

Coordinated observation of Venus cloud top with Subaru and Akatsuki

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The first sequential mid-infrared images taken by Longwave Infrared Camera (LIR) onboard Akatsuki after its insertion into Venus orbit on December 7, 2015 revealed that a planetary-scale bow-shaped structure exists at Venus cloud top and is fixed in a position above Aphrodite Terra. This structure has been suggested to result from an upward-propagating mountain gravity wave generated by the interaction of atmospheric flow with the topography (Fukuhara et al., 2017). Up to the present, small and large bow-shaped structures possibly originated from similar mechanism have been detected above various highlands.

In order to obtain a better understanding of the atmospheric dynamics at the cloud top including the newly discovered stationary structure, we carried out the coordinated observation with Subaru Telescope and Akatsuki on January 11-14, 2017. The Cooled Mid-Infrared Camera and Spectrometer (COMICS) mounted on Subaru Telescope was used to observe Venus at the solar phase angle of $\sim 90^\circ$ with the evening terminator in view by two narrow-band imaging (8.66 μm and 11.34 μm) and N-band (8-13 μm) low resolution ($R \sim 250$) spectroscopy. During the period, Akatsuki was approaching to Venus and solar phase angle at sub-spacecraft point was increasing from 15° to 50° with the evening terminator in the field of view. It means that overlapping and simultaneous dayside observations were performed with LIR and Ultraviolet Imager (UVI).

The COMICS images at both wavelengths after high-pass filtering, although the data processing is still ongoing, clearly show that a bow-shaped structure distributed in the equatorial region appears above the highland named Maat Mons in the early night and survives through the observation period. It is noteworthy that a stationary structure similar to those discovered by LIR was also observed by another different instrument, COMICS. In addition, several streaks are also found to be distributed over the entire disk and some of them are not fixed to the topography. The images on January 14 have a horizontal Y-shape feature resembling that seen in UV.

In this presentation, we will show the processed images obtained by COMICS and compare them with simultaneously-acquired LIR and UVI images.

Keywords: Venus, atmosphere, Akatsuki, ground-based observation