S1 Mapping of CORINE land use to USGS land use classes

Table S1. Mapping of CORINE land use to USGS land use classes

CORINE land use type	CORINE id	USGS land use type	USGS id
Continuous urban fabric	1	high intensity residential	32
Discontinuous urban fabric	2	low intensity residential	31
Industry, airports, dump sites, constructions, etc.	3-9	commercial, industry, transport	33
Green urban areas, sport and leisure facilities	10-11	low intensity residential	31
Non-irrigated arable land	12	dryland cropland and pasture	2
Permanently irrigated land, rice fields	13-14	irrigated cropland and pasture	3
Vineyards, fruit/berry/olive plantations	15-17	cropland/woodland mosaic	6
Pastures	18	Dryland cropland and pasture	2
Annual crops, complex cultivation, etc.	19-22	Cropland/woodland mosaic	6
Broad-leaf forest	23	Deciduous broadleaf forest	11
Coniferous forest	24	Evergreen needle leaf forest	14
Mixed forest	25	Mixed forest	15
Natural grasslands	26	Grassland	7
Moors and heathland, sclerophyllos vegetation, etc.	27-29	Mixed shrubland/grassland	9
Beaches, bare rocks, sparse vegetation, burns	30-33	Barren or sparsely vegetated	19
Glaciers and perpetual snow	24	snow or ice	24
Marshes, peat bogs, salines, intertidal flats	35-39	herbaceous wetland	17
Water	40-43	inland water bodies	28
Sea and ocean	44	water bodies	16
Unclassified	48-50	unclassified	0

S2 Supplementary figures and tables

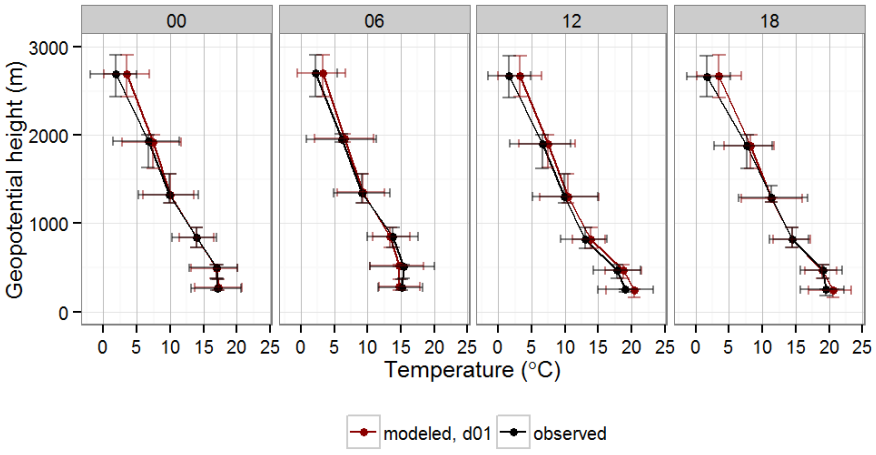

Figure S1. JJA mean profiles of observed and modeled (base run, 15kmx15km horizontal resolution) temperature at Lindenberg at 00:00, 06:00, 12:00 and 18:00 UTC. Error bars show the 25th and 75th percentiles of temperature and geopotential height.

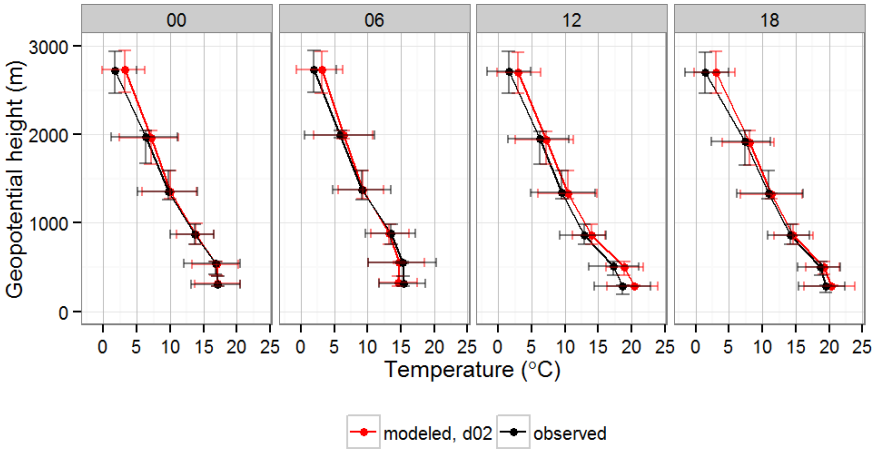

Figure S2. JJA mean profiles of observed and modeled (base run, 3kmx3km horizontal resolution) temperature at Lindenberg at 00:00, 06:00, 12:00 and 18:00 UTC. Error bars show the 25th and 75th percentiles of temperature and geopotential height.

