Geophysical Research Abstracts
Vol. 16, EGU2014-1599, 2014
EGU General Assembly 2014

Dust Grain Charge in the Lunar Environment

Jakub Vaverka, Ivana Richterova, Marek Vysinka, Jiri Pavlu, Jana Safrankova, and Zdenek Nemecek
Charles University, Faculty of Mathematics and Physics, Department of Surface and Plasma Science, Prague, Czech Republic (jakubvaverka@gmail.com)

Interaction of a lunar surface with solar wind and magnetosphere plasmas leads to it charging by several processes as photoemission, a collection of primary particles and secondary electron emission. Nevertheless, charging of the lunar surface is complicated by a presence of crustal magnetic anomalies with can generate a "mini-magnetosphere" capable for more or less complete shielding the surface. On the other hand, shielding of solar light and plasma particles by rocks and craters can also locally influence the surface potential as well as a presence of a plasma wake strongly changes this potential at the night side of the Moon. A typical surface potential varies from slightly positive (dayside) to negative values of the order of several hundred of volts (night side). At the night side, negative potentials can reach –4 kV during solar energetic particle (SEP) events. Recent measurements of the surface potential by Lunar Prospector and Artemis spacecraft have shown surprisingly high negative dayside surface potentials (–500 V) during the magnetotail crossings as well as the positive surface potential higher than 100 V. One possible explanation is its non-monotonic profile above a surface where the potential minimum is formed by the space charge.
Dust grains presented in this complicated environment are also charged by similar processes as the lunar surface. A strong dependence of the secondary electron yield on the grain size can significantly influence dust charging mainly in the Earth's plasma sheet where an equilibrium grain potential can by different than the surface potential and can reach even the opposite sign. This process can lead to levitation of dust above a surface observed by the Surveyor spacecraft.