
IRENE: AE9/AP9/SPM Radiation Environment Model

Release Notes

Version 1.57.004

Approved for public release; distribution is unlimited.
Public Affairs release approval #AFRL-2022-3248.

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

V1.03.001 release: 26 September 2012

V1.04.001 release: 20 March 2013

V1.04.002 release: 20 June 2013

V1.05.001 release: 06 September 2013

V1.20.001 release: 31 July 2014

V1.20.002 release: 13 March 2015

V1.20.003 release: 15 April 2015

V1.20.004 release: 28 September 2015

V1.30.001 release: 25 January 2016

V1.35.001 release: 03 January 2017

V1.50.001 release: 01 December 2017

V1.57.004 release: 11 July 2022

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July 11, 2022

Note: This document describes the feature updates of v1.57.001-3 and other minor updates for v1.57.004.

Highlights

Please refer to the ‘Ae9Ap9_v1_55_003_ReleaseNotes’ and ‘IRENE_v1_56_002_ReleaseNotes’ documents for descriptions of the significant revisions and enhancements of the model software since v1.50.001.

A feature was added to perform logging of the ‘worst case’ values for the ‘Boxcar’ and ‘Exponential Flux Average’ accumulation modes. *This feature is also available in the GUI application (v1.57.002).*

Error detection during model runs was improved *and extended (v1.57.002).*

The default values of performance-related parameters were revised.

The build process was revised and streamlined.

The build instructions were expanded to also include support for both CentOS/Rocky 8.4 and Ubuntu-based Linux operating systems (v1.57.004).

An issue with multi-threaded model runs on Windows machines with an active VPN connection was resolved with an update of the Intel MPI Library files (v1.57.004).

Software Changes

CmdLineIrene application (and its associated ‘helper’ applications):

- A new ‘CLWorstCaseLog’ parameter was added as an option for generating log files for the reporting the highest value-to-date values of the ‘Boxcar’ and ‘Exponential Flux Average’ Monte Carlo flux accumulations, in both the individual scenario files and the aggregation confidence level files. *The aggregation confidence level log files also include the time associated with the identified scenarios’ ‘worst case’ flux value (v1.57.003).*
- The detection of errors, such as writing output files to a full disk, was improved; any errors that occur during model runs, in single- or multi-threaded mode, now properly halt the execution. *Other error conditions, such as missing input files, are also detected (v1.57.002).*
- The Windows-specific option for SSH-based MPI communication was removed, due to its removal from the Intel MPI Library.
- The Linux-specific code was revised to enable to use newer versions of the ‘openmpi’ library.
- *The default value for the ChunkSize parameter was changed to 960, for improved performance (v1.57.004).*

- *The new TaskDelay parameter was added, sometimes needed for MPI process management on Linux under certain conditions (v1.57.004).*

IreneGui application:

- The source code was revised to support use of the Qwt 6.x library for its plotting feature; *also now supports use of QT 5.x library, when available (v1.57.004)*.
- The option for using SSH-based MPI communications was removed from the GUI configuration dialog for Windows installations.
- *The option to activate the new ‘Worst Case Logging’ feature was added in the Advanced Options dialog window (v1.57.002).*
- *Alternate versions of the IreneGui.pro file are available for the building of the application on Ubuntu and CentOS/Rocky 8 systems (v1.57.004).*
- *The new ‘Task Delay’ option was added to the ‘Configure/Directories+Options’ dialog window (v1.57.004).*

API library:

- The C++ API was revised to include new methods supporting the ‘worst case’ logging features.
- Several existing methods were revised to return error codes.
- *The default value for the ChunkSize parameter was changed to 960 (v1.57.004).*
- *Methods were added for the new ‘Task Delay’ option (v1.57.004).*

Supporting Files: (v1.57.004)

- The Intel MPI Library runtime redistributable files were updated to version 2021.5, resolving an issue with multi-threaded model runs on Windows machines with an active VPN connection.
- Along with this library update, an additional setting is required for these runs to be successful:
 - Edit environment variables for your account, adding a new entry:
variable: FI_TCP_IFACE value: lo

Build Scripts:

- The CMakeLists.txt files used in the build process were revised to remove obsolete options and streamline operations. All third-party library dependencies are now expected to be fulfilled by system-installed packages.

Documentation Changes

- The *User’s Guide* document was revised, adding a description of the new ‘CLWorstCaseLog’ parameter, and the resulting log files produced. *The description of the ChunkSize parameter was updated with new information (v1.57.004).* Appendix H was expanded to provide additional details about potential errors or warning messages that could be encountered.
- The *Build Instructions* document was revised to reflect changes in the build process. *An appendix was added to the document, providing appropriate information for building the software on the CentOS/Rocky 8.4 and Ubuntu-based operating systems (v1.57.004).*
- The C++ API (Application Programming Interface) document was updated with descriptions of the new methods related to the logging capabilities.

- *All API documents were updated with new information about the ChunkSize parameter (v1.57.004).*
- *Several documents were revised due to the update of the Intel MPI Library, and the need to set an environment variable for the successful execution of multi-threaded model runs on Windows machines when a VPN connection is active (v1.57.004).*

Version Numbering Scheme: $Va.bc.ddd$

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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