

# The Longwave Infrared Imager onboard the Venus Climate Orbiter

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The Longwave Infrared Imager (LIR) onboard the first Japanese Venus mission PLANET-C or Venus Climate Orbiter operates in the middle infrared region, measuring thermal radiation emitted from the cloud-top of the Venusian atmosphere. A horizontal wind vector field at the cloud-top height will be retrieved by means of a cloud tracking method. Absolute temperature will be also determined with an accuracy of 3K. Since solar irradiation scattered by the atmosphere is much weaker than the atmospheric thermal radiation, LIR can continuously monitor a hemispheric wind field independent of local time of the apocenter throughout the mission life. Wind and temperature fields obtained by LIR will provide key parameters to solve climatological issues on the Venusian atmosphere. Use of an uncooled microbolometer array (UMBA) which needs no cryogenic apparatus as an image sensor contributes to reduction of power consumption and weight of LIR. The instrumental field-of-view of 12 degrees is equal to the angle subtended by Venus when observed from a nominal height of the apocenter of 10 Rv. The pixel field-of-view corresponds to a spatial resolution of 70 km seen from the apocenter. A mechanical shutter functions not only as an optical shutter but also as a reference blackbody. Temperature stability of the sensor is especially important, because fluctuation of thermal radiation from the internal environment of the sensor itself causes background noise. Therefore, temperature of the UMBA package is stabilized at 313 $\pm$ 0.1K with a feedback controlled Peltier cooler/heater, and NETD of 0.3K, which is required for the scientific purpose, will be achieved. Flat field images are taken with the shutter closed several seconds before and after 1 sec-exposure for a Venus thermal image. After a Venus image is taken, LIR takes a cold calibration image of deep space. This measurement sequence is repeated every two hours while the spacecraft is in the apocenter part of the orbit. Image data are transmitted down to the Earth after onboard calibration and data compression by a common digital electronics.