

Dust contribution to space weathering of asteroid surfaces

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The processes of alteration of airless bodies exposed to the space environment are referred to as ‘space weathering’. Multiple agents contribute generally to space weathering, to an extent that depends on the specific location of the surface within the solar system. Typical space weathering agents encountered in the solar system are: solar radiation, solar wind and cosmic rays, magnetospheric plasma (for example, at Jupiter or Saturn), and cosmic dust. The effect of space weathering is generally assessed by measuring the surfaces optical properties, for example by IR spectroscopy. The altered surfaces often show a darkening, reddening and flattening of IR-bands. The alteration of the surfaces is due to a cumulative effect over time of all agents. We investigate in this paper the contribution of micro-meteoroid (dust) bombardment on different asteroids, by using the Micrometeoroid Environment Model (IMEM) for the interplanetary dust populations (IDPs), and a simplified model of Interstellar Dust (ISD) dynamics. We quantify, for different asteroids (Main belt, NEOs and one Jupiter trojan), the particle cumulative flux, impact velocity and kinetic impact energy deposited. This work is primarily intended to support laboratory work investigating the effect of energy deposition onto sample surfaces, as well as astronomical observations of the optical properties of asteroid surfaces.