

# Technical Specification

## Sources

ADMS 4 calculates the dispersion of pollutants from up to 300 sources. Source types include point, line, area, volume and jet. It models continuous, instantaneous and time-varying releases.

## Boundary Layer Structure and Dispersion

ADMS 4 includes a fully-integrated meteorological pre-processor. ADMS 4 is based on current understanding of the structure of the atmospheric boundary layer, using the boundary layer height and Monin-Obukhov length to characterize the stability of the atmosphere. Advanced algorithms allow for height-dependence of wind speed, turbulence and stability and their impact on dispersion.

## Features

Allowance for calm conditions, NO<sub>x</sub>-ozone chemistry, fires and flares, wet and dry deposition, condensed plume visibility, radioactive decay and gamma dose including gamma dose due to deposits, puffs, Use of hourly background concentrations in calculating total concentration.

## Development

ADMS 4 is the latest version of the ADMS model that was first released in 1993. The model is continuously developed to incorporate the latest scientific thinking, to build on new understandings arising from measurements and to provide new user features.

## Validation

ADMS 4 has been validated against 20 data sets that include field experiments as well as wind and water tunnel experiments. The 20 datasets cover flat terrain, buildings, hills, and buildings with hills scenarios. The model predictions and monitored data have been compared using a variety of measures. The full set of validation documents are available on the CERC web site.

## Complex Effects

**Hills**  
ADMS 4 calculates the effects on the mean flow and turbulence and, hence, on dispersion, of changes in terrain elevation and surface roughness using CERC's FLOWSTAR model. In very stable conditions the 2-dimensional flow below a dividing stream-surface is modelled.

## Buildings

The ADMS buildings module calculates the impact of buildings on flow and dispersion. Up to 25 buildings including those of circular cross-section can be accounted for.

## Coastline

The ADMS 4 coastline module allows for the influence of the growing thermal boundary layer at coasts on dispersion from onshore, coastal sources.

## Offshore Sources

Dispersion from offshore sources can be modelled in ADMS 4 using the marine boundary layer option whereby the effective surface roughness and heat flux over the sea are calculated by the model.

## Fluctuations

ADMS 4 models the effect of short time-scale atmospheric dispersion on concentrations. Output is the probability that certain concentrations are exceeded, percentiles of short term concentrations and the number of exceedences of thresholds taking into account fluctuations.

## Wet Deposition of SO<sub>2</sub> and HCl

A "falling drop" method that takes account of drop kinetics and chemistry is used to calculate the wet deposition of SO<sub>2</sub> and HCl.

## Technical Specification

A full Technical Specification is available from the CERC web site.

## Output

Users can calculate short term output such as hourly, 8-hourly or daily time series as well as long term averages such as annual averages, percentiles and the number of exceedences of thresholds for a number of pollutants. The flexibility of the output in terms of averaging time, rolling or non-rolling averages, specification of the thresholds and percentiles allows direct comparison with air quality limits and objectives including those of the EU and WHO.

## Visualisation

The ADMS Mapper, which is part of ADMS 4, enables users to visualise model set up, and to create and edit sources, receptors and buildings. Users with Surfer or ArcGIS Spatial Analyst can plot contours in the ADMS Mapper. Model set up and output can be displayed against a background image in a variety of formats including map tiles, ArcGIS shape files, MapInfo files and AutoCAD dxf files.

ADMS 4 has automatic links with ArcGIS and MapInfo for creating and visualising model input and output.

## System Requirements

ADMS 4 will run in Windows Vista, Windows XP & Windows 2000 environments. The minimum memory specification is 256 MB of RAM and 1 GB of hard disk space.

It is recommended that the highest specification machine available should be used for running simulations. Higher processor speeds and larger amounts of RAM will reduce run times.

## Use of ADMS

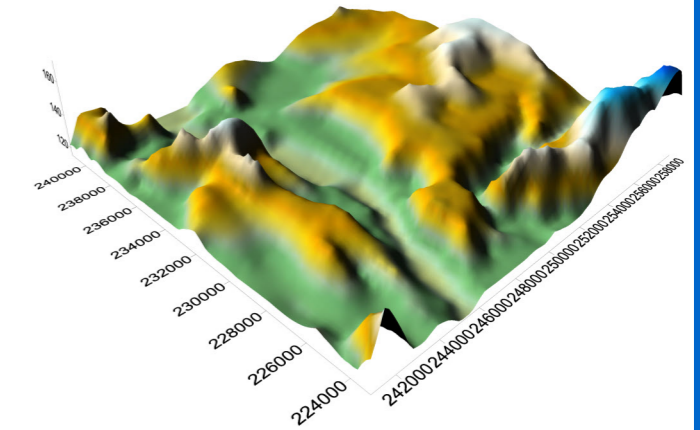
ADMS is used across the world in air quality studies and in permit applications and environmental impact assessments that are submitted to national regulators. Model interfaces are also available in French, Chinese and other languages.

