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Contrast sources for the infrared images taken by the Venus mission AKATSUKI

Seiko Takagi and Naomoto Iwagami
Graduate school of science, The university of Tokyo, Japan (seiko@eps.s.u-tokyo.ac.jp)

A feasibility study is carried out to look for the source of contrast which will be seen in the infrared images of Venus taken by the cameras on board AKATSUKI based on Galileo space craft data. This procedure uses a Venus cloud model based on the measurements of previous entry probes (Veneras series, Pioneer Venus) and radiative transfer calculations.
There are 0.986 μm dayside images of Venus taken by SSI (Solid State Imaging) of the Galileo space craft. Although it appears almost flat, there are some small-scale (300 km) features with contrast of 3 % (Belton et al., 1991). To determine the source of small contrast (3 %), Venus dayside spectra in the 0.90 μm region are calculated with various total cloud optical thickness, cloud altitude and temperature. The source of small contrast (3 %) is found to be due to inhomogeneity in the cloud optical thickness. The variations in cloud altitude and temperature are found to affect little.
There are 2.3 μm nightside images of Venus taken by NIMS (Near Infrared Mapping Spectrometer) of Galileo. There are a lot of features showing contrast of almost 100 % (Tsang et al., 2009). It is also interesting to investigate whether the source of such large contrast in nightside is consistent with the source of small contrast seen in the dayside image or not. To determine the source of large contrast (100 %), the Venus nightside brightness at around 2.26 μm is calculated as the thermal emission of the atmosphere and the surface after scattered by the cloud. Venus nightside spectra in the 2.26 μm region are calculated with various total cloud optical thickness, cloud altitude and temperature. The source of large contrast (100 %) in the 2.3 μm nightside image taken by Galileo is found to be also due to inhomogeneity in the cloud optical thickness.
We attempted to determine their representative altitude. To determine their representative altitudes, the integrated brightness in the 0.90 μm and 2.26 μm regions are calculated with various sets of optical thickness of layers. However, they could not be specified to one particular layer.