



Supplement of

**Impact of agricultural interventions on ammonia emissions
and on PM_{2.5} concentrations in the UK: a local and
regional modelling study**

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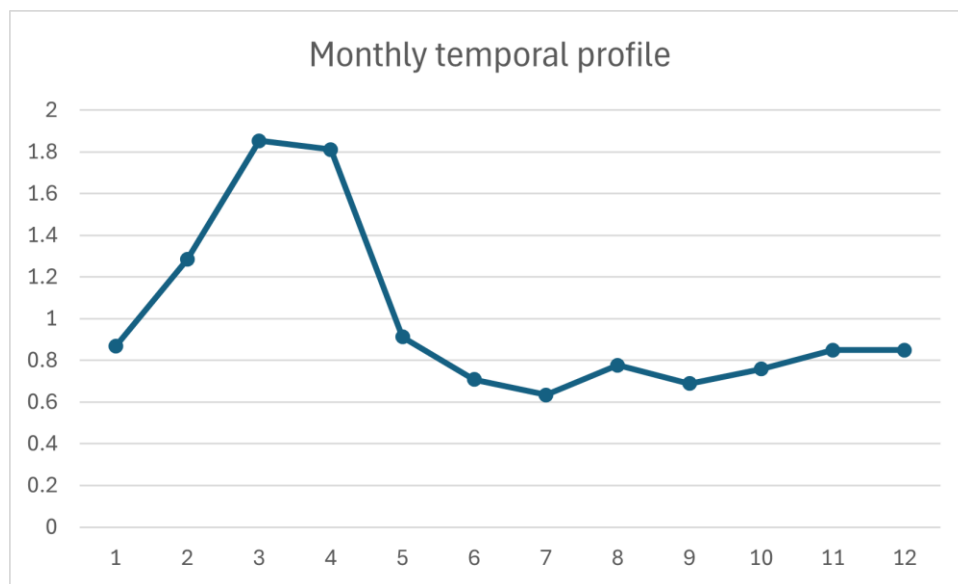


Figure S1. Monthly temporal profile for NH₃ emissions in agriculture sector in the UK.

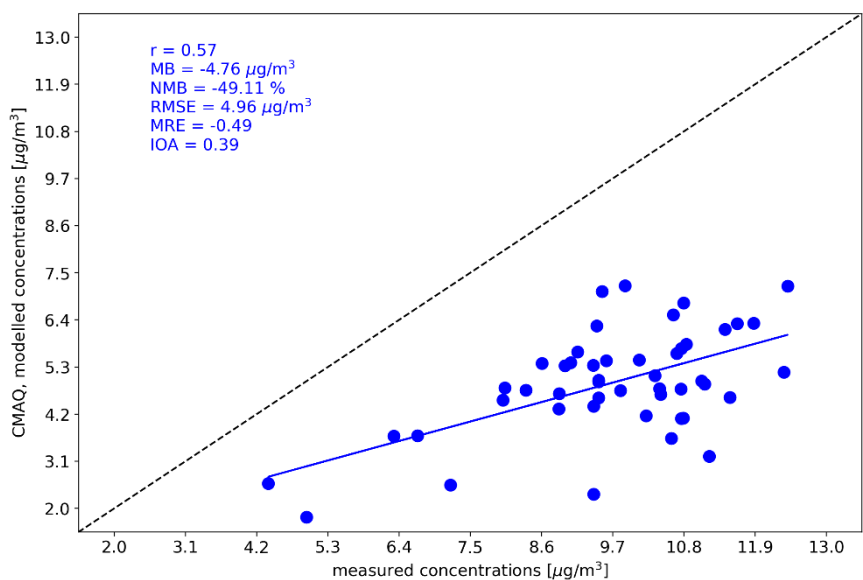


Figure S2. Comparison between annual measured concentrations with the modelled values in 2019 using the simulation with UK NH₃ emissions increased by 50%. Only the background stations with a data capture higher than 75% are used. Insert values are the Pearson correlation coefficient (R), the mean bias (MB), the normalized mean bias (NMB), the mean relative error (MRE), the root-mean-square error (RMSE), and the index of agreement (IOA). The blue line represents the linear fit and dashed black line is the 1:1 slope.

