ADMS
Atmospheric Dispersion Modelling System

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ADMS

- **Development commissioned in 1988 following a CERC report to regulatory authorities in the UK**
- **The CERC report highlighted the advantages of the use of surface/boundary layer scaling over Pasquill Gifford stability categories. Recommendations consistent with AMS / EPA meeting, Florida 1984**

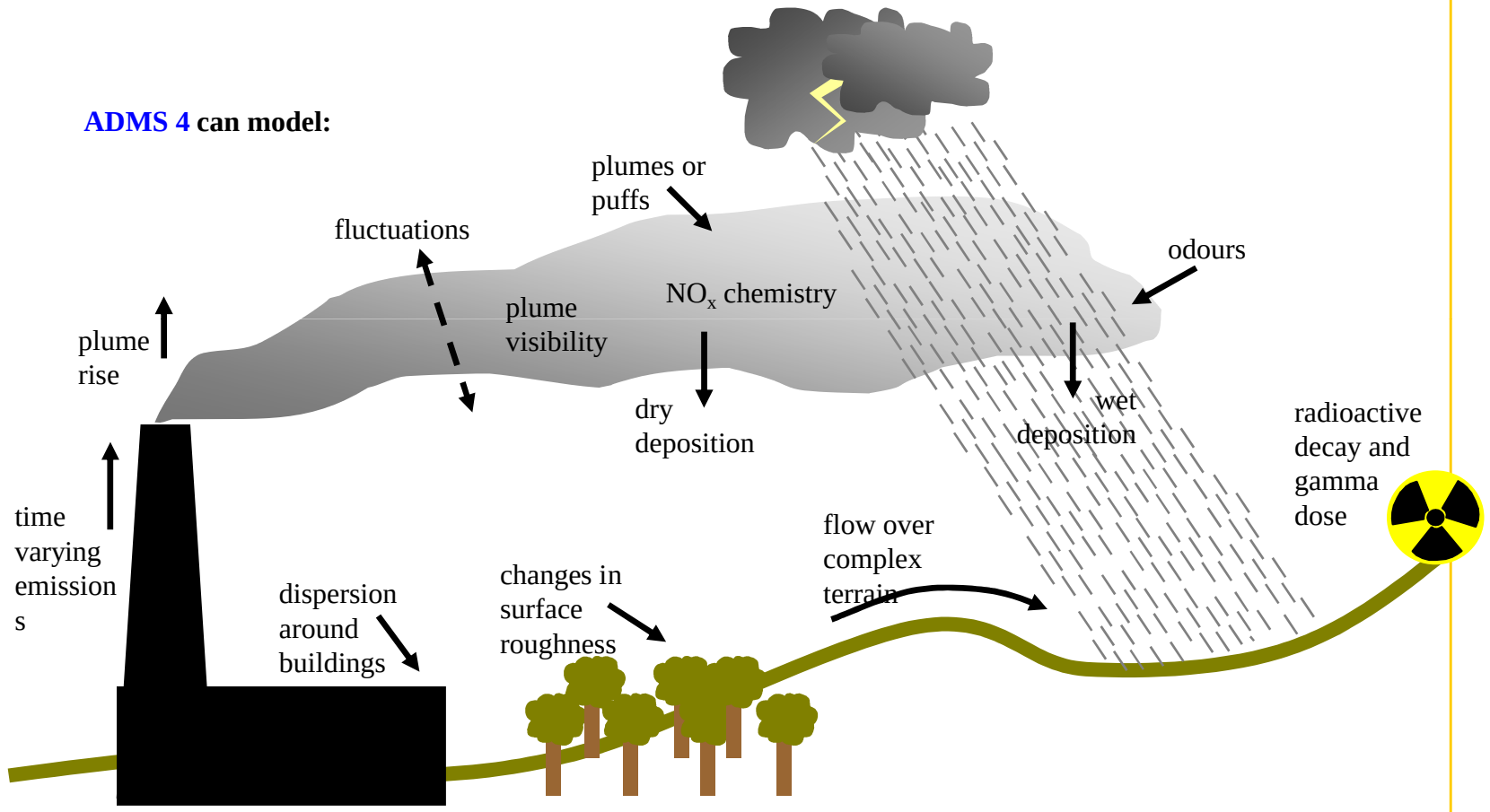
ADMS

- **Sponsors include UK's Environment Agency, UK Health and Safety Executive, nuclear industry, major power and chemical companies**
- **Development by:**
  - **CERC (including Prof. Julian Hunt, Dr. David Carruthers, Dr. Christine McHugh, Dr. Rex Britter)**
  - **Power Companies, then University of Surrey (Prof. Alan Robins)**
  - **UK Meteorological Office (Dr. David Thomson)**

