

Met Office National Air Quality Modelling System

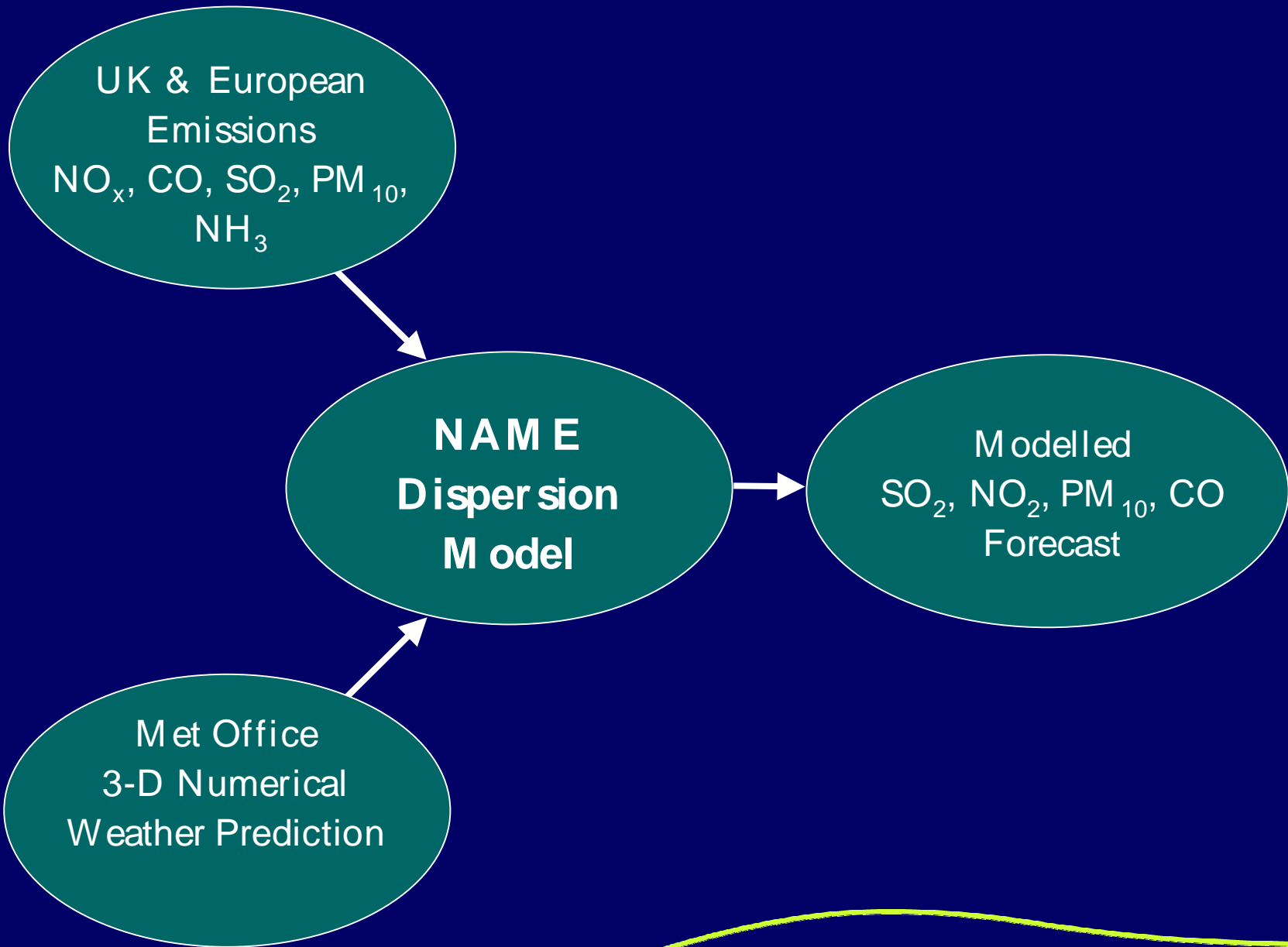
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Government Meteorological Research



