Initial products of AKATSUKI one micro-meter camera

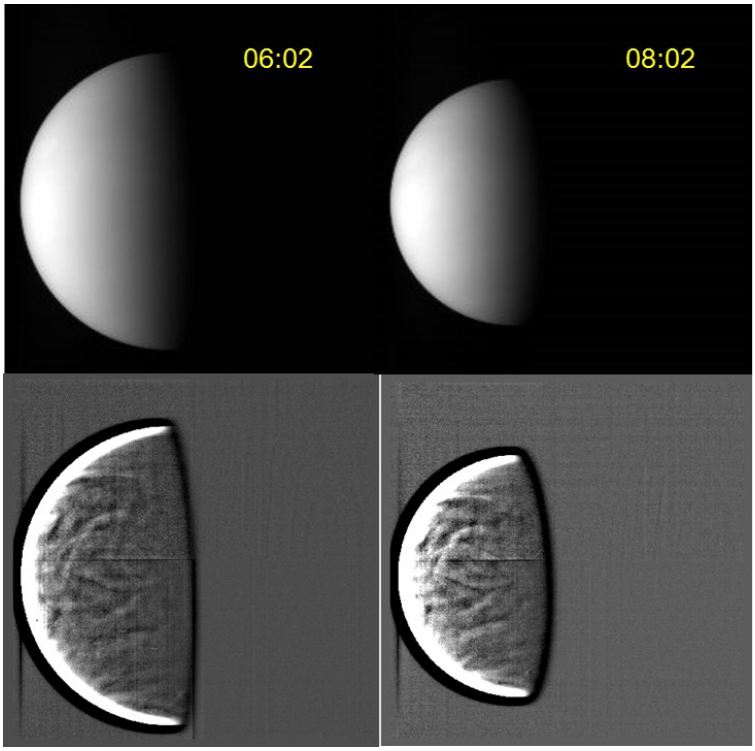
*Naomoto Iwagami[1], Takeshi Sakanoi[2], George L. Hashimoto[3], Shoko Ohtsuki[4], Seiko Takagi[5], Shingo Kameda[6], Shin-ya Murakami[7], Kenta Sawai[3]

1. none, 2. Tohoku Univ, 3. Okayama Univ, 4. Senshu Univ, 5. Tokai Univ, 6. Rikkyo Univ, 7. ISAS/JAXA

The one micro-meter camera on board AKATSUKI is producing images of both dayside and nightside of Venus since it succeeded to become a Venus orbiter on 7th Dec. 2015.
The strategy of the one micro-meter camera consists of three purposes. (1) Dayside cloud-tracking by the 0.90 micro-meter image due to the solar radiation scattered by the cloud. The final goal is to understand the generation mechanism of the Super Rotation. (2) Nightside watching of surface thermal radiation at 1.01 micro-meter to find out volcanic activity. The wavelength 1.01 micro-meter is suitable for such purpose because of almost no gas absorption. And (3) H2O and/or some other surface properties such as emissivity from the combination of 0.90-0.97-1.01 micro-meter radiances.
As for the strategy 1, some trial have already been done to find out a wind-field at the cloud-bottom height. The wind-fields found are similar to those by GALILEO 27 years ago (Belton et al., 1991) and those of VIRTIS (Hueso et al., 2012). The present ones are almost uniform westward zonal wind of around 75 m/s and surprisingly small meridional wind less than 5 m/s at low and middle latitudes. The slower zonal wind than at the cloud-top of 100 m/s probably due to the lower representative height at around 51 km. Such representative height comes from the fact “The contrast source of the 0.90 micro-meter dayside image is due to uneven cloud thickness (Takagi and Iwagami, 2011).” It is interesting that the meridional wind speed is almost zero at the lower and middle latitudes.
As for the strategy 2, some nightside images have already obtained showing topographical signatures such as Aphrodite Terra and Lakshmi Planum. It was expected that the nightside 1.01 micro-meter image consists of both effects due to topography and surface properties such as emissivity distribution. However, the former appears to be prominent and the latter to be obscure requiring more careful treatment.

Belton et al., Science 253, 1531, 1991
Hueso et al., Icarus 217, 585, 2012
Takagi and Iwagami, Earth Planets Space 63, 435, 2011

Keywords: venus, IR, imaging



Dayside example

0.90μm dayside 07May2016
06:02 and 08:02
(sub s/c lat -10° lon -32°)

L2 image: very smooth

after high-pass
something is seen

Due to similar angular speeds of Akatsuki and the 4 day rotation, similar cloud patterns are seen 2 hours later.