ADMS

- **ADMS is the leading European Short Range Air Dispersion Model and is used extensively in the UK and across Europe, Far East (including China) etc**
- **ADMS has featured in all 12 European Workshops on Harmonisation of Dispersion Models (1991-present). The 12th is taking place in Croatia this week.**
- **It was proposed to US-EPA. Proprietory issues? Now listed as alternative model by US-EPA.**

Key Features of ADMS



Key Features of ADMS

- **PC-based, with user friendly interface and graphical output**
- **Continuous or discrete releases**
- **Point, line, area, volume & jet sources**
- **Skewed-Gaussian model using local boundary layer variables**
- **Meteorological preprocessor**
- **Integral plume rise model**

Key Features of ADMS

- **Building effects**
- **Complex terrain**
- **Wet and dry deposition**
- **Chemical transformation**
- **Radioactive decay and γ-dose**
- **Jets and directional releases**
- **Concentration fluctuations module**
- **Coastline**
- **Condensed plume visibility module**

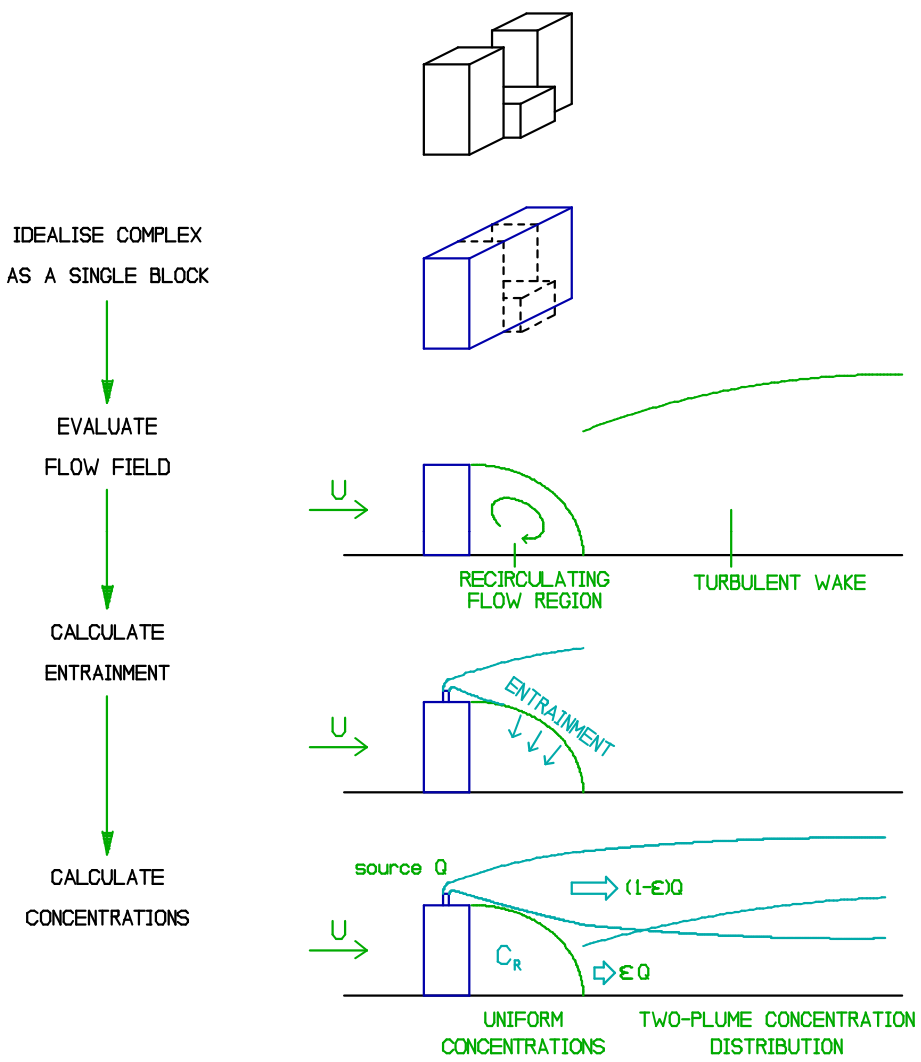
Regulatory Applications

- **Multiple buoyant or passive industrial emissions**
- **Surface, near surface or elevated releases**
- **Urban or rural areas**
- **Short (seconds) to long (annual) term averaging times**

