



Magnetic shadowing of high energy ions at Mars: SLED/Phobos-2 observations and hybrid model simulations

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Energetic particle data recorded by the SLED instrument aboard Phobos-2 while in circular orbit about Mars in March, 1989 showed the presence of magnetic shadowing. A 3-D, self consistent, hybrid model (HYB-Mars) supplemented by test particle simulations has been developed to study the response of the Martian plasma environment to the solar disturbances concerned and to interpret the SLED observations. During Extreme Solar Events, the magnetic and electric fields as well as the properties of high energy ions present at Mars can be derived from HYB-Mars. The hybrid modeling was found to result in magnetic shadowing which is qualitatively similar to that recorded by SLED while also the size of the shadow varied depending on the energy of ions in the range analyzed (50 keV-3.2 MeV). The simulations suggest that the magnetic shadowing found in the energetic ion records depended on the pertaining solar wind density and velocity, and on the magnitude and direction of the interplanetary magnetic field.