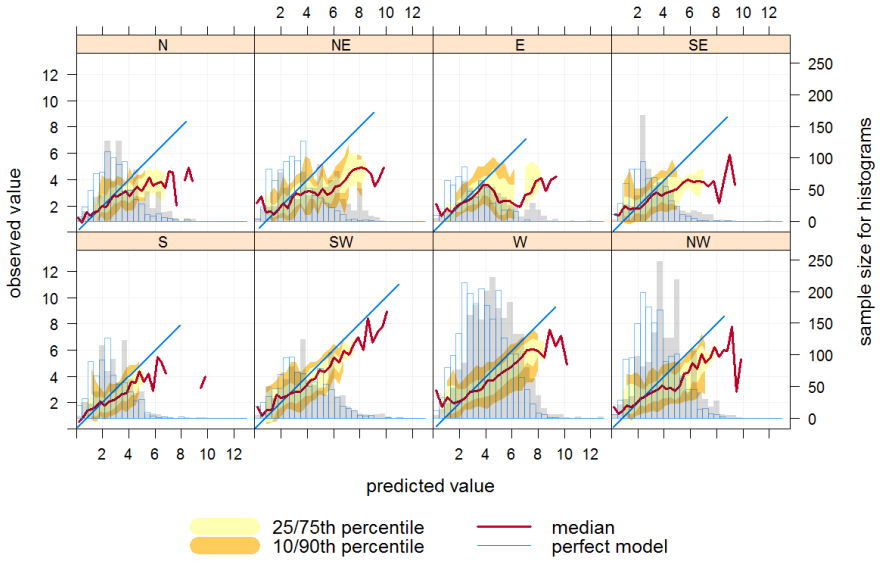

Figure S3. Conditional quantile plot of wind speed, split by modeled wind direction. Observations at Tempelhof, Schöneberg and Tegel are compared to model results extracted for the respective grid cells, 1km horizontal resolution, base run.

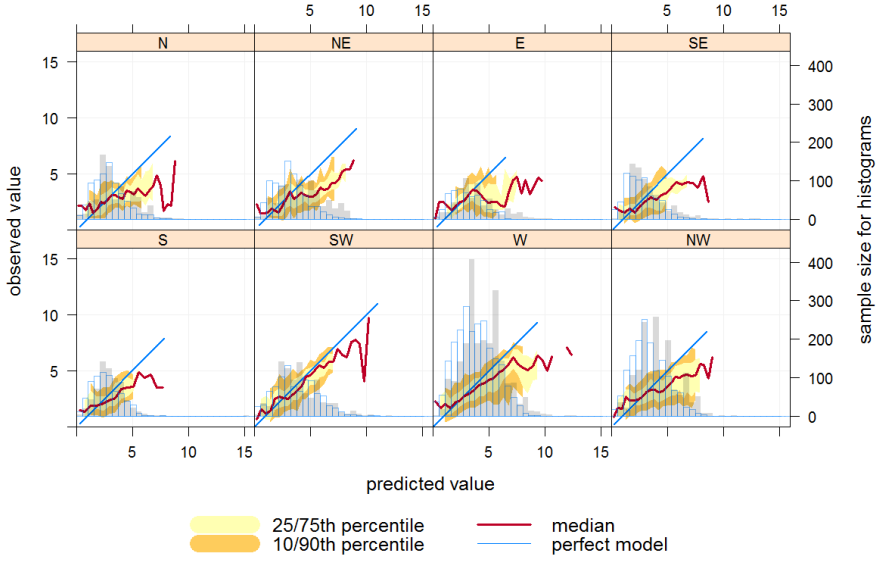

Figure S4. Conditional quantile plot of wind speed, split by modeled wind direction. Observations at Tempelhof, Schöneberg and Tegel are compared to model results extracted for the respective grid cells,1km horizontal resolution, S1_urb.

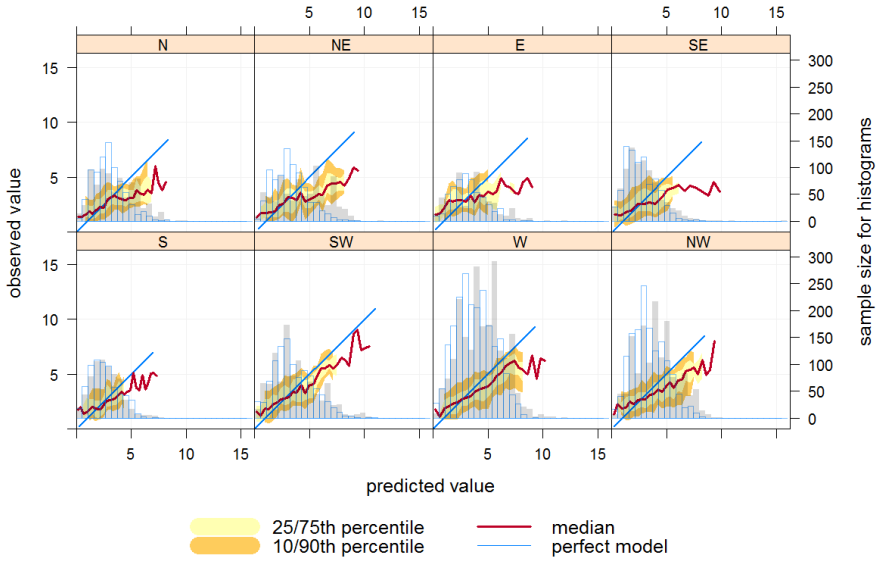

Figure S5. Conditional quantile plot of wind speed, split by modeled wind direction. Observations at Tempelhof, Schöneberg and Tegel are compared to model results extracted for the respective grid cells, 1km horizontal resolution, S2_mos.

