Present Status of Japanese Venus Climate Orbiter

Current status of VCO development:

Mechanical and Thermal models were evaluated in 2007.

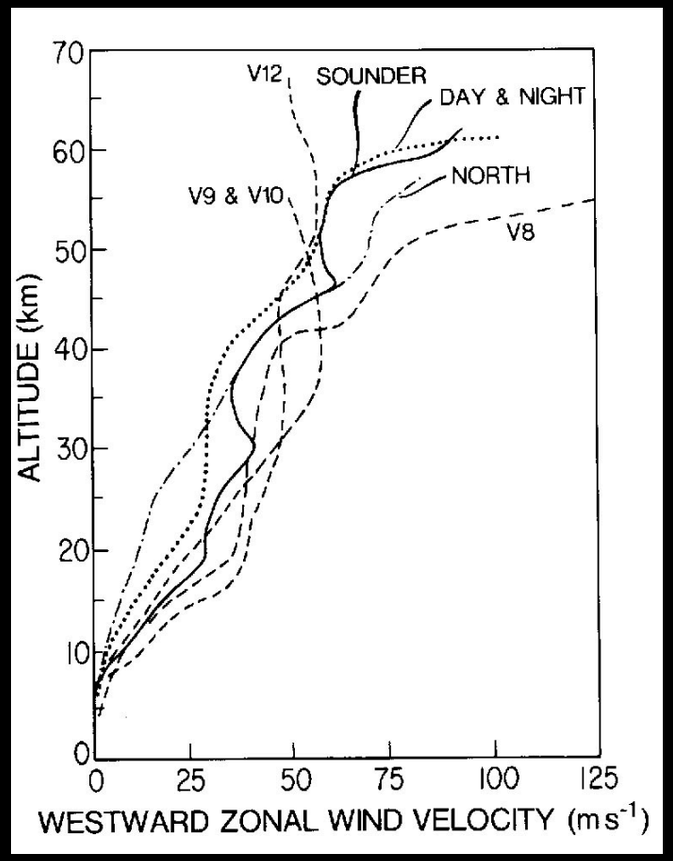
Critical Design Review has been carried out through Dec. 2007 to March 2008 and the mission has successfully been phased up.

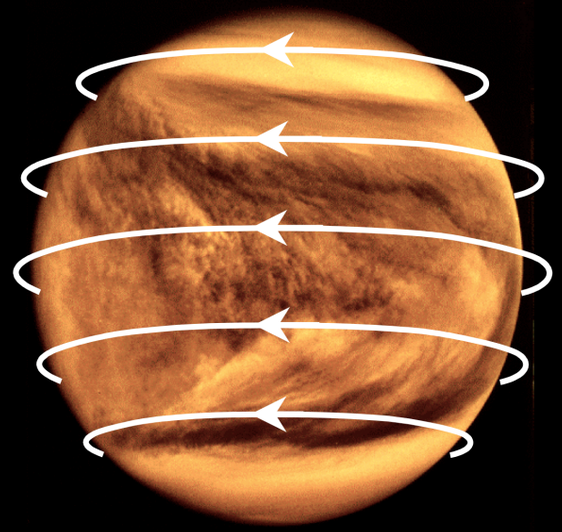
The flight model is being manufactured with minor modifications from the mechanical and thermal models.

- *VCO will be the first Japanese Venus mission*
- *It is dedicated to the meteorological survey*
- *It will be launched in May 2010 and arrive at Venus in December 2010*
- *Nominal mission life is 2 years*
- *It has 5 cameras (UV, Visible, NIRx2, LIR) to investigate the atmospheric*

Scientific Targets

- Atmospheric dynamics
  - Super rotation
  - Circulations
  - Meso-scale phenomena
- Lightning
- Cloud physics
- Active volcano
- Geological survey