National Air Quality Forecasting System



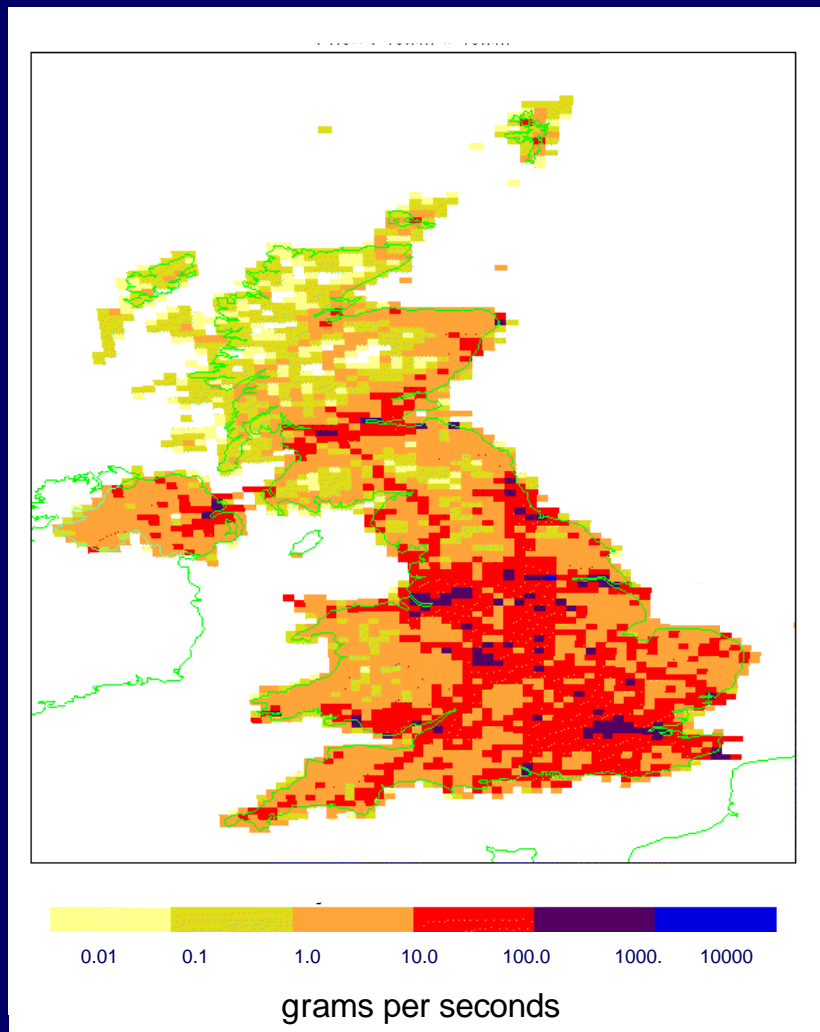


Emissions

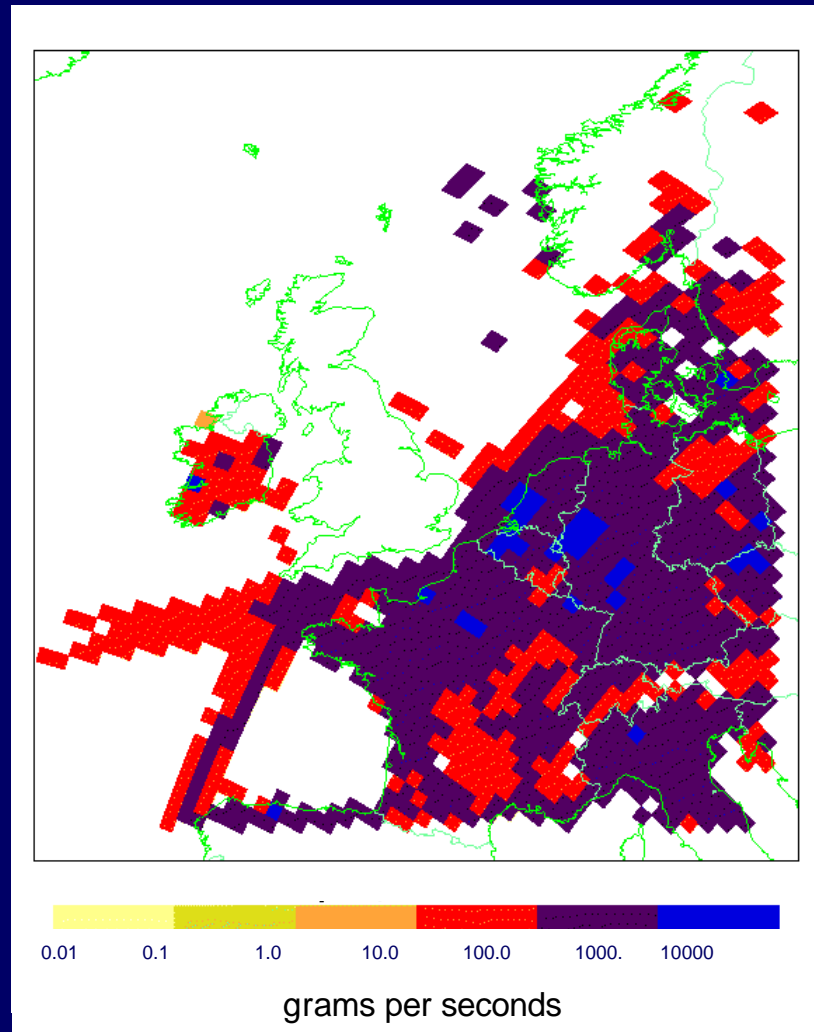
- UK & European emissions treated separately
- Pollutants: SO₂, NO_x, PM₁₀, CO, NH₃
- UK
 - 1km x 1km 1998 annual average maps from NETCEN (~¼ million sources)
 - Split into traffic, industrial, point source components
 - Large point sources (e.g. power stations) individually modelled (230)
 - Large traffic or industrial sources modelled as 1km area sources (430)