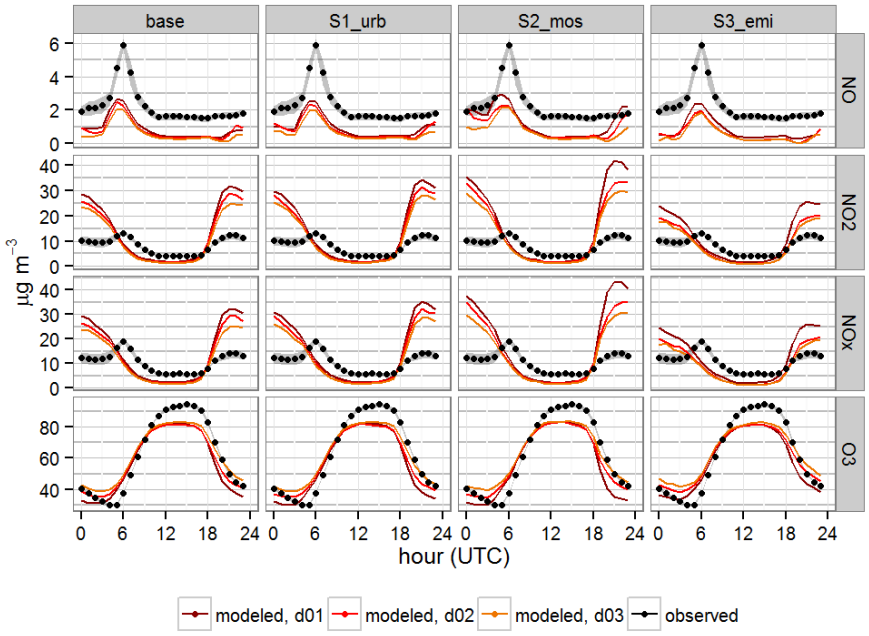

Figure S6. Mean diurnal cycles of NO, NO_2, NO_x and O_3 for all Berlin and Potsdam urban background stations as observed and modeled by the base run, S1_urb, S2_mos and S3_emi. The diurnal cycle is averaged over three stations for NO, NO_2 and NO_x and three stations of O_3. The grey shaded areas represent the variability between the different stations' diurnal cycles, showing 25th and 75th percentiles.

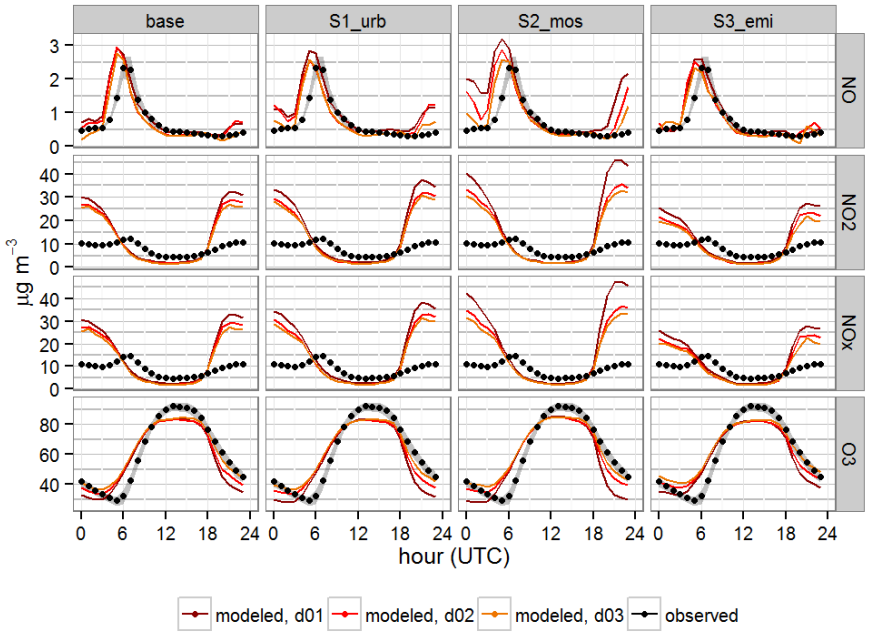

Figure S7. Mean diurnal cycles of NO, NO_2, NO_x and O_3 for all Berlin and Potsdam urban background stations as observed and modeled by the base run, S1_urb, S2_mos and S3_emi. The diurnal cycle is averaged over four stations for NO, NO_2 and NO_x and four stations of O_3. The grey shaded areas represent the variability between the different stations' diurnal cycles, showing 25th and 75th percentiles.

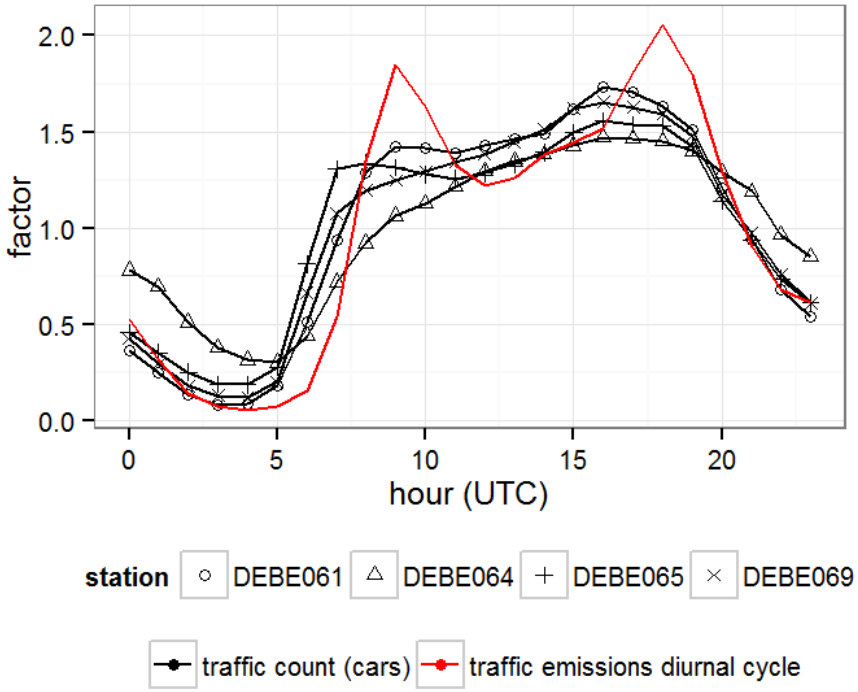

Figure S8. Prescribed diurnal traffic emission factors and factors calculated from JJA 2014 traffic counts at five stations in Berlin, taking into account weekday car traffic in both directions. A factor of one corresponds to the mean over the whole day, a larger factor points to higher emissions/number of cars counted than on average during one day.

