



**US Army Corps
of Engineers**
Hydrologic Engineering Center

Hydrologic Modeling System HEC-HMS

Release Notes

Version 2.1.3
October 2001

Introduction

Version 2.1.2 of the Hydrologic Modeling System (HEC-HMS) was completed in June 2001 and released for general use shortly thereafter. A number of program errors have been found since that release and mainly occur in portions of the program used infrequently. However, an error was found in the frequency precipitation method and an error was found in the S-graph transform that prevented its use under most circumstances. This new release repairs these defects without adding new capabilities and is labeled Version 2.1.3. This release is available for computers running the Microsoft Windows 2000/NT/98/95 operating systems or the Sun Microsystems Solaris operating system.

The Technical Reference Manual for Version 2.0 continues to accurately describe the mathematical models included in the program. The User's Manual labeled Version 2.1 continues to accurately describe the use and application of the program.

The installation program and all documentation are available on the HEC website at <http://www.hec.usace.army.mil>.

Installation

If you have not previously installed the program, obtain the installation program and run it. You will be prompted to specify locations for program files, sample projects, and other required information. You should reboot the computer before attempting to use the program. The method for upgrading earlier versions of the program depends on the method used originally to install the software. If you do not know how it was originally installed, you should skip to the instructions for upgrading from any other version.

Use the following steps to upgrade to the new version *if you have installed Version 2.0.3 or any newer version*:

1. Download the installation program from the HEC website to a temporary folder on the computer. Alternately, insert the provided CD-ROM or other media in the drive.
2. Run the installation program. In Windows Explorer, double-click the icon for the installation program.
3. Follow the on-screen prompts to upgrade the installed software. The program executable and related files will automatically be replaced with updated versions. The installation itself is not modified and project data are not affected.

Use the following steps to *upgrade to the new version from any other version* of the program:

1. Uninstall the version of HEC-HMS present on the computer; project data are not affected. Use the add/remove programs applet in the control panel to uninstall the program. Future upgrades are not expected to require uninstallation.
2. Download the installation program from the HEC website to a temporary folder on the computer. Alternately, insert the provided CD-ROM or other media in the drive.

3. Run the installation program. In Windows Explorer, double-click the icon for the installation program.
4. Follow the on-screen prompts to begin the installation process, specifying locations for program files, sample projects, and other required information.
5. Reboot the computer when the installation program finishes or before attempting to use the program.

New Users

The program has been designed to be easy to use. However, an understanding of how the program works is critical to producing accurate results. It is suggested that a new user read Chapter 3 of the User's Manual and Chapters 2 and 3 in the Technical Reference Manual before attempting to start and use the program. Subsequently, start the program and construct the example application contained in Chapter 10 of the User's Manual. These chapters provide the fundamental instruction necessary to effectively use the program.

Experienced Users

The User's Manual contains information about using each of the computational methods included in the program. A Technical Reference Manual is also available to describe the theoretical basis for the methods included in the program. It is recommended that experienced users read the topics, both in the User's Manual and Technical Reference Manual, for methods used frequently.

Closed Defects

A total of 21 defects have been repaired since the release of Version 2.1.2. A brief description of each defect follows:

1. The source element was unable to use external DSS gages that included missing flow. Missing data is now converted to zero flow and a warning placed in the run log.
2. A run that included a subbasin using the S-graph transform method aborted with no error messages.
3. The program occasionally crashed while switching from the ModClark to the Clark transform method.
4. Some subbasin element data was lost when copying a basin model that included a subbasin using the S-graph transform method.
5. Some diversion element data was lost when exiting the program, if no reservoirs or routing reaches were included in any of the basin models in the project.
6. Summary data for a subbasin element was incorrect for runs that included the "save states" option.
7. The program would crash under some conditions when switching between routing reaches in the modified Puls global editor.

8. Precipitation data could not be found during a run if the control specifications time interval had been changed in some obscure ways.
9. The program would crash while attempting to open the linear reservoir global editor if any of the subbasin elements set to use the linear reservoir method contained no data.
10. The linear reservoir baseflow method was incorrectly labeled in the basin model attributes.
11. Changes to the evapotranspiration coefficient in the constant monthly evapotranspiration method were not saved if no other changes were made.
12. The results for a run including a meteorologic model using the frequency storm method could change under some conditions. The change only occurred for the first run computed after opening a project.
13. Hydrologic element data could be lost for gridded subbasins when using the Element List to edit any element in the basin model.
14. The source element did not correctly interpolate gage data when the control specifications start time was offset from the gage data.
15. Incorrect storage state variable time-series data was written to the project DSS file when optimizing soil moisture accounting parameters. Computed flow results were not affected.
16. The program would crash if a graph were requested for a user-specified S-graph that contained no data.
17. The meteorologic model screen did not correctly display evapotranspiration data after switching between models.
18. User-specified unit hydrograph ordinates on UI cards were incorrectly interpreted when importing an HEC-1 file. The data was interpreted at the time interval on the IN card instead of the IT card.
19. Outflow was computed incorrectly for a groundwater layer in the soil moisture accounting loss method. Outflow was computed as higher than actual.
20. No messages were given when computing a run that included a subbasin using the recession baseflow method without specifying any parameter values.
21. Excess precipitation and direct flow were not saved to the project DSS file when computing a run that included a subbasin using the kinematic wave method with only one plane.

