9. Spacecraft Charging/Contamination Experiment on SCATHA

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Abstract

The MLI2 experiment to be flown on Air Force Space Vehicle P78-2, SCATHA (Spacecraft Charging at High Altitudes), is designed tb determine if spacecraft charging contributes significantly to the rate of cbntamination arriving at exterior spacecraft surfaces, anti Bame of the characteristics and effects of the contamination collected. The contamination transport mode under investigation involves the ionization within the vehicle plasma sheath of malecules outgassed or released by the vehicle and their subsequent electrostatic reattraction to the vehicle.

Two sensor types will be flbwn. One type is a combination retarding potential atialyeer (RPA) and.temperature controlled quartz crystal microbalance (TQCM). With it, distinction can be made between charged and uncharged arriwing molecules, and information can be obtained concerning the temperature dependence of contamination adsorption and desorption rates. The other sensor type exposes samples of different spacecraft surface materials to arriving contamination and continuously measures the solar absorptance (α_s) of thede materials, Changes in α_s of space-stable samples will be entirely ascribed to contamination effect8 whereas changes In ather samples will result from a combination of contamination, photochemical, and radiation effects. Upon ground command, some samples will go through a heating. sequence designed to roughly determine the temperature at which contamination is desorbed.

In addition to describing the goals arid techniques of MLI2 in more detail. the expected performance of the sensors and the need far coordination with other experiments on SCATHA will be discuesed.