Cloud-top altimetry of Venus with Akatsuki IR2

*Takehiko Satoh[1], Takao M. Sato[1], Yeon Joo Lee[1], George HASHIMOTO[2], Kosuke Takami[3], Yasumasa Kasaba[3]

1. Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency, 2. Okayama University, 3. Tohoku University

To study the dynamics near the cloud top of Venus, we have performed altimetry with IR2 2.02-micron data. The 2.02-micron filter includes a strong absorption band of CO_2 gas, the primary constituent of Venus atmosphere, thus observed intensity is a measure of path length of reflected sunlight. The deeper the cloud top is, the more absorption occurs and the observed intensity decrease, or vice versa.

The 2.02-micron data are deconvolved with an empirical point-spread function (PSF) to reduce the loss of light to the background while restoring the intensity distribution across the Venus disk. A set of scattering geometry is assigned to each point by referring to the coordinate system computed with SPICE kernels. A radiative transfer code (adding and doubling method) is combined with a line-by-line computation of molecular absorption. The HITRAN database is used to compute absorption by CO_2, N_2, H_2O, and HCl (natural isotopic ratio is assumed). Computed spectrum (4800-5100 cm^{-1} range) is then integrated over the IR2 2.02-micron filter transmission curve. By repeating this for 5 representative cloud models (with different effective cloud tops), we obtain a "look up table" to convert observed intensity to cloud-top altitude.

We will present the initial results. Effects of the aerosol scale height, the temperature profile, and particle size will be discussed, and implication to interpreting the relationship between dynamics, UV albedo, and the cloud-top altitude will be discussed.

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