

Supplementary materials for the paper: “A Bayesian spatio-temporal model to estimate long term exposure to outdoor air pollution at coarser administrative geographies in England and Wales.”

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S.1 Data file

All the files described in this document are available from
http://www.southampton.ac.uk/~sks/pollution_estimates/

The file `AURN_data_07_11.txt` contains the AURN monitored air pollution data and the AQUM output at the 144 sites in England and Wales for the five years 2007-2011. All the results reported in the paper have been obtained using this data file. The definitions of the column headings are given in Table 1.

Table 1: Headings for the columns in the file `AURN_data_07_11.txt`.

Column	Heading	Description
1	index	site index (taking values 1, 2, ..., 144)
2	lon	longitude of the site
3	lat	latitude of the site
4	easting	easting of the site
5	northing	northing of the site
6	type	type of the site (Rural or Urban or RKS (road or kerbside))
7	validation	1 for validation and 0 for fitting
8	year	year (2007, ..., 2011)
9	month	month (1, ..., 12)
10	day	day in a month (1, ..., 31)
11-14	aqum_pollutant	AQUM output for the pollutant (in $\mu\text{g}/\text{m}^3$)
15-18	obs_pollutant	observed value of the pollutant (in $\mu\text{g}/\text{m}^3$). 'NA' denotes a missing value.

S.2 Prediction at the 1km grid locations

The 20 files `grid_1km_daily_pollutant_year.txt.zip`, where pollutant is one of no2, ozone, pm10, pm2p5 and year is one of 2007-2011, contain the zipped versions of the daily predictions at the 151284 grid corners for the four pollutants and for the five years. The locations of the 151284 grid corners have been shown in Figure 2. The definitions of the column headings are given in Table 2.

The 20 files `grid_1km_annual_pollutant_year.txt`, where pollutant is one of no2, ozone, pm10, pm2p5 and year is one of 2007-2011, contain the annual predictions at the 151284 grid corners for the four pollutants and for the five years. The definitions of the column headings are given in Table 3.

S.3 Prediction at the local authority levels

The 20 files `local_authority_daily_pollutant_year.txt`, where pollutant is one of no2, ozone, pm10, pm2p5 and year is one of 2007-2011, contain the daily predictions for the 346 local authority areas in England and Wales for the five years. The definitions of the column headings are given in Table 4.

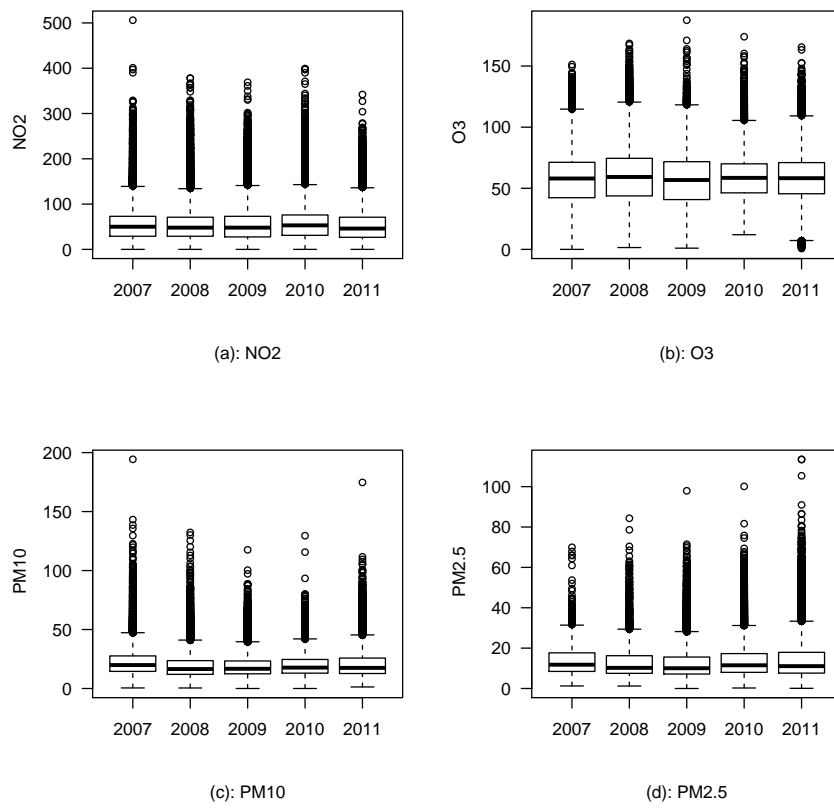


Figure 1: Boxplots of the daily average concentrations for each pollutant by year.

