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# Final Integration test of the Venus Climate Orbiter (Planet-C)

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**Abstract**

Venus is our nearest neighbour, and has a size very similar to the Earth's; however, previous spacecraft missions discovered an extremely dense (~92 bar) and dry $CO_2$ atmosphere with $H_2SO_4$-$H_2O$ clouds floating at high altitudes, and exotic volcanic features covering the whole planet. The Venus Climate Orbiter mission, one of the future planetary missions of Japan, aims at understanding the atmospheric circulation of Venus. Meteorological information will be obtained by globally mapping clouds and minor constituents successively with 4 cameras (IR1, IR2, UVI, LIR) at ultraviolet and infrared wavelengths, detecting lightning with a high-speed imager (LAC), and observing the vertical structure of the atmosphere with radio science technique using Ultra Stable Oscillator (USO). The equatorial elongated orbit with westward revolution fits the observation of the movement and temporal variation of the atmosphere which rotates westward. The systematic, continuous imaging observations will provide us with an unprecedented large dataset of the Venusian atmospheric dynamics. The exploration of the Venusian meteorology is given a high priority not only for understanding the climate of Venus but also for the general understanding of planetary fluid dynamics.

VCO (code name: PLANET-C) is the 24th science spacecraft of the Institute of the Space and Astronautical Science (ISAS) of Japan Aerospace Exploration Agency (JAXA). The telemetry rate will be higher than 4 kbps at 1.5 AU, 8 kbps at 1.1 AU, 16 kbps at 0.7 AU and 32 kbps at 0.5 AU. The mass of the spacecraft is ~500 kg including fuel, and the science payload weighs ~35 kg. The orbit around Venus is a long elliptical one near the ecliptic plane (172-degrees inclination) with 30-hours orbital period. The direction of orbital motion is westward, which is the direction of the atmospheric super-rotation. The apoapsis altitude is chosen to be 79000 km, or 13 Venus radii (Rv), so that the angular velocity of the spacecraft is roughly synchronized with the 60-m s-1 super-rotational flow near the cloud base (50 km) for ~20 hours centered at the apoapsis.

The phase B study of VCO started in April, 2004, and the flight model development (Phase C) started in the middle of 2006. It is now under the final integration test at ISAS/JAXA in Sagamihara, which started in June 2009. Everything is going well so far and we will present the present status of this final integration test at this meeting. The spacecraft will be launched and arrive at Venus in 2010, and will perform 2 Earth years of operation.