 - Remaining smaller sources combined into 10km area sources (2152)
 - Daily cycle imposed on traffic emissions
- European (non-UK)
 - 50km x 50km 1998 annual average maps from EMEP (1066 sources)
 - No distinction between different source components

1998 Annual Emissions (NO_x)

UK 10km



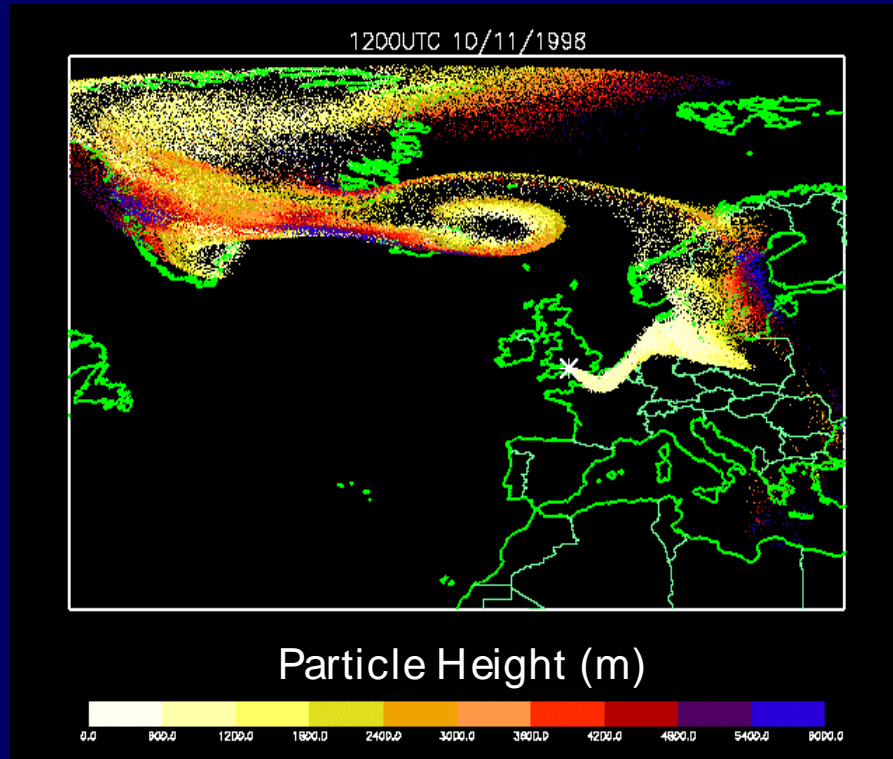
EUROPEAN 50km



Forecast Meteorology

- Met Office 3-D Numerical Weather Prediction (NWP) model
 - Horizontal Resolution : ~55km
 - Vertical Resolution : 21 levels
 - Time Resolution : 3 hourly
- Forecasts issued twice daily