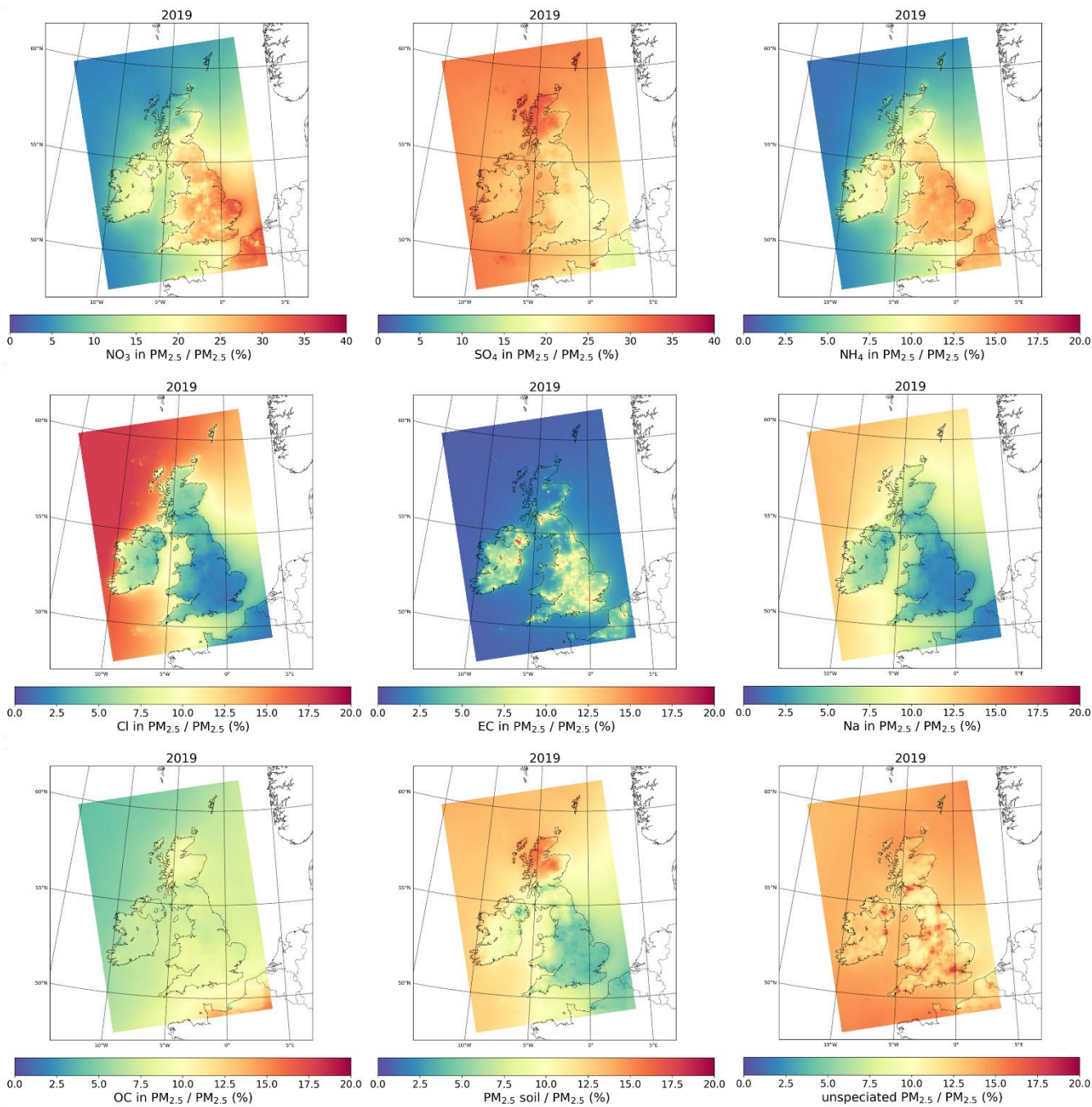


Figure S3. Composition of PM_{2.5} in percent for each component as defined and calculated by CMAQ for the 2019 simulation at 10 km × 10 km spatial resolution. This definition includes NO₃, SO₄, NH₄, Cl, EC, Na, OC soil and unspiciated. Note the different colour scale for NO₃ and SO₄ compared to the other components.

