

Local, national and regional contributions to PM_{2.5} pollution in Leicester

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EARTHSENSE

The impact of air pollution on health



Most hazardous is **fine particles**

Small particles penetrate deep into our lungs

Many health consequences from exposure to fine particles. Most severe is **premature mortality**

Fine particles last in the atmosphere for **1-2 weeks**, so can be transported long distances

Many different emission sources of PM_{2.5}

Traffic



Construction



Agriculture



Saharan Dust

Shipping

European







3D atmospheric chemistry transport model (GEOS-Chem)

Time period: January 2019 – December 2019



UK NAEI emissions (with temporal information)



Chemistry, transport, wet/dry deposition

GEOS-Chem version 12.1.0 (doi:10.5281/zenodo.1553349)

Annual-average PM_{2.5} across the UK and guideline values



12 13 10 11 6 8 9 7 μ g m⁻³

All sites: Measured = 10.0 μ g m⁻³ Modelled = 8.4 μ g m⁻³ Normalised mean bias = -16 %

Leicester: Measured = 11.4 μ g m⁻³ Modelled = 9.4 μ g m⁻³

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National guideline: 25 μg m⁻³



WHO guideline: 10 μg m⁻³

Contributors to PM_{2.5} in Leicester



PM_{2.5} is controlled by agriculture, as opposed to local emission sources within the city/county

Validating against a sensor network (EarthSense®)



Both the model and sensors agree that local emissions have a low contribution to PM_{2.5} in Leicester

Concluding remarks

- UK agricultural emissions have a large (37 %) influence on PM_{2.5} in Leicester
- 2. Transboundary emissions from continental Europe have a large (18 %) influence on PM_{2.5} in Leicester
- **3.** Local emissions have small (< 5 %) influence on PM_{2.5} in Leicester
- UK traffic emissions both have small (10 %) influence on PM_{2.5} in Leicester



☺ Thanks for listening ☺







