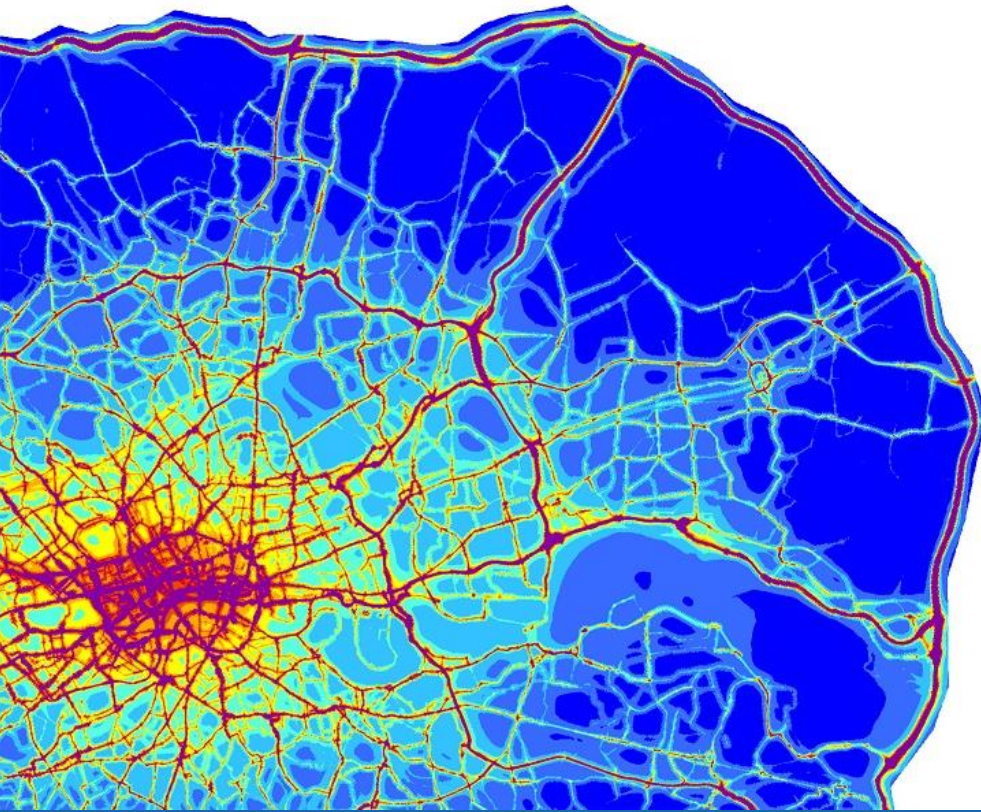


WG1 discussion topic:
**Model's fitness-for-purpose in
the context of exceedance
modelling**