# ADMS 4

## Atmospheric Dispersion Modelling System

**ADMS 4 is a practical application of state of the art science.**

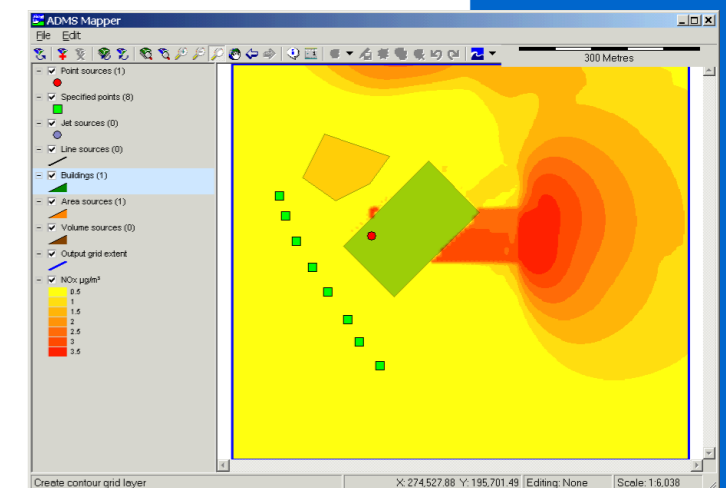
- **IPPC and other permit applications**
- **Environmental Impact Assessment**
- **Odour prediction**
- **Risk assessment and emergency planning**
- **Planning applications**



**ADMS 4 models the effect of hills and spatially varying surface roughness on flow, turbulence and dispersion.**

## ADMS Mapper

The integrated ADMS Mapper lets you visualise model set up and output. The Mapper enables you to create and edit sources, receptors and buildings using the editing tools. Users of Surfer or ArcGIS Spatial Analyst can display contours of output. You can load a background image from a range of formats.



**The ADMS Mapper displaying sources, a building and receptors.**

**Cambridge Environmental Research Consultants**

tel: +44 (0) 1223 357773 email: enquiries@cerc.co.uk

**www.cerc.co.uk**

**CERC**  
Environmental  
Software

## User support

Users with a support contract receive technical support from the ADMS helpdesk that is available by phone, email, fax or post, providing a response within 24 hours. You will also receive model maintenance upgrades, a free invitation to the annual User Group Meeting, bi-annual newsletters and access to the password-protected user area of the CERC web site. The user area contains model news, knowledge base articles and downloads.



**A CERC training session held in South Africa.**

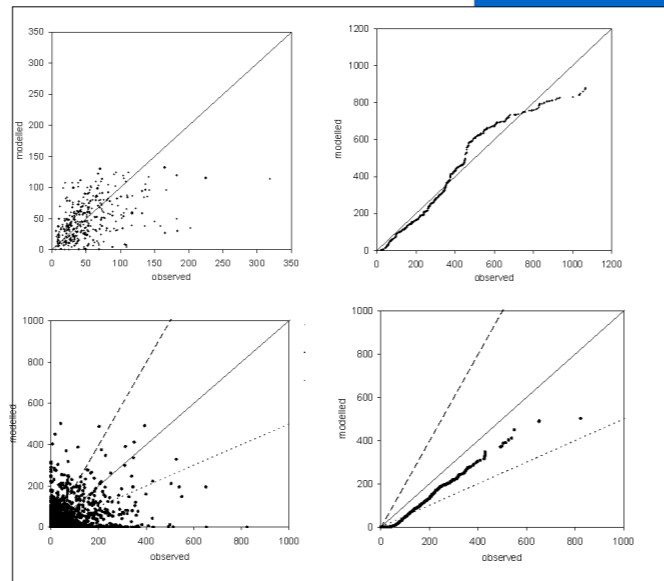
## Training

CERC staff have delivered training in ADMS across the world to audiences large and small. Scheduled training courses take place throughout the year at CERC's offices in Cambridge. Dates and costs can be found on our web site. Customised training and courses held at the clients own premises available by arrangement.

