Release of AE9/AP9/SPM Radiation Belt and Space Plasma Model Version 1.20.002

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An update of the AE9/AP9/SPM radiation belt and space plasma specification model, Version 1.20.002, has been released. As in the prior releases in 2012 and 2013, this model suite provides estimates of trapped energetic electrons, energetic protons, and plasma, for use in space system design, mission planning, and other applications of climatological specification. It is based on 37 satellite-based data sets processed to create maps of the particle fluxes along with estimates of uncertainties from both imperfect measurements and space weather variability. These uncertainty estimates can be obtained as statistical confidence intervals, e.g. the median and 95th percentile, for fluxes and derived quantities, supporting design trades. Implementations of the legacy AE8/AP8 and CRRESELE/CRRESPRO models are available within the model suite. The SHIELDOSE2 code is used for dose estimation from the calculated fluxes. Orbit ephemeris may be generated using one of three orbit propagators, or may be directly supplied. The self-contained software package includes a Windows-based executable version of the model suite, accessible either by command line or graphical user interface, plus supporting documentation such as the users' guide, validation results, and software license information.

This version includes substantial enhancements over the last public release, Version 1.05.001 in September 2013. Flux maps for AE9, AP9 and SPM electrons and protons have been updated: TacSat-4/CEASE data have been added to AP9, plus AP9 now covers energies up to 2 GeV using estimates based on Van Allen Probes/RPS data; AE9 maps are improved; and THEMIS/ESA data are added to SPM. Added features provide more options for orbital elements and other input/output formats, improved methods for optional unidirectional flux queries (additional to the default omnidirectional results), and the option to output magnetic field and related quantities used internally by the model. The recent 2015 update of the IGRF magnetic field model has also been incorporated.

Beginning with this release, the AE9/AP9/SPM model is hosted on a new dedicated web site (https://www.vdl.afrl.af.mil/programs/ae9ap9). This public site includes both general and detailed information about the model as well as instructions for obtaining the current model software. The AE9/AP9/SPM model is publicly available at no cost and can be downloaded after registering on the web site with contact information. For platforms other than Windows, the source code version must be directly requested.

AE9/AP9/SPM continues to be actively developed by a collaboration led by the Air Force Research Laboratory and including Aerospace Corp., Atmospheric and Environmental Research, Inc., Los Alamos National Laboratory, and MIT Lincoln Laboratory. The AE9/AP9/SPM team may be reached at ae9ap9@vdl.afrl.af.mil.

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