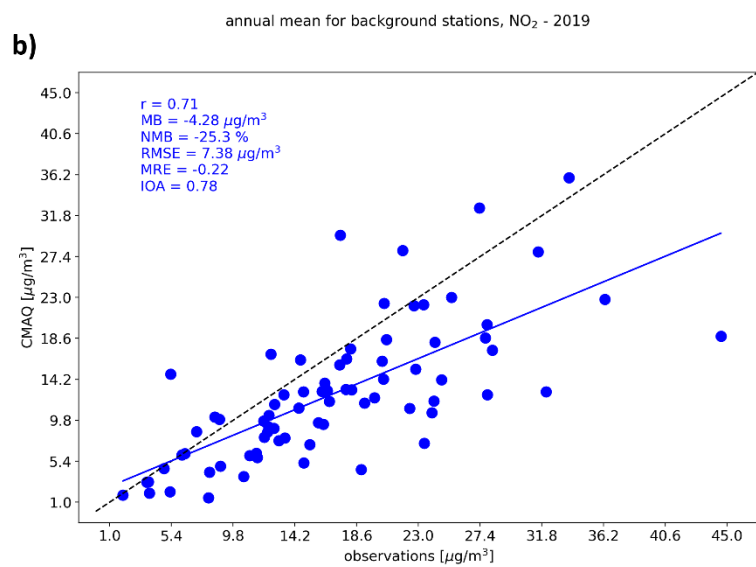
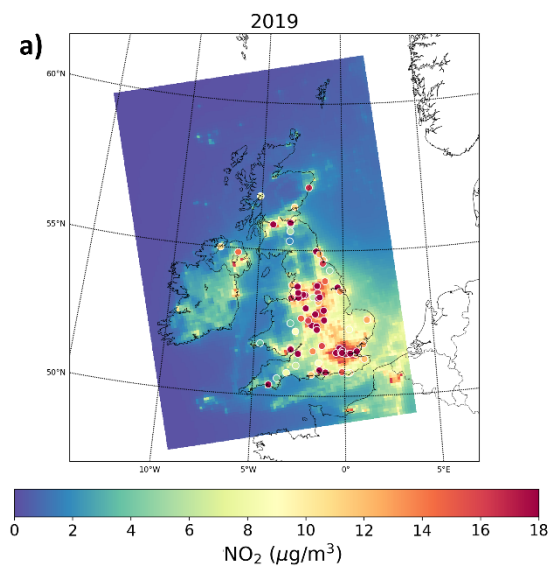


Figure S4. Spatial distribution of annual mean NO₂ concentrations in $\mu\text{g}/\text{m}^3$ calculated by CMAQ at 10 km resolution in 2019. The measured concentrations at the monitoring stations are shown with the coloured circles. b) Comparison between these annual measured concentrations with the modelled values in 2019. Only the background stations with a data capture higher than 75% are used. Insert values are the Pearson correlation coefficient (R), the mean bias (MB), the normalized mean bias (NMB), the mean relative error (MRE), the root-mean-square error (RMSE), and the index of agreement (IOA). The blue line represents the linear fit and dashed black line is the 1:1 slope.

