Vertical Structure of the Interplanetary Dust Cloud

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The vertical density distribution of Solar system's interplanetary dust (IPD) cloud has been a longstanding problem in the field. Though many models have been proposed [see 1, 2, and references therein], they are based on empirical functions with a number of parameters and made by fitting the functions to the observation. Our method, however, employs an inversion method of Volterra integral equation and can directly retrieve the vertical model from the observed profiles of zodiacal scattered (ZL) or emission (ZE) light brightness along the solar elongation 90°. We applied it to the recent result [3] from reduction of Mt. Haleakala observation in optical wavelengths and observations by Infrared Astronomical Satellite (*IRAS*) and Diffuse Infrared Background Experiment (DIRBE) on-board Cosmic Background Explorer (*COBE*) in 60 μm wavelength. Comparing the results with others, we found that the models [4, 5] derived from *COBE*/DIRBE observations are reliable. We also examined the vertical profiles of ZE color indices observed by *COBE*/DIRBE and Infrared Camera (IRC) of *AKARI*. With a simple model of IPD cloud, the dust temperature , T_0, at 1 AU is obtained. The results obtained from three colors are all consistent within ± 4 K range and coincide with the temperature [4] determined from *COBE*/DIRBE observation. But it is revealed that the value of T_0 is dependent on the degree of IPD model's non-grayness, which will be fixed by analyzing [6] the near- and mid-infrared spectra of ZE observed by *AKARI*.

Keywords: Interplanetary medium; zodiacal light.

References

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