Ozone in the United Kingdom
The fifth report from the Air Quality Expert Group

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The fifth AQEG report

- Report started in late 2006
- Currently consultation draft
- Defra question-based approach
  - More focus on specific issues where Defra needs support
  - Total of **seven** questions
  - Short answer – brief summary – supporting evidence
  - . . . for a shorter report!
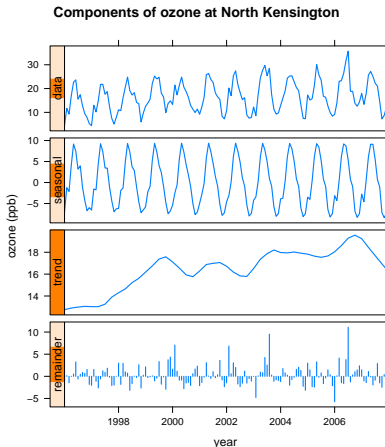
AIR QUALITY EXPERT GROUP

Ozone in the United Kingdom

Draft report for comment
April 2008

Prepared for:
Department for Environment, Food and Rural Affairs;
Scottish Executive; Welsh Assembly Government; and
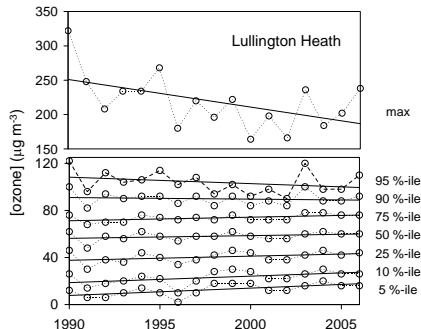Department of the Environment in Northern Ireland

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Ozone as a pollutant

- General characteristics
  - No direct source – secondary pollutant
  - High background concentrations
  - Difficult to control
  - A plethora of metrics
- Three principal influences
  - Global/northern hemispheric background
  - Regional scale ozone – Europe
  - Urban ozone – depletion

Components of ozone at North Kensington

Background
The questions

Question 1
Question 2
Question 3
Question 4
Question 5
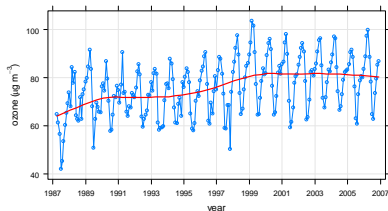Question 6
Question 7

Trends in UK ozone

- Annual mean concentrations
  - Most increases in urban areas
  - Less of an increase in rural areas
- Peak concentrations
  - Marked decrease in rural locations – European emissions control
  - Less of a decrease in urban areas

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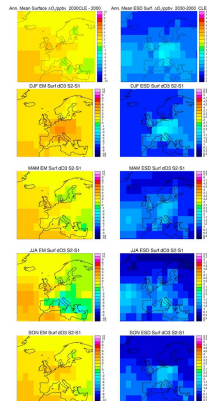Question 6
Question 7

Global baseline ozone

- Trends at Mace Head
    - Coastal fringe location
    - Increased ozone over past two decades
    - More recent stabilisation
    - More important for UK than mainland Europe
- Influences
    - Global/northern hemispheric precursor emissions
    - Accounts for vast bulk of total ozone concentrations
    - Can identify influence of different source regions around the world

Background
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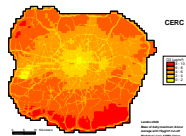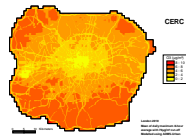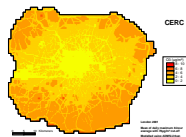Question 6
Question 7

Climate change and ozone

- General characteristics
  - Very difficult to quantify
  - Effects likely to be small compared with influence regional precursor trends
- Complex and finely balanced
  - Current legislation: European $O_3 \Uparrow$; stricter emissions control $O_3 \Downarrow$
  - Regional scale ozone – Europe
  - Urban ozone – depletion

Background
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Projected trends in urban ozone

- Trends and projections
  - Urban ozone concentration have been increasing
  - Concentrations will approach rural concentrations
- Important factors
  - NO_X titration; vehicular emissions control
  - Regional scale ozone changes affect urban areas
  - Hemispheric scale processes e.g. biomass burning – can be detected in the urban/rural network

Background
The questions

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Modelling uncertainties

- Modelling ozone is highly complex
  - Atmospheric chemistry – 1000s of reactions; unmeasured species
  - Atmospheric mixing
- Models
  - Many approaches available
  - No accepted method for quantifying uncertainties and comparing models
  - A more comprehensive assessment of model uncertainties is necessary

Background
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EC Integrated Assessment

- Overview
    - UK ozone concentrations change little
    - Many measures targeted to PM, NO_X and not ozone
- Response of UK ozone concentrations
    - European coastal fringe most affected by changes to baseline ozone
    - Effect of NO_X reduction in UK urban areas
    - European measures have most effect on peak ozone concentrations

Background
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Most effective control options

- Underlying issues
  - Must consider changes in precursor emissions (NMVOC, methane, NO_X and CO)
  - Consider the spatial-temporal aspects
- Main points
  - UK action alone is limited (but beneficial) – must consider regional (and increasingly) hemispheric scales
  - Reduction in NMVOC almost always reduces ozone concentrations
  - Methane management on regional/global scale
  - Large reductions in NO_X required