POWER SPECTRUM ANALYSIS OF VENUSIAN CLOUD IMAGES

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A Venus exploration project (Planet-C) is in progress for the purpose of elucidating the Venusian meteorology. In this project, the distribution of clouds and minor gases at different heights are continuously measured by using several cameras which differ from each other in observation wavelength. As a preparation, we have analyzed the cloud images of Venus which were taken by previous missions in order to examine methods for analysis and demands for observations. The cloud images used are the ones taken by the SSI onboard GALILEO at the time of Venus flyby. Observation wavelengths are violet and near-infrared. According to the past examinations, it is thought that the pattern of violet images indicates the distribution of the violet absorption matter, which exist at cloud top height, and near-infrared images reflect the structure of lower cloud at the height of about 50 km. In the beginning we have calculated spatial power spectra for equatorial and mid-latitude regions of those images to investigate the dependence of turbulent structure on latitude and height. Although this kind of analyses has been carried out for the data sets obtained by Pioneer Venus and Mariner, it has not been done for the data sets of Galileo. Moreover the data obtained by Galileo has higher spatial resolution and therefore covers smaller spatial scale which we have never seen. The results are as follows. 1) The power of violet images for equatorial region is bigger than that for mid-latitude region regardless of spatial scale, whereas that of near-infrared images have no dependence on latitude. 2) The slope of the power spectra for near-infrared images is smaller than that of violet images. These results indicate that the production and loss processes of turbulence and the mechanism which connect various scale phenomena vary with height. In this report, the slopes of the power spectra are also compared with the case of the Earth.