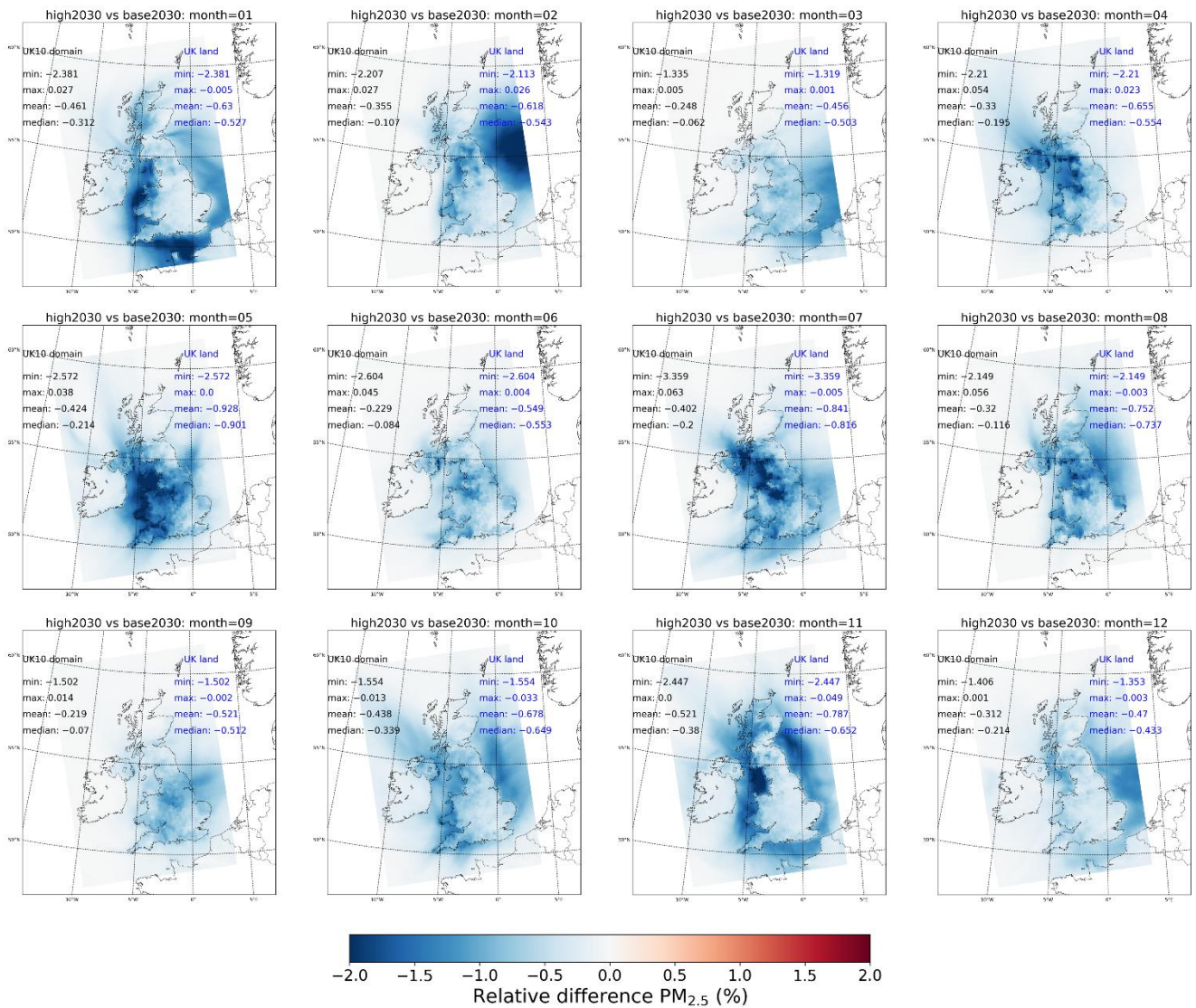


Figure S5. Relative difference of the PM_{2.5} concentration with high2030 scenario compared to base2030 for each month. The minimum, maximum, mean, and median relative difference values in the whole UK10 domain (in black) and for the UK land grid cells (blue) are provided. The relative difference is calculated as follow: $((\text{high2030}-\text{base2030})/\text{base2030}) \times 100\%$.

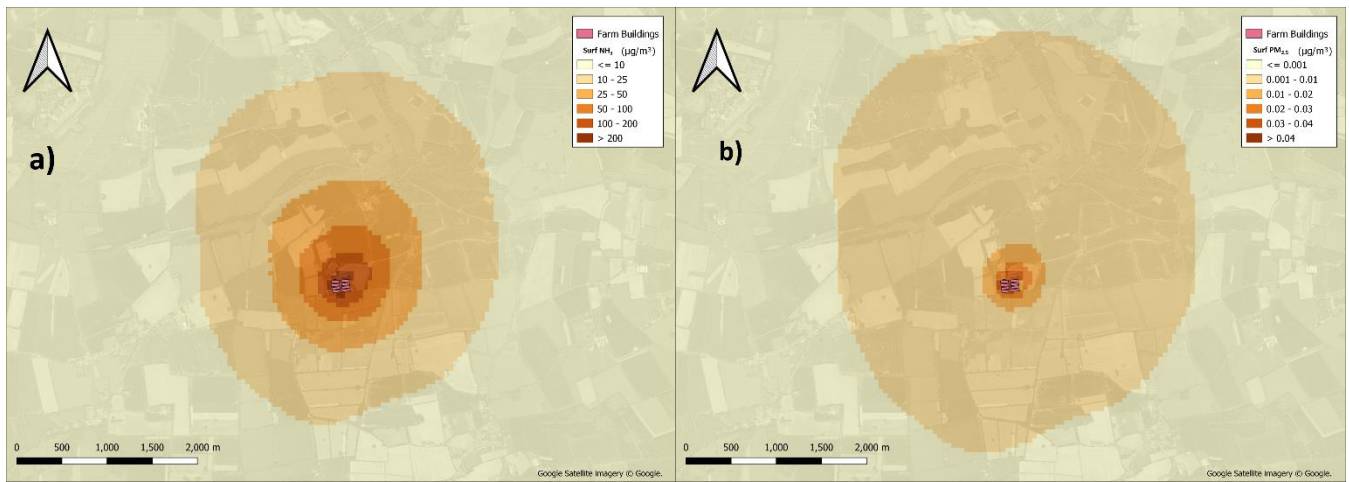


Figure S6. Distribution of NH_3 (a) and $\text{PM}_{2.5}$ (b) surface concentrations in $\mu\text{g}/\text{m}^3$ at farm three for the base2030 scenario.

