

OML

AN ATMOSPHERIC DISPERSION MODEL FOR REGULATION AND PLANNING



OML MULTI 6.0

OML-Multi is an atmospheric dispersion model, used to assess air pollution from sources such as stacks and area sources. It can be used at distances up to around 20 km from the sources. OML-Multi is a modern Gaussian plume model, based on boundary layer scaling instead of relying on Pasquill stability classification such as older models do. The OML model is maintained by Aarhus University (AU) in Denmark. The model was originally developed by the National Environmental Research Institute (NERI), which in 2007 became part of Aarhus University.

The OML model is frequently applied for regulatory purposes. Thus, it is the recommended model to be used for environmental impact assessments when new industrial sources are planned in Denmark. The model is used to demonstrate that planned facilities comply with the Danish Guidelines for Air Emission Regulation. Furthermore, the model is used in the context of the regulations concerning Danish approvals for livestock holdings.

The model is not restricted to use in Denmark. Besides studies on compliance, the model can be used for environmental assessments where air pollution has to be mapped for an entire area.

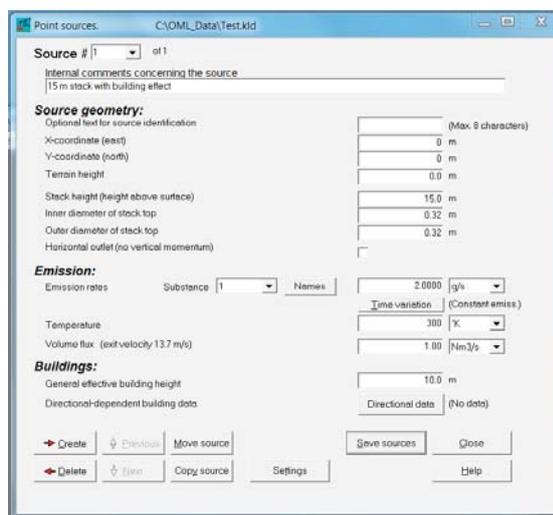
OML-MULTI 6.0

MAIN FEATURES

- OML-Multi requires information on emission and meteorology on an hourly basis. Often, emission is assumed constant in time. The model computes a time series of concentrations at user-specified receptor points, from which statistics are extracted and presented to the user.
- The model can be used for both high and low sources in flat or moderately sloping terrain.
- OML-Multi performs computations for arbitrarily placed sources and receptors. The model can handle up to 3000 sources.
- Most often, the receptors are placed in a set of concentric rings or in a rectangular grid. A concentric net of receptors can have up to 15 rings (540 receptors). A rectangular grid has a maximum of 1681 (41 x 41) receptors (this is suitable for a subsequent graphical presentation). It is also possible to use specially constructed receptor grids.
- OML-Multi can handle emissions of a maximum of 3 substances within the same calculation.
- OML-Multi handles area sources, meaning sources whose emission can be considered evenly distributed within a rectangle of arbitrary dimensions and orientation.
- Mapping: The model can be used to map air pollution over greater domains such as cities, so air quality can be compared to EU requirements.
- Meteorology: Before being used by the model, meteorological measurements must be processed by a pre-processor. For use in Denmark, processed meteorological data are available off-the-shelf for many locations. Users outside of Denmark will normally need a pre-processed meteorological data set representing local conditions. If no off-the-shelf data are available, a processed data set can be generated, based on hourly meteorological measurements from a synoptic surface station and on twice-daily vertical profiles of temperature from a nearby radiosonde station. The pre-processing of meteorological data is a rather specialised task, which may require expert assistance, but once the met data are in place, using the model is straightforward. As an alternative to the pre-processing just described, a meteorological model such as MM5 can be used to create the necessary data, or data originally prepared for other dispersion models can be converted to OML format. Such data generation or conversion software is not part of OML-Multi. You may enquire about current possibilities.
- As a new feature in OML-Multi version 6.0 it is possible to perform calculations for a 10 year time series of meteorological data. This is of particular interest in the context of the Danish regulations concerning approvals for livestock holdings.
- As another new feature in OML-Multi version 6.0 a relatively simple method for deposition estimates has been implemented. The method applies to deposition of particles and gases on a local scale.
- A menu system guides the user through the process of preparing

data for standard calculations. Computations are organised in projects, so the user can conveniently manage the files he uses for a certain set of calculations.