ADMS Evaluation

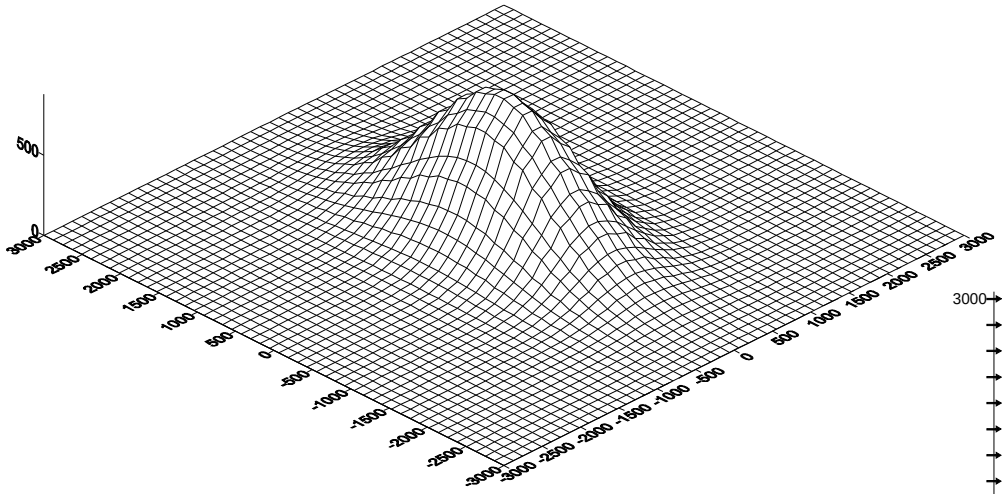
- Model comparison with field and wind tunnel experiments, numerical models; mainly datasets from USA.
- Environment Agency test cases
- Comparisons with other Gaussian type models eg AERMOD
- All upgrades compared with previous versions