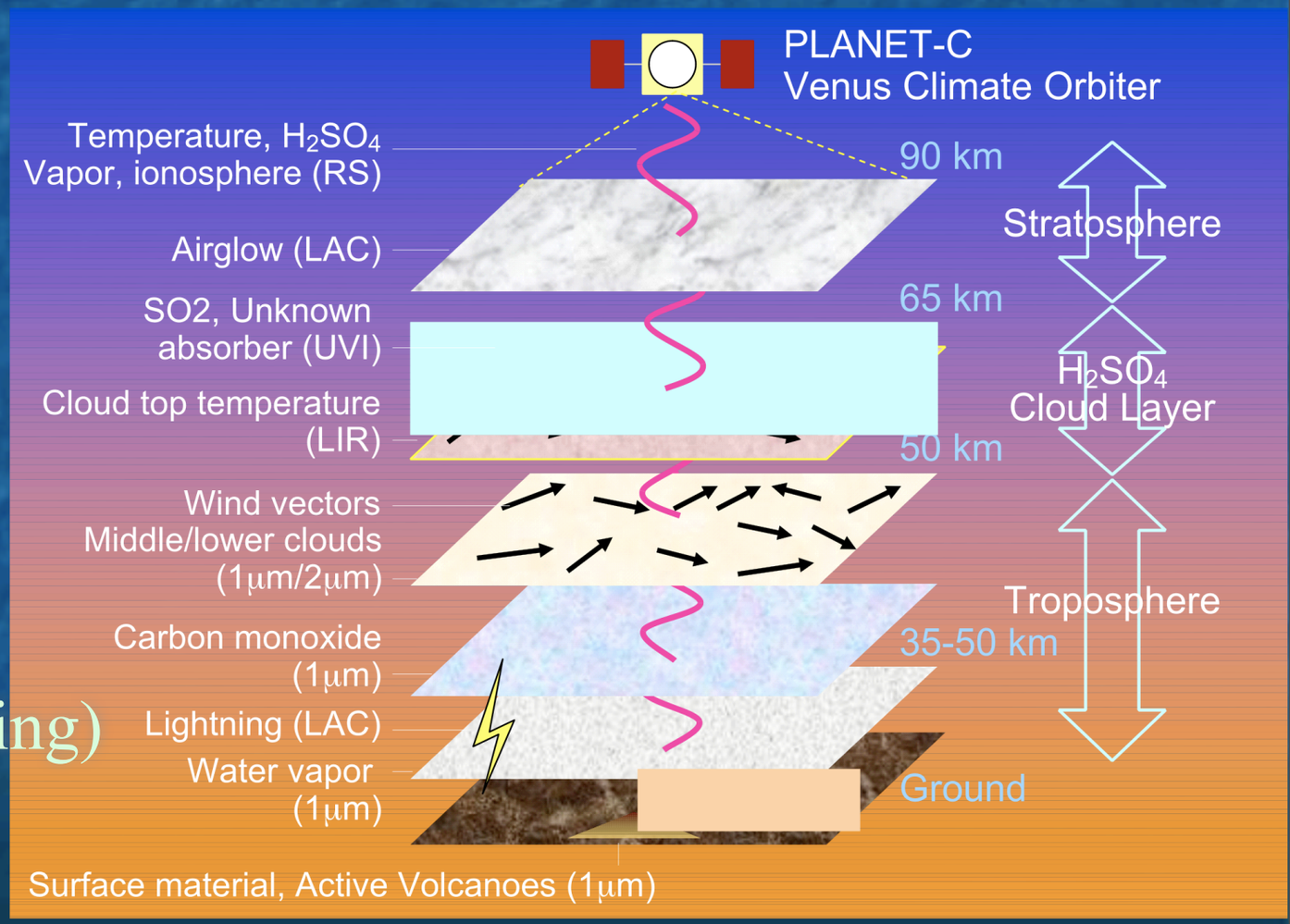




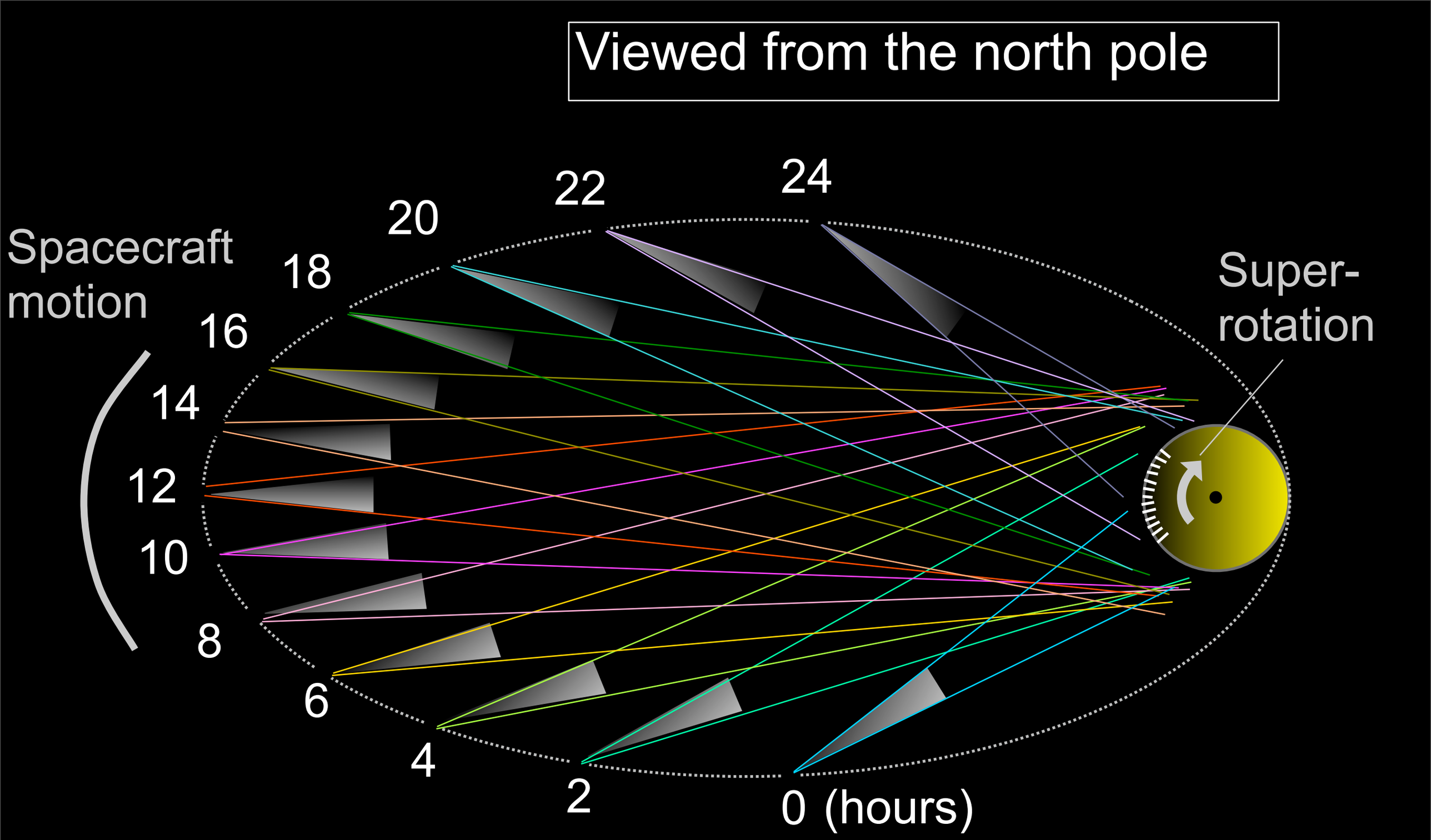
Venus wind system

5 Cameras onboard PLANET-C

- **IR1** λ= 0.9 1.01 μm
- 1024x1024 SiCCD
- **IR2** λ= 1.73, 2.26, 2.32 μm (Venus atmosphere.),
- 2.02 μm (CO_2), 1.65 μm (IPD)
- 1024x1024 PtSi
- **LIR** λ= 8-12 μm
- 240x320 micro bolometer array
- **UVI** λ= 280, 365 nm
- 1024x1024 UV intesified SiCCD
- **LAC** λ= 777, 551, 558 nm
- 8x8 Av. photo-diode (50kHz sampling)
- **DE & USO**



Viewed from the north pole