Table S2. Statistics of hourly 2m temperature for JJA for all stations (top: land use class of the respective grid cell changes with resolution, bottom: same land use class for all three domains). „LU“ refers the WRF land use class of the grid cell in the respective domain, „Obs“ refers to the JJA observed mean, „Mod“ refers to the JJA modeled mean for the respective grid cell. MB is the mean bias for JJA and r is the correlation of hourly values. Obs, Mod and MB are in °C.

Station				**base**			**S1_urb**			**S2_mos**		
		LU	**Obs**	**Mod**	**MB**	**r**	**Mod**	**MB**	**r**	**Mod**	**MB**	**r**
kani	d01	31	18.1	19.6	1.5	0.88	19.3	1.2	0.88	19.2	1	0.89
	d02	2	18.1	19.4	1.3	0.9	19.3	1.2	0.9	19.3	1.1	0.89
	d03	2	18.1	19.4	1.2	0.9	19.2	1.1	0.9	19.2	1.1	0.89
marz	d01	2	19.2	18.8	-0.4	0.91	18.7	-0.6	0.9	18.9	-0.4	0.92
	d02	31	19.2	19.6	0.4	0.91	19.4	0.2	0.9	19.2	0	0.9
	d03	31	19.2	19.7	0.4	0.91	19.3	0.1	0.9	19.2	0	0.9
scho	d01	31	18.8	19.6	0.8	0.92	19.3	0.6	0.91	19.2	0.4	0.92
	d02	31	18.8	19.9	1.1	0.91	19.7	0.9	0.91	19.4	0.6	0.91
	d03	2	18.8	19.3	0.6	0.92	19.2	0.4	0.91	19.3	0.6	0.91
temp	d01	31	19.3	19.6	0.3	0.92	19.3	0	0.91	19.3	-0.1	0.92
	d02	33	19.3	20.3	0.9	0.9	19.7	0.4	0.9	19.6	0.3	0.9
	d03	33	19.3	20.2	0.8	0.9	19.6	0.3	0.9	19.5	0.2	0.9
nans	d01	31	20.8	19.6	-1.1	0.91	19.3	-1.4	0.9	19.3	-1.5	0.91
	d02	31	20.8	19.9	-0.9	0.9	19.6	-1.1	0.89	19.6	-1.2	0.9
	d03	32	20.8	20.2	-0.5	0.9	20	-0.8	0.89	19.6	-1.2	0.9
dahf	d01	31	17.9	19.6	1.6	0.88	19.3	1.4	0.89	19.1	1.1	0.9
	d02	14	17.9	19.3	1.4	0.9	19.1	1.2	0.9	19.3	1.4	0.88
	d03	14	17.9	19.2	1.3	0.9	19	1.1	0.9	19.2	1.3	0.88
bamb	d01	31	19.3	19.6	0.4	0.9	19.3	0.1	0.89	19.3	0	0.91
	d02	31	19.3	19.9	0.6	0.89	19.6	0.4	0.88	19.6	0.3	0.9
	d03	32	19.3	20.2	0.9	0.9	19.9	0.7	0.89	19.5	0.2	0.9
botg	d01	31	18.6	19.6	1	0.91	19.3	0.7	0.91	19.3	0.7	0.91
	d02	31	18.6	19.9	1.3	0.91	19.6	1	0.91	19.4	0.8	0.9
	d03	31	18.6	19.8	1.2	0.91	19.5	0.9	0.91	19.3	0.7	0.9
buch	d01	31	18.5	19.5	1	0.9	19.2	0.7	0.9	19.1	0.6	0.9
	d02	31	18.5	19.6	1.1	0.9	19.3	0.8	0.9	19.1	0.6	0.9
	d03	31	18.5	19.5	1	0.9	19.2	0.7	0.9	18.9	0.4	0.9
pots	d01	31	18.5	19.6	1.1	0.91	19.3	0.8	0.91	19.1	0.6	0.92
	d02	31	18.5	19.8	1.3	0.9	19.6	1.1	0.9	19.2	0.7	0.91
	d03	31	18.5	19.7	1.2	0.91	19.5	1	0.9	19.2	0.6	0.9
tege	d01	31	19.1	19.5	0.3	0.92	19.2	0.1	0.91	19.1	0	0.92
	d02	31	19.1	19.9	0.7	0.91	19.6	0.5	0.91	19.5	0.4	0.91
	d03	31	19.1	19.8	0.7	0.91	19.5	0.4	0.91	19.4	0.3	0.91
dest	d01	31	20.1	19.6	-0.4	0.91	19.3	-0.7	0.9	19.3	-0.8	0.91
	d02	31	20.1	20	-0.1	0.9	19.7	-0.4	0.89	19.6	-0.4	0.9
	d03	31	20.1	20	-0.1	0.9	19.6	-0.5	0.89	19.5	-0.5	0.9
roth	d01	31	18.8	19.6	0.8	0.91	19.3	0.5	0.91	19.3	0.4	0.91
	d02	31	18.8	19.9	1	0.91	19.6	0.8	0.9	19.4	0.6	0.9
	d03	31	18.8	19.8	1	0.91	19.5	0.7	0.9	19.3	0.5	0.9
albr	d01	31	18.3	19.6	1.3	0.91	19.3	1	0.91	19.3	0.9	0.91
	d02	31	18.3	19.9	1.5	0.9	19.6	1.3	0.91	19.5	1.1	0.9
	d03	31	18.3	19.9	1.5	0.9	19.5	1.2	0.91	19.3	1	0.9
tier	d01	31	19.1	19.6	0.5	0.91	19.3	0.2	0.9	19.3	0.1	0.91
	d02	31	19.1	19.9	0.8	0.9	19.6	0.5	0.9	19.6	0.4	0.89
	d03	31	19.1	19.9	0.8	0.9	19.6	0.4	0.9	19.5	0.4	0.89