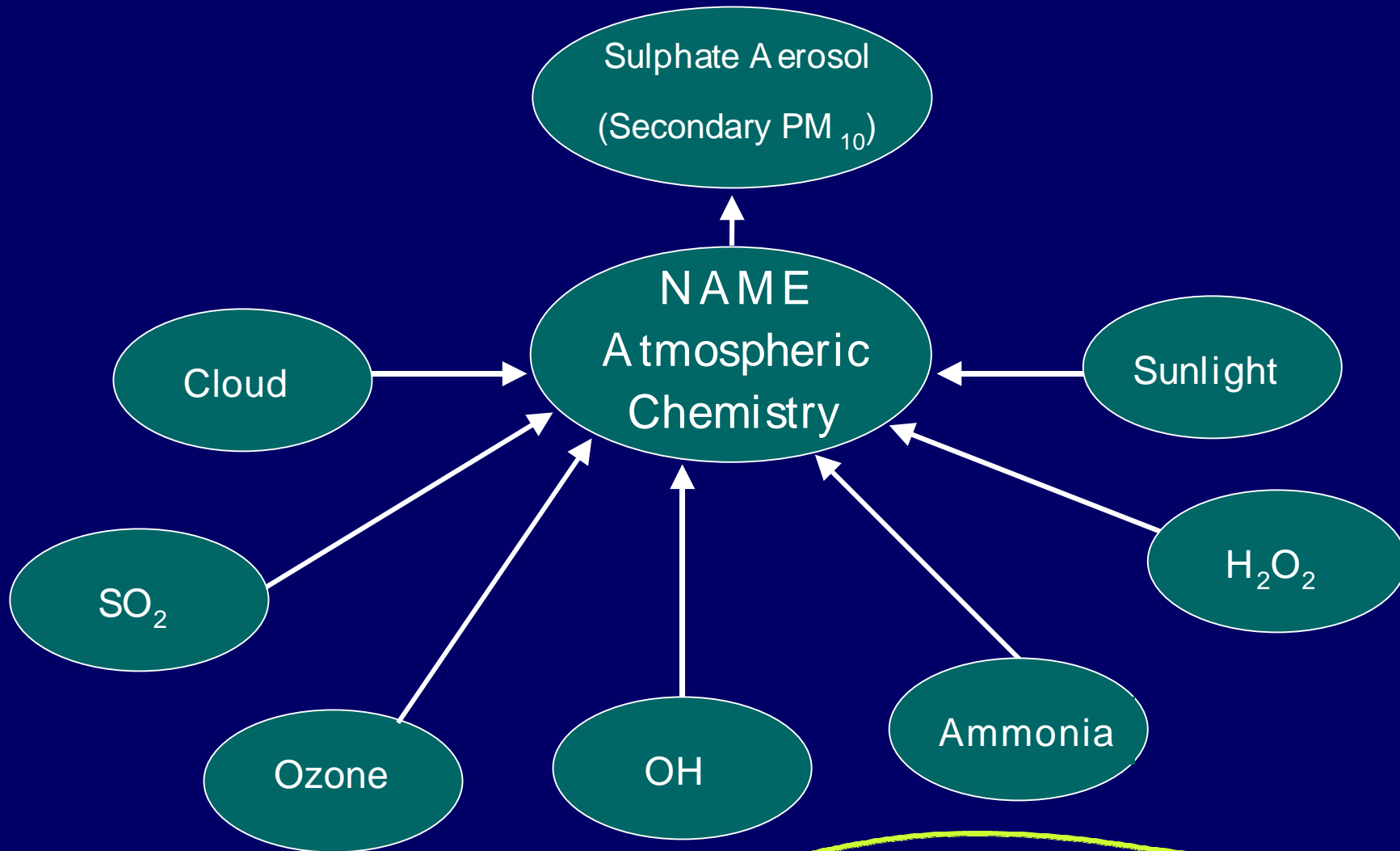
NAME Dispersion Model



Example
Continuous Single Source Release (4
day transport)

