Integrated assessment modelling of future air quality in the UK to 2050, and synergies with net zero strategies.

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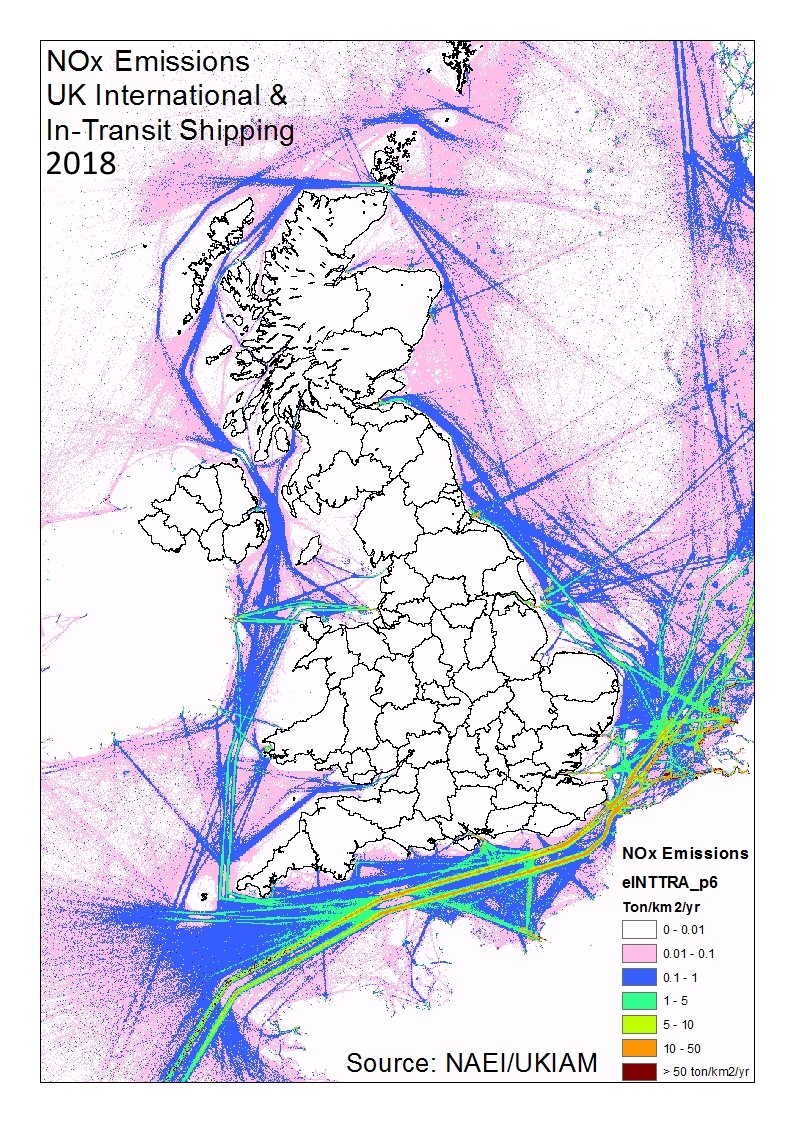
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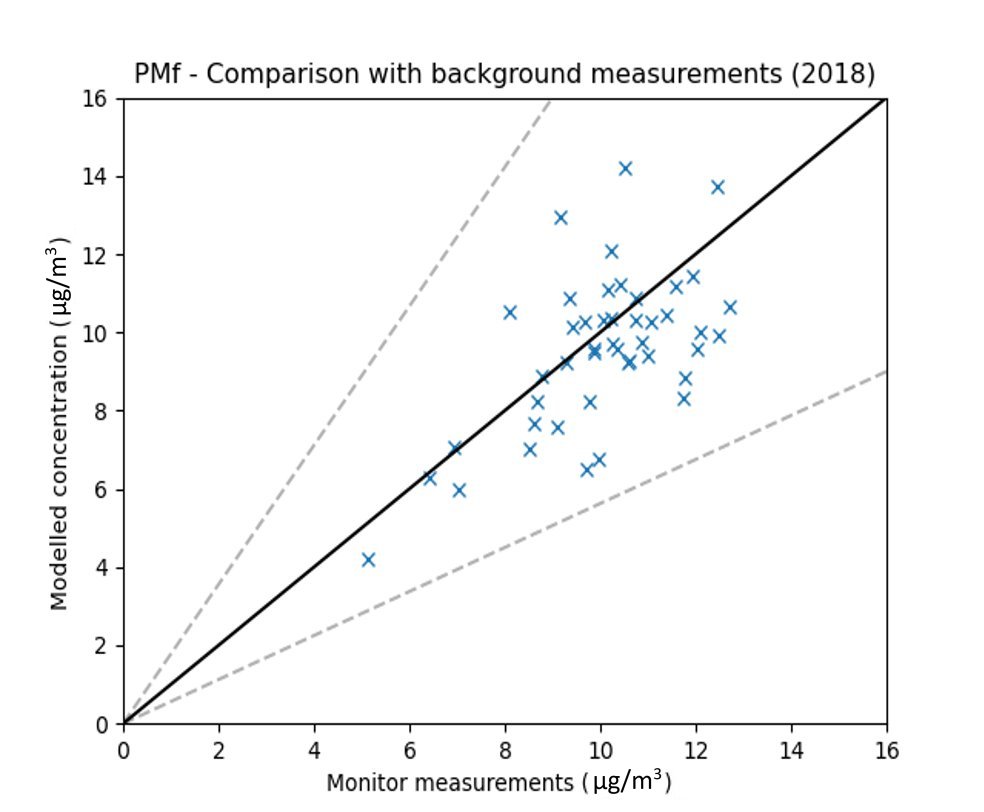
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Supplementary Material