Modelling Building Effects

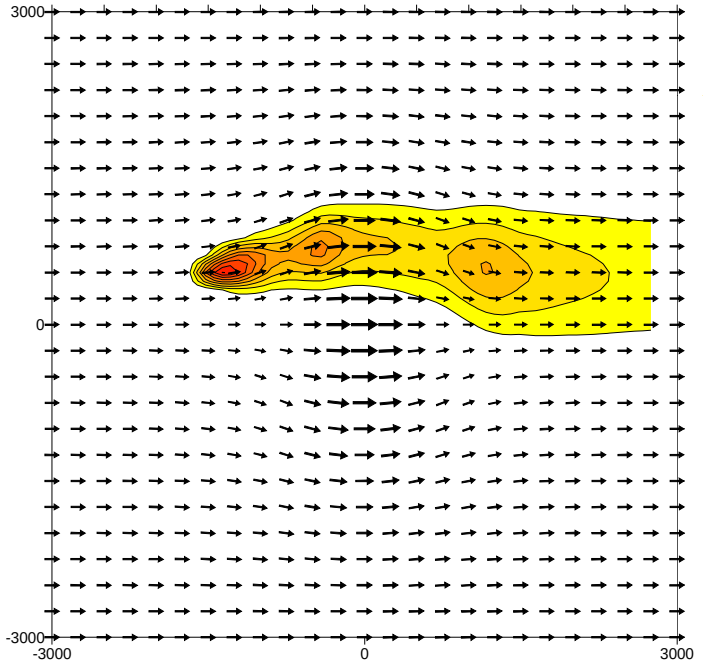


- **Two plume model**
- **Based on modelled flow field**

ADMS Complex Terrain Effects

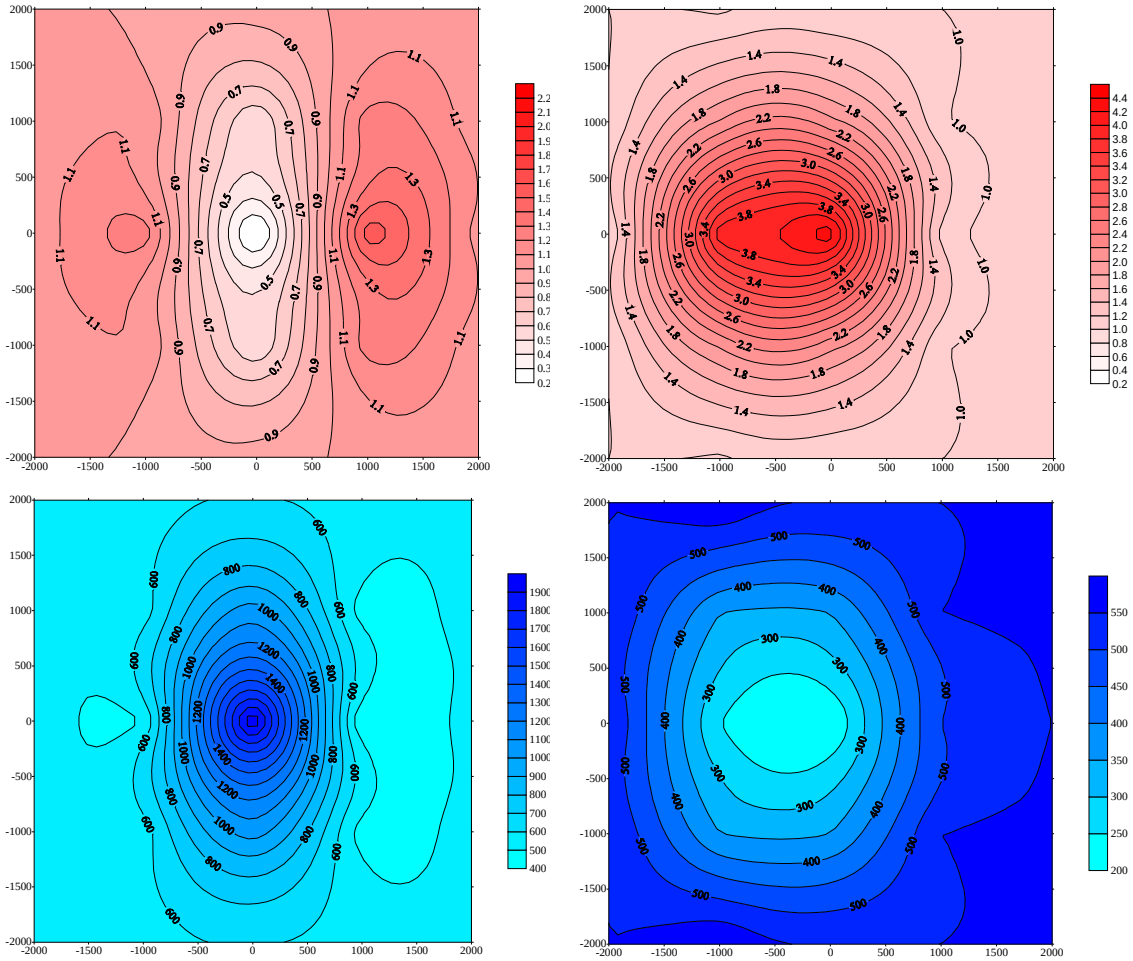


Above: View of idealised hill



Right: 80m flow field and ground level concentration from an 80m stack. Slightly stable flow.