- There is an extensive system of help text available within the programme.



The OML model is maintained by Aarhus University (AU) in Denmark. The model was originally developed by the National Environmental Research Institute (NERI), which in 2007 became part of Aarhus University.

STACK HEIGHT DETERMINATION

OML-Multi can be used as a tool to determine stack heights for a planned facility. This is done by documenting that the resulting concentration contribution is in compliance with regulations. In Denmark, this procedure is established in the Danish Guidelines for Air Emission Regulation.

In Denmark the OML-model is used not only for industrial sources, but also in the context of regulations for odour concerning approvals for livestock holdings. Since August 2014 it is required that in the context of approvals for livestock holdings concentration calculations should be based on ten years' worth of meteorological data. OML-Multi 6.0 makes it possible to fulfil this requirement.

USING THE PROGRAMME

Organisation within projects

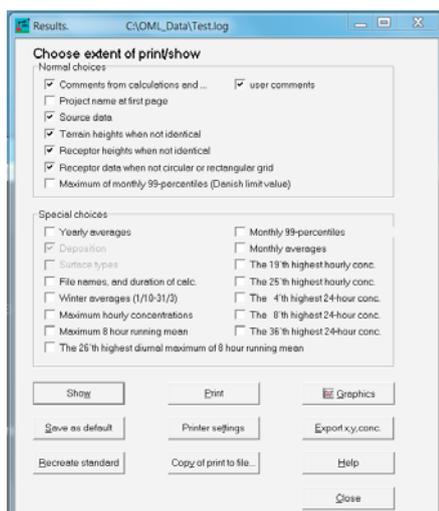
The feature with organisation of files within projects makes it easy to conduct new sets of computations based on previous sets.

User comments

When setting up calculations users can provide general comments that are shown among the results. However, a user can also provide comments for internal use only. This latter possibility is associated with each source.

Flexible output

The user can choose among a wide range of statistical parameters when designing the printed output. Most of the statistical parameters are related to various EU limit values. The output can include a range of parameters based on 8-hourly moving averages, on hourly averages, or on daily averages. This flexibility is useful when model results are compared to EU limit values for SO₂, NO_x, NO₂, O₃, CO, particulate matter and other substances.

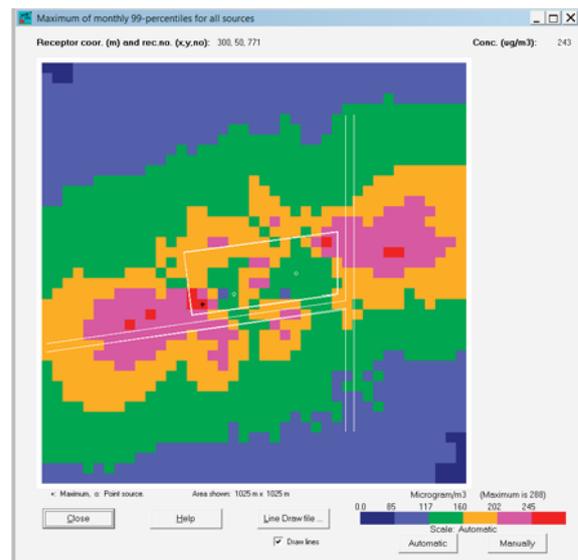


Graphics

The result of model computations can be presented graphically. If the user requires a more sophisticated graphical presentation than OML-Multi itself allows, he can easily export the results of calculation to a file, which can subsequently be used by a GIS program or another third-party graphics software package.

Importing source data

Source data can be imported from external files in CSV format. Such files can be generated from Excel.



