CERC — ADMS 5 & ADMS-Screen News — Summer 2018

Contents

News

ADMS 5 User Group Meeting

The 2018 ADMS 5 User Group Meeting will be held in Edinburgh on 7th November. Come along for an engaging day of talks from CERC staff and software users and hear the latest news and advice about modelling using ADMS 5. This year, speakers include Ruth Fain from Golder, Simon Coldrick from HSE and Steve Smith from AS Modelling and Data.

Users with current support are entitled to one or more delegate places free of charge, depending on the type of licence held.

Please book your place via our website. Registration will remain open until 29th October 2018.

ADMS 5 developments

The next update to ADMS 5 will be released in 2019. The new features will focus on usability aspects of the model and will include:

➢ The ability to open multiple copies of the ADMS 5 interface at the same time, allowing you to compare two or more .apl files side by side

➢ An option to output the per source concentration at an output point together with a viewing mode in the ADMS Mapper allowing for easy visualisation of this output

➢ The ability to specify different diurnal profiles for each pollutant in the .fac file, rather than having to use a .var file

➢ The ability to easily import data from ADMS-Urban or ADMS-Roads by opening UPL files

ADMS NO_x chemistry scheme evaluation

A journal article by CERC authors describes the evaluation of the standard ADMS NO_x chemistry scheme when implemented in AERMOD. The chemistry scheme, ADMSM, performs well when compared to measurements from five validation studies and with other chemistry schemes accessible from AERMOD.

This work is cited in the recent US EPA 'White Paper on Planned Updates to AERMOD Modeling System' and is being further evaluated as an alternative model for Tier 3 NO_2 modelling in AERMOD.

The code development work carried out by CERC was funded by the American Petroleum Institute.
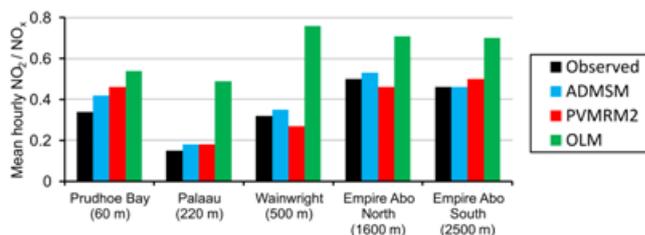
The figure shows the mean hourly NO_2/NO_x ratio, averaged over each study period

ADMS-Urban, ADMS-Roads & ADMS-Airport 4.1.1 with Emissions Factors Toolkit 8

The latest release of ADMS-Urban, ADMS-Roads and ADMS-Airport contains emission factors from Defra's latest Emissions Factors Toolkit (EFT 8) in addition to a range of usability upgrades, such as the ability to open multiple copies of the interface simultaneously.

The updated release is available from the User Area for users with current support.

## EMIT patch with Emissions Factors Toolkit 8

EMIT is our software tool for compiling and editing emissions inventories, including quantifying contributions from individual vehicle types, such as older diesel cars, to emissions (and concentrations, when used with ADMS-Urban or ADMS-Roads). An EMIT patch is now available with emission factors from Defra's latest Emissions Factors Toolkit (EFT 8). Further details and the patch itself can be downloaded from the User Area.

Upcoming release of ADMS-Urban, ADMS-Roads and ADMS-Airport 5: new features

The next release of ADMS-Urban, ADMS-Roads and ADMS-Airport, version 5, is coming early next year. With this new version you will be able to:

➢ Output the per source concentration at an output point, along with a new facility in the ADMS Mapper to allow this data to be visualised

➢ Specify separate profiles for each pollutant in time-varying emission factor files

➢ Specify traffic counts for road sources that have user-defined emissions for more accurate traffic-induced turbulence

➢ Specify across-road distances for intelligent grid points, including taking into account the widths of advanced canyons

➢ Improved road source geometry to reduce gaps and overlaps at corners

➢ Easily import data from ADMS 5 by opening APL files

➢ Increase the scope of your modelling by including more outputs, more emissions and more pollutants in each run

Please ensure that you receive the latest versions of ADMS models as soon as they are released by keeping your support contract up-to-date.
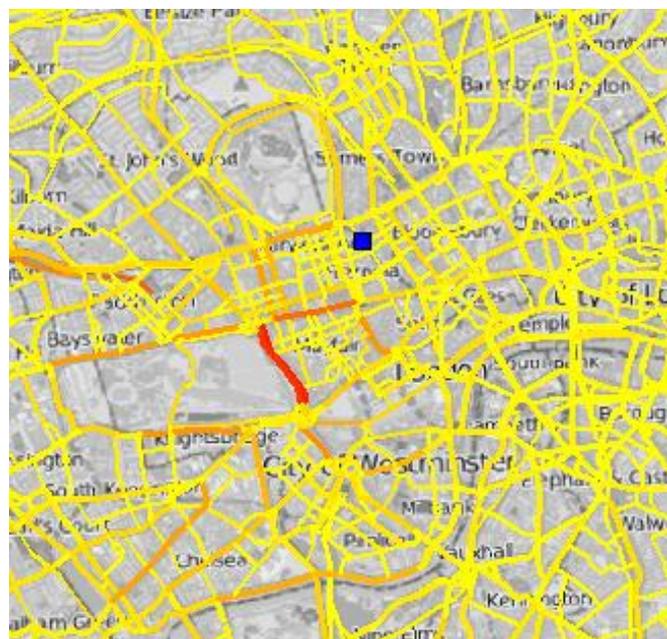
The figure shows the contribution to concentration from each road source at the output point (blue square).

