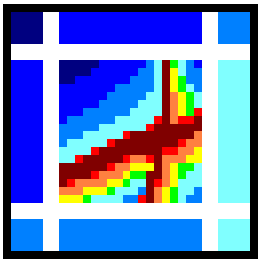

What's New in MAQS 1.4?

December 2025

MAQS 1.4 is a minor update to CERC's state of the art system for multi-scale modelling of pollutant dispersion. MAQS 1.4 contains a number of improvements and new features, most notably:

- Compatibility with ADMS-Urban 5.1, allowing use of new features such as the generation of output grid points at a fixed distance from the edges of each road source;
- New feature to automatically update input *.cfg* files prepared in previous versions of MAQS into the current version using the *make_def_inputs.sh* script;
- Allow with ADMS-Urban options that were previously only achievable with ADMS-Local:
    - Specify spatially varying site parameters such as minimum Monin-Obukhov length;
    - Define the extents and resolution of the regular grid output in *localmodel.cfg*; and
- Option for extracting surface roughness length at the met. site from WRF regional model output and generic format netCDF meteorological data files.

Note that ADMS-Airport is an extension of ADMS-Urban and all mentions of ADMS-Urban in this document also apply to ADMS-Airport. This document contains details of the changes implemented since the previous version of MAQS (version 1.3, January 2024). Also contained in this document are instructions for installing MAQS and upgrading from previous model versions.

IMPORTANT NOTE FOR THE UPGRADE OF MODEL RUNS

Any input *.cfg* files set up under previous versions of MAQS need to be updated before they can be used in MAQS 1.4. Please create a new set of template *.cfg* files using the *make_def_inputs.sh* script or use the new feature to update existing files to the current version. Full details of how to upgrade these files are given in this document.

The format of ADMS-Urban input files (*.upl*) has been updated. In the ADMS-Urban 5.1 Windows interface, simply open the files you wish to convert into the current format and follow the instructions given on screen. Any additional input files (*.uai*) from previous versions also need to be updated. Full details of how to upgrade these files are given in the document What's New in ADMS-Urban 5.1.

In this release

This version of MAQS 1.4 includes updated scripts and utilities. The updated MAQS User Guide can be found in the Documentation directory of the MAQS 1.4 installation.

Installation

Full instructions for installing and configuring MAQS 1.4 are given in Section 2.2 of the MAQS User Guide. A copy of the User Guide can be found in the MAQS installation files in *.pdf* format.

Unzip *maqs_v1.4.0.zip* in the desired install location and set read, write and execute permission for this folder and its subdirectories. The ADMS-Urban model and MAQS utilities will be stored in the *model* and *utils* subdirectories respectively, and the worker scripts in *scripts*.

The MAQS licence file will be supplied separately by email. It needs to be copied to the MAQS <*install_path*>*/utils* directory with the filename *MAQS.lic*.

To use ADMS-Urban as the local model, an ADMS-Urban licence file must be copied to the MAQS <*install_path*>*/model* subdirectory with the filename *ADMS-Urban.lic*.

To use ADMS-Airport as the local model, an ADMS-Airport licence file must be copied to the MAQS <*install_path*>*/model* subdirectory with the filename *ADMS-Airport.lic*.

Upgrading your input files

Input configuration (*.cfg*) files

Any existing input configuration (*.cfg*) files must be updated so that they are in file version 1.4 format. To do this:

1. Run the *make_def_inputs.sh* script and use the `-i` argument to specify the directory containing the files to be upgraded.

   ```
   make_def_inputs.sh -i /home/user/inputs
   ```

   New files will be stored in the same directory as the script by default. Alternatively, specify the directory to output the new files. The script does not allow overwriting of existing *.cfg* files thus the specified directory must be a different location.

   ```
   make_def_inputs.sh -i /home/user/inputs -o /home/user/newinputs
   ```

2. Open the newly created *.cfg* files and confirm that the parameters and values set up in the original files were preserved. Note that additional comments outside the standard format will not be kept.
3. Reference the directory containing the new *.cfg* files in the MAQS run via *folders.cfg* or argument to the main *run-maqs* script.