Optimization for detecting small deviations of atmospheric motions from the background flow

Evaluation of the H-IIA mechanical environment

- Acoustic & Vibration test
- Marman clamp shock test
- SAP extension shock test

- *Flight load factors*

	Axial	*Lateral*
Lift off		
compression	*−3.2G*	*±1.8G*
tension	*−0.1G*	*±1.8G*
Main engine cut-off		
Before MECO	*−4.0G*	*±0.5G*
During MECO	*+1.0G*	*±1.0G*

- *Sinusoidal vibration levels*

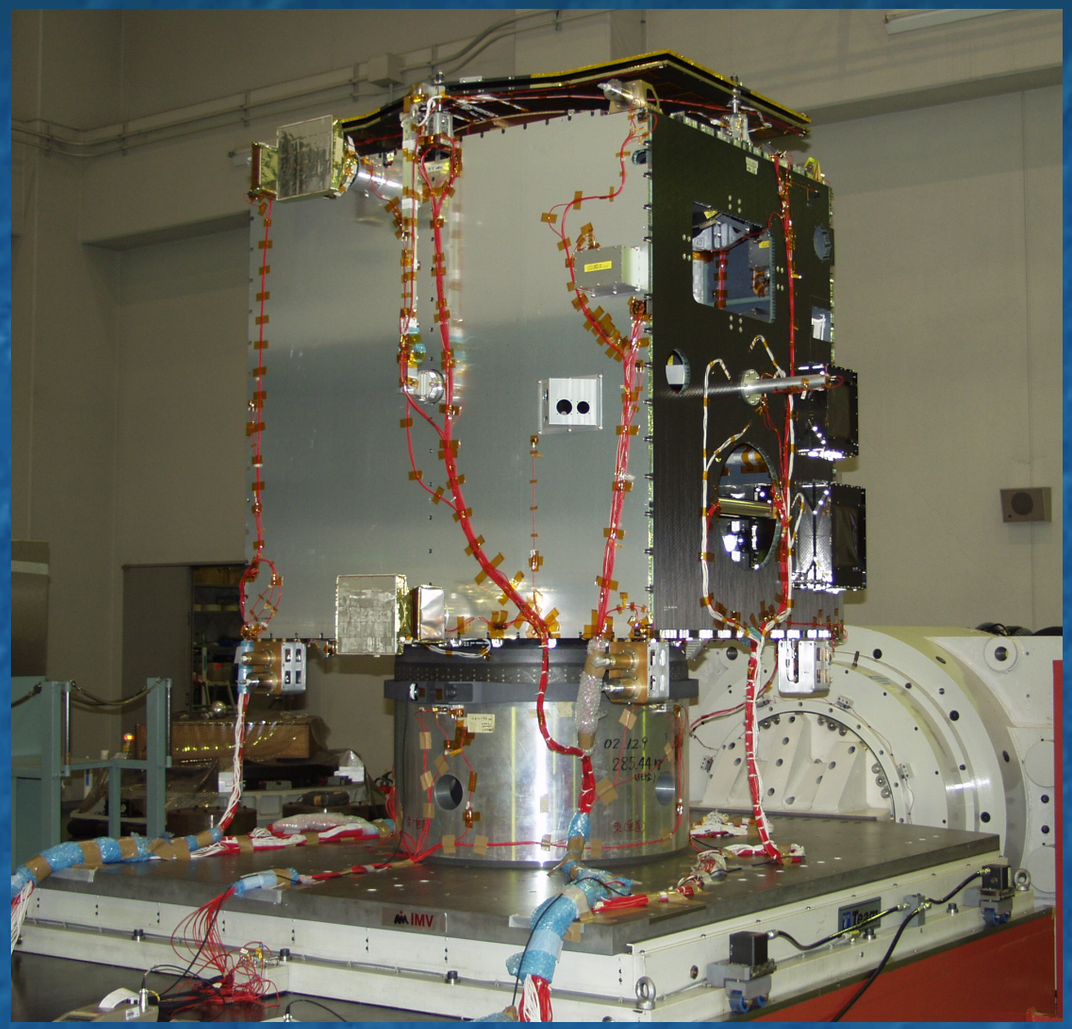
Axial	*5~30Hz*	*1.0 Go-p*
	30~100Hz	*0.8 Go-p*
Lateral	*5~18 Hz*	*0.7 Go-p*
	18~100 Hz	*0.6 Go-p*

