金星雲層高度における温度擾乱の時間・空間的な変動

神山 徹 [1]; 佐藤 隆雄 [2]; 佐川 英夫 [3]
[1] 産総研; [2] 宇宙研; [3] 京都産業大学

Spatial and temporal variations of thermal fluctuations in Venus middle atmosphere as seen by IRTF ground-based observations

Toru Kouyama[1]; Takao Sato[2]; Hideo Sagawa[3]
[1] AIST; [2] ISAS/JAXA; [3] Kyoto Sangyo University

Previous studies on cloud brightness patterns and wind velocity fields have shown the presence of many kinds of transient waves, with various spatial scales, in the Venus atmosphere. On the other hand, there has been less clues of periodical perturbations in cloud thermal structures, and thus the understanding on relationship between thermal fluctuation in the cloud top altitudes and spatial/temporal variations in Venus atmosphere has been poorly revealed. Recently a model research showed Kelvin and Rossby waves can provide thermal perturbations with the amplitude of 1 K based on results of wind speed analysis using images from Venus Monitoring Camera onboard Venus Express. 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.

We have conducted ground-based observations at 4.5 um using Infrared Telescope Facility (IRTF) in December 2013, and July 2015. NSFCam2 and SpeX instrument were used for the former and latter period, respectively. At this M-band wavelength, the thermal radiation emitted from the altitude around 70 km is observed at both day and night-side hemispheres of Venus. Relatively small scale features (several hundred km scale) were clearly seen in the high-passed Venus images, and westward motion of these features were confirmed by comparing images taken with ˜1 hr separation. In addition to M-band images, we obtained 2.3 um near-infrared images of Venus at which the spatial distribution of cloud opacity is illuminated as a silhouette against the hot thermal emission from the lower atmosphere. Such 2.3 um images were also taken with ˜1 hr separation so that we can derive the short-term temporal variation (movement) of the cloud opacity. Comparison of propagation velocities between upper and lower cloud regions may provide a hint of existence of thermal connection between both layers.