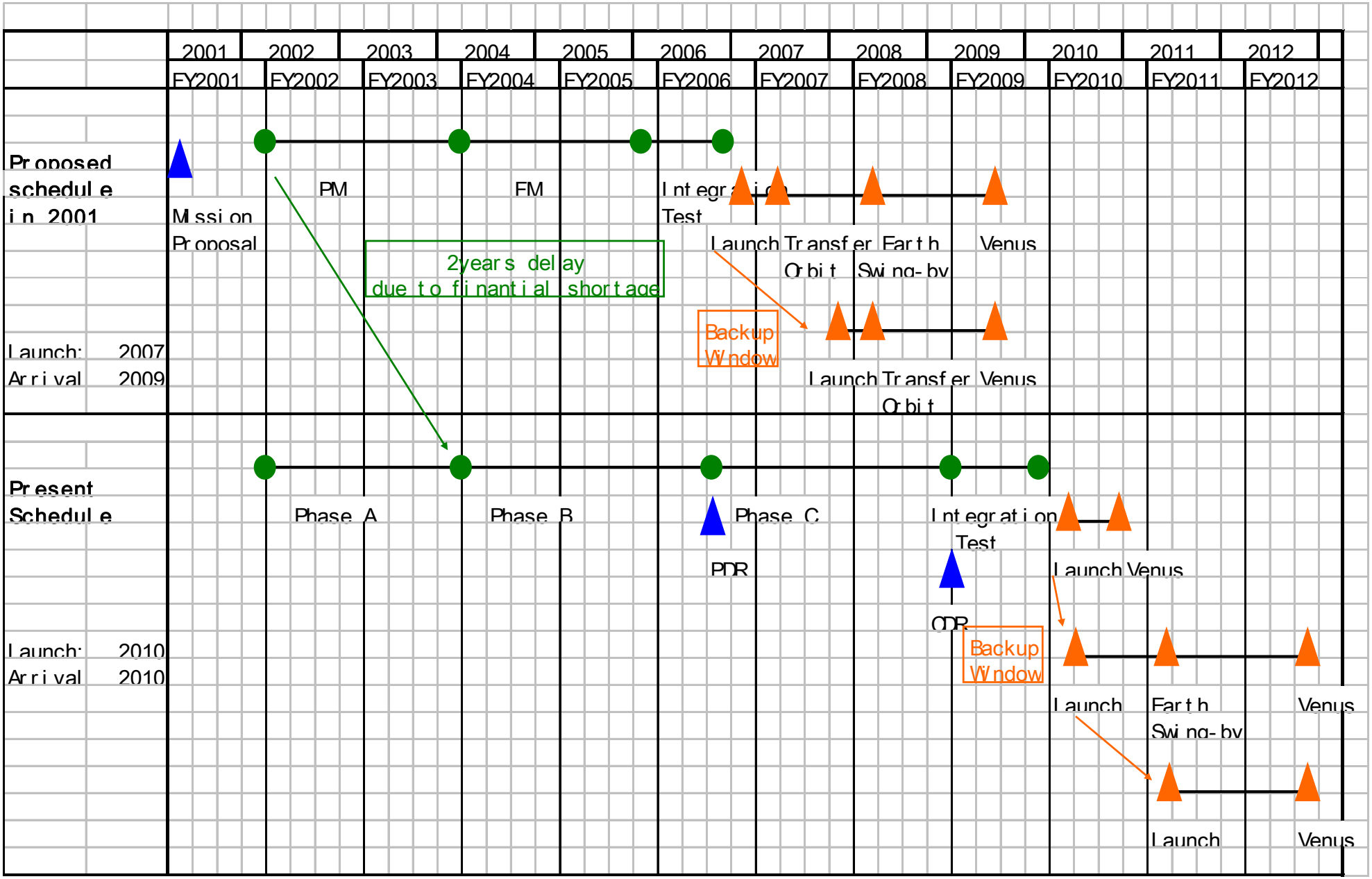
# Present Status of Planet-C in 2007

Masato Nakamura
Takehiko Satoh

ISAS/JAXA

# 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
Launch
Transfer Orbit
Earth Swing-by
Venus
2years delay due to finantial shortage
Backup Window
Launch: 2007
Arrival 2009
Launch
Transfer Orbit
Venus
Present Schedule
Phase A
Phase B
Phase C
PDR
Integration Test
CDR
Launch Venus
Backup Window
Launch: 2010
Arrival 2010
Launch
Earth Swing-by
Venus
Launch
Venus

