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# Laboratory studies into the thermal inertia of granular materials on planetary surfaces.

Takenori Toyota[1*], Akiko Iwasaki[1], Kei Kurita[1]

[1]Earthquake Research Institute

In this work, we measured porosity, thermal conductivity and thermal inertia of granular materials to bring out the relationship between the bulk structure and the thermal properties.

To characterize the surface materials by remote sensing, thermal inertia is used as an important parameter. Thermal inertia is defined by thermal conductivity, bulk density and specific heat capacity. Especially thermal conductivity strongly affects on thermal inertia. For terrestrial planets, it is covered with granular materials on the surfaces. Therefore, understanding of thermal conductivity of granular materials is a key in considering situations of planetary surfaces.

We measured the thermal properties of glass beads, natural pyroclasts and hollow glass beads. One of the remarkable results is that bulk porosity definitely controls thermal conductivity; the larger the bulk porosity, the smaller the thermal conductivity. To understand the structure of granular materials, it is important to divide porosity into packing porosity (fractional volume of vacant spaces among grains over total volume) and grain porosity (that of vacant spaces inside grains). The effect of pores inside grains on thermal conductivity is different from that of pores among grains.

Keywords: granular material, thermal inertia, thermal conductivity, laboratory experiment