

## Akatsuki IR2 camera data restoration towards revealing Venus' s middle cloud properties

\*Choon Wei Vun<sup>1</sup>, Takehiko Satoh<sup>2,1</sup>, Takao M. Sato<sup>3</sup>, Takeshi Horinouchi<sup>4</sup>

1. SOKENDAI, 2. ISAS/JAXA, 3. Hokkaido Information University, 4. Hokakido University

Akatsuki IR2 camera utilises 3 filters (1.735, 2.26, 2.32  $\mu\text{m}$ ) to observe the Venus nightside that probes down to the lower cloud layer ( $\sim 48\text{-}55$  km). The IR2 camera nightside observation has been known to suffer contamination from the intense dayside light spread by the camera' s Point Spread Function (PSF). Two restoration processes were developed: Restoration by Subtraction (RS) and Restoration by Deconvolution (RD). This presentation focuses on the RD method where RS method has helped in further calibrating RD procedures. Two main improvements made in the latest RD are: PSF model to include 'hole' in the axisymmetry term resembling perfect internal reflection in the PtSi detector substrate, and optical fogging factor caused by fraction of reflection bouncing back by glass surfaces in the camera. During the process of restoration, we uncover the properties of the cloud layer using Radiative Transfer calculations: CO abundances, variability in cloud number density, and aerosol size distributions. In result, we can observe interesting features such as an enormous cloud few thousands km across propagating faster than the background super-rotation on Venus (2016-08-18 data), where this cloud mass has  $\sim 20\%$  attenuation compared to the background cloud. To sum, RD method aims at improving the data quality of nightside observations to enable accurate photometric studies for the first time.

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