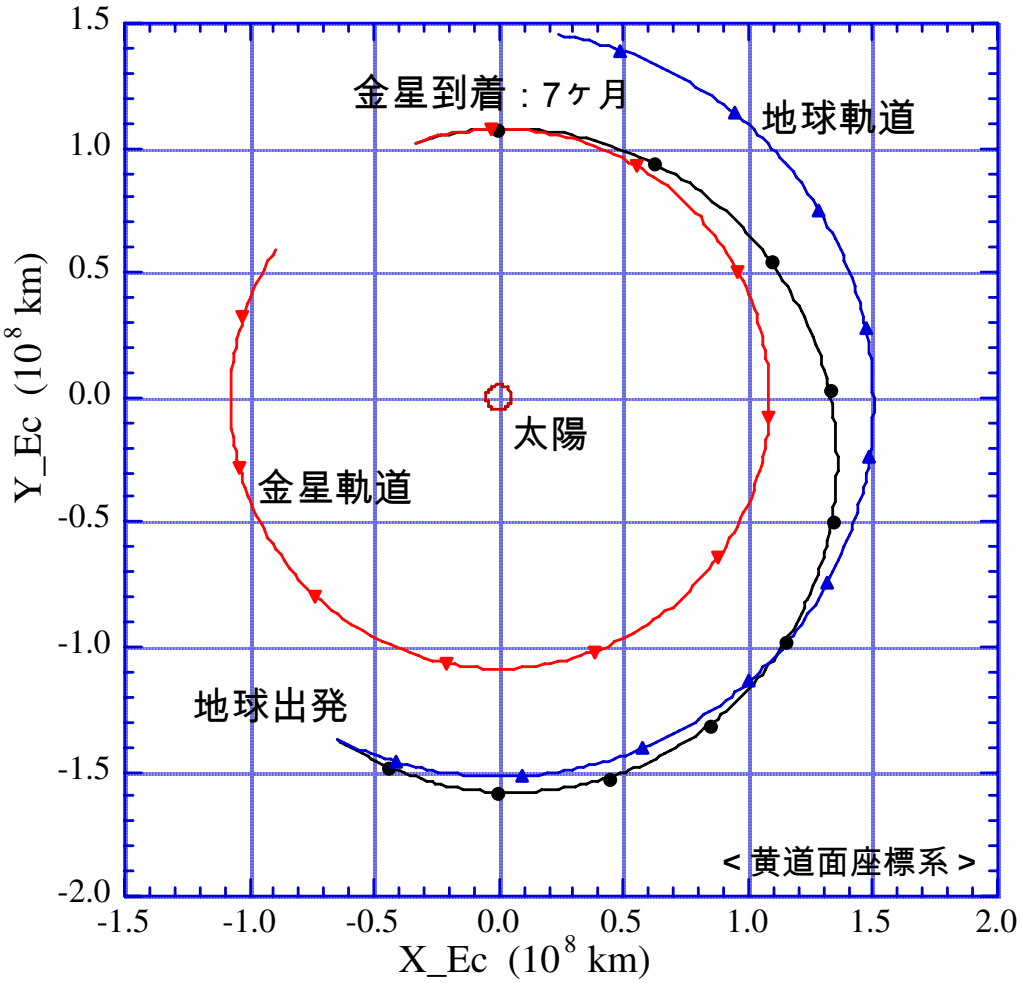
# New Launcher: H - II A

- M - V project is terminated in 2006 due to its high costs. JAXA is developing a new cheaper solid propellant rocket, but it is not available before 2011.
- Planet-C will be launched by H - II A (type 202)
- Spacecraft design is not changed, except PAF, umbilical cord, GSE

