

## Telescopic observations of the Venus dayside cloud structure

Jun Yoshida[1]; # Yukihiro Takahashi[1]; Hiroshi Fukunishi[1]; Daisuke Tamura[1]

[1] Dept. of Geophysics, Tohoku Univ.

<http://pat.geophys.tohoku.ac.jp/>

The two planets Venus and Earth are similar in size, mass, and distance from the Sun; however, its atmosphere is completely different. Past ground-based and spacecraft observations have revealed the characteristic features of the Venus atmosphere such as the high-speed westward circulation, 60 times as fast as the rotation speed. The driving mechanism of this circulation is a big mystery of Venus meteorology.

To understand the atmospheric dynamics of Venus, it is required to visualize in three dimensions the atmospheric motion and the fundamental process that drives the atmospheric circulation. For a long time, imaging observation of Venus has been mainly made on its dayside disk in the ultraviolet; the images of which only reflect the features near the cloud top (70 km). It was difficult to obtain the information of atmospheric motion under the upper cloud layer. However, the results of the Galileo's Venus fly-by provided us that the near-infrared (NIR, 1.0  $\mu\text{m}$ ) image of the Venus dayside disk represents the features of the bottom of middle cloud layer (55 km).

We have established telescopic imaging observations of the Venus dayside disk in the near-infrared (NIR) range from 900 to 1000 nm and at 380 nm in the ultraviolet (UV) range. In order to reduce the blurring and twinkling of Venus images caused by astronomical seeing, a high-speed imaging technique with exposure time from 50 to 200 ms has been adopted, and several hundred frames have been acquired in each data set. In order to detect small contrast less than 3 % in the NIR image, only high quality frames have been stacked as correcting the position of Venus. In addition, a brightness gradient of the Venus dayside disk with the blurring caused by astronomical seeing has been reproduced and the brightness gradient has been removed from stacked Venus images. The patterns at wavelengths of 905 nm and 380 nm are successfully derived, in which the contrast variations in longitudinal direction are 0.7 % and 31 %, respectively. In the NIR patterns, there is a patch which elongates from 5 N to 20 S with a longitudinal width of 15 degrees, while in the UV patterns, dark markings appear from the equator to the mid-latitude. These structures may represent the patterns around the 'root' of the horizontal Y feature. Using the NIR patterns observed at different time, we attempted to estimate westward wind velocity in the region from 15 S to 5 N. We discuss obtained patterns and estimated zonal wind speeds of Venus.