Project Details

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Project Title:
Energetic Radiation Environments in the inner Magnetosphere: Polar and HEO Data

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Summary:
We propose to update the energetic electron models of the Earth's radiation belts using data from the Polar and HEO energetic particle investigations taken during the period from solar minimum through solar maximum (mid 1994 to mid 2001). In addition we will include the extreme conditions and characterizations of the environment variability that are missing from the present models.
The NASA radiation environment models, AE8 and AP8, are used worldwide for engineering purposes. In spite of the obvious importance of these tools, the models are based upon data that is decades old. Studies have shown that the depth-dose profiles derived from AE8 are, in general, not accurate. Other deficiencies of the AE8 models include the fact that only omnidirectional fluxes are specified, that only long-term averages are available, and that the time dependence in these models is limited to solar max vs solar min. We propose to correct these deficiencies.
Accurate, long term averages of the space radiation environment are increasingly important as cost and availability considerations create pressure to use COTS (commercial, off-the-shelf) components. These do not have the radiation hardness pedigree of traditional space-use rad-had components. There is great scientific and engineering interest in knowing the variance of the space radiation environment from long-term average values. In particular, we need to know what the worst-case environments are. For example, what is the equivalent of a thirty or one hundred year storm? Worst case values are needed for purposes such as extra-vehicular activity (EVA) planning for Space Shuttle and International Space Station (ISS) missions, for developing hardening specifications and test requirements for spacecraft components, and for evaluating background effects in spacecraft systems. The radiation problems for ISS are spelled out in great detail in a National Academy Report (NRC, 2000) and those for unmanned spacecraft have been spelled out in a recent National Security Space Architecture report. We propose to respond to these needs by developing updated models of the radiation environment using new data from modern instrumentation.

Publication References:

no references