**Jenny Stocker &
Kate Johnson**

**FAIRMODE Technical Meeting
June 2017
Athens
Greece**

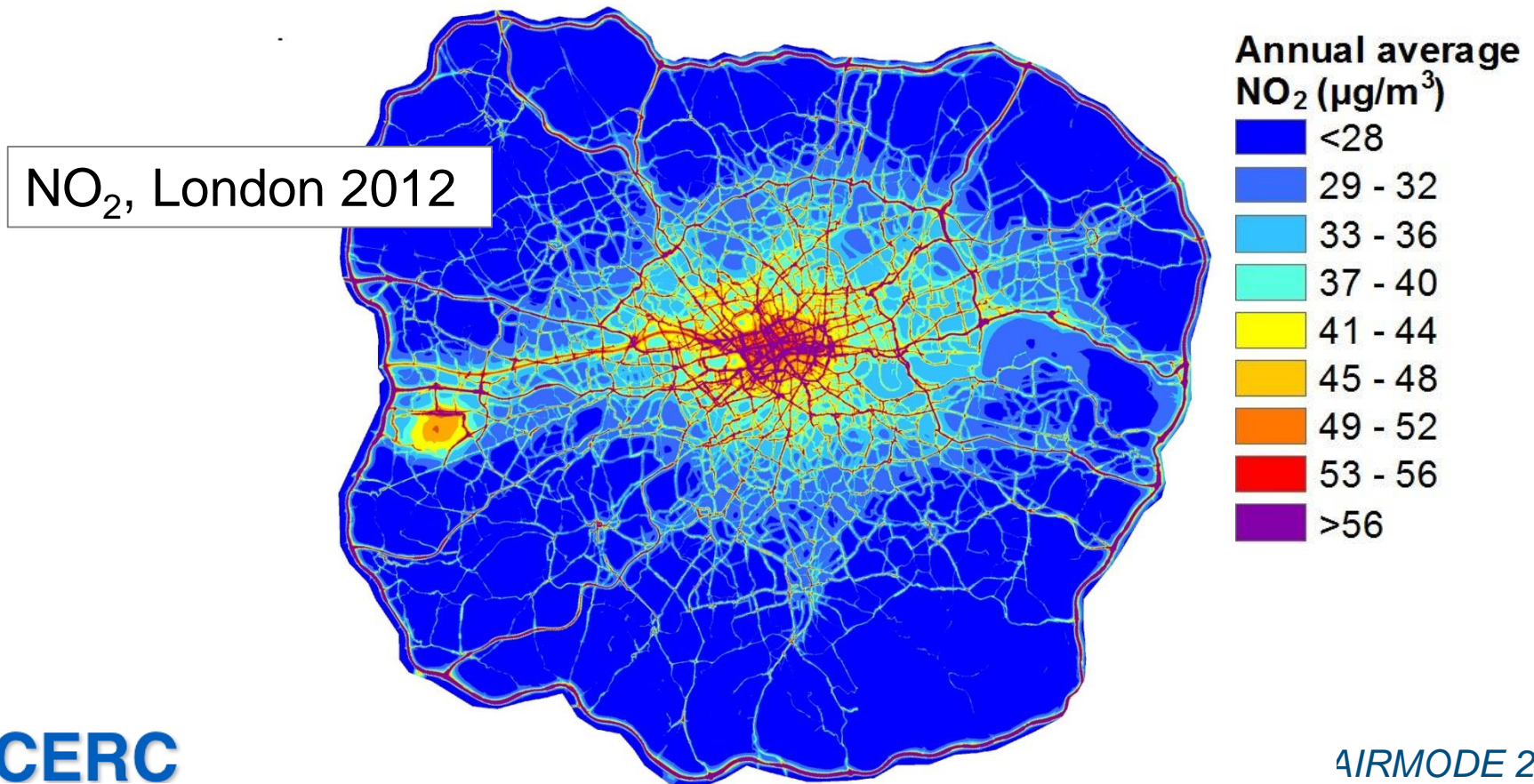


Contents

- Context
- Specific questions:
 1. Do you see (other) elements that define the extent of a model's fitness-for-purpose with regard to exposure assessment?
 2. Do you agree that assessment/definition of the typical spatial variability is one of the main missing criteria to define fitness-for-purpose within the present FAIRMODE concepts?
 3. Do you have any preferences or suggestions on how to define the typical spatial variability for the yearly average environmental criteria for NO₂ and PM_{2.5} (first focus)?
 4. Can you come up with proposal for the required spatial resolution for annual averaged NO₂ and PM_{2.5} simulations? What kind of information do you base your proposal on?

Context

- Following on from discussions in Utrecht
- CERC develop ADMS which can be used for high resolution (spatial and temporal) modelling:

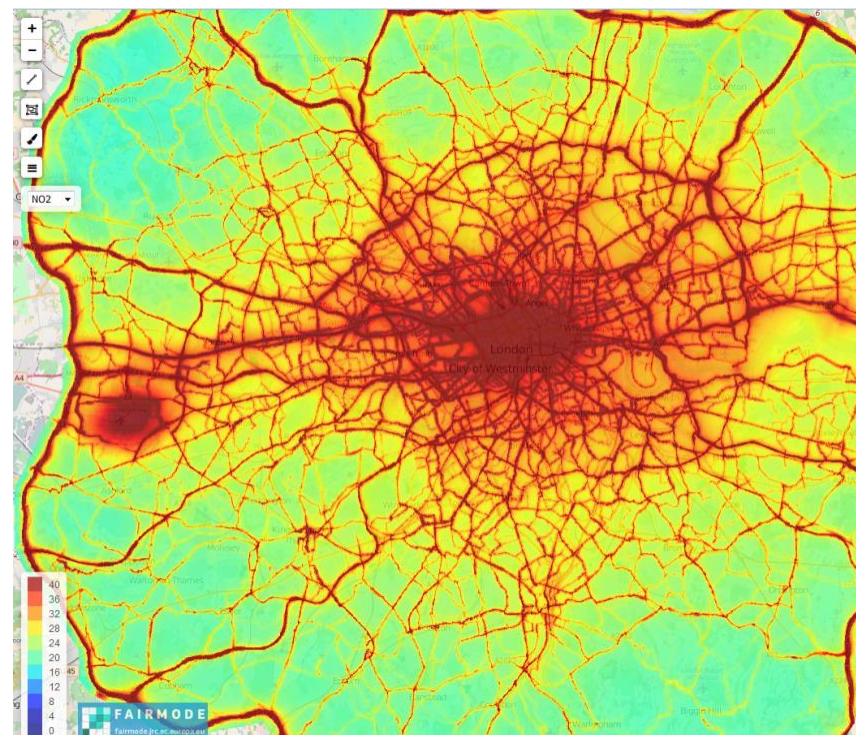
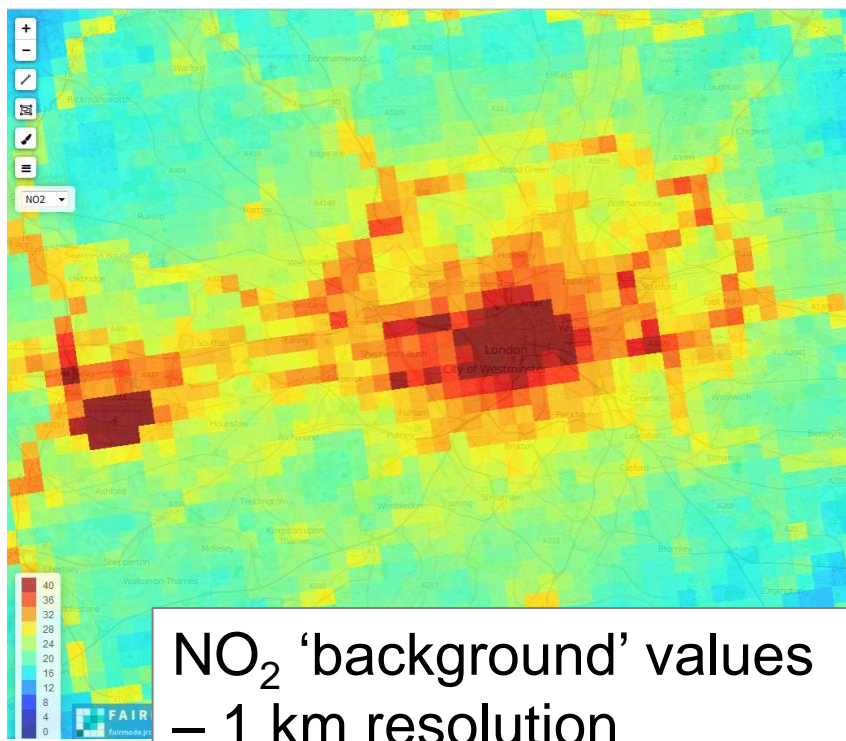


Context

- Following on from discussions in Utrecht
- CERC develop ADMS which can be used for high resolution (spatial and temporal) modelling
- ADMS model output is used for health studies, e.g. for a capital city in the UK, the following data were required :
 - **Daily** NO_x, NO₂, PM₁₀, PM_{2.5}, O₃ concentrations
 - **100 000+** receptor locations
 - **Temporal** categorisation: 'in school' and 'not in school'
 - **Statistics** for those periods: minimum, maximum, average
- Other health studies may require equally **high spatial resolution** output but **lower temporal resolution** e.g. annual average concentrations split into 'daytime' and 'night time'

Context: London

- Last year's presentation:



**Ricardo-AEA also submit
representative 'roadside
concentrations' to EU**

- Low resolution map does not indicate as many exceedances
- Modelling explicit detail will lead to greater calculated exceedances – so should model resolution be specified?

