Rocky planetesimal formation by sublimation of icy dustaggregates: effect of ${¥rm H_2O}$ vapor pressure

Etsuko Saitou[1]; Sin-iti Sirono[2]

[1] Nagoya Univ.; [2] Earth and Planetary Sci., Nagoya Univ.

Planetesimal formation is still one of the most important unresolved problems in planetary science.

I propose a scenario of planetesimal formation in this study. Sublimation of H_2O ice in an icy dust aggregate leads to concentration of silicate dust core particles at a particular heliocentric distance. I show that the dust column density can reach the critical density required for the self gravitational instability of the dust layer.

First, we neglect H_2O vapor pressure for simplicity.

In this case, the dust surface density increases locally by a factor of 10 by
falling dust aggregates distributed in width of 15AU for 10-cm sized
aggregates.

Sublimation rate sensitively depends on H_2O vapor pressure.

We investigated time evolution of vapor pressure sublimed from the dust aggregates.

The location of snowline varies with time
evolution of the vapor pressure. We studied the time evolution of dust column
density.