Venus dayside cloud patterns detected from near-infrared imaging observation

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Past ultraviolet imaging observations of Venus detected only the features near the cloud top (~70 km), and it was difficult to obtain information on atmospheric motion under the upper cloud layer. However, measurements during the Galileo's Venus fly-by demonstrated that the near-infrared (NIR, ~1.0 um) image of the Venus dayside disk represents the features of the cloud deck (~50 km) [Belton et al., 1991].

We have carried out imaging observations of the Venus dayside disk at wavelengths of 1.0 um and 900 nm (NIR) using the 60 cm telescope at Iitate observatory, Fukushima. To reduce the effect of atmospheric turbulence what is called seeing, we have introduced a high-speed CCD camera with an exposure time of 60 ms and an interval of about 200 ms. Then we have selected frames with sharp outlines and stacked these frames. These procedures enable us to obtain images with high signal to noise ratios. Since the Galileo data show that the contrast of the cloud pattern to the background brightness is about 3 % at NIR, it is essential to remove the brightness gradient at the dayside from the stacked image. First, we subtracted 900 nm image from 1.0 um image and detected wave-like structures which extended east-west direction similar to Galileo's result. Secondary, we subtracted the brightness gradient model of the Venus dayside disk [Ishikawa et al., 2004] from 1.0 um and 900 nm images and detected different cloud patterns. These results suggest that the 900 nm image reflects the cloud pattern at the different altitude from the 1.0 um image. We will discuss these altitude dependence of cloud patterns.