Table S3. Statistics of daily maximum 2m temperature for JJA for all stations (top: land use class of the respective grid cell changes with resolution, bottom: same land use class for all three domains). „LU“ refers the WRF land use class of the grid cell in the respective domain, „Obs“ refers to the JJA observed mean, „Mod“ refers to the JJA modeled mean for the respective grid cell. MB is the mean bias for JJA and r is the correlation of hourly values. Obs, Mod and MB are in °C.

Station				**base**			**S1_urb**			**S2_mos**		
		LU	**Obs**	**Mod**	**MB**	**r**	**Mod**	**MB**	**r**	**Mod**	**MB**	**r**
kani	d01	31	24.2	23.8	-0.4	0.88	23.6	-0.6	0.87	23.3	-0.9	0.89
	d02	2	24.2	24.4	0.2	0.9	24.3	0.1	0.87	23.9	-0.3	0.9
	d03	2	24.2	24.3	0.1	0.9	24.2	0	0.87	23.8	-0.4	0.89
marz	d01	2	23.9	23.4	-0.5	0.88	23.2	-0.8	0.86	23	-1	0.9
	d02	31	23.9	24.2	0.2	0.89	24	0	0.87	23.5	-0.4	0.9
	d03	31	23.9	24.1	0.2	0.89	23.9	0	0.87	23.5	-0.5	0.9
scho	d01	31	23.8	23.8	0	0.88	23.6	-0.3	0.87	23.3	-0.5	0.9
	d02	31	23.8	24.4	0.6	0.9	24.3	0.5	0.88	23.8	0	0.91
	d03	2	23.8	24.3	0.5	0.9	24.1	0.3	0.88	23.7	-0.1	0.9
temp	d01	31	24.1	23.8	-0.3	0.88	23.5	-0.6	0.87	23.3	-0.8	0.89
	d02	33	24.1	24.5	0.3	0.9	24.3	0.2	0.87	23.8	-0.3	0.9
	d03	33	24.1	24.4	0.2	0.9	24.2	0	0.87	23.6	-0.5	0.91
nans	d01	31	25.5	23.8	-1.7	0.86	23.5	-1.9	0.85	23.3	-2.2	0.88
	d02	31	25.5	24.4	-1.1	0.87	24.2	-1.3	0.85	23.8	-1.7	0.88
	d03	32	25.5	24.5	-1	0.87	24.2	-1.3	0.85	23.6	-1.8	0.88
dahf	d01	31	23.8	23.7	-0.1	0.89	23.5	-0.3	0.88	23.3	-0.5	0.9
	d02	14	23.8	24.1	0.3	0.9	24	0.2	0.88	23.7	-0.1	0.9
	d03	14	23.8	24	0.2	0.9	23.8	0	0.88	23.5	-0.3	0.9
bamb	d01	31	22.9	23.8	0.9	0.88	23.5	0.7	0.87	23.3	0.4	0.9
	d02	31	22.9	24.4	1.5	0.89	24.2	1.3	0.87	23.8	0.9	0.9
	d03	32	22.9	24.4	1.5	0.9	24.1	1.2	0.87	23.6	0.7	0.9
botg	d01	31	23.6	23.8	0.1	0.89	23.5	-0.1	0.88	23.3	-0.3	0.9
	d02	31	23.6	24.4	0.8	0.9	24.2	0.5	0.88	23.7	0.1	0.9
	d03	31	23.6	24.3	0.6	0.9	24.1	0.4	0.88	23.6	-0.1	0.9
buch	d01	31	23.9	23.6	-0.3	0.89	23.4	-0.6	0.88	23.1	-0.8	0.9
	d02	31	23.9	24.1	0.1	0.9	23.8	-0.1	0.88	23.5	-0.5	0.9
	d03	31	23.9	24	0	0.9	23.7	-0.2	0.87	23.3	-0.6	0.9
pots	d01	31	23.6	23.7	0.2	0.89	23.5	-0.1	0.87	23.3	-0.3	0.89
	d02	31	23.6	24.5	0.9	0.89	24.2	0.7	0.87	23.8	0.2	0.89
	d03	31	23.6	24.3	0.7	0.89	24	0.4	0.87	23.5	0	0.9
tege	d01	31	23.7	23.6	-0.1	0.89	23.4	-0.3	0.87	23.1	-0.6	0.9
	d02	31	23.7	24.4	0.6	0.9	24.2	0.5	0.88	23.7	0	0.9
	d03	31	23.7	24.3	0.6	0.9	24	0.3	0.88	23.5	-0.2	0.9
dest	d01	31	24.2	23.8	-0.4	0.88	23.5	-0.7	0.87	23.3	-0.9	0.9
	d02	31	24.2	24.4	0.2	0.9	24.2	0	0.87	23.8	-0.4	0.9
	d03	31	24.2	24.4	0.2	0.9	24.1	-0.1	0.87	23.7	-0.5	0.9
roth	d01	31	23.5	23.8	0.3	0.89	23.5	0	0.87	23.3	-0.2	0.89
	d02	31	23.5	24.4	0.9	0.89	24.2	0.7	0.88	23.7	0.2	0.9
	d03	31	23.5	24.3	0.8	0.9	24.1	0.6	0.87	23.6	0.1	0.9
albr	d01	31	23.6	23.8	0.8	0.89	23.5	0	0.87	23.3	-0.3	0.89
	d02	31	23.6	24.4	0.8	0.9	24.2	0.6	0.88	23.8	0.2	0.89
	d03	31	23.6	24.3	0.7	0.9	24.1	0.5	0.87	23.6	0.1	0.9
tier	d01	31	24.6	23.8	-0.8	0.88	23.5	-1.1	0.87	23.3	-1.3	0.89
	d02	31	24.6	24.4	-0.2	0.89	24.2	-0.4	0.87	23.8	-0.9	0.89
	d03	31	24.6	24.4	-0.2	0.89	24.1	-0.5	0.86	23.7	-0.9	0.89