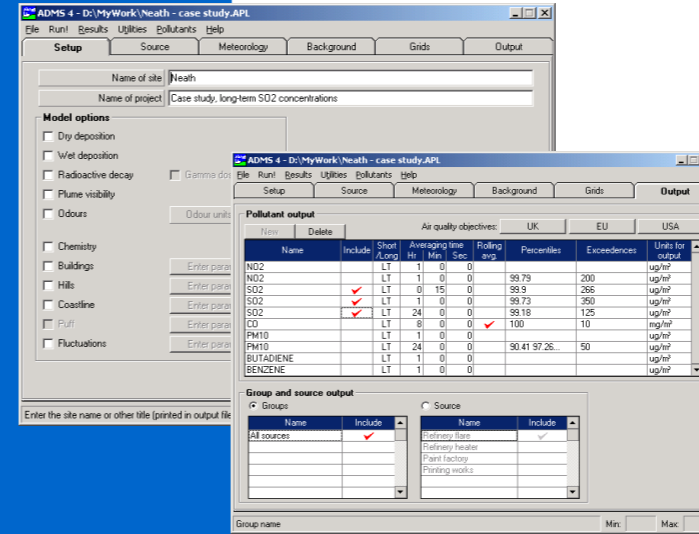
## Validation

ADMS 4 has been extensively validated using available data from field trials and wind tunnel measurements. The validation documents are published on the CERC web site.

CERC are experts in model assessment and validation having led an EU project to compare models and participating in the series of Harmonisation Workshops [www.harmono.org](http://www.harmono.org)



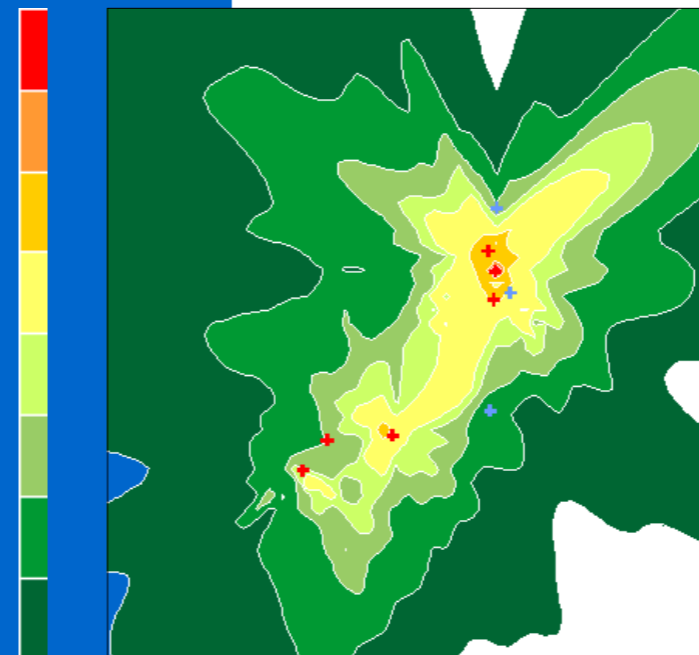
**Results of validation exercises are analysed using a variety of measures.**



**The ADMS 4 Setup screen (top) and the Output screen (bottom).**

## Model features

- ✓ Integrated meteorological pre-processor
- ✓ Automatic links to Surfer, ArcGIS and MapInfo
- ✓ Calculation of averages, percentiles and number of exceedences
- ✓ The FLOWSTAR hills model calculates flow and turbulence due to the terrain
- ✓ Modelling the effect of up to 25 buildings including circular cross-section buildings
- ✓ Utilities include those to plot a wind rose, create a batch file for multiple runs, plot diagnostics and run a set-up verification step



**Typical model output that can be displayed in Surfer, ArcGIS, MapInfo or the ADMS Mapper.**

## Advanced features

- ✓ Chemistry model for NO<sub>2</sub>, NO and ozone
- ✓ Wet deposition of SO<sub>2</sub> and HCl models falling drop kinetics and chemistry
- ✓ Short time scale fluctuations due to atmospheric turbulence
- ✓ Visibility of plumes due to condensed water
- ✓ Calculation of odours in ou or ou<sub>e</sub>
- ✓ Offshore releases
- ✓ Growth of an internal boundary layer at a coastline
- ✓ Instantaneous and finite duration puff model