ADMS and AERMOD Comparison: Terrain amplification factors



Lfet: ADMS Cmax
Right: AERMOD Cmax

Ratio of complex terrain to flat terrain as function of stack location

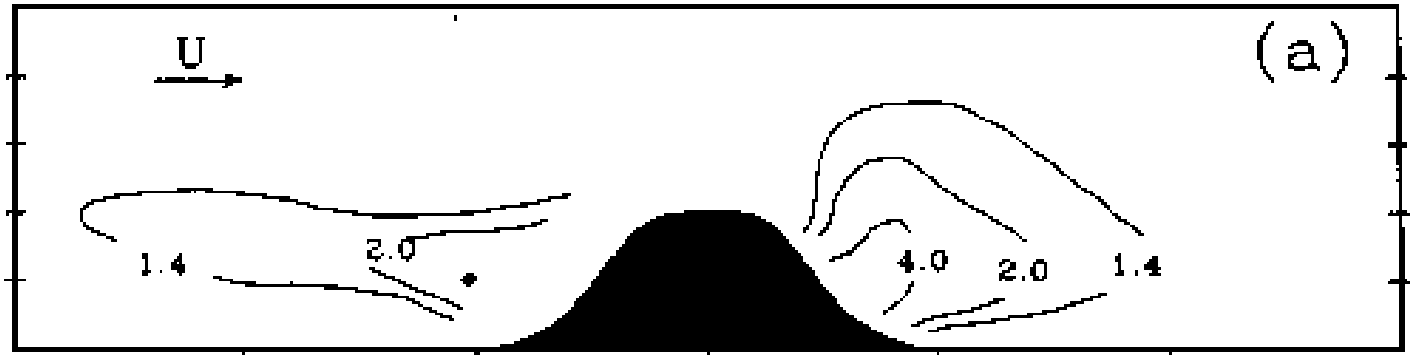
- **Neutral conditions**
- **50m stack**
- **Idealised hill**
- **Wind from left to right**

Left: ADMS Xmax
Right: AERMOD Xmax

ADMS and AERMOD Comparison: Complex terrain, Neutral flow, Terrain amplification Factors

US EPA Wind Tunnel Data

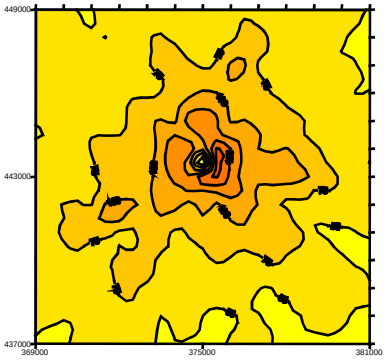
Lawson, Snyder and Thompson (1989)

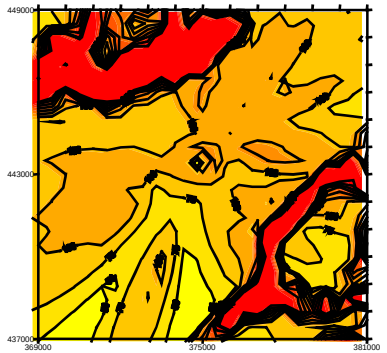


ADMS and AERMOD Comparison: Complex terrain results

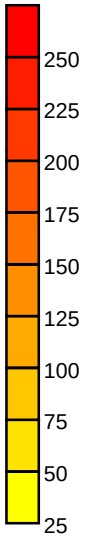
Maximum Concentration (ug/m3)

ADMS (Max=178)



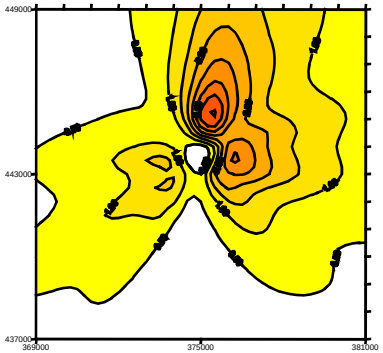


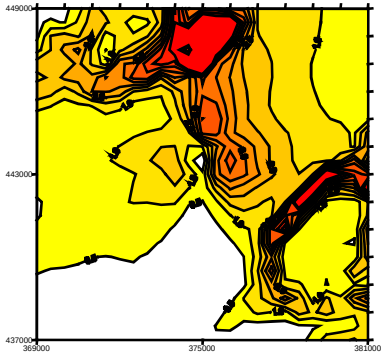
AERMOD (Max=1162)



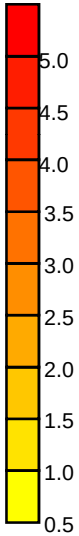
Long Term Average Concentration (ug/m3)

