

The nature of the regolith on minor bodies from observations in the thermal infrared

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I will discuss how the nature of the regolith on asteroids can be studied from astronomical observations of asteroids in the thermal infrared. These observations can be interpreted, by means of thermophysical models, in terms of the thermal inertia of the surfaces of these bodies. Thermal inertia is a sensitive indicator for the presence or absence of thermally insulating loose material on the surface such as regolith or dust. The value of the thermal inertia depends on regolith depth, degree of induration and particle size, rock abundance, and exposure of solid rocks and boulders within the top few centimeters of the subsurface. I will show how recent works have shown that the thermal inertia of km-sized near-Earth asteroids (NEAs) is more than 2 orders of magnitude higher than that of main belt asteroids (MBAs) with sizes (diameters) between 200 and 1000 km. This confirms the idea that large MBAs, over hundreds millions of years, have developed a fine and thick thermally insulating regolith layer, responsible for the low values of their thermal inertia, whereas km-sized asteroids, having collisional lifetimes of only some millions years, have less regolith, and consequently a larger surface thermal inertia.