Geophysical Research Abstracts
Vol. 21, EGU2019-5279, 2019
EGU General Assembly 2019

Dust Observations with Antenna and Faraday Cup Measurements

Jiri Pavlu (1), Ingrid Mann (2), Tarjei Antonsen (2), Ashild Fredriksen (2), Ove Havnes (2), Michael C. Lue (3), Libor Nouzak (1), Zoltan Sternovsky (4), Joan Stude (5), Jakub Vaverka (1), Shengyi Ye (6), and Arnaud Zaslavsky (7)

(1) Charles University, Faculty of Mathematics and Physics, Department of Surface and Plasma Science, Prague, Czech Republic (jiri.pavlu@mff.cuni.cz), (2) The Arctic University of Norway, Tromsø, Norway, (3) IRF, Kiruna, Sweden, (4) LASP, University of Colorado at Boulder, CO, USA, (5) DLR, Oberpfaffenhofen, Germany, (6) University of Iowa, Department of Physics and Astronomy, Iowa City, IA, USA, (7) Observatoire de Paris, Meudon, France

We address the physics of dust impacts and its influence on detecting dust particles in space. Dust impacts onto spacecraft can be observed by detecting dust surface charge directly. They can also be detected by antenna instruments, because the impacts generate free atoms, molecules and particulate fragments, most of them in a charged state. Depending on the spacecraft potential a fraction of the impact-generated charges are recollected, and the antenna instruments can register a transient charging event, typically 100 microseconds long. The shape of the signal is set by to the formation of the impact cloud, the escape of electrons and ions, and a subsequent relaxation to the equilibrium potential depending on the surrounding plasma environment. We consider this process of impact cloud generation, expansion, charge separation and re-collection that take place before the spacecraft potential reaches its equilibrium again. We discuss typical pulse shapes observed with antennas in different plasma conditions. This type of impact process is best described at high velocities (few 10 km/s) where impact-generated charges exceed by far the dust charges. At low impact velocities, as e.g. on atmospheric rockets, the dust is also measured via its surface charge with Faraday cups. We discuss secondary charging processes that influence these measurements. This is the effort of a team at the International Space Science Institute, in ISSI Bern brings together researchers who are studying different aspects of dust and dust impacts (http://www.issibern.ch/teams/physdustimpact/).