

Characteristic features in cloud-top temperature of Venus

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The Longwave Infrared Camera (LIR) onboard Akatsuki has obtained more than 4000 images during the first year after the Venus orbit insertion (VOI-R1) in December 2015. Temperature distributions at the cloud-top altitudes have been retrieved from them. A large bow-shaped thermal structure was discovered in the very first image taken after VOI-R1, and it is concluded by a numerical simulation that the bow-shaped structure is temperature perturbation associated with passage of a gravity wave generated in the equatorial lower atmosphere. More than 15 bows have been found in the images obtained in the subsequent eight months, and we found that most of their center positions locate above the highlands of Venus surface. Local time dependence, topographical distribution, and amplitude of the bows are being investigated. Since Akatsuki is orbiting a highly elongated elliptical orbit almost in the equatorial plane, both northern and southern polar regions can be observed by LIR. It has been known that characteristic thermal features called as polar dipoles and polar collars exist in the polar regions of Venus atmosphere. Rotation periods of the polar vortices have been derived from the cloud-top temperature distributions to be slightly longer than the previous results by Pioneer Venus and Venus Express. Limb darkening is apparent in the Venus disks obtained by LIR, and vertical distributions of cloud particles can be retrieved from the limb darkening profiles combined with a vertical temperature distribution obtained by the radio occultation technique. In the close-up images obtained while Akatsuki passes periapsis cell-like structures with a horizontal scale of ~100 km are found in the low latitudes, and they may correspond to those known in the UV images. Relationship between the cell-like structures seen in the IR and UV images is being studied in detail.