*Figure S.1 - NOx emissions from international and in-transit shipping in sea areas surrounding the United Kingdom, when combined with domestic shipping, exceed the UK land-based emissions of NOx in 2018.*



*Figure S.2 - Comparison modelled concentrations against AURN measurements for B2018*

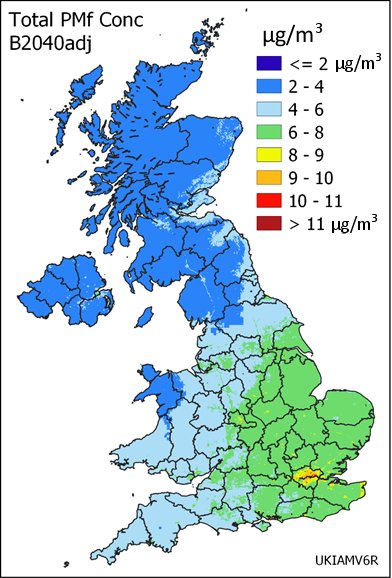
|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table S.1 -** (B2018) Statistical comparison at monitoring locations. N=number of measurements, Obs.=mean of all measurements, Mod.=mean of all modelled concentrations, r=Pearson correlation, FAC2=fraction of modelled values within a factor 2 of measured value, NMSE=Normalised Mean-Square Error, RMSE=Root Mean-Square Error, NAD=Normalised absolute difference. | | | | | | | | |
| **Model** | **N** | **UKIAM** | **EMEP4UK** | **r** | **FAC2** | **FB** | **RMSE** | **NAD** |
| Total PM2.5 | 51 | 9.41 | 9.43 | 0.83 | 1 | 0 | 1.09 | 0.04 |

Fractional bias (FB):

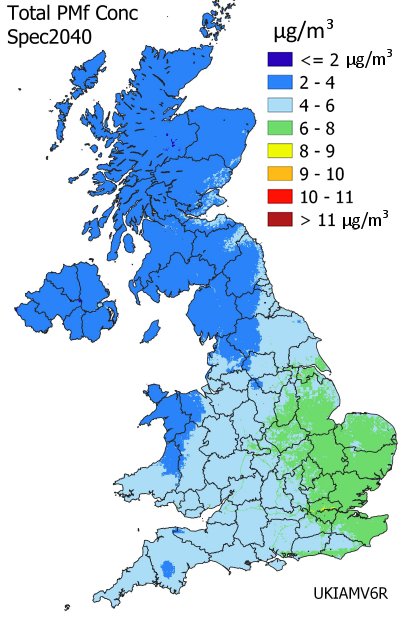
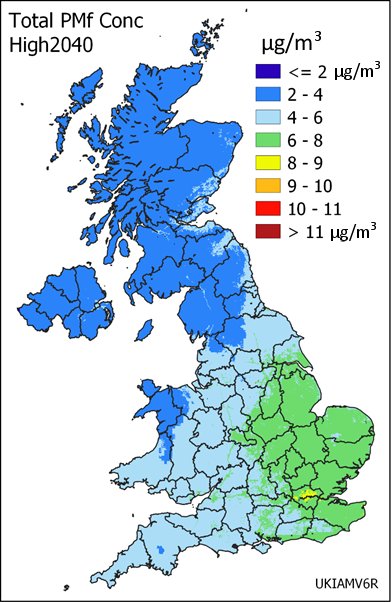
Normalised Mean-Square Error:

Normalised Absolute Difference:

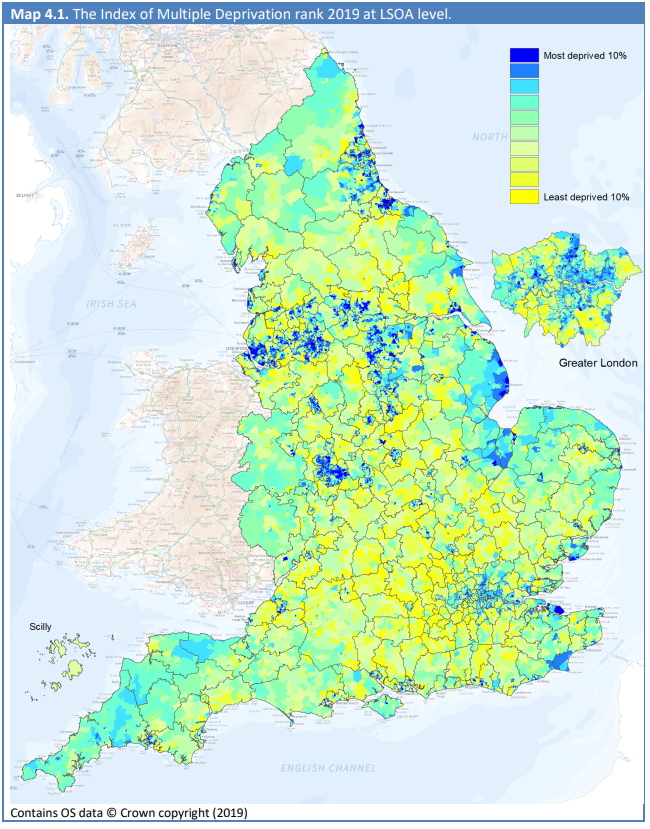
Here is the measured, or observed, concentration and is the modelled concentration. The overbar indicates that the mean is taken.

Map

Description automatically generated



*Figure S.3 – Maps of total PM2.5 concentrations in 2040. There is already a clear reduction in concentrations relative to 2018 (see Figure 3) for the baseline (business-as-usual) scenario; Progressively more ambitious abatement strategies show a further significant redcution of concentrations across the UK.*



*Figure S.4 – Map of the Index of Multiple Deprivation (IMD) at the LSOA level. Reproduced from* [*https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019*](https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019)

Table

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*Figure S.5 – A comparison of modelled PWMC and PWMC derived from monitoring data for 2018 highlights the generally slightly higher exposures based on measurements since monitor locations tend to be in areas of higher concentrations.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Table S.2 - Cumulative (2023-2040) air quality benefits in England from reduced damage to health, productivity, ecosystems and soiling of buildings, broken down by sensitivity (2020 prices, £m) | | | | | | |
|  | **Medium Scenario** | | | **High Scenario** | | |
|  | Low | Central | High | Low | Central | High |
| **Total Air Quality Benefits** | £5,327 | £23,150 | £71,255 | £9,142 | £37,891 | £114,332 |

Chart, line chart

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*Figure S.6 - Population Weighted Mean Concentration (PWMC) and Delta PWMC for each deprivation decile across London, consistently showing higher concentrations in the most deprived deciles. The Delta PWMC shows that the disparity across all deciles reduces with the more ambitious abatement scenarios.*