

PLANET-C / Venus Climate Orbiter

(4.5.6 Atmosphere)

Why Venus?

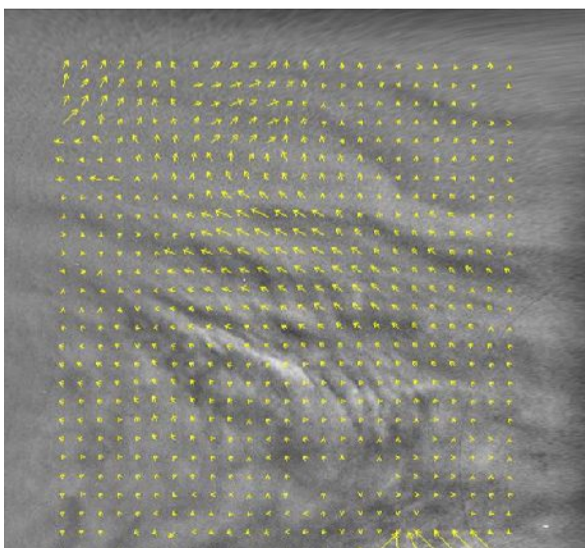
Venus and the Earth are often considered as twins for the similarity in dimensions. Their climates, however, are quite different from each other. Why these twins grew up differently? How their climate systems are different from each other? Answering these questions would provide us with clues to the evolution of the Earth in the past and future.

Unveiling Venus' meteorology in 2010

PLANET-C, a 3-axis stabilized spacecraft weighing 500 kg (including fuel and 35 kg of science payload) will be launched in May 2010 by H-IIA rocket. It will arrive at Venus in December 2010 and be inserted into an elongated equatorial orbit around Venus. Such an orbit allows us to continuously monitor Venus' atmospheric dynamics, like geostationary meteorological satellites, with high-reso mappings. During 2 Earth years of its nominal mission, PLANET-C will unveil the mechanism of "super-rotation", a *strong* westward wind prevailing in the Venus atmosphere. Development of the spacecraft, the system bus, mission instruments and the ground-support system is in progress as is planned (2.1.3).

Visualization of atmospheric motions

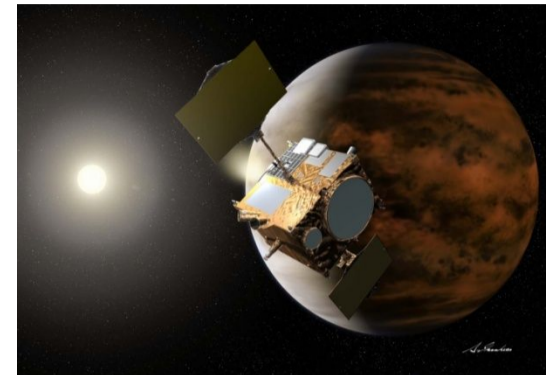
Tracking of cloud features to precisely determine the wind vectors is a key technique of PLANET-C data analysis, to which we have been making great efforts. As expected spatial resolution of PLANET-C images is unprecedented (12 km at sub-spacecraft point when the full-disk of Venus is imaged), development of algorithm is being done on highest available spatial-resolution images, Galileo's Solid-State Imager data. An example result shown below demonstrates that fine structure of the wind-velocity distribution can be extracted with our technique. Such a technique will be further improved and be applied to PLANET-C data immediately after its arrival at Venus in December 2010.



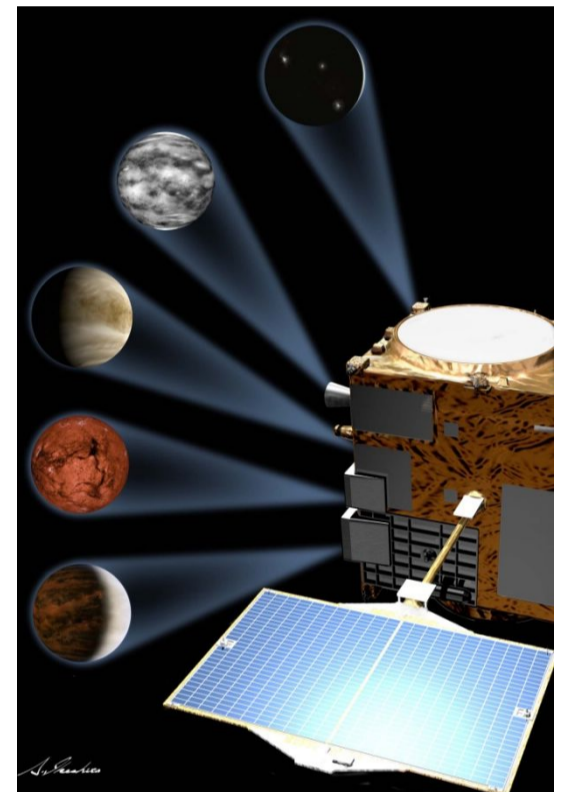
Wind vectors at the cloud top of Venus obtained by our group from successive Venus images taken by Galileo's SSI.



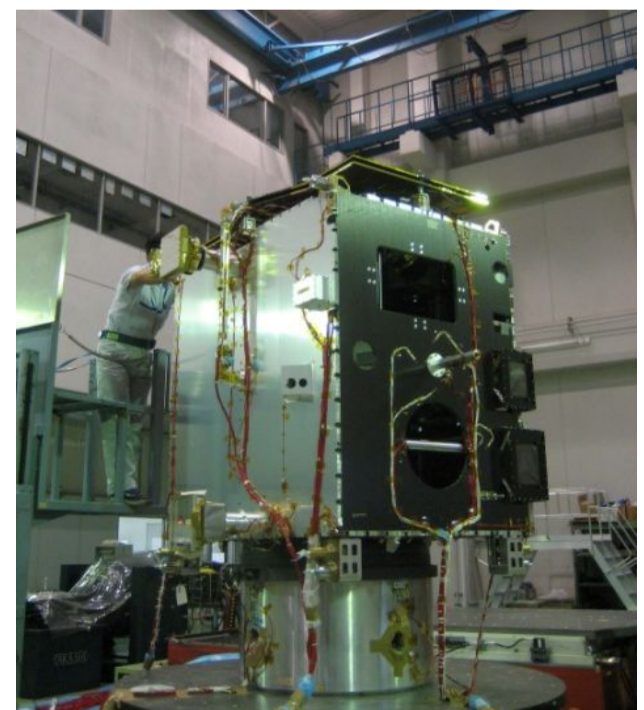
Above: Protomodel test of the optical sensors to be onboard Planet-C (August 2007).



An artist's concept of PLANET-C at its arrival at Venus.



Imaging different faces of Venus: lightning (visible light), cloud-top temperature (mid-IR), SO₂ and other chemicals (UV), ground surface (1 μm), and lower atmosphere in IR (2 μm).



Right: Mechanical test model of Planet-C (October 2007).