

Polarimetric observation to investigate the presence of ice crystals in Venus cloud with Pirka telescope

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It has been considered that Venus is entirely covered by the cloud which is mainly concentrated solutions of sulfuric acid at altitude 45-70km. There is the possibility of the existence of ice crystals from a suggestion that the cloud top temperature is under freezing point, though it's still under discussion.

The degree of polarization shows some significant differences between ice crystal and droplet. Using the ice crystal's feature that the degree of polarization is decreased at scattering angle 22 degrees by the 22-degree halo, L' Oreary (1972) carried out polarimetric observation at the wavelength 550 and 650 nm but did not show positive results. On the other hand, Können et al. (1993) observed at 8 wavelengths between 402 and 850 nm and showed positive results. However, one run showed opposite sign, i.e., contrary to that expected from a 22-degree halo at the wavelength 622 and 712 nm. This cause is still not clear.

We focus on the cloud pattern at near the cloud top where is expected that ice crystals exist and we observe not only for the period of 22-degree halo but also for other feature of ice crystals which are not observed in the previous studies. We will carry out polarimetric observation with MSI (Multi-Spectral Imager) mounted on the 1.6-m Pirka telescope of the Hokkaido University, and investigate the existence of ice crystals and their spatial distribution, compared with the cloud top images.

We designed the shielding plate to achieve the accuracy to confirm the existence of ice crystals. Then we need to observe when the angular separation between Sun and Venus is very small also. To confirm if we can get enough accurate data even if it's under such condition we plan to observe on Mar. 2018.

In this presentation, we will report the results of test observations and observation plan (Jun.-Jul., Sep.-Oct. 2018) on these preparations.

Keywords: Venus, polarimetric observation, ice crystal