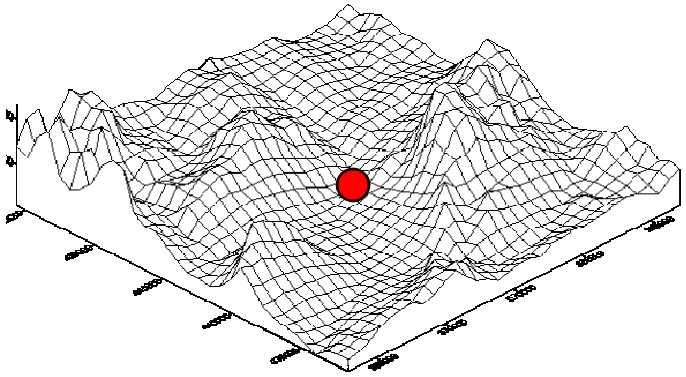
ADMS (Max=4.0)





AERMOD (Max=10.3)





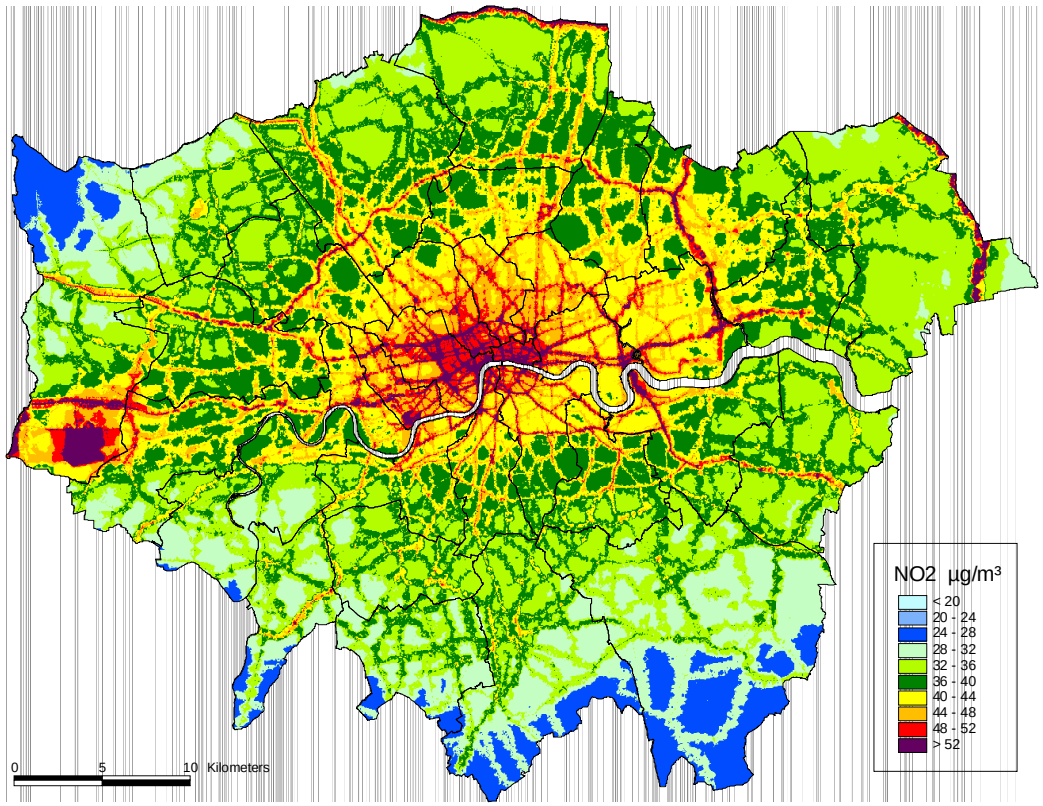
Stack and surrounding terrain, Ribblesdale Valley, North-West England.

Stack height = 100m

Terrain = up to 300m

ADMS-Urban

London
Annual average NO_2 concentration, 2005



- Advanced, discrete source air quality model for major cities and airports.

- Includes algorithms for dispersion from roads and street canyons.

- Used in over 50 cities worldwide, including London, Rome, Budapest and in China

Other ADMS Models

- **ADMS-Roads cf CALINE**
- **ADMS-Airport cf EDMS**
- **ADMS-Star -- Emergency Response**

Summary

- **ADMS 4 includes all the features of AERMOD – but not all treated in same way**
- **Additional algorithms include concentration fluctuation, condensed plume visibility, radioactive decay and gamma dose algorithms etc.**
- **ADMS is listed on US-EPA's list of alternative models. Accepted for use in China and many other countries.**

Summary (cont.)

- **ADMS was first released in 1993 and has been used in many critical applications. There are over 500 licenses worldwide**

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