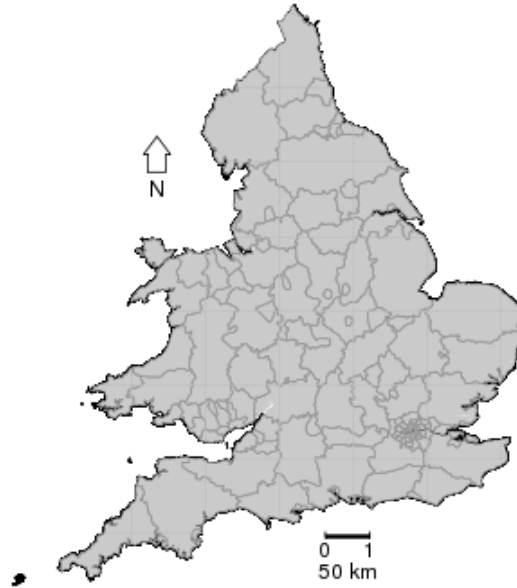


Figure 2: A map showing boundaries of the 346 local authorities in England and Wales with corners (151284 in total) of a 1 kilometre grid.

Table 2: Column headings for the 20 files `grid_1km_daily_pollutant_year.txt`

Column	Heading	Description
1	index	site index
2	lon	longitude of the site
3	lat	latitude of the site
4	year	year (2007, ..., 2011)
5	month	month (1, ..., 12)
6	day	day in a month (1, ..., 31)
7	aqum	AQUM output for the pollutant (in $\mu\text{g}/\text{m}^3$).
8	pollutant	predicted value of the pollutant (in $\mu\text{g}/\text{m}^3$)
9	sd	Standard deviation

Table 3: Column headings for the 20 files `grid_1km_annual_pollutant_year.txt`

Column	Heading	Description
1	index	site index
2	lon	longitude of the site
3	lat	latitude of the site
4	year	year (2007, ..., 2011)
6	aqum	AQUM output for the pollutant (in $\mu\text{g}/\text{m}^3$).
7	pollutant	predicted value of the pollutant (in $\mu\text{g}/\text{m}^3$)
8	sd	Standard deviation
9	low95	Lower limit of the 95% credible interval
10	up95	Upper limit of the 95% credible interval

Table 4: Column headings for the 20 files `local_authority_daily_pollutant_year.txt`

Column	Heading	Description
1	LA	Local Authority code
2	year	year (2007, ..., 2011)
3	month	month (1, ..., 12)
4	day	day in a month (1, ..., 31)
5	pollutant	predicted value of the pollutant (in $\mu\text{g}/\text{m}^3$)
6	sd	Standard deviation
7	X95low	Lower limit of the 95% credible interval
8	X95up	Upper limit of the 95% credible interval

Table 5: Column headings for the 20 files `local_authority_annual_pollutant_year.txt`

Column	Heading	Description
1	LA	Local Authority code
2	year	year (2007, . . . , 2011)
3	pollutant	predicted value of the pollutant (in $\mu\text{g}/\text{m}^3$)
4	sd	Standard deviation
5	X95low	Lower limit of the 95% credible interval
6	X95up	Upper limit of the 95% credible interval

The 20 files `local_authority_annual_pollutant_year.txt`, where pollutant is one of no2, ozone, pm10, pm2p5 and year is one of 2007-2011, contain the annual predictions for the 346 local authority areas in England and Wales for the five years. The definitions of the column headings are given in Table 5.