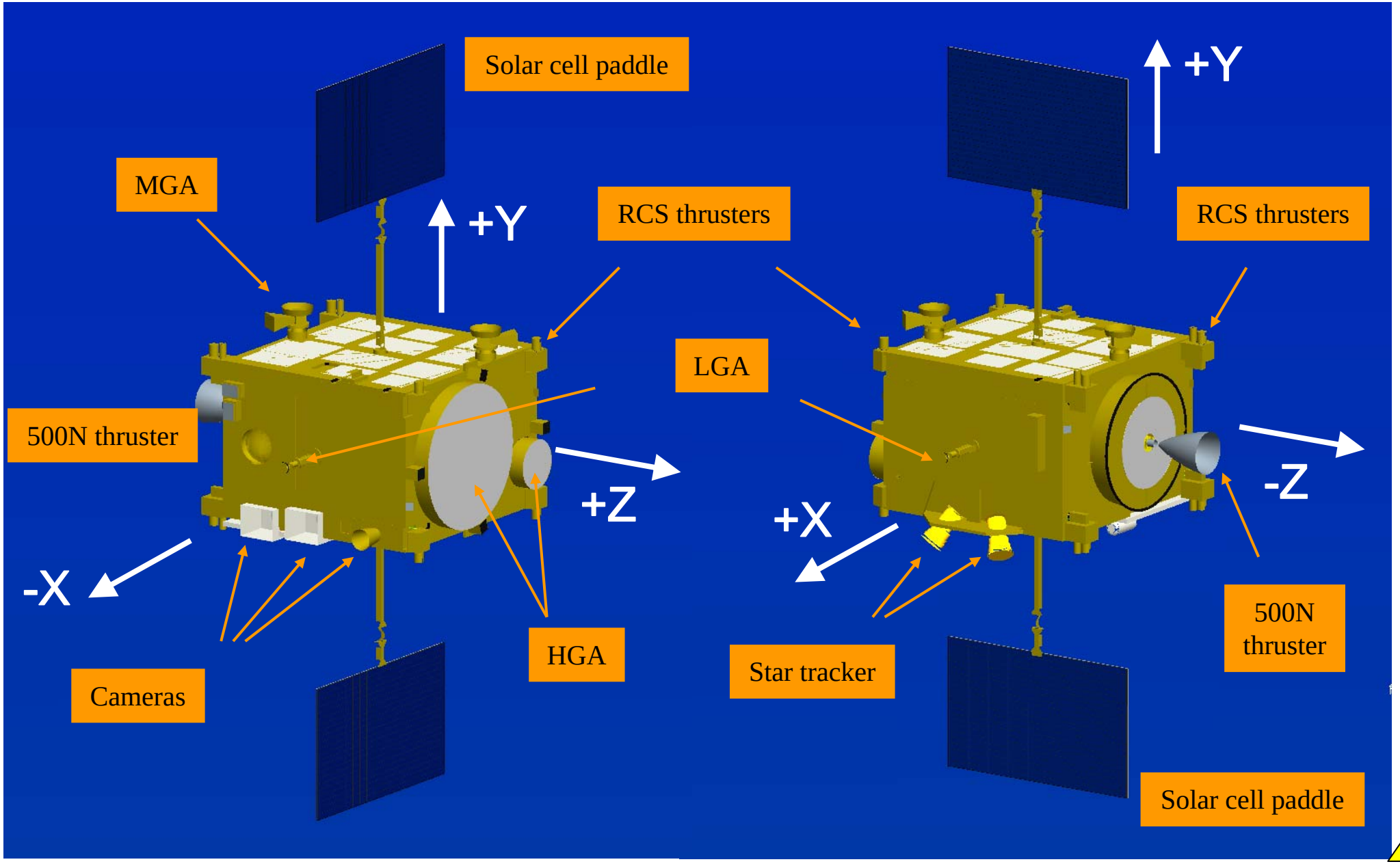
# Transfer orbit

Departure from Earth: May 2010
Departure Energy 15.9 MJ/kg