'Hyper-local' air mapping in London with smart sensors and Google Street View cars

Sadiq Khan, the Mayor of London, and C40, a network of cities committed to 'bold action' on climate change, have launched a cutting-edge new project to better understand Londoners' exposure to air pollution around the city. Sensors measuring harmful pollution in tens of thousands of locations will be combined with air quality modelling to produce hyper-local air quality mapping.

This summer, new fixed and mobile sensors will be rolled out across London's streets. 100 fixed AQMesh sensors will be fitted to lampposts and buildings in the worst affected areas and sensitive locations, and two dedicated Google Street View cars will be driving across the city, mapping air pollution at an unprecedented level of detail. CERC's ADMS-Urban model will be used together with the sensor data to generate hyper-local air quality mapping for both nowcasts and forecasts, and for policy studies.

The project will be run by a team of air quality experts led by the charity Environmental Defense Fund Europe, in partnership with CERC, Air Monitors, Google Earth Outreach, University of Cambridge, National Physical Laboratory, and the Environmental Defense Fund team in the United States.

Modelling Tips and Issues

Deposition parameters for pollutants

When modelling dry or wet deposition, it is necessary to input additional parameters in the palette of pollutants. For dry deposition, these parameters depend on the nature of the pollutant. For gaseous pollutants, either the deposition velocity or the nature of the gas is required. For particulate pollutants, either the deposition and terminal velocities or the size and density of the particles must be input. For wet deposition, parameters relating to the washout coefficient are required. When modelling deposition, it is important to check these parameters for each pollutant being modelled, as the default values are unlikely to be appropriate. Suggested values for some common pollutants are given in the ADMS 5 User Guide (Section 4.2.5 for dry deposition and Section 4.3.6 for wet deposition).

Wet deposition and volume sources issue

Wet deposition flux may be incorrectly calculated for volume sources due to a model issue. An updated model executable (ADMS 5.2.4), which addresses this issue, is available to download from the User Area.

Spatially varying roughness

The complex terrain spatially varying roughness option can be used to represent the effect on dispersion of varying land use around a site. For example, an inland body of water would have a small roughness length but a neighbouring urban, industrial or forested area could have a large roughness length. Changes in roughness length should be limited to an order of magnitude in the file. Please refer to the Complex terrain sections of the ADMS 5 User Guide (Sections 4.10 and 9.17) for more details.

User input 3D flowfields

If 3D flow field data are available for a modelling site, either from CFD or wind tunnel modelling, they can be input to ADMS 5 using the User-input 3D flow field data option, described in Section 4.11 of the ADMS 5 User Guide. Each meteorological condition must be modelled using a separate flow field file, containing grid point coordinates (X, Y, Z), three wind speed components (U, V, W) and either turbulent kinetic energy (TKE) or three components of turbulence velocity (SigU, SigV, SigW).

Import and Export in ADMS models

The ADMS models all include 'Import' and 'Export' tools, accessible from the File menu. These powerful tools give you great flexibility: you can prepare sources, emissions, buildings, group membership and pollutant data in your preferred data editor (e.g. Excel) and then 'Import' these data into the model; you can export data, carry out changes and re-import the data for further modelling; you can also move data easily between ADMS models using these tools. EMIT can also export data in this format. The model User Guides give full instructions on how to use the import/export tools (Section 5 of the ADMS 5 User Guide).

Making the most of the ADMS Mapper: Helpdesk note

The ADMS Mapper can be used to visualise your model input, alongside any project data you may have in other file formats, such as shape or AutoCAD files. These can easily be overlaid on a background map, which is very useful for correcting source and receptor locations, checking input emissions and viewing output concentrations. A new helpdesk note is available that describes how to make the most of the renderer to query data in the Mapper. For example, you can colour sources by type or name, in order to find particular sources.