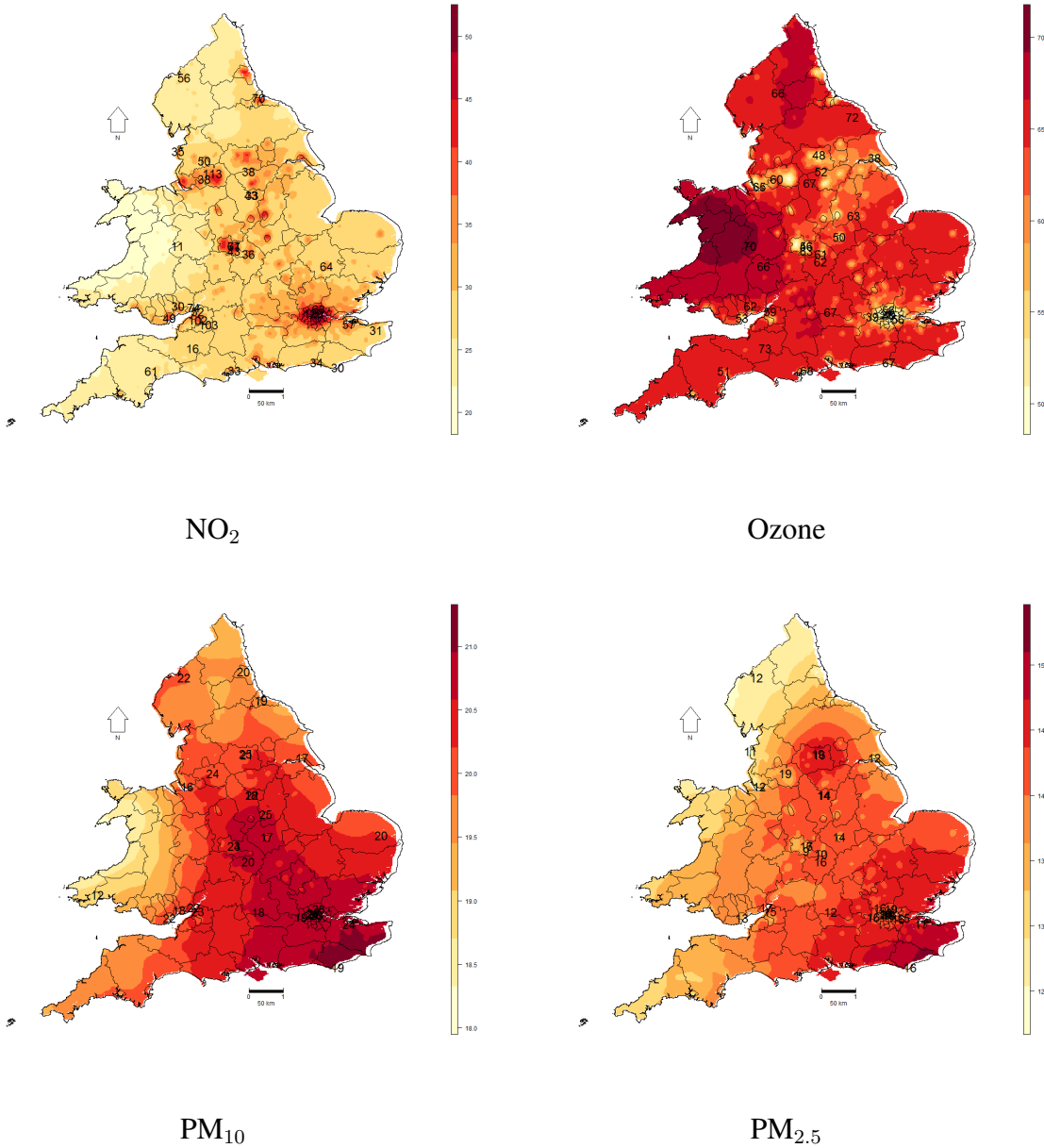


Figure 3: Annual prediction plots for 2011 for all the pollutants using the 1 kilometre predictive grid. 30 observed annual values of different pollutants, selected at random, are also superimposed on the plots. Values from the remaining sites are not superimposed to avoid clutter.

