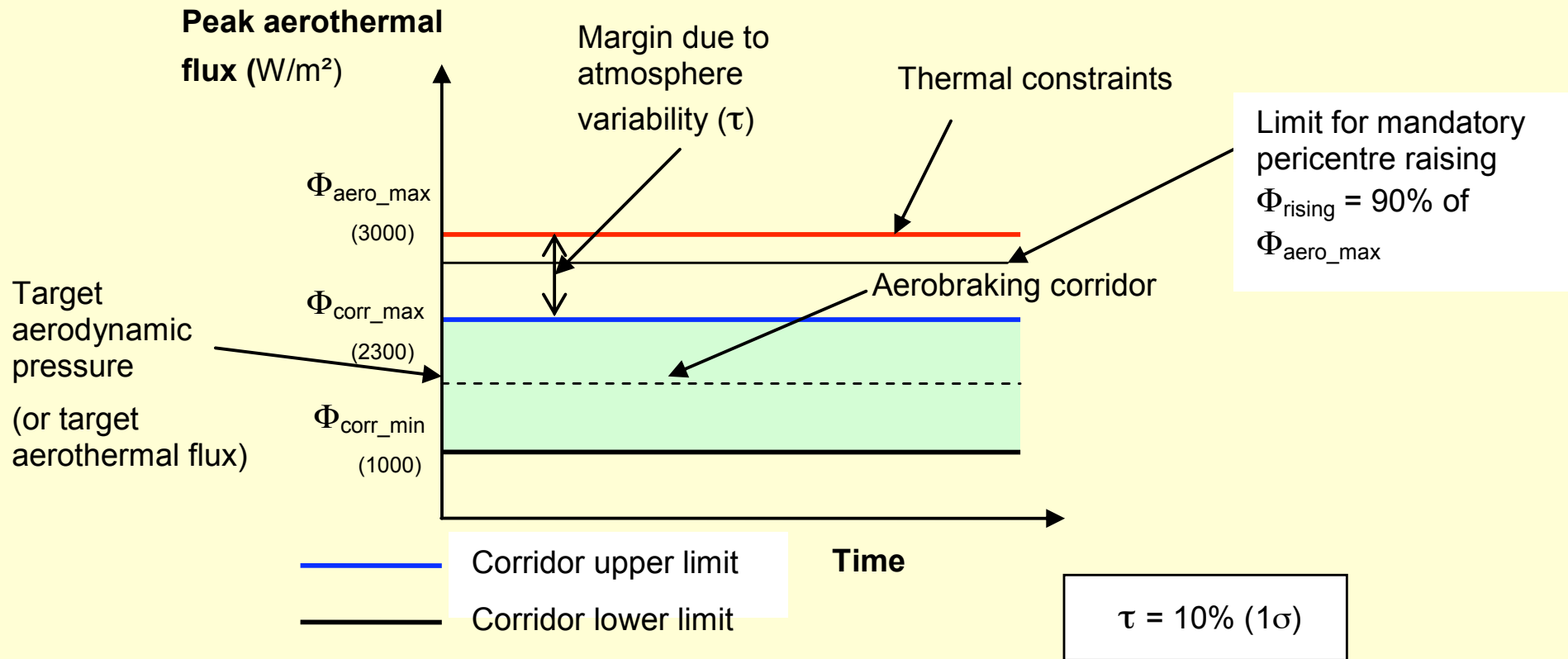
Aerobraking – most favourable case



Aerobraking study



Note (1) : Depending on the plateau the sun will be illuminating the back side of the SA either at the beginning or at the end of the plateau



Required delta-v for orbit reduction

- 24h-18h 90 m/s
- 18h-16h 42 m/s
- 16h-12h 118 m/s

- 24h-12h 250 m/s

What can we achieve?

- $3000 \text{ W/m}^2 \rightarrow 0.3 \text{ N/m}^2 \rightarrow 0.6 \text{ m/s}$
- $4000 \text{ W/m}^2 \rightarrow 0.4 \text{ N/m}^2 \rightarrow 0.8 \text{ m/s}$

- Each plateau ~ 30 days

- $18\text{h} \rightarrow 90 \text{ m/s} \rightarrow \sim 150 \text{ days} \rightarrow \sim 5 \text{ plateaus}$ Difficult!
- Can we do aerobraking in between plateaus?
- Can we operate at higher heat fluxes?
- What can we achieve by combining aerobraking and thruster activity?
- Study in progress.
- A technical review will take place on 5 September

Publications

- The cumulative number of refereed publications related to Venus Express is now approximately 222. Another 25 papers have been submitted, several of which already accepted.
- **Special Issue:**
 - Planetary and Space Science, Vol. 59, Iss.10 pp. 887-1112, (2011), Comparative Planetology: Venus-Earth-Mars
 - 24 papers originating from the ESLAB 2009 meeting.

Upcoming meetings/events

- **Atmospheric waves workshop: Venus, Earth, Mars**
 - Date: November 9-10 ESTEC, Noordwijk, NL
 - Org. Arianna Piccialli, (H. Svedhem, D. Titov)
 - Info soon to appear on <http://www.rssd.esa.int/index.php?project=TOP&page=conferences>
- **SWT #27**
 - Graz, Austria, 16-18 November (Host: MAG team)
- **SWT #28 & Venus transit**
 - Svalbard (Spitsbergen), 4-7 June 2012



*Looking due North,
Longyearbyen, midnight 6 June 2012*