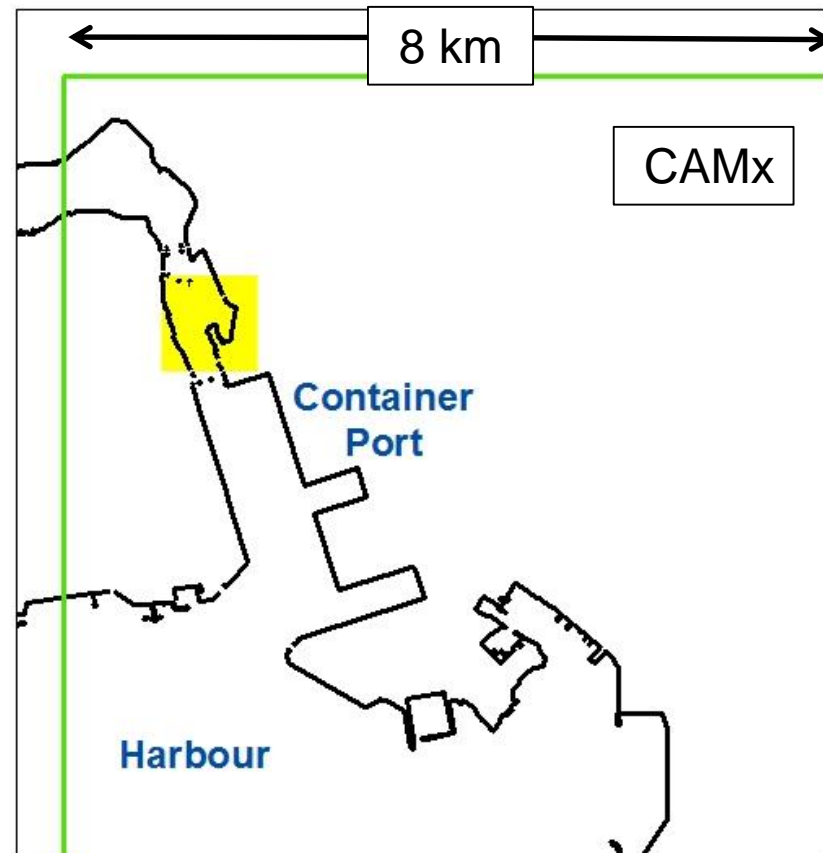
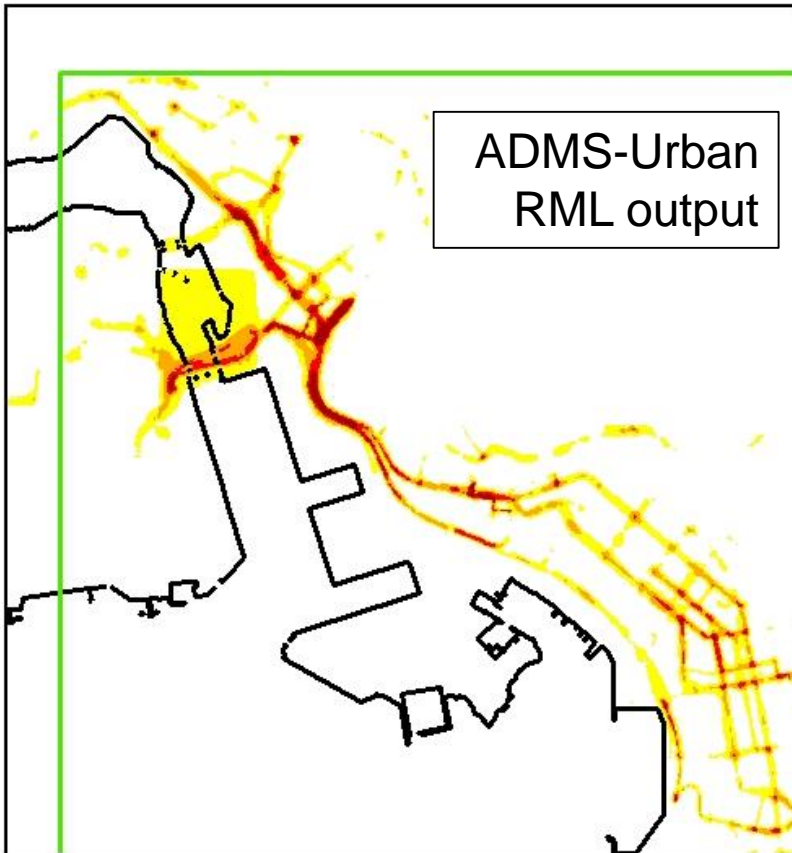
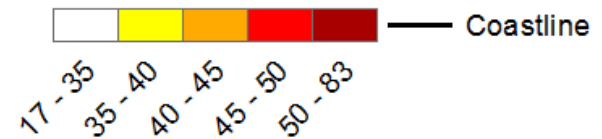
FAIRMODE 2017