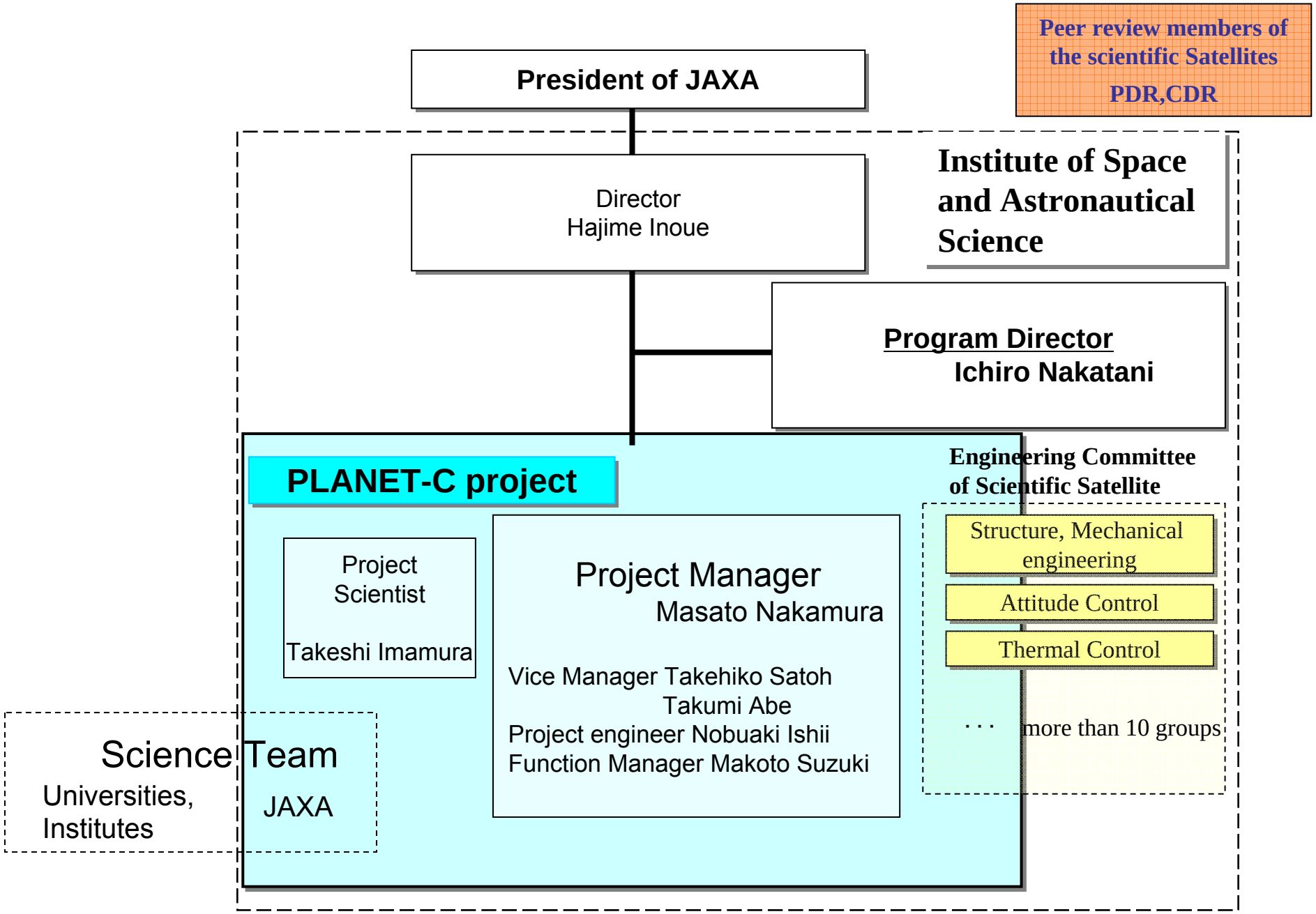
Arrival at Venus: December, 2010
Insertion Energy 9.1 MJ/kg