Sound pressure levels

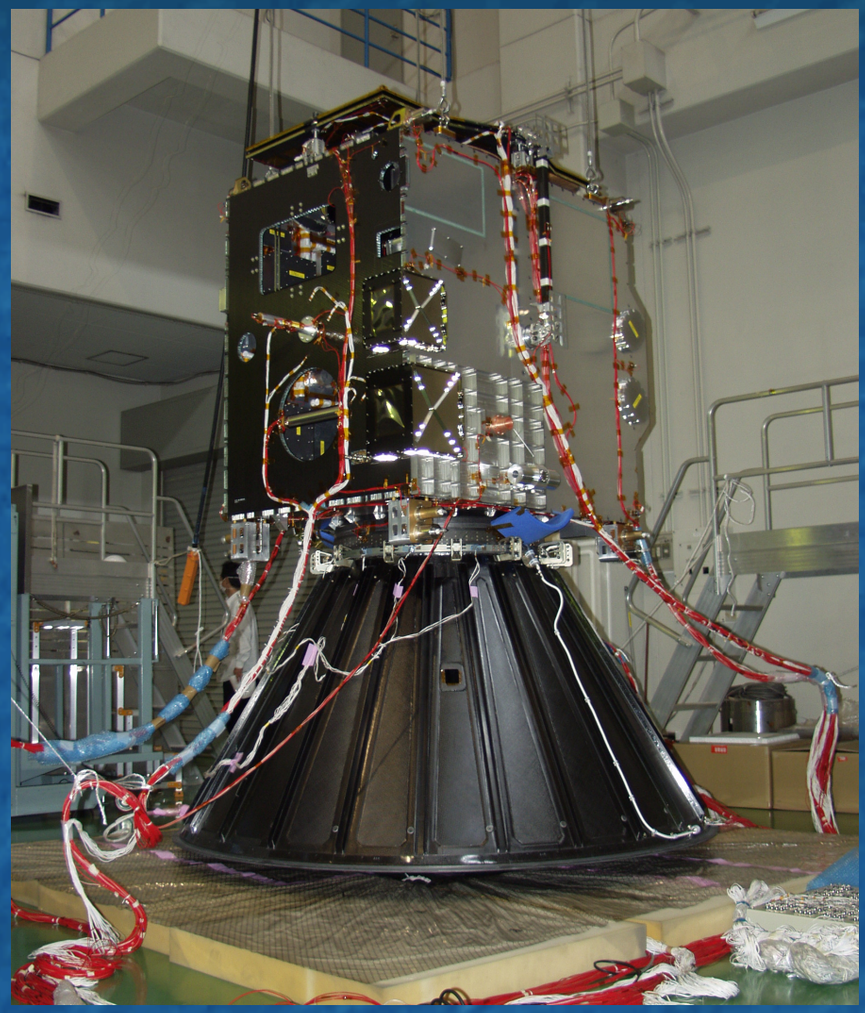
Center Frequency(Hz)	*SPL(dB)*
31.5	*125.0*
63	*126.5*
125	*131.0*
250	*133.0*
500	*128.5*
1000	*125.0*
2000	*120.0*
4000	*115.0*
8000	*113.0*
O.A.	*137.5*

