Ground-based Observation of Cloud Patterns on Venus Dayside

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

[1] Dept. of Geophysics, Tohoku Univ.

Past ultraviolet imaging observations of Venus detected only the features near the cloud top at about 70 km altitude, and it was difficult to obtain information on atmospheric motion under the upper cloud layer. However, measurements during the Galileo's Venus flyby demonstrated that a near-infrared (NIR, 986nm) image of the Venus dayside disk showed a feature of the cloud deck at about 50 km altitude [Belton et al., 1991]. Images of the Venus dayside taken at violet and NIR wavelengths would give important information about the atmospheric dynamics of Venus.

In order to detect the cloud patterns in the dayside region of Venus, we have carried out imaging observations at wavelengths of 380 nm, 410 nm (violet), 900 nm and 1000 nm (NIR) using the 60-cm telescope at Iitate observatory, Fukushima in August 2004. We have succeeded in deriving cloud patterns on the Venus dayside from violet and NIR images taken in August 2004 using the above method. A zonal structures with a scale of ˜1000 km was seen in best images at 900 nm wavelength. From cross-correlation analysis of successive images taken at interval of ˜4 hours, we estimated the zonal velocity as 60+-30 m/s. This is consistent with the result of Galileo (˜70 m/s).

We have used a fast imaging technique with an exposure time of 60 ms and models as a tool to remove a large scale brightness gradient on the dayside from stacked images [Ishikawa, 2004]. To reduce the effect of atmospheric turbulence, we have introduced a high-speed CCD camera, and then we have selected frames with sharp outlines and stacked these frames. Then, we have calculated a model image and subtracted from the stacked image as a background. This model image has been made from an empirical function through convolution with the Point Spread Function (PSF) for atmospheric scintillation.

In this presentation, we also report the result of initial analysis using observation data after October 2005. In this observation, we use liquid crystal tunable filter (650 to 1100 nm, FWHM: 10 nm) for spectral imaging.