Table S1. Name, coordinates, annual mean PM_{2.5} measured, and annual mean PM_{2.5} modelled concentrations in µg/m³ in 2019. The concentrations of the corresponding PM_{2.5} components in µg/m³ calculated by CMAQ are also provided.

site	Latitude (°)	Longitude (°)	PM _{2.5} Obs	PM _{2.5} CMAQ	NO ₃	SO ₄	NH ₄	EC	Cl	Na	OC	soil	unspeciated
Aberdeen	57.15736	-2.094278	7.19	2.45	0.32	0.64	0.23	0.28	0.09	0.1	0.19	0.18	0.41
Auchencorth Moss	55.79216	-3.2429	4.38	2.52	0.56	0.62	0.31	0.16	0.09	0.09	0.18	0.19	0.31
Barnstaple A39	51.074793	-4.041924	10.61	3.5	0.6	0.99	0.43	0.32	0.13	0.13	0.22	0.22	0.48
Belfast Centre	54.59965	-5.928833	8.61	5.09	1.16	1.15	0.66	0.53	0.09	0.1	0.4	0.22	0.79
Birmingham A4540 Roadside	52.476145	-1.874978	10.11	5.16	1.16	1.15	0.67	0.56	0.08	0.1	0.41	0.21	0.82
Birmingham Acocks Green	52.437165	-1.829999	9.16	5.28	0.9	1.33	0.63	0.68	0.15	0.13	0.41	0.22	0.83
Birmingham Ladywood	52.481346	-1.918235	10.79	4	0.96	0.92	0.5	0.26	0.12	0.13	0.36	0.23	0.53
Blackpool Marton	53.80489	-3.007175	10.76	4.09	1.01	0.94	0.54	0.29	0.11	0.11	0.33	0.22	0.53
Bristol St Paul's	51.462839	-2.584482	8.36	4.52	1.16	1.05	0.64	0.36	0.1	0.1	0.32	0.2	0.58
Camden Kerbside	51.54421	-0.175269	8	4.43	1.14	0.99	0.6	0.32	0.1	0.1	0.39	0.21	0.59
Cardiff Centre	51.48178	-3.17625	9.05	5.19	1.25	1.13	0.69	0.52	0.09	0.1	0.41	0.21	0.79
Carlisle Roadside	54.894834	-2.945307	9.41	2.22	0.29	0.65	0.23	0.17	0.11	0.11	0.17	0.19	0.31
Chatham Roadside	51.374264	0.54797	10.44	4.5	1.28	0.95	0.58	0.17	0.21	0.16	0.39	0.24	0.53
Chepstow A48	51.638094	-2.678731	6.32	3.6	0.62	0.86	0.39	0.45	0.09	0.1	0.24	0.22	0.63
Chesterfield Loundsley Green	53.244131	-1.454946	6.69	3.64	0.58	0.88	0.39	0.47	0.1	0.1	0.25	0.2	0.66
Chesterfield Roadside	53.231751	-1.456928	10.76	4.72	1.32	1.04	0.68	0.34	0.1	0.1	0.35	0.21	0.59
Chilbolton Observatory	51.149617	-1.438228	9.82	4.58	1.18	0.99	0.62	0.38	0.09	0.09	0.38	0.21	0.64
Christchurch Barrack Road	50.735454	-1.780888	12.35	4.87	1.05	1.17	0.64	0.49	0.1	0.1	0.35	0.22	0.75
Coventry Allesley	52.411628	-1.560189	11.12	4.75	1.31	1.02	0.67	0.37	0.09	0.09	0.36	0.2	0.61
Derry Rosemount	55.002818	-7.331179	11.62	6.14	1.51	1.28	0.81	0.67	0.09	0.11	0.45	0.23	0.98
Eastbourne	50.805778	0.271611	10.63	6.32	1.38	1.33	0.79	0.75	0.08	0.11	0.51	0.23	1.14
Edinburgh St Leonards	55.945589	-3.182186	10.8	6.62	1.49	1.39	0.84	0.77	0.09	0.11	0.52	0.23	1.18
Glasgow High	55.860936	-4.238214	9.89	6.98	1.39	1.48	0.84	0.9	0.08	0.11	0.56	0.23	1.38