M. Nakamura et,al.

PLANET-C Mechanical Test Model



Vibration test

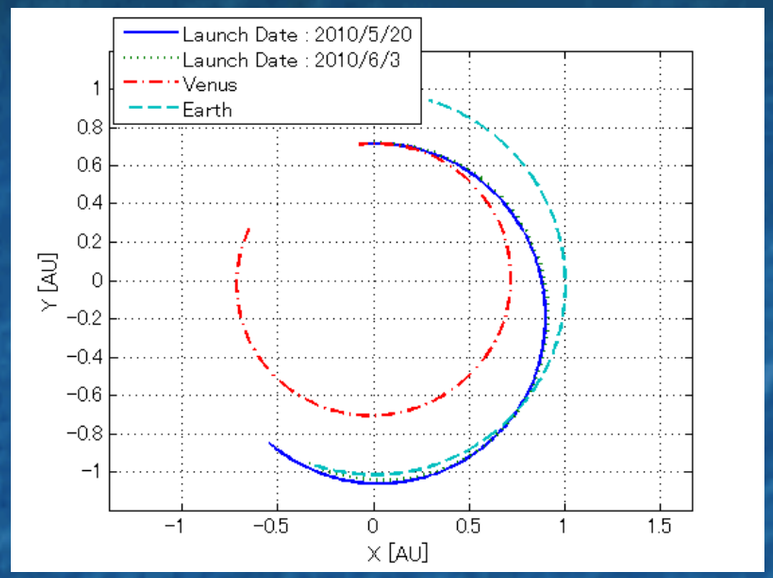


Marman clamp shock test

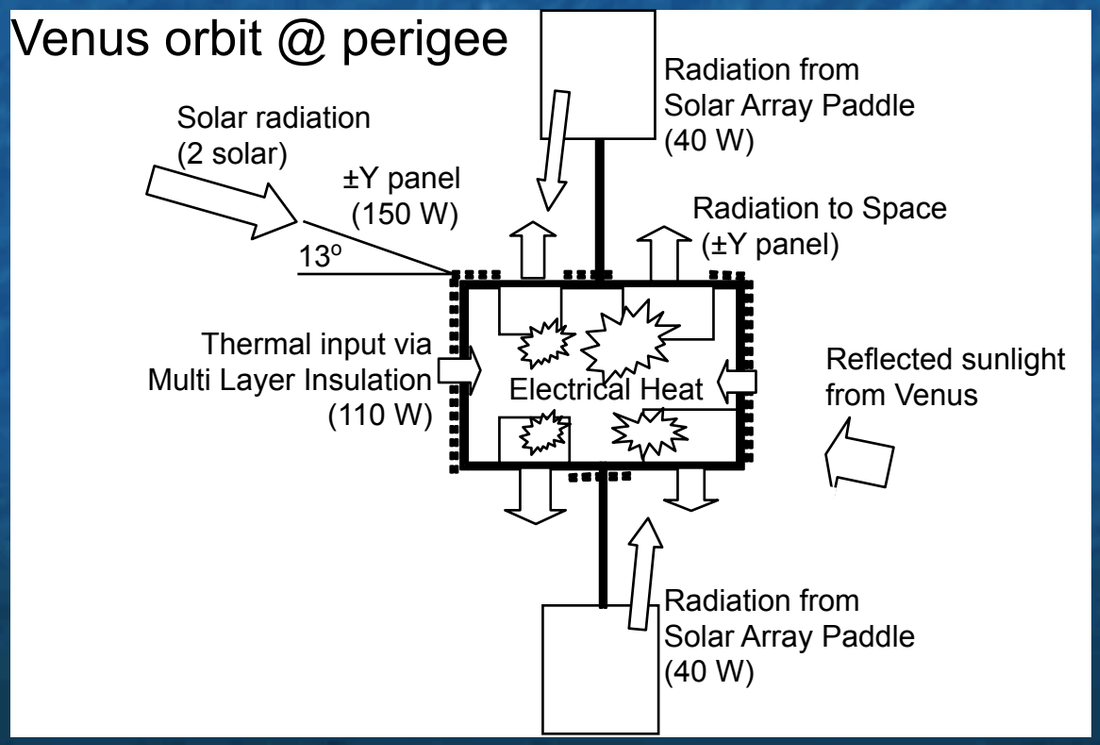
Eigen frequency

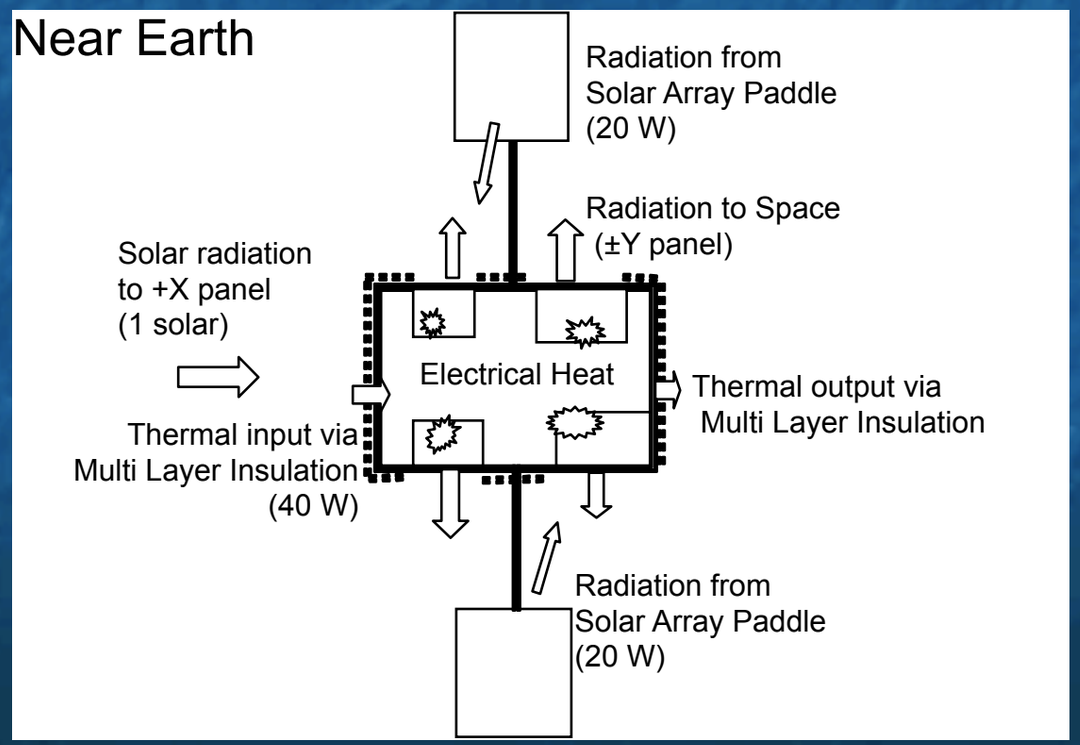
	Requirement	*Analysis result*	*Test result*
Axial	*>30Hz*	*63.7Hz (Z)*	*64.0Hz*
Lateral	*>10Hz*	*22.9Hz (X)* *26.7Hz (Y)*	*22.8Hz* *26.2Hz*