Helpdesk notes on carrying out many common model tasks are available to download from the User Area by those who have up-to-date support.
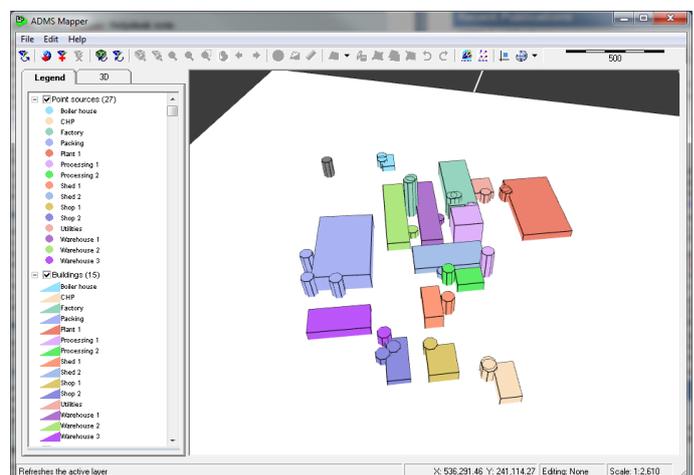
Recent Publications

ADMS 5 publications

Price C, Tickle G, Attree M, Lad C and Carruthers D, 2017: *High Level Review of the Sensitivity of Dispersion Model Predictions to Individual Source Term*. Atmospheric Dispersion Modelling Liaison Committee, ADMLC/2016/1 Report. Article online

Smith S, Stocker J, Seaton M and Carruthers D, 2017: *Model inter-comparison and validation of ADMS plume chemistry schemes*. International Journal of Environment and Pollution, vol.62, no.2/3/4, pp. 395-406. Article online

Stocker J, Ellis A, Smith S, Carruthers D, Venkatram A, Dale W and Attree M, 2017: *A review of dispersion modelling of agricultural emissions with non-point sources*. International Journal of Environment and Pollution, vol.62, no.2/3/4, pp. 247-263. Article online

Other model publications

Carruthers DJ, Stidworthy AL, Clarke D, Dicks KJ, Jones RL, Leslie I, Popoola OAM, Billingsley A and Seaton M, 2017: *Using Sensor Data and Inversion Techniques to systematically reduce Dispersion Model Error*. 18th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, Bologna, Italy, October 2017. Article online

Hood CM, Stocker JR, Carruthers DJ, Grayson W, Handley J, Fung J and Yeung D, 2017: *Integrating regional and local modeling to create a high-resolution air quality forecasting system for Hong Kong*.16th Annual CMAS Conference, Chapel Hill, NC October 2017. Article online

Monteiro A, Durka P, Flandorfer C, Georgieva E, Guerreiro C, Kushta J, Malherbe L, Maiheu B, Miranda AI, Santos G, Stocker J, Trimpeneers E, Tognet F, Stortini M, Wesseling J, Janssen S and Thunis P, 2018: *Strengths and weaknesses of the FAIRMODE benchmarking methodology for the evaluation of air quality models*. Air Quality, Atmosphere and Health, pp. 1-11. Article online

Stidworthy A, Jackson M, Johnson K, Carruthers D and Stocker J, 2017: *Evaluation of Local and Regional Air Quality Forecasts for London*. 18th International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, Bologna, Italy, October 2017. Article online

Valencia A, Venkatram A, Heist D, Carruthers D and Arunachalam S, 2018: *Development and evaluation of the R-LINE model algorithms to account for chemical transformation in the near-road environment*. Transportation Research Part D: Transport and Environment, vol. 59, pp. 464-477. Article online

A comprehensive list of all our publications may be found on the publications section of our website.

Training Information

Discount on CERC training courses

A 20% discount applies to scheduled CERC training courses, if purchased at the same time as a software annual licence or support renewal. This discount also applies to one-day refresher courses. Training must be booked within 12 months of purchase.

Upcoming training courses

Our training courses focus on giving users the knowledge and expertise to efficiently apply CERC software to real-life air quality problems. CERC holds regular 2-day courses at its Cambridge offices. The table shows dates for 2018.

Course	Oct
ADMS 5	9 - 10

Courses may also be arranged at alternative locations and/or dates and can be customised to particular user requirements. For more information, visit www.cerc.co.uk/training or contact CERC.

Products and Services

CERC has been developing world-leading air dispersion and complex flow modelling solutions since 1985. Our consultancy team was established to apply our expertise to a wide variety of applications for a diverse client base.

Other software solutions

ADMS-Roads and Roads-Extra
Local scale air quality modelling including road and industrial sources

ADMS-Urban
Urban scale modelling including roads, industrial and diffuse sources

ADMS-Airport
Urban scale modelling with detailed treatment of aircraft emissions

GASTAR
Modelling emergency releases of dense gases

FLOWSTAR-Energy
Modelling wind energy and airflow at high spatial resolution for wind farm planning and other airflow-related applications

ADMS-STAR
Short-term accidental release modelling

For custom-made software solutions, visit www.cerc.co.uk/research or contact CERC.

Consultancy services

Our consultancy services include:

- Air quality assessments, e.g. odours, LAQM, planning and permitting
- Specialised modelling, e.g. dioxins, accidental releases, wind energy
- Compilation of emissions inventories and forecasting for large urban areas
- Project support and review services
- Research with complex atmospheric flows and air quality

For more details, visit www.cerc.co.uk/consultancy or contact CERC.

Contacting the helpdesk

The CERC helpdesk is available to provide model support. Contact us:

- From the ADMS 5 interface, select Help, Email CERC
- Email help@cerc.co.uk
- Phone +44 (0)1223 357773