The Observational Study of Carbon Monoxide Distribution in the Venusian Lower Atmosphere

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We observed the nightside of the Venus atmosphere at Okayama Astrophysical Observatory, Japan, with the multi-purpose near-infrared camera superOASIS, utilizing the near-infrared window at wavelength around 2.3micron. Utilizing Venusian orbital motion, we scanned the nightside continuously in spectroscopic mode to perform 2-D imaging spectroscopy with spectral resolution of 800 and with spatial resolution of 700km.

Based on the results, we can discuss the spatial distribution and variability of cloud optical thickness and the amount of carbon monoxide (CO), which has a distinct absorption feature at 2.32micron. CO is thought to be produced by the photodissociation of carbon dioxide above the cloud. After the observation of Galileo spacecraft, however, the latitudinal inhomogeneous distribution of CO in the lower atmosphere was found [Collard et al., 1993], which mixing ratios become larger in the high/middle latitude. This latitudinal gradient implies the existence of a transportation of the CO-rich air from the upper to the lower atmosphere. Also the asymmetry between the northern and the southern hemispheres was discussed by Galileo observations. These analyses have never been carried out with other ground-based observations.

Our observation verified the qualitatively similar latitudinal distribution to the Galileo observations. The detailed discussion, however, is prevented due to the spectral variations affected by the cloud opacity distribution. To make further quantitative analysis, it is necessary to distinguish the effects of cloud from the real enhancement of the CO mixing ratio.