

Upcoming Venus exploration by AKATSUKI/Venus Climate Orbiter

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AKATSUKI (PLANET-C project) is Japans third planetary explorer succeeding SUISEI (PLANET-A), which observed Halleys comet, and NOZOMI (PLANET-B), which could not complete its mission to explore Mars. 'AKATSUKI' is a Japanese word meaning 'dawn', and the spacecraft is also called the Venus Climate Orbiter. The spacecraft will be launched in May 2010 and will enter a Venus-encircling orbit in December 2010.

The aim of AKATSUKI is to understand the mechanism of the Venus' atmospheric dynamics and cloud formation, with secondary targets being the exploration of the ground surface and the zodiacal light observation during the cruise to Venus. Three-dimensional structure of the atmosphere and its dynamics will be studied with the combination of five multi-wavelength cameras and radio occultation. The atmosphere below the cloud top is probed by two near-infrared cameras by utilizing the near-infrared windows. The cloud top is covered by an ultraviolet camera and an infrared camera. Lightning flashes and night airglows are also observed by a dedicated sensor.

With these instruments dedicated to meteorological study, we are planning a systematic observation sequence to detect dynamical processes 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 meridional circulation, mid-latitude jets and various wave activities which might ultimately cause the super-rotation will be studied. Close-up and limb observations will also be conducted near the periapsis for a detailed look at small-scale structures.

The science plan of AKATSUKI is complementary with that of the ESA's Venus Express. Coordinated observation plans after the arrival of AKATSUKI at Venus are under development.