

U002-01

Room: IC

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## Studying the Venusian meteorology with Akatsuki

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The Venus Climate Orbiter (PLANET-C project) of Japan will be launched in May 2010 and arrive at Venus in December 2010. The aim of the mission is to understand the mechanism of the Venus' atmospheric dynamics, with secondary targets being the exploration of the ground surface and the zodiacal light observation during the cruise to Venus.

The onboard scientific instruments altogether sense different levels of the atmosphere. The deepest level will be investigated by the 1- $\mu$ m Camera (IR1) at 0.90, 0.97 and 1.01  $\mu$ m wavelength, which are known to be relatively absorption free (so-called atmospheric windows), enabling us to see the deep atmosphere and the ground surface through the clouds on the nightsides. In addition to the studies of cloud properties and sub-cloud H<sub>2</sub>O vapor, suspected volcanic activities will be searched for and the surface emissivity distribution will be mapped with IR1. This camera will also observe the lower cloud on the dayside. The 2- $\mu$ m Camera (IR2) will observe the middle and lower atmosphere at 1.73, 2.26 and 2.32  $\mu$ m wavelengths, which are also atmospheric windows. The distribution of sub-cloud CO will be studied by differentiating 2.26 and 2.32  $\mu$ m images to understand the production, circulation and dissociation processes of this molecule. The cloud top is covered by the Ultraviolet Imager (UVI), which maps SO<sub>2</sub> and unknown absorbers at wavelengths 283 and 365 nm on the dayside. The meso- to global-scale structures in the upper cloud will be mapped by the Longwave Infrared Camera (LIR) at 10  $\mu$ m wavelength both on the dayside and nightside. Variations in the cloud top height will be studied also by IR2 with its 2.02- $\mu$ m filter (a CO<sub>2</sub> absorption band) applied to the dayside. The Lightning and Airglow Camera (LAC) will detect yet-to-confirm lightning in the clouds and also observe night airglows at visible wavelengths in the lower thermosphere. In addition to the imaging-camera suite above, Radio Science (RS) technique will be used to observe the vertical profiles of atmospheric temperature, sub-cloud H<sub>2</sub>SO<sub>4</sub> vapor, and ionospheric plasma.

With these instruments dedicated to meteorological study, we are planning a systematic imaging sequence to detect meteorological phenomena with various temporal and spatial scales. The elliptical, near-equatorial orbit is suitable for obtaining successive global images to derive cloud-tracked wind vectors. Using such wind data, together with cloud and minor gas maps, the characteristics of meridional circulation, mid-latitude jets and various wave activities will be studied. Close-up images of meso-scale features and limb images will also be obtained near the periapsis.

Keywords: Venus, Akatsuki