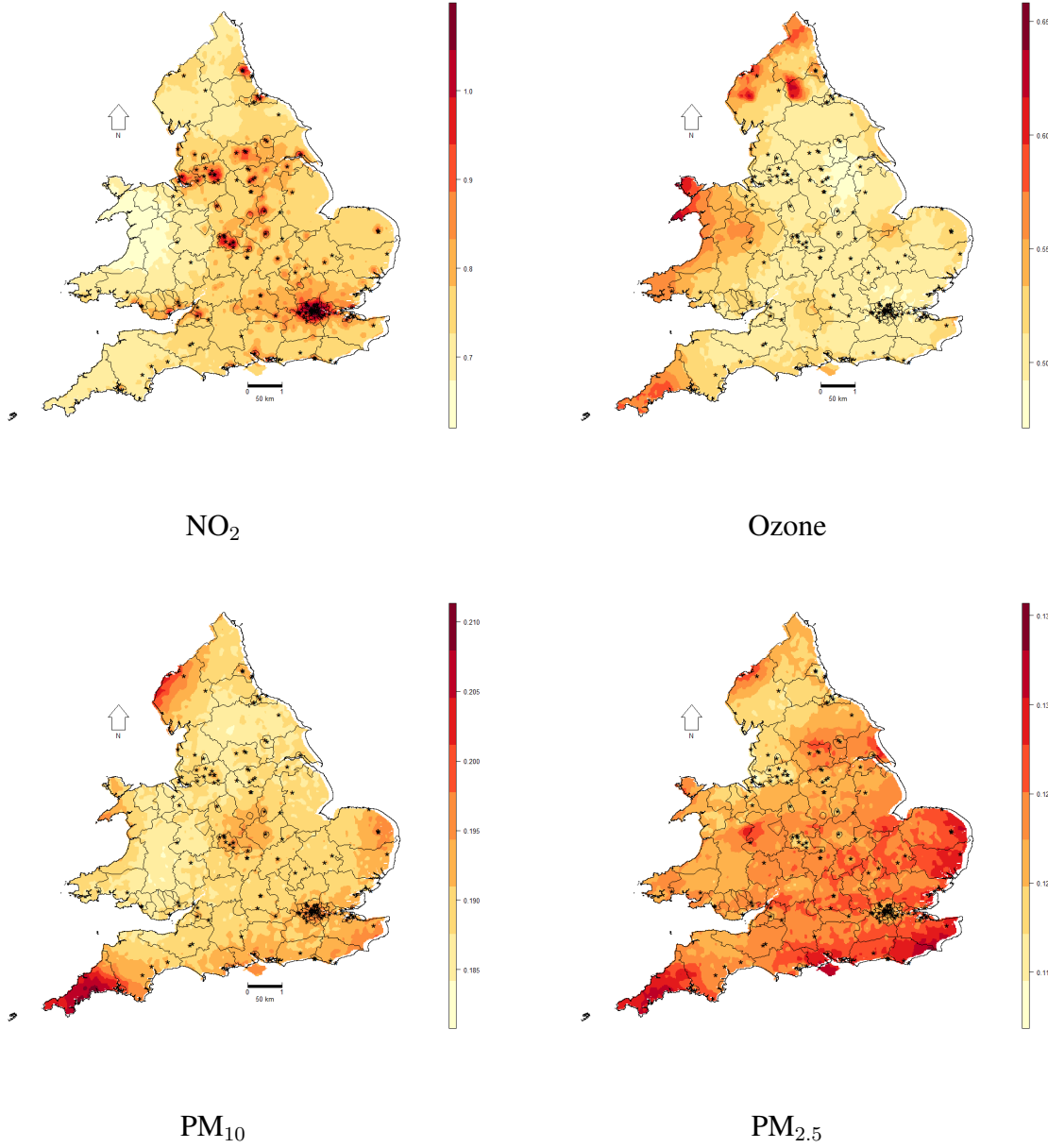


Figure 4: Maps showing standard deviations of the annual predictions for 2011 for four pollutants in Figure 3. The locations of the 144 AURN data monitoring sites are plotted as “*”.