Context: Hong Kong

- **Coupled system concentrations compared to regional model concentrations**

- Contour plot for $PM_{2.5}$
- Exceedences of the annual average air quality objective, $35 \mu\text{g}/\text{m}^3$

Annual Average $PM_{2.5}$ ($\mu\text{g}/\text{m}^3$)



Q1. Model fitness-for-purpose

- Do you see (other) elements that define the extent of a model's fitness-for-purpose with regard to exposure assessment ?
- In addition to spatial resolution
 - **Model temporal resolution:**
 - How accurate are 'annual average' models for 'local' chemistry pollutants (NO₂, O₃) (correlations usually applied)?
 - How accurate are 'annual average' models for calculating hourly / daily exceedances (correlations usually applied)?
 - **Model input data:**
 - What if sufficiently high **traffic data** are unavailable to resolve all exceedance situations?
 - **Other sources** e.g. diesel generators in urban areas lack accurate emissions data (magnitude & temporal variations)
 - **Measurements for model evaluation purposes:**
 - There needs to be 'sufficient' monitors to evaluate model

DELTA Tool
can be used to
assess this

**Need criteria for
inclusion of
sources e.g. in
terms of AADT or
(better) g/km/s,
g/s (allows for
speed)**

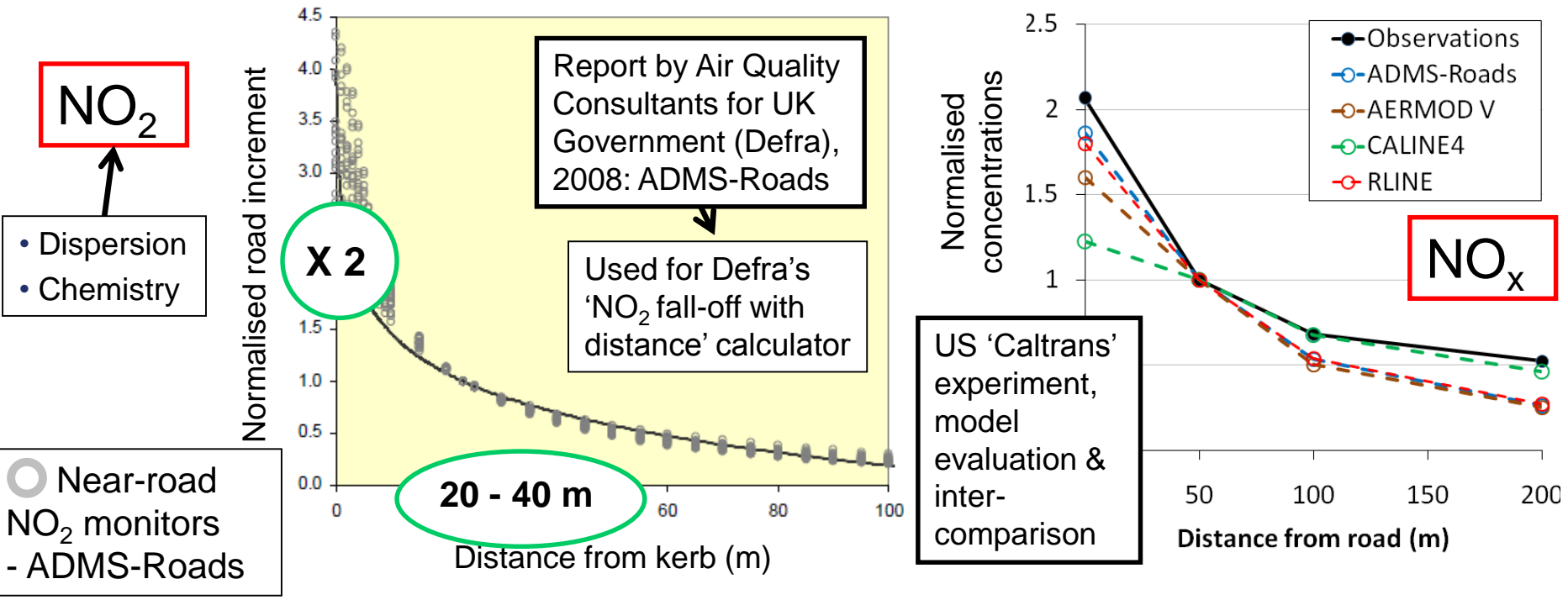
**Need roadside &
background sites**

Q2. Spatial variability - the main missing criteria?

- **Do you agree that assessment/definition of the typical spatial variability is one of the main missing criteria to define fitness-for-purpose within the present FAIRMODE concepts?**
- **Yes!**

Q3. Spatial variability criteria definition

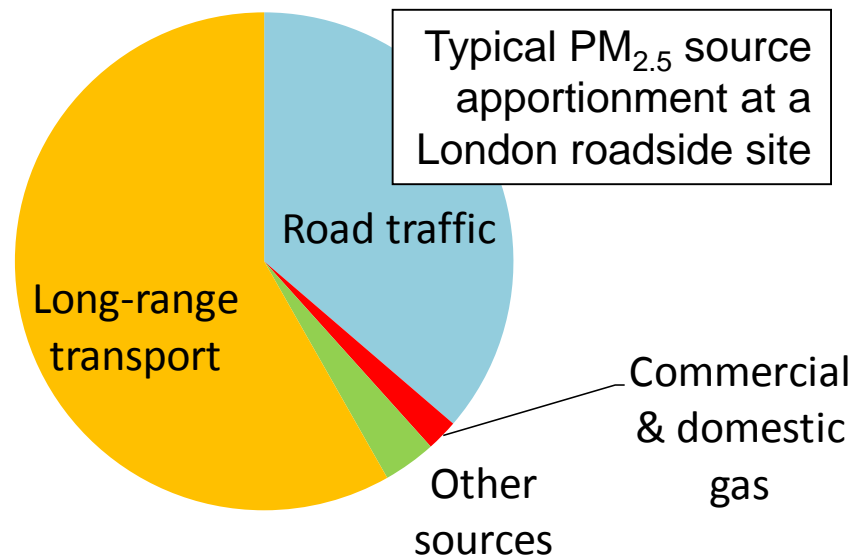
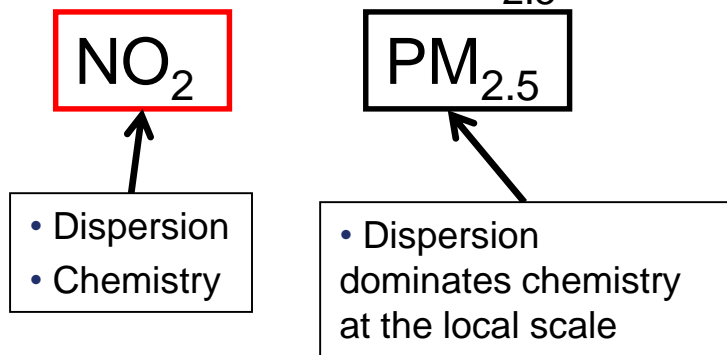
- Do you have any preferences or suggestions on how to define the typical spatial variability for the yearly average environmental criteria for NO₂ and PM_{2.5} (first focus)?
- What is the spatial variability of the measured concentrations?



- All values normalised 23m/50m (observations by observations, modelled by modelled)

Q3. Spatial variability criteria definition

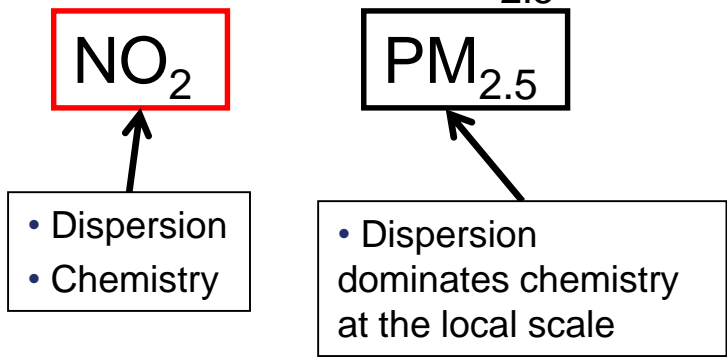
- Do you have any preferences or suggestions on how to define the typical spatial variability for the yearly average environmental criteria for NO₂ and PM_{2.5} (first focus)?
- What is the spatial variability of the modelled concentrations (if extensive PM_{2.5} measurements are unavailable)?



