

Mid-infrared Observations for Investigating Spatiotemporal Variations of Venus Middle Atmosphere

Toru Kouyama¹, Hideo Sagawa², Takao M. Sato³, Shoko Ohtsuki⁴
(¹ AIST, ² NICT, ³ ISAS/JAXA, ⁴ Senshu-Univ.)

Abstract

Planetary-scale waves have been confirmed at Venus cloud top level by analyzing periodical perturbations in cloud brightness and wind velocity fields whose periods are four or five days. Recently it was confirmed that Kelvin and Rossby wave-like perturbations dominated with the amplitudes of 5 – 10 m s⁻¹ in 2006-2011 from the wind speed analysis using images from Venus Monitoring Camera onboard Venus Express. It has known that such planetary-scale waves propagate in Venus atmosphere accompanied by not only wind speed perturbations but also thermal fluctuations. Since the amplitude and the phase of thermal fluctuation are one of key components which represent characteristics of a wave structure and its propagating structure, analyzing thermal fluctuations should provide additional hints for investigating wave activities in Venus atmosphere.

From result of our previous mid-infrared (4.5 μm) observation conducted with IRTF/NSFCam2 from December 13 to 18 in 2013, daily variation of thermal brightness suggested that propagation of a planetary-scale wave seemed to exist. Additionally, relatively small scale features (several hundred km scale) were clearly seen in high-passed Venus images.