# New design of PLANET-C



# Management


Peer review members of the scientific Satellites
PDR,CDR
President of JAXA
Director
Hajime Inoue
Institute of Space and Astronautical Science
Program Director
Ichiro Nakatani
PLANET-C project
Engineering Committee of Scientific Satellite
Structure, Mechanical engineering
Attitude Control
Thermal Control
. . .
more than 10 groups
Project Scientist
Takeshi Imamura
Project Manager
Masato Nakamura
Vice Manager Takehiko Satoh
Takumi Abe
Project engineer Nobuaki Ishii
Function Manager Makoto Suzuki
Science Team
Universities, Institutes
JAXA

# Lunar and Planetary Exploration Center

- Science planetary exploration project (Hayabusa, SELENE, PLANET-C, BepiColombo) has been managed by ISAS
- From April, newly established Lunar and Planetary Exploration Center of JAXA will manage planetary projects Hayabusa2, SELENE2, and maybe PLANET-C and BepiColombo
- Management group of PLANET-C will remain even if we move the new center

# *Venus Climate Orbiter Updates: Instruments*

**Takehiko Satoh, Masato Nakamura** *(ISAS/JAXA)*

**Munetaka Ueno, Naomoto Iwagami** *(U. of Tokyo)*

**Shigeto Watanabe** *(Hokkaido University)*

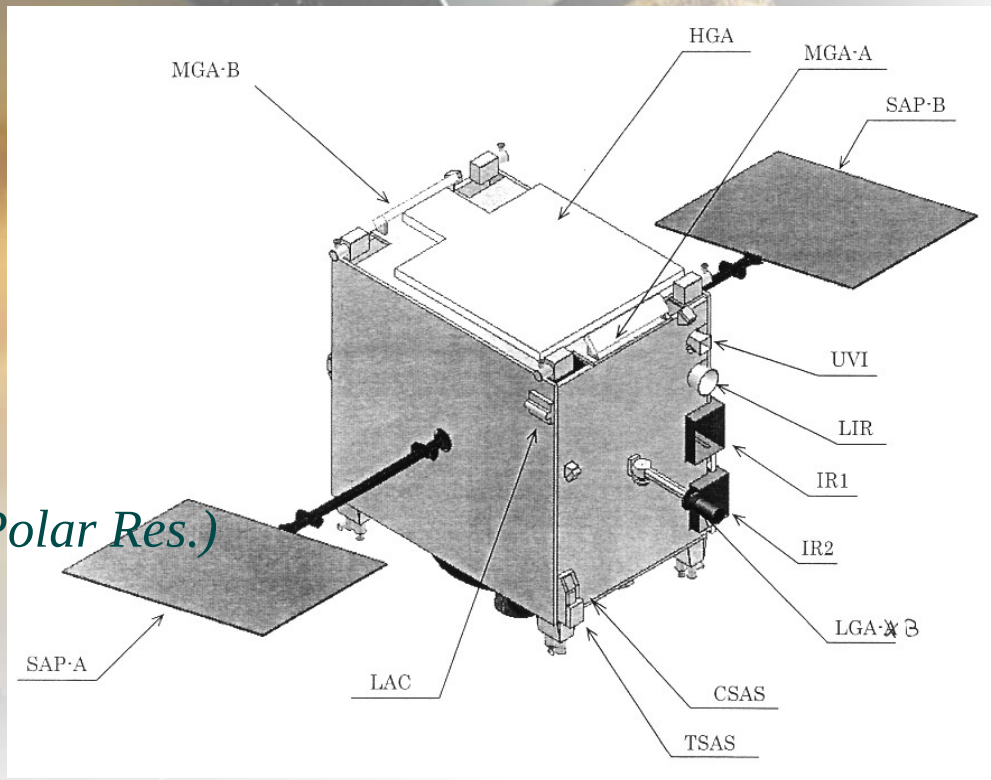
**Makoto Taguchi** *(Nat'l Institute for Polar Research)*