Open Defects

A total of 2 major defects are currently open and undergoing investigation and repair. Additional minor defects are currently open and will be repaired after completion of priority items. The following major defects are open:

1. The program may crash under some conditions when attempting to graph element results. The crash may occur before the graph has finished drawing, while moving or resizing the graph, or when closing a graph. The crash occurs whenever diversion flow from a diversion element is connected downstream to another element in the basin model. The crash does not occur if the diversion flow *is not* connected downstream. The exact cause of the problem is unknown.
2. Optimization results will be lost if any of the hydrologic elements used in an optimization trial are renamed in the supporting basin model. Affected are the optimization location and any elements with parameters selected for optimization. The supporting basin model and other components can be renamed without affecting the optimization results; it is only the elements within the components that should not be renamed.

Future Plans

Planning is under way for two versions beyond the current release. Planning and design of future versions is a dynamic process and features scheduled for inclusion in each version do change over time in response to funding and field requests. The following descriptions should be used as a general outline when anticipating new features.

Improved reservoir modeling will be the focus of the first version, to be labeled Version 2.2.0. Specification of pressure flow through an outlet structure will be included in the reservoir element definition. Spillway structures such as broad-crested and ogee weirs and dam overflow will also be included. Additionally, dam break capabilities similar to HEC-1 will be added. Additional reservoir features including a wider variety of outlet structures will be included in later versions. Testing is currently underway on the new capabilities and the software is expected to be released for general use in early 2002.

Efficiency tools for planning studies, where the product is a frequency curve, will be the focus of the second version, to be labeled Version 3.0. New visualization capabilities will create graphs and tables of results from several elements or simulation runs. Report tools will be added to create appendix-quality records of basin or meteorologic model data. Snowmelt methods will be added to the meteorologic model. Capability will be provided for degree-day lumped simulation at one elevation over a subbasin, lumped simulation in elevation bands over a subbasin, or gridded simulation over a subbasin. An automatic depth-area reduction frequency analysis tool will also be included. Finally, this version will implement a brand-new user interface. Work on this version is ongoing but no release date has been set.

A comprehensive program validation guide is currently under development and will be published when complete. The guide gives detailed information about the tests used to determine the accuracy of the mathematical models included in the program, for example, the SCS curve number loss method. The section for precipitation methods is currently complete in draft form. Sections for junctions, sinks, diversions, reservoirs, and some reach routing and loss rate methods are also complete in draft form. It was found that HEC-HMS accurately implements all features in the tested methods.

A program application guide is currently under development and. The guide will provide detailed information on the application of the program to a wide variety of studies. Study types to be addressed include urban flooding, flood frequency,

flood-loss reduction, flood warning system planning, reservoir sizing, environmental restoration, and real-time forecasting. Details for each study type will include typical objectives, required hydrologic information, modeling options and selection criteria, model configuration, design criteria where appropriate, and results presentation. A case study will illustrate each study application.

Documentation

The *Hydrologic Modeling System HEC-HMS: User's Manual* contains extensive information on installing and using the program. An example application is included to illustrate the steps necessary to produce results.

The *Hydrologic Modeling System HEC-HMS: Technical Reference Manual* contains information on how to use the various methods included in the program. The scientific origin and equation derivations are presented for each method. Specific solution algorithms for a method are discussed when necessary for a complete understanding. Application and parameter estimation for each method is also included.

The online help system within the program contains topics describing each screen of the graphical user interface.

Support Policy

Technical support for program users within the Corps of Engineers is provided through an annual subscription service. Subscribing offices can expect full support from HEC staff in the routine application of the program. Users are strongly urged to consult with HEC staff on the technical feasibility of using the program before beginning a project with unique requirements such as grid-cell hydrology, snow melt, or continuous simulation. Extended support for large or complex projects can be arranged under a separate reimbursable project agreement.

Support can not be provided to users outside the Corps of Engineers. Domestic and foreign vendors are available that provide fee-for-service support similar to the support provided to subscribing Corps offices. Such service agreements are between the user and the vendor and do not include HEC staff. Vendors do contact HEC on behalf of their users when unusual problems or errors are encountered.

Reporting of suspected program errors is unrestricted. We are continuously working to improve the program and possible bugs should always be reported. Reports should include a written description of the steps that lead to the problem and the effects that result from it. We will reply to all correspondence concerning program errors.

Request support or report program errors through the following channels:

- Call +1-530-756-1104, 7:30 am to 4:30 pm PT Monday through Friday.
- Fax +1-530-756-8250 any time.
- Write to U.S. Army Corps of Engineers, Institute for Water Resources, Hydrologic Engineering Center, 609 Second Street, Davis, CA 95616-4687 USA.
- Send email to hms@usace.army.mil on the internet.
- Visit our web site at <http://www.hec.usace.army.mil>.