

Correction of brightness offset seen in Akatsuki LIR image

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The longwave infrared camera (LIR) onboard Akatsuki has started observation of Venusian cloud-top temperature since re-orbit insertion on December 2015. Observation continues almost two Venusian years and revealed interesting temperature structures on the cloud-top which have never seen (Fukuhara et al., 2017). On the other hand, it became clear that images include background-offset more than 20 K that was unrelated to cloud features. The cause was investigated and we attempted to eliminate the offset from images in the study.

The uncooled micro-bolometer array (UMBA) which is applied to LIR detect thermal infrared wavelength of ~10 microns. Preventing thermal noise input to the detector, it is suitable for the instrument to be kept thermally stable. However, LIR has two suspicious noise factors on orbit; one is power-supply management and the other is variation of solar incident angle accompanying temperature deviation of instrument. The power supply unit turned on the instrument before every observation, which obviously affected thermal balance. Hence, we have improved operation procedure of LIR observation; power status of the instrument has been changed to normally turn-on. Consequently, thermal potential of the instrument have been stable with background offset decreasing. The offset still remaining has well correlated with temperature of baffle which prevents sunlight input to the UMBA. The baffle is configured outside of spacecraft and temperature drastically changes with solar incident angle. It probably affects thermal potential of the germanium lens which would be major cause of the offset.

Deep space observation with solar incident angle gradually changed has been carried out. Reference table for correction of background offset has been derived from the observation, and it has been confirmed that the offset can be well corrected by the reference table.

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