Transfer orbit from Earth to Venus



Heat input at a Venus orbit is twice larger than at an earth orbit

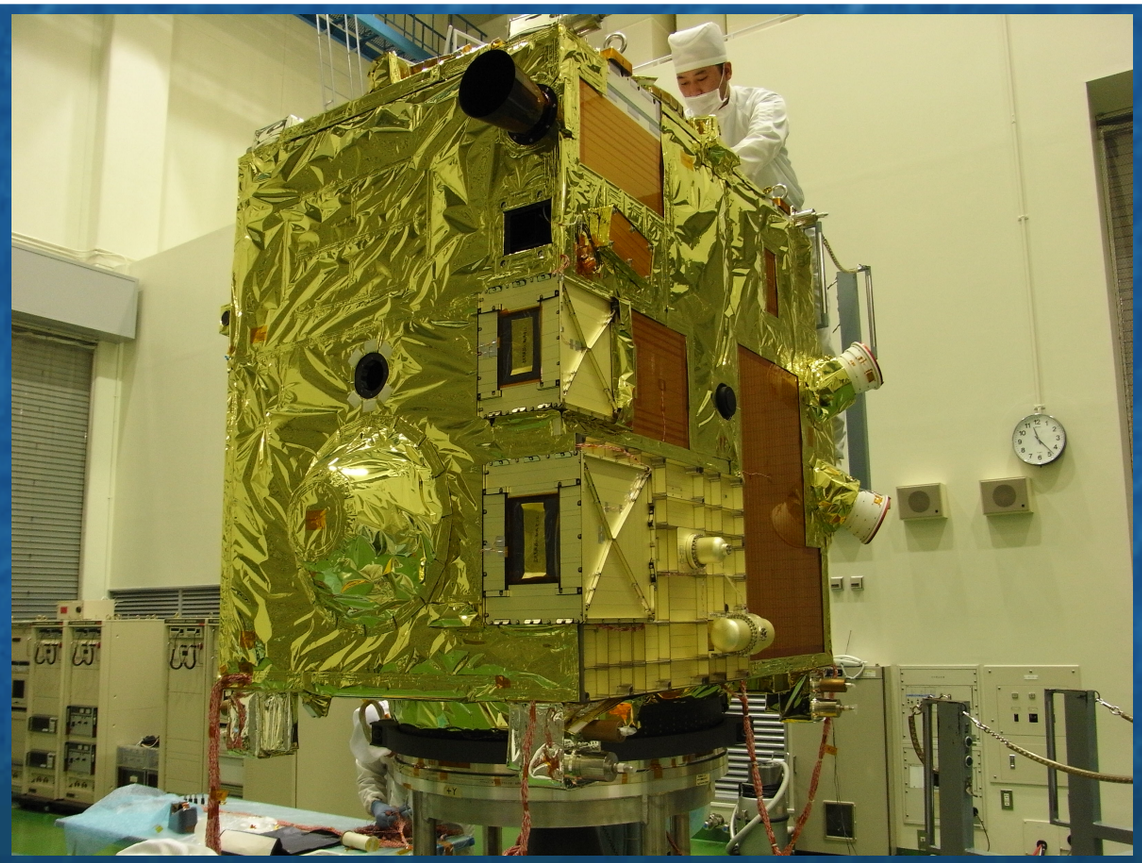


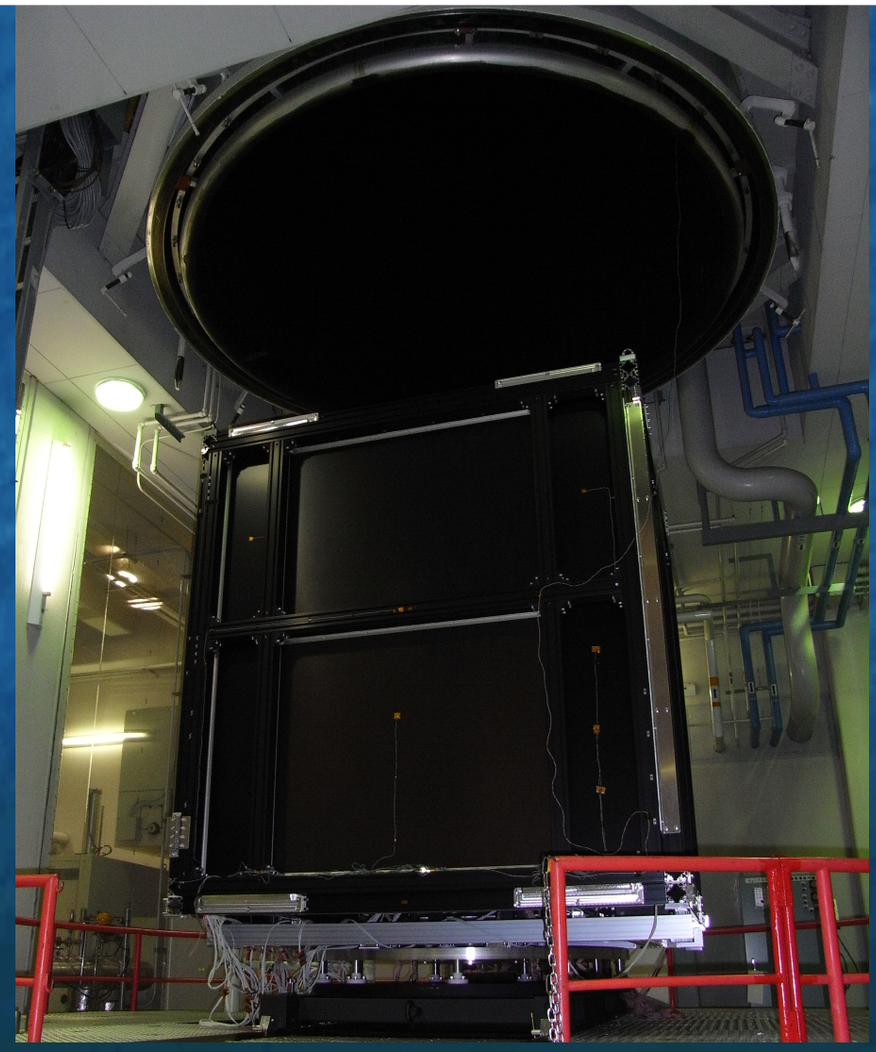


M. Nakamura et,al.

Evaluation of the thermal environment

Orbit	*MODE*	*Cameras*	*Telecom*	*Attitude Control*	*DHU*
Venus	*Data Aquisition (HOT1)*	*ON*	*SSPA*	*RW*	*ON*
	Telecom (HOT2)	*OFF*	*XTWT*	*RW*	*ON*
	Safe hold (HOT3)	*OFF*	*SSPA*	*RCS*	*ON*
Transfer	*Safe hold (COLD1)*	*OFF*	*XTWT*	*RCS*	*ON*

