Modeling of the Zodiacal Emission for the AKARI Mid-Infrared All-Sky Diffuse Maps

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We are creating all-sky diffuse maps from the AKARI 9 and 18 μm mid-infrared (IR) survey data. The AKARI 9 μm map is crucial to investigate the all-sky distribution of polycyclic aromatic hydrocarbons, while the 18 μm map is useful to trace hot dust grains. At the same time, the AKARI mid-IR all-sky maps are useful data for the study of the interplanetary dust (IPD) in our Solar System because the zodiacal emission from the IPD grains is the dominant foreground emission in those wavelengths.

The IPD model constructed by Kelsall et al. (1998) (the Kelsall model) has been widely used as a standard model. This model is based on the COBE/DIRBE data. However, there still remains the residual zodiacal component whose level is $\sim$1 MJy sr^{-1} around the ecliptic plane in the mid-IR maps after removal of the zodiacal emission by the Kelsall model. We therefore try constructing the new IPD model by changing the method of determining the model parameters based on the Kelsall model, and by using the AKARI data which have higher spatial resolution than the DIRBE data and are better brightness-calibrated than the IRAS data. As a result, our new model better reproduces the zodiacal emission in the AKARI mid-IR all-sky maps than the Kelsall model. Through the analysis, we obtain new information about the zodiacal emission. We discuss the structure and physical properties of the IPD grains based on our new results.