

U003-07

会場:304

時間:5月27日 10:00-10:15

金星探査機あかつきのための雲追跡システムと VEx/VMC データを使ったテスト Cloud tracking system for Akatsuki data and its tests using VEx/VMC images

小郷原 一智^{1*}, 神山 徹², 山本 博基³, 佐藤 尚毅⁴, 高木 征弘², 今村 剛¹

Kazunori Ogohara^{1*}, Toru Kouyama², Hiroki Yamamoto³, Naoki Sato⁴, Masahiro Takagi², Takeshi Imamura¹

¹ 宇宙航空研究開発機構 宇宙科学研究所, ² 東京大学大学院 理学系研究科, ³ 京都大学大学院 理学研究科, ⁴ 東京学芸大学

¹JAXA/ISAS, ²University of Tokyo, ³Kyoto University, ⁴Tokyo Gakugei University

A zonal retrograde super-rotation of the entire atmosphere is the most curious atmospheric phenomenon. The wind velocity increases with height and reaches ~100 m/s near the cloud top. This is very mysterious because the solid planet rotates very slowly with a period of 243 Earth days corresponding to an equatorial rotation speed of 1.6 m/s. Various theories have been suggested so far to explain mechanisms which maintain the super-rotation. However, none of them has been able to fully explain the mechanisms because of insufficient observational information on the meridional circulations crucial for the zonal momentum transport. Wind speed distributions obtained by previous missions were based on cloud tracking on only dayside. Therefore, it has been uncertain whether zonal mean of them approximates the actual meridional circulation. Akatsuki, Venus Climate Orbiter (VCO) has the potential to solve this problem. Cameras onboard Akatsuki image cloud features of both dayside and nightside at more than one vertical levels. IR1 visualizes the distribution of clouds illuminated by sunlight at ~50 km above the surface. IR2 can visualize the global cloud height distributions at 50-55 km by utilizing the 2.02 μm filter on dayside and the 1.735 μm filter on nightside. In addition, LIR is able to take images of both dayside and nightside with equal quality and accuracy. Tracking of cloud features in images taken by these instruments enable us to obtain three dimensional global wind distributions, which lead to understanding of the meridional circulation and the super-rotation.

We prepare images in longitude-latitude coordinate by coordinate transformation. This is not straightforward because Venus in each image is not a circle but an ellipse when the space-craft is near Venus. We fit an ellipse to the Venusian limb on images using many parameters of the orbit and the attitude to achieve this transformation. We track cloud features found on the images in longitude-latitude coordinate to obtain the distributions of horizontal wind. In our presentation, we explain a pipeline process for getting a global wind distribution from an image and present results of some kinds of tests for the pipeline process using images obtained by Venus Monitoring Camera on board Venus Express.

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