New Features and Major changes

Local models

1. Compatibility with the recently released ADMS-Urban 5.1, allowing use of new features such as the generation of output grid points at a fixed distance from the edges of each road source. Refer to the What's New in ADMS-Urban 5.1 document for more details.
2. ADMS-Urban now includes an option to run in 'Verification' mode. A verification mode run carries out checks on all model input data, runs the met pre-processor, and produces a log file, but stops before concentrations are calculated. If the option to specify a static *.asp* file is in use, ADMS-Urban is run by MAQS in verification mode during the initial checking stage to provide a useful check of the modelling input data before carrying out the main model runs.
3. ADMS-Local is now deprecated but remains available for use as the local dispersion model.

MAQS Coupled System

4. The *make_def_inputs.sh* script has been changed to include an option to automatically update existing *.cfg* files from previous versions of MAQS into the current version while preserving the parameters and values set up in the original files.
5. The option to specify spatially varying site parameters using a text file can now be used with ADMS-Urban. In addition to the optional urban canopy flow parameters, this allows definition of site parameters such as latitude, surface roughness length and minimum Monin-Obukhov length for each grid cell by overwriting the values in the *.upl* file with those from the site properties data file. This option was previously only available with ADMS-Local.
6. The option to define the extents and resolution of the regular grid output can now be used with ADMS-Urban, allowing for quick adjustments if modelling multiple smaller regions with a single *.upl* file covering a large area. As an alternative to modifying the grid extents in the ADMS-Urban interface, users can now specify the grid using the regular grid output options in *localmodel.cfg* to overwrite the definition in the *.upl* file. This option was previously only available with ADMS-Local.
7. A new option exists to set the output locations of source-oriented grid points on both sides of road sources at a fixed distance from the road carriageway edge. This option makes use of new features introduced in ADMS-Urban 5.1 (refer to the What's New in ADMS-Urban 5.1 document for more details).
8. All components of MAQS have been built using modern compilers that use GNU C Library (glibc) version 2.36. Hence MAQS will no longer run on Linux distributions that implement older versions of glibc.
9. Surface roughness length at the met. site can now be extracted from WRF regional meteorological data files for use in ADMS-Urban. The surface roughness length can now also be included in 'Generic' format netCDF meteorological data files. The

variable should have the following characteristics (refer to Table 4.7 in the MAQS User Guide for equivalent information for other meteorological variables):

Variable	Long name attribute	Units attribute	Comment
ROUGHLEN_MET	Surface roughness length at met site	m	Optional

Minor Changes

MAQS Coupled System

1. A check is now carried out at the start of a MAQS run to prevent concurrent runs on the same working directory. If MAQS is currently running, any subsequent attempts will not continue until the current run has completed as the working directory must only be used by one MAQS run at a time.
2. The input variable for the minimum horizontal wind speed U at 10 m has been moved from *localmodel.cfg* to *options.cfg*.
3. The location of the executable binary for GNU Parallel required by the system in parallelisation can now be specified by users. In most Linux distributions, the */usr/bin* directory is the standard directory for executable programs while some packages allow configuration of the location of the binary during installation. This maintains use of GNU Parallel regardless of if it is installed in a non-standard location.
4. The file version global attribute for the 'Generic' format meteorological data file has been changed to 'ADMS_2DMF_v1.0'. Refer to Table 4.6 in the MAQS User Guide for information about other attributes included in the file format.

Utilities

5. A new option for setting a minimum value for boundary layer heights has been added to the system. All extracted values that fall below the minimum will be adjusted to this value.
6. The Processor utility now checks if the NO_2 value is greater than NO_x from its calculations and adjusts the NO_x value to be equal to NO_2. A warning message will be issued indicating on which timestep(s) it occurred.
7. The PostProcessor utility will now issue an error in interpolation mode if the run is set up to calculate the interpolation weights once and the storing of the calculated weights would lead to more than 90% usage of memory. Previously, runs would continue to use memory, which slowed the run down considerably until memory was completely exhausted and Linux terminated the run.