Geophysical Research Abstracts, Vol. 8, 05139, 2006
SRef-ID: 1607-7962/gra/EGU06-A-05139

Solar Energetic Particles in Near-Mars Space

J.G. Luhmann, D. Brain, C. Lee, G. Delory (1), C.J. Zeitlin (2), J.G. Lyon

(1)Space Sciences Laboratory, University of California, Berkeley, (2) Lawrence Berkeley Laboratory, (3) Dartmouth College (jgluhman@ssl.berkeley.edu/Fax 510-643-8302)

Solar energetic particles (SEPs), comprised mainly of $>$1 MeV protons, have been detected by both MARIE on Mars Odyssey and in the background counter of the MGS Electron Reflectometer (ER) experiment. These particle events, also seen on the earlier Phobos spacecraft, are typically associated with the form of solar activity called a Coronal Mass Ejection or CME. They are of interest both because of their potential for depositing significant amounts of energy in the Martian atmosphere, and also for their known effects on spacecraft instrumentation and astronauts. In contrast to Earth, weakly magnetized Mars represents a practically unshielded obstacle. To a first approximation, Mars should absorb the energetic protons that are incident on a sphere including Mars and its lower atmosphere. Thus the observation of shadowing or "dropouts" in SEP fluxes observed by MARIE on Odyssey was not a surprise. However, the dropouts show varying orbital phase, depth and shape that merits explanation. This poster describes the results of modeling SEP access to low Mars orbit where existing as well as planned missions will spend significant periods of time. We use this model to illustrate how an anisotropic influx of energetic protons from the Sun or an interplanetary shock source is affected by the presence of Mars at close range, together with the enhanced interplanetary magnetic fields that accompany proximity to Mars and CME disturbances. The orbital locations of the dropouts can also be used as a diagnostic of interplanetary field orientation during the SEP event.