SPECIAL ANALYSES

Area sources

OML-Multi allows a user to define area sources. This possibility can be useful, e.g. if you deal with emissions from the surface of a basin or from many small sources.

Deposition estimates

In OML-Multi version 6.0 a relatively simple method for deposition estimates has been implemented. The method applies to deposition of particles and gases on a local scale. The method has been developed for use in relation to Environmental Impact Assessments of large projects in respect to their impact on terrestrial and aquatic ecosystems.

Time variation for point sources

For each point source it is possible to prescribe a time variation, of the emission strength through weighting factors for month (12 factors), day of week (7), and hour (24). Alternatively, the user can supply emission data given directly as a time series.

Time variation for area sources

For area sources, a time variation can be prescribed through five user-defined profiles for time variation each with its own set of weighting factors for month, weekday and hour.

Background concentrations and chemical reactions

It is possible to account for measured background concentrations of NO_x, NO₂ and ozone, and to account for chemical reactions among these substances. This is of particular interest when performing calculations over entire urban areas. The model can also handle background concentrations for other substances.

Dumping data

It is possible to dump computed concentrations for every hour in receptors of the user's choice. This can be useful if you wish to study an event in detail.

NEW IN OML-MULTI VERSION 6

- **10 year time series of meteorological data.** OML-Multi 6.0 provides the possibility to perform calculations for a 10 year time series of meteorological data. This is of particular interest in the context of the Danish regulations concerning approvals for livestock holdings.
- **Deposition estimation.** In OML-Multi version 6.0 a relatively simple method for deposition estimates is implemented. The method applies to deposition of particles and gases on a local scale. The method has been developed for use in relation to Environmental Impact Assessments of large projects in respect to their impact on terrestrial and aquatic ecosystems.
- **New system for help text.** Previous OML versions used the help text format WinHelp by Microsoft. However, new Windows operating systems do not include support for this format, so the help system has been changed to the format Microsoft Compiled HTML Help (.chm files).
- **Center of gravity for emissions.** It can often be convenient to position the coordinate system, so it is centred at the centre of gravity for emissions. In order to help the user in relocating the coordinate system the centre of gravity is automatically calculated and shown in the receptor menu.
- **Long area sources.** In previous versions of OML-Multi the largest permitted ratio between side lengths was 1:10. Now, this restriction has effectively been removed.
- **Graphical display of results.** There are some minor improvements compared to previously. The intervals for colouring concentration levels can be defined by the user and can be saved for later use. When pointing with the mouse at a receptor in a circular grid the distance and direction from the center is displayed.

SYSTEM REQUIREMENTS FOR OML-MULTI 6.0

- OML-Multi works with all Windows versions (from Windows 95 to Windows 8.1)
- 30 MB free disk space is required.
- Your PC should have a DVD drive for installation (or you may copy the content of the DVD to a USB key on another computer and use the USB key for installation)
- When installing the software administrator privileges are required. The program can be installed so that it is accessible for a single users or for all users of the machine.

Price

The price for OML-Multi is 2550 Euro (excluding VAT; price as of July 2014). A special rate applies to educational institutions.

Licensing conditions

The licensing conditions for OML-Multi give the licensee the right to use any number of copies of the program on any number of PC's, as long as they are physically present at the address of registration. Also included by the license are portable and home computers for employees working at the specified address. Note that a company having branches at several physical locations is required to have separate licenses for each branch where the program is applied.

OML-MULTI WEB SITE

The web site www.au.dk/oiml-international provides additional information on the programme.

From the web site you are able to download the entire help text of the programme, which will give you a good impression of the capabilities of the programme.

ORDERING OML-MULTI

The OML model can be ordered from:

DCE – Danish Centre for Environment and Energy
Aarhus University
P.O. Box 358
DK-4000 Roskilde
Denmark
Att. Per Løfstrøm
E-mail: pl@envs.au.dk

A time-limited demonstration version is available upon request.