Table S4. Statistics of hourly wind speed for JJA. „Obs“ refers to the JJA observed mean, „mod“ refers to the JJA modeled mean for the respective grid cell. MB is the mean bias for JJA, and r is the correlation of hourly values. Obs, Mod and MB are in ms^{-1}. The statistics are shown for the results from the model domains of 15km (d01), 3km (d02) and 1km (d03) horizontal resolution.

Station			**base**			**S1_urb**			**S2_mos**		
		Obs	**Mod**	**MB**	**r**	**Mod**	**MB**	**r**	**Mod**	**MB**	**r**
pots	d01	3.6	4.4	0.8	0.51	4	0.4	0.5	3.8	0.2	0.52
	d02	3.6	4.3	0.7	0.5	3.9	0.3	0.48	3.9	0.3	0.51
	d03	3.6	4.3	0.7	0.51	4	0.4	0.48	4	0.4	0.52
scho	d01	3.5	4.4	0.9	0.64	4	0.5	0.59	3.8	0.4	0.67
	d02	3.5	4.3	0.9	0.6	4	0.5	0.57	3.8	0.4	0.65
	d03	3.5	4	0.5	0.62	3.9	0.5	0.58	3.5	0.1	0.65
tege	d01	2.9	4.4	1.5	0.62	3.9	1	0.56	4	1	0.66
	d02	2.9	4.3	1.4	0.6	3.8	0.9	0.58	4.1	1.2	0.65
	d03	2.9	4.2	1.3	0.56	3.9	1	0.56	4.1	1.1	0.66
temp	d01	3.2	4.4	1.1	0.62	3.9	0.6	0.56	3.9	0.6	0.66
	d02	3.2	4.1	0.8	0.57	4.1	0.9	0.54	3.8	0.6	0.63
	d03	3.2	4.1	0.8	0.56	4.2	0.9	0.53	3.8	0.6	0.62

Table S5. Statistics of daily NO_2 for JJA. „Obs“ refers to the JJA observed mean, „mod“ refers to the JJA modeled mean for the respective grid cell. MB is the mean bias for JJA, NMB refers to the normalized mean bias and r is the correlation of hourly values. Obs, Mod and MB are given in $\mu g\,m^{-3}$ and NMB is given in %.

