



Ground-based mid-infrared observation of microstructures at the Venus cloud-top level

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We carried out mid-infrared imaging observation of the Venus cloud by COMICS (Cooled Mid-Infrared Camera and Spectrometer) of the Subaru telescope at the summit of Mauna Kea on the island of Hawaii in December, 2005. In this observation, two narrow-band filtered images at the wavelength range of 8.6 ± 0.2 and 11.3 ± 0.3 μm , respectively, were obtained with a spatial resolution less than 100 km which is higher than those of the past ground-based observations. The Venusian mid-infrared emission corresponds to the thermal emission from the cloud-top level (approximately 65~70 km). Since the intensity depends on the temperature there, the fluctuation of the intensity represents the variation of the cloud-top altitude or the disturbance of the temperature at the same altitude.

In the analysis result at both wavelengths, we discovered patchy microstructures with the fluctuation of brightness temperature ~ 0.5 to 1K, and with the spatial scale ~ 300 to 600km in the lower latitude region, while at the high latitude (>50 degree), the structures become streak shapes extending in the east-west direction with some degree of inclination. These structures well resemble to the UV images of the OCPP on the Pioneer Venus Orbiter or the Near-IR ones of the SSI on Galileo spacecraft.

Further, differential images between the 8.6 and 11.3 μm images have north-south symmetry, and vary according to the longitude (the Venus local time). This structure is possibly interpreted as the SO_2 variation above the cloud deck since the 8.6 μm band contains the absorption band of SO_2 (ν_1).