IRENE: AE9/AP9/SPM Radiation Environment Model

Release Notes

Version 1.55.003

The IRENE (International Radiation Environment Near Earth): (AE9/AP9/SPM) model was developed by the Air Force Research Laboratory in partnership with MIT Lincoln Laboratory, Aerospace Corporation, Atmospheric and Environmental Research, Incorporated, Los Alamos National Laboratory and Boston College Institute for Scientific Research.

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The IRENE (AE9/AP9/SPM) model and related information can be obtained from AFRL's Virtual Distributed Laboratory (VDL) website: https://www.vdl.afrl.af.mil/programs/ae9ap9

V1.00.002 release: 05 September 2012
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Highlights

Please refer to the 'Ae9Ap9_v1_50_001_ReleaseNotes' document for a description of the revisions and enhancements of the model software since v1.35.001.

The installation directory layout was revised for better support of the expanded API.

The Windows executables were built using Microsoft Visual Studio 2017 (previous releases used 2012).
An installation of a newer version Visual Studio run-time libraries is likely to be required.
See Appendix H of the User's Guide document for more details.

A new kernel-based calculation of the dose values was added as an option for the model processing. The Dose Kernel is faster than the ShieldDose2 model.

The performance of the ShieldDose2 model has been significantly improved.

The software API was greatly expanded to include C and Python model- and application-level API methods.

The third-party library dependencies were updated to use more recent versions.

Software Changes

CmdLineAe9Ap9 application (and its associated 'helper' applications):

- Support for the new Dose Kernel calculations was added, accessible via new parameters.
- The calculation of the Fluence and Dose was split into separate 'helper' applications.
- A subtle error in the interval-based accumulation and averaging was corrected.
- The output file header section was enhanced with additional information.
- The energy limits for the Ae8 and Ap8 legacy models was corrected.

Ae9Ap9Gui application:

- Added new user interface elements to activate the Dose Kernel option and to specify the location of its supporting xml files.
- A 'Cancel Run' button was added, enabling model run calculations to be terminated cleanly.
- The Window MPI communication mode selection was added to the 'Directories/Options' configuration dialog window.

- The fixed set of energy values for the Ae8 and Ap8 legacy models was revised.

API library:

- The API was greatly expanded to support both C and Python languages.
- Demonstration programs are included for both 'Application-Level' and 'Model-Level' API modes, in each of the supported C++, C and Python languages.

Build Scripts:

- The entire build configuration was extensively updated, and installation layout was revised.
- CMake version 3.x is now required.

Documentation Changes

- The *User's Guide* document was revised, adding references to the new Dose Kernel option in both the command-line and GUI application descriptions. An appendix was added to provide an overview of the parallelization strategy being used. An appendix was added to describe the deprecated parameter keywords and values, and their replacements. An appendix was added to provide more information about the Dose Kernels.
- New documents were added to the collection, providing more details about the use of Kernel-based calculations in general.
- The *Build Instructions* document was updated to reflect changes in the build process.
- The C++ *Application Programming Interface* (API) document was updated, adding descriptions for several previously undocumented methods, and was renamed to reflect its language.
- Two new API documents were added, for the C and Python languages.

General

- The AE9 and AP9 runtime model databases are unchanged from the v1.50.001 release; therefore, the flux results produced for these models will be unchanged.
- Interval-based accumulation and average results may show slight differences under certain conditions, due to the correction of a subtle error.

Changes in Supporting Files

- The new 'kernelXml' directory was added, containing the files supporting the kernel-based dose calculations.

Version Numbering Scheme: **V***a.bc.ddd*

The '*a*' digit changes with major new architecture or feature changes in the model.
The '*b*' digit changes with updates of the model database files.
The '*c*' digit changes with minor new features in the model and/or interface software.
The '*d*' digits change with bug fixes and trivial feature tweaks.

Contact Information

Please send any questions, comments and/or bug reports to: ae9ap9@vdl.afrl.af.mil

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