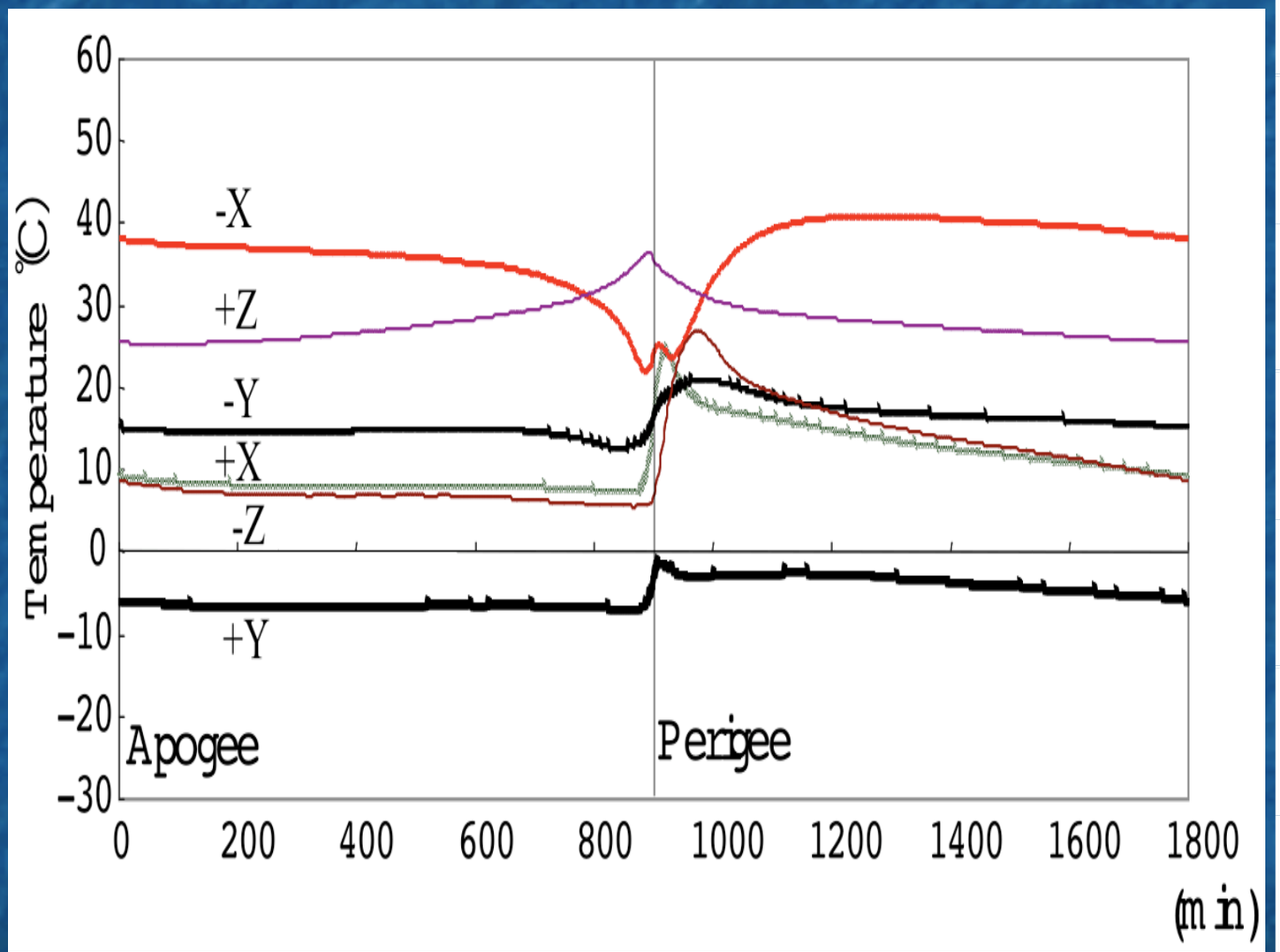




PLANET-C Thermal Test Model

M. Nakamura et,al.

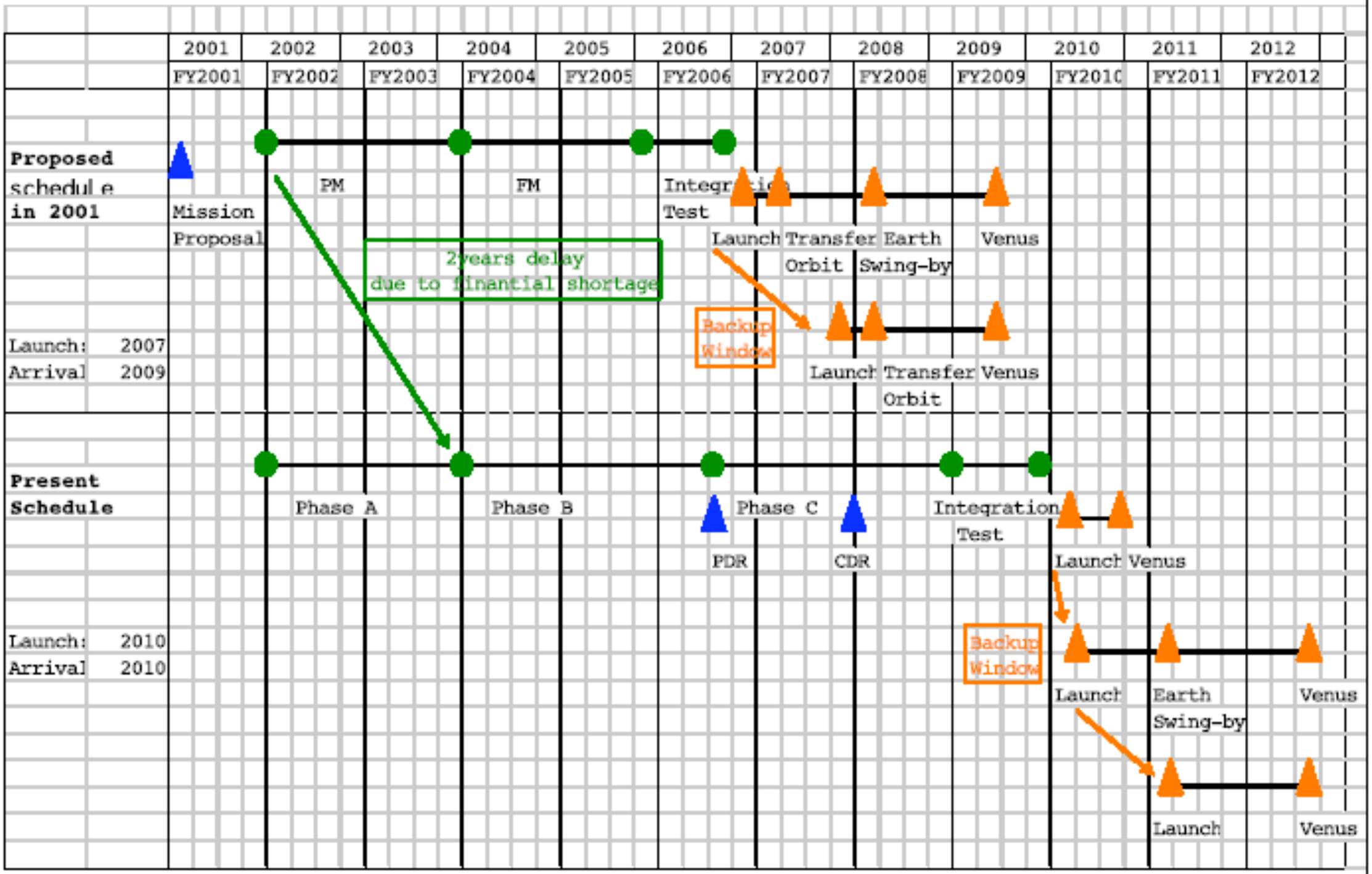
Typical temperature profile of each panel at Venus orbit



	Temperature range (℃) (HOT3) ⟷ (HOT1)	
+X	-11.7	26.1
	-11.1	25.3
-X	-18.9	26.9
	-16.2	26.9
+Y	-3.4	28.2
	-3.4	28.7
-Y	-19.3	22.5
	-19.1	23.3
+Z	-13.9	27.4
	-12.4	29.3
-Z	-32.6	12.3
	-33.7	12.1

Test result ⟷
Analysis result ▬

Schedule


2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
FY2001
FY2002
FY2003
FY2004
FY2005
FY2006
FY2007
FY2008
FY2009
FY2010
FY2011
FY2012
Proposed schedule in 2001
Mission Proposal
PM
FM
Integration Test
2years delay due to financial shortage
Launch
Transfer Orbit
Earth Swing-by
Venus
Backup Window
Launch
Transfer Orbit
Venus
Launch: 2007
Arrival 2009
Present Schedule
Phase A
Phase B
PDR
Phase C
CDR
Integration Test
Launch
Venus
Backup Window
Launch
Earth Swing-by
Venus
Launch
Venus
Launch: 2010
Arrival 2010


VCO is looking forward
to meeting VEX in 2010
at Venus!