**Yukihiro Takahashi** *(Tohoku University)*

**Makoto Suzuki, Takeshi Imamura** *(ISAS/JAXA)*

# 5 Cameras plus USO

- ***UVI** (Ultraviolet Imager)*
  *Shigeto Watanabe (Hokkaido Univ.)*
- ***LAC** (Lightning and Airglow Camera)*
  *Yukihiro Takahashi (Tohoku Univ.)*
- ***IR1** (1-μm Infrared Camera)*
  *Naomoto Iwagami (Tokyo Univ.)*
- ***IR2** (2-μm Infrared Camera)*
  *Takehiko Satoh (ISAS/JAXA)*
- ***LIR** (Long-wave IR Camera)*
  *Makoto Taguchi (Nat'l Institute for Polar Res.)*
- ***USO** (Ultra-Stable Oscillator)*
  *Takeshi Imamura (ISAS/JAXA)*



# A Summary Table

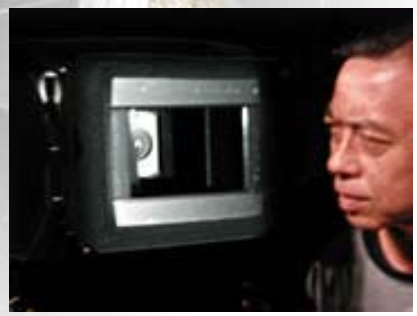
| Camera | FOV | Detector | Filters | Targets |
|---|---|---|---|---|
| *IR1* | 12° | Si-CSD/CCD (1024x1024 pixels) | 0.90 μm (Dayside) | Clouds (motion & properties |
| | | | 0.90 μm | Surface temp., Clouds |
| | | | 0.97 μm | $H_2O$ in lower atmosphere |
| | | | 1.01 μm (Nightside) | Surface temp., Clouds |
| *IR2* | 12° | PtSi-CSD/CCD (1024x1024 pixels) | 1.73 μm (Nightside) | Clouds (motion & properties |
| | | | 2.26 μm (Nightside) | Clouds (motion & properties |
| | | | 2.32 μm (Nightside) | CO Distribution |
| | | | 2.02 μm (Dayside) | Cloud-top altiitudes |
| | | | H-Band | Zodiacal Light |
| *UVI* | 12° | Si-CCD (1024x1024 pixels) | 283 nm (Dayside) | $SO_2$ at Cloud Top |
| | | | 365 nm (Dayside) | Unidentified UV absorber |
| *LIR* | 12° | Bolometer (240x240 uncooled) | 8-12 μm (Day/Night) | Cloud-Top Temperature |
| *LAC* | 16° | 8x8 Multi-Anode APD | 777 nm (Nightside) | OI Lightning |
| | | | 551 nm (Nightside) | $O_2$ Herzburg II Airglow |
| | | | 558 nm (Nightside) | OI Airglow |
| | | | 630 nm (Nightside) | OI Airglow |
| | | | 545 nm (Nightside) | Background |

# Notable Updates (1)

- **All Instruments**
  - Properly completed *Phase-B* design
  - Areas need to be improved
    - Shield to radiation environment (UVI and electronics)
    - Vibration environment (due to change of launch vehicle)
    - Thermal environment
- **IR1**
  - Added new wavelengths
    - Si CCD nearly “transparent” at 1.01 μm -> image could get significantly blurred. Such effect is much less for shorter wavelength (0.90 μm)
    - 0.90 μm (day/night)
    - 0.97 μm (night, $H_2O$ absorption, more science)

# Notable Updates (2)

- **IR2**
  - Radiator *"cold"* plate
    - Reduced size for weight/configuration issues. Use of AlBeMet to compensate for reduced radiating area
    - PtSi detector cooled down to required temp (65 K)
    - Imaging test in February
  - **IR1 & IR2 common**
    - CCD chips delivered (Mitsubishi Electric, Co.)
    - Baffle test in late January
- **DE (Senor Digital Electronics)**
  - Hardware/Software upgrade
    - Image buffer increased for better image processing
    - Testing a few compression algorithms



# Notable Updates (3)

- **LIR**
  - Improved electronics design
    - Reduced noise -> target NETD 0.3 K can be achieved
    - Calibration test in April - May
- **UVI & LAC**
  - Improved designs
    - To better achieve the science while reducing weight
    - Radiation/vibration tests of components in progress
- **USO (Radio Scienc)**
  - Compreted review (Dec 2006 with VEX scientists)
    - Vibration environment issue remains