

Lunar electrostatic dust dynamics in the solar wind and geospace environments

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The dynamic dust fountain model has recently been proposed to explain high-altitude dust in the lunar exosphere observed during the Apollo era. Predictions for this model were only made for typical solar wind conditions; however, the lunar electrostatic environment varies considerably depending on the Moon's location relative to the Earth's magnetosphere. The Moon spends about 75% of the time in the solar wind, while the remaining quarter is spent in the magnetosheath, tail lobes and plasma sheet. Of these regions the plasma sheet produces the most extreme conditions, with typical surface potentials predicted to be about -600 V on the nightside of the Moon. This variation in the electrostatic environment effects the dust transport described by the dynamic fountain model. Presented here are predictions for dust dynamics in these various regions, which in turn shows how dust transport is strongly dependent on ambient plasma conditions.