- Lagrangian Particle Model
- Particles (representing pollution) released from many locations
- Follow many 1000's particles around model 3-D atmosphere
- Each Particle moved individually:
Local Mean Wind + Local Atmospheric Turbulence
- Wet and Dry Deposition Schemes
- 3-D Atmospheric Chemistry
- Output : Time and Volume-averaged concentrations

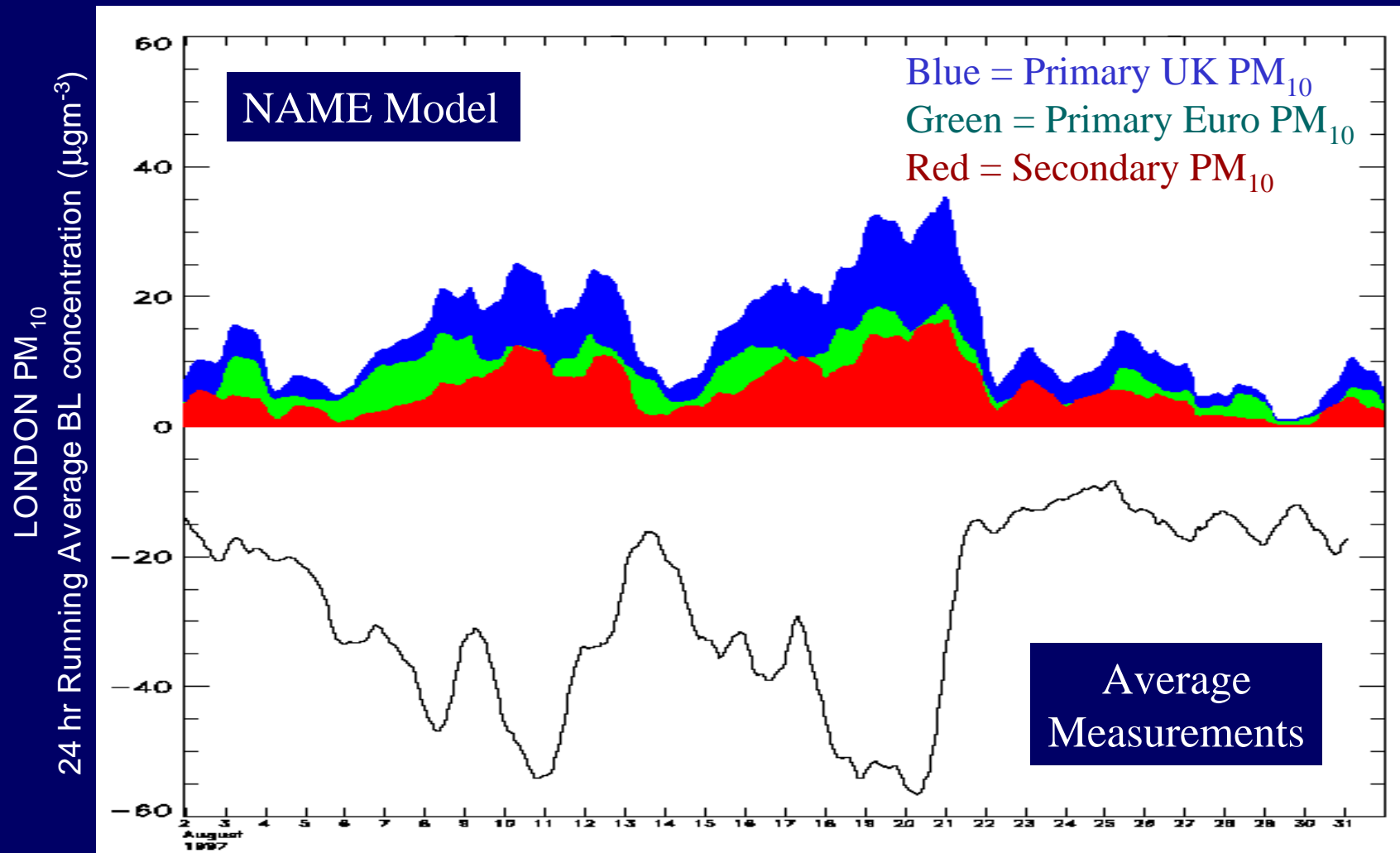
NAME Atmospheric Sulphate Chemistry



National Air Quality Forecasting

- Sources (3878 point and area releases modelled)
- 2 forecasts issued daily
 - Starting point : rolling model run using hindcast meteorology
 - 48 hour forecast
- Model Domain : -15°W to 14°E and 44°N to 63°N
- Background Air Concentrations across UK
 - Hourly, Volume-averaged : 15km x 15km x 80m