St.			**base**				**S1_urb**				**S2_mos**				**S3_mos**			
		Obs	**Mod**	**MB**	**NMB**	**r**	**Mod**	**MB**	**NMB**	**r**	**Mod**	**MB**	**NMB**	**r**	**Mod**	**MB**	**NMB**	**r**
froh	d01	7.6	18.6	11.1	146.8	0.56	20.3	12.8	168.8	0.43	23.6	16.1	212.8	0.56	17	9.5	125.3	0.45
	d02	7.6	9.7	2.1	27.8	0.55	10	2.5	32.7	0.49	10.7	3.1	41.1	0.55	7.8	0.3	3.8	0.5
	d03	7.6	9.5	1.9	25.4	0.55	10.1	2.5	33.7	0.5	10.1	2.5	33.7	0.56	7.7	0.1	1.8	0.5
grun	d01	8.6	11.8	3.2	37.6	0.45	12.4	3.9	45.1	0.48	15.5	7	81.4	0.49	8.8	0.2	2.9	0.42
	d02	8.6	15.1	6.6	76.9	0.29	15.8	7.2	84.2	0.4	17.2	8.6	100.6	0.38	11.9	3.3	39.1	0.44
	d03	8.6	15	6.5	75.6	0.26	15.6	7.1	82.7	0.38	17.6	9	105.6	0.33	10.8	2.2	26	0.35
mueg	d01	8.3	13.3	5	60.6	0.41	14.6	6.3	75.5	0.35	16.8	8.5	102.1	0.47	11.5	3.2	38.3	0.37
	d02	8.3	13.6	5.3	63.9	0.4	15.1	6.8	81.3	0.36	15.7	7.4	88.6	0.46	12.4	4.1	49.3	0.33
	d03	8.3	12.8	4.5	53.7	0.45	13.7	5.4	65	0.38	14.5	6.2	74.2	0.49	11.3	3	36.1	0.37
schw	d01	10.8	20.1	9.4	86.9	0.39	21.6	10.8	100.3	0.32	24.6	13.8	128.3	0.46	18.9	8.2	75.7	0.28
	d02	10.8	13.4	2.7	24.7	0.35	14.4	3.6	33.2	0.34	15.3	4.5	42.2	0.45	9.9	-0.9	-8.3	0.19
	d03	10.8	13.3	2.5	23.5	0.36	14.6	3.8	35.5	0.36	15.2	4.4	40.6	0.44	10.7	0	-0.4	0.16
blan	d01	9.5	10.3	0.8	8.7	0.24	10.1	0.7	7.2	0.2	10.3	0.8	8.6	0.23	9.1	-0.3	-3.5	0.16
	d02	9.5	12.2	2.7	28.5	0.19	13	3.5	37.1	0.17	13.9	4.5	47.3	0.27	9.9	0.4	4.4	0.15
	d03	9.5	10.7	1.3	13.5	0.23	11.2	1.7	18	0.16	11.9	2.5	25.9	0.26	8.7	-0.8	-8.1	0.14
buch	d01	8.4	18.6	10.2	121.6	0.59	20.3	11.9	141.4	0.52	23.6	15.2	180.9	0.55	17	8.6	102.3	0.52
	d02	8.4	10.4	2	24.1	0.67	11.7	3.2	38.5	0.63	12.1	3.7	44.2	0.63	9	0.5	6.5	0.64
	d03	8.4	9.8	1.4	16.3	0.67	11.5	3.1	37.2	0.59	11.5	3.1	37.1	0.62	8.5	0.1	0.9	0.63
glie	d01	6.9	11.7	4.8	69.8	0.39	12.4	5.5	79.2	0.46	15.4	8.5	123.6	0.34	8.8	1.9	27.1	0.41
	d02	6.9	14.2	7.3	105.7	0.48	14.2	7.3	106.3	0.53	16.4	9.5	137.3	0.42	8.2	1.3	19.1	0.55
	d03	6.9	12.6	5.7	82.2	0.45	12.7	5.8	84.4	0.5	14.6	7.7	112.1	0.41	8.1	1.2	16.9	0.57
amst	d01	22.6	18.6	-3.9	-17.4	0.68	20.3	-2.3	-10	0.59	23.6	1.1	4.7	0.66	17	-5.5	-24.6	0.6
	d02	22.6	22.2	-0.4	-1.8	0.64	24.4	1.8	8	0.57	25.7	3.1	13.7	0.64	23.2	0.7	3	0.55
	d03	22.6	21.2	-1.4	-6.3	0.64	23.9	1.3	5.8	0.58	25.5	3	13.1	0.62	25	2.4	10.7	0.57
belz	d01	20	20.1	0.2	0.9	0.5	21.6	1.6	8.1	0.41	24.6	4.6	23.2	0.5	18.9	-1	-5.2	0.47
	d02	20	20.5	0.6	2.8	0.46	22.1	2.1	10.7	0.38	23.2	3.2	16.1	0.47	18.8	-1.2	-6.1	0.33
	d03	20	19.3	-0.6	-3.1	0.47	20.9	1	4.8	0.45	22.6	2.6	13.1	0.5	18.2	-1.8	-9	0.33
brue	d01	23.5	20.1	-3.3	-14.2	0.49	21.6	-1.9	-8	0.37	24.6	1.1	4.8	0.47	18.9	-4.5	-19.3	0.44
	d02	23.5	23.9	0.4	1.6	0.59	26	2.5	10.9	0.5	25.4	1.9	8.1	0.57	26.5	3	12.9	0.51
	d03	23.5	22.2	-1.3	-5.5	0.6	24.6	1.1	4.8	0.55	25.1	1.6	6.7	0.59	43.4	19.9	84.9	0.52
nans	d01	21.7	20.1	-1.6	-7.3	0.49	21.6	-0.1	-0.7	0.44	24.6	2.9	13.2	0.53	18.9	-2.8	-12.9	0.5
	d02	21.7	23.9	2.1	9.7	0.57	26	4.3	19.7	0.54	25.4	3.6	16.8	0.62	26.5	4.8	21.9	0.53
	d03	21.7	21.1	-0.6	-2.8	0.54	23.4	1.7	7.8	0.52	24	2.2	10.3	0.61	21	-0.8	-3.6	0.42
pots	d01	13.2	11.7	-1.5	-11.2	0.44	12.4	-0.8	-6.3	0.33	15.4	2.2	17	0.35	8.8	-4.4	-33.5	0.31
	d02	13.2	9.5	-3.7	-27.8	0.41	9.6	-3.5	-26.9	0.29	10.8	-2.4	-18.3	0.36	8.1	-5	-38.2	0.32
	d03	13.2	8.7	-4.5	-34.4	0.4	8.9	-4.3	-32.7	0.29	9.6	-3.6	-27.2	0.34	7.5	-5.7	-43.5	0.33

Table S6. Statistics of daily NO for JJA. „Obs“ refers to the JJA observed mean, „mod“ refers to the JJA modeled mean for the respective grid cell. MB is the mean bias for JJA, NMB refers to the normalized mean bias and r is the correlation of hourly values. Obs, Mod and MB are given in $\mu g\,m^{-3}$ and NMB is given in %.