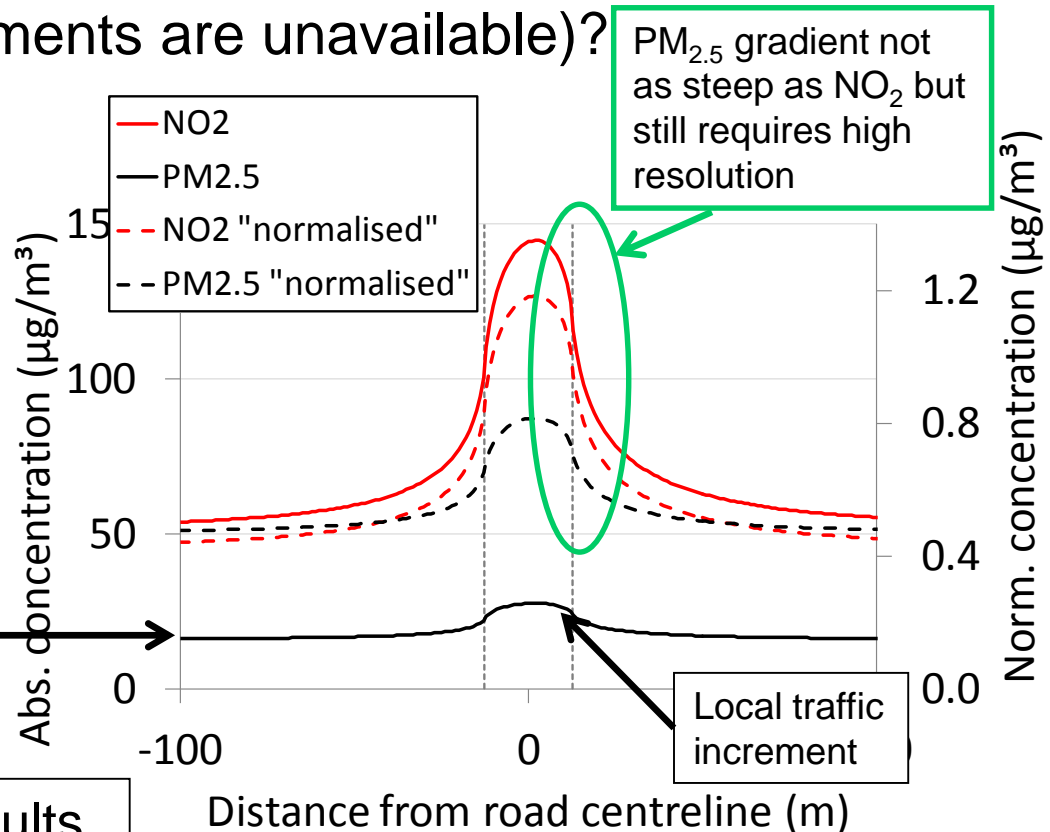
- In an urban area, PM_{2.5} concentrations are a combination of long-range transport & local traffic sources

Q3. Spatial variability criteria definition

- Do you have any preferences or suggestions on how to define the typical spatial variability for the yearly average environmental criteria for NO₂ and PM_{2.5} (first focus)?
- What is the spatial variability of the modelled concentrations (if extensive PM_{2.5} measurements are unavailable)?



- In an urban area, PM_{2.5} concentrations are a balance between long-range transport & local traffic sources



Q4. What is the required spatial resolution?

- **Can you come up with proposal for the required spatial resolution for annual averaged NO₂ and PM_{2.5} simulations? What kind of information do you base your proposal on?**
- 10 m resolution, in order to model the high concentration gradients close to roads.
- Information based on measurements of NO₂ and high-resolution modelling of PM_{2.5} in the vicinity of roads

Any
Questions?