- NO₂ : NO_x ratio from Derwent-Middleton empirical function
- PM₁₀ : Primary + Secondary components

Contributions to modelled PM₁₀

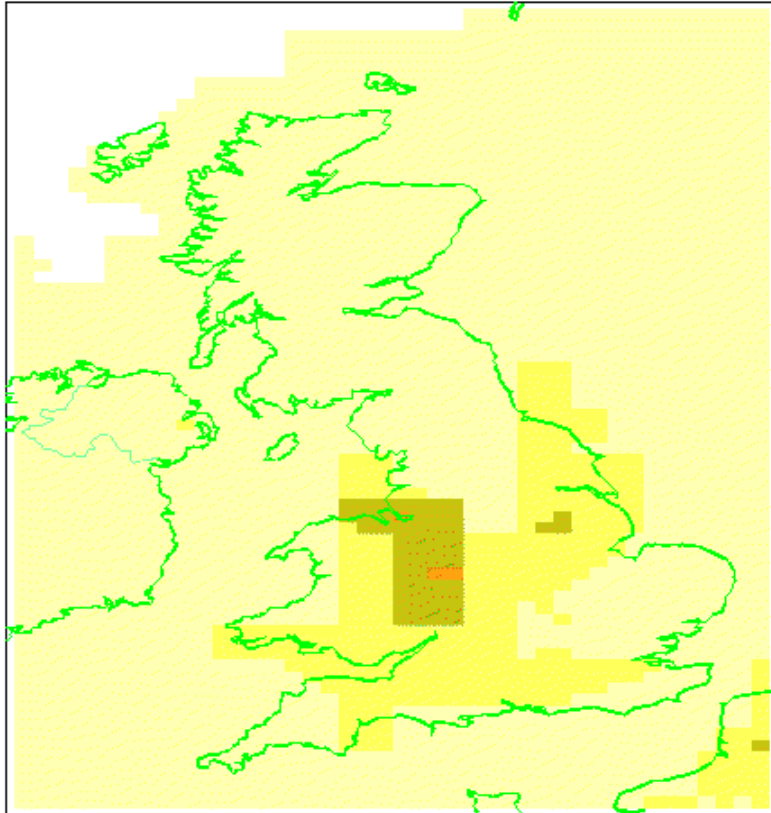


August 1997

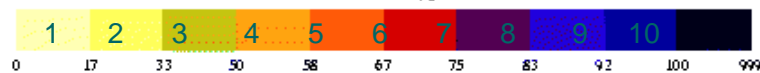
Met Office : NAME MODEL

Valid at 1600UTC/17/11/2001 (T+ 40H)

Particles less than 10 microns : 24hr-running Average 80m Concentration



Max Value = 53 µg m⁻³



Particles less than 10 microns in diameter

Met data: Regional
Analysis on Custom
Date: 0000UTC/16/11/2001
White Grid = 1 to concentration

Example NAME output

- PM₁₀
 - 24hr-running average
 - Background air concentration (15km x 15km x 80m volume)
 - Primary + Secondary
 - Banded by Index
 - No Natural or Re-suspension Components

National Air Quality Forecasting System

