

The thermal evolution of protoplanetary disks due to dust growth and settling

Hidekazu Tanaka[1]; Shigeru Ida[1]

[1] Dept. of Earth and Planetary Sci., Tokyo Inst. of Tech.

Theoretical models of the SED evolution of protoplanetary disks play essential role in deriving detail information from observational data on protoplanetary disks. We investigate the thermal and SED evolution of disks due to dust growth and settling, performing numerical simulations of dust growth and settling. Our results are summarized as follows.

1. The absorption surface of a minimum-mass nebula disk goes down with sub-micron dusts. the descending time of the absorption surface is about one million yr, which is consistent with D'Alessio et al. (2001).
2. The descent of the absorption surface cools the disk itself. After one million yr, the disk temperature is lower than 1/3 of that of the Hayashi model. This indicates the existence of icy planetesimals in Earth-forming region.
3. The decay of the infrared excess in the SEDs with the time scale of millions yr can be explained by dust growth and settling. This indicates the possibility of the much longer life time of protoplanetary disks than ten million yr.