Street													
Glasgow Townhead	55.865782	-4.243631	9.54	6.85	1.43	1.45	0.85	0.87	0.08	0.1	0.54	0.22	1.29
Grangemouth	56.010319	-3.704399	11.88	6.11	1.34	1.28	0.76	0.72	0.08	0.1	0.53	0.23	1.06
Greenock A8 Roadside	55.944079	-4.734421	12.4	6.98	1.48	1.46	0.86	0.9	0.09	0.11	0.53	0.23	1.32
Hull Freetown	53.74878	-0.341222	4.97	1.7	0.27	0.48	0.14	0.05	0.12	0.12	0.13	0.19	0.21
Inverness	57.481308	-4.241451	11.44	5.76	1.08	1.42	0.74	0.7	0.1	0.11	0.42	0.22	0.98
Leamington Spa	52.28881	-1.533119	10.22	4.02	0.95	0.92	0.53	0.34	0.1	0.1	0.31	0.21	0.56
Leeds Centre	53.80378	-1.546472	8.87	4.16	0.79	1.01	0.51	0.47	0.09	0.1	0.32	0.2	0.67
Leeds Headingley Kerbside	53.819972	-1.576361	9.48	4.95	0.98	1.22	0.63	0.5	0.11	0.11	0.42	0.22	0.75
Leicester University	52.619904	-1.127182	11.51	4.43	1.27	0.95	0.63	0.3	0.09	0.09	0.36	0.2	0.54
Liverpool Speke	53.34633	-2.844333	10.35	5.03	1.62	0.99	0.76	0.3	0.11	0.1	0.38	0.21	0.57
London Bexley	51.46603	0.184806	10.83	5.58	1.29	1.26	0.75	0.61	0.09	0.1	0.41	0.21	0.87
London Bloomsbury	51.52229	-0.125889	8.88	4.54	1.18	0.98	0.61	0.37	0.09	0.09	0.4	0.21	0.61
London Eltham	51.45258	0.070766	11.19	3.09	0.56	0.78	0.32	0.18	0.16	0.15	0.27	0.23	0.45
London Harlington	51.48879	-0.441614	8.96	5.24	1.15	1.23	0.66	0.47	0.12	0.13	0.45	0.23	0.79
London Honor Oak Park	51.449674	-0.037418	9.4	4.94	1.01	1.2	0.64	0.54	0.11	0.11	0.36	0.21	0.75
London N. Kensington	51.52105	-0.213492	10.76	5.55	1.35	1.19	0.72	0.54	0.09	0.11	0.49	0.23	0.83
London Teddington Bushy Park	51.425286	-0.345606	9.45	5.84	1.06	1.42	0.73	0.75	0.1	0.11	0.43	0.22	1.02
London Westminster	51.49467	-0.131931	10.42	4.54	1.03	1.08	0.61	0.42	0.09	0.1	0.33	0.22	0.65
Lough Navar	54.43951	-7.900328	9.6	5.32	1.13	1.23	0.67	0.56	0.1	0.11	0.46	0.21	0.84
Manchester Piccadilly	53.48152	-2.237881	10.69	5.44	1.36	1.17	0.72	0.5	0.08	0.11	0.48	0.23	0.79
Middlesbrough	54.569297	-1.220874	9.48	4.32	1.18	0.98	0.63	0.3	0.1	0.09	0.32	0.2	0.53
Narberth	51.782616	-4.69237	9.41	4.22	0.82	1.02	0.5	0.46	0.1	0.11	0.31	0.22	0.68
Newport	51.601203	-2.977281	9.48	4.51	1.01	1.12	0.61	0.39	0.11	0.11	0.34	0.21	0.62
Northampton Spring Park	52.272257	-0.916605	8.03	4.51	0.87	1.22	0.59	0.39	0.11	0.12	0.34	0.23	0.65
Norwich Lakenfields	52.614823	1.302686	11.07	4.83	1.22	1.08	0.67	0.43	0.1	0.1	0.36	0.21	0.67

All mean	-	-	9.69	4.74	1.06	1.09	0.61	0.46	0.10	0.11	0.37	0.22	0.72
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