St.			base				S1_urb				S2_mos				S3_mos			
		Obs	Mod	MB	NMB	r	Mod	MB	NMB	r	Mod	MB	NMB	r	Mod	MB	NMB	r
froh	d01	0.8	1.6	0.8	112.6	0.46	1.7	0.9	122.5	0.35	2.4	1.6	217.5	0.44	1.4	0.6	80.1	0.38
	d02	0.8	0.7	-0.1	-7.5	0.51	0.6	-0.1	-18.7	0.35	0.7	0	-4.1	0.34	0.6	-0.2	-21	0.38
	d03	0.8	0.6	-0.1	-19.5	0.49	0.6	-0.2	-23.5	0.32	0.6	-0.1	-14.8	0.29	0.5	-0.2	-27.2	0.28
grun	d01	0.6	0.7	0.1	16.3	0.22	0.7	0.1	23	0.2	0.9	0.3	59.6	0.29	0.5	-0.1	-12.1	0.28
	d02	0.6	1	0.4	73.3	0.29	1	0.4	70	0.22	1.2	0.7	120.5	0.31	0.9	0.3	61.6	0.32
	d03	0.6	0.8	0.3	46.9	0.27	0.8	0.3	48.3	0.25	1.1	0.5	96	0.25	0.9	0.3	52.6	-0.02
mueg	d01	0.8	0.7	-0.1	-14.2	0.18	0.8	-0.1	-6.3	0.17	0.9	0.1	14.8	0.38	0.7	-0.2	-19.7	0.13
	d02	0.8	0.8	0	0.3	0.06	1.2	0.3	40.8	0.2	1	0.2	23.6	0.47	0.8	0	0.6	0.06
	d03	0.8	0.7	-0.1	-12.7	0.1	1	0.1	15.6	0.21	0.8	0	2.7	0.48	0.8	0	-0.9	0.1
schw	d01	0.9	1.7	0.7	76.1	0.36	1.7	0.8	80	0.33	2.8	1.8	194	0.46	1.6	0.6	64.6	0.3
	d02	0.9	0.7	-0.2	-21.7	0.25	0.9	-0.1	-9.1	0.38	1	0	1.7	0.32	0.6	-0.4	-39.7	0.22
	d03	0.9	0.7	-0.3	-28.1	0.38	0.8	-0.2	-19.3	0.35	0.9	-0.1	-7	0.39	0.6	-0.3	-34.7	0.27
blan	d01	2.4	1.4	-1	-42.2	0.23	1.4	-1	-41.1	0.21	1.5	-0.9	-38.7	0.17	1.4	-1	-42.1	0.17
	d02	2.4	1.4	-1	-40.3	0.14	1.5	-0.9	-36.1	0.38	1.7	-0.7	-30.5	0.23	1.4	-1	-41.5	0.1
	d03	2.4	1.4	-1	-42.9	0.1	1.4	-1	-43.1	0.22	1.5	-0.9	-37.4	0.18	1.4	-1	-43	0.1
buch	d01	2.6	2.7	0.2	6.1	0.4	2.7	0.2	6	0.37	3.4	0.8	32.6	0.4	2.5	-0.1	-3.1	0.34
	d02	2.6	2.3	-0.3	-12.6	0.43	2.3	-0.3	-10.8	0.4	2.4	-0.2	-6.4	0.47	2.3	-0.3	-12.1	0.41
	d03	2.6	2.2	-0.4	-15.7	0.42	2.3	-0.3	-11.7	0.44	2.3	-0.3	-11.9	0.4	2.2	-0.4	-16.1	0.2
glie	d01	1.8	1.5	-0.3	-16.9	0.34	1.5	-0.3	-15.6	0.33	1.7	-0.1	-5.2	0.47	1.4	-0.4	-21.7	0.32
	d02	1.8	1.8	0.1	5.2	0.47	1.8	0.1	3.6	0.37	2.1	0.3	18.3	0.32	1.6	-0.1	-8.4	0.31
	d03	1.8	1.6	-0.1	-7.7	0.5	1.6	-0.1	-7.9	0.38	1.8	0	2.5	0.28	1.5	-0.2	-13.4	0.34
amst	d01	4	1.6	-2.4	-60.1	0.5	1.7	-2.3	-58.2	0.56	2.4	-1.6	-40.4	0.59	1.4	-2.6	-66.2	0.57
	d02	4	2.7	-1.3	-32.4	0.47	2.9	-1	-26.2	0.55	4.2	0.2	5.9	0.45	3.6	-0.4	-9.2	0.61
	d03	4	2.4	-1.6	-40.3	0.39	2.6	-1.4	-34.6	0.4	4	0	-0.3	0.38	4	0	0.5	0.4
belz	d01	3.5	2.7	-0.8	-22.3	0.36	2.7	-0.8	-23.1	0.2	3.7	0.3	8.1	0.48	2.5	-0.9	-26.8	0.21
	d02	3.5	2.7	-0.8	-22.2	0.36	2.8	-0.6	-18.4	0.42	3.8	0.3	8.5	0.39	2.6	-0.9	-24.8	0.06
	d03	3.5	2.6	-0.9	-26	0.3	2.6	-0.9	-25.9	0.4	3.4	-0.1	-2.6	0.43	2.5	-0.9	-26.4	0.11
brue	d01	5.1	2.7	-2.4	-46.9	0.24	2.7	-2.4	-47.5	0.14	3.7	-1.3	-26.1	0.34	2.5	-2.5	-49.9	0.16
	d02	5.1	3.3	-1.8	-35.6	0.35	3.6	-1.4	-27.9	0.31	4.6	-0.4	-8.6	0.45	4	-1.1	-21.8	0.26
	d03	5.1	3.1	-2	-39.4	0.25	3.3	-1.8	-34.6	0.24	4.1	-1	-19.9	0.37	10.8	5.8	113.8	0.32
nans	d01	3.5	1.7	-1.9	-53	0.31	1.7	-1.8	-51.9	0.21	2.8	-0.8	-21.4	0.4	1.6	-2	-56	0.22
	d02	3.5	2.5	-1.1	-29.6	0.39	2.9	-0.6	-17	0.38	3.8	0.3	7.4	0.51	3.5	0	-0.7	0.28
	d03	3.5	2	-1.6	-44.7	0.26	2.2	-1.4	-38.1	0.32	3	-0.6	-16.7	0.42	2.3	-1.3	-36.6	0.11
pots	d01	2.5	1.5	-1.1	-42.6	0.43	1.5	-1.1	-41.7	0.44	1.7	-0.9	-34.5	0.41	1.4	-1.2	-45.9	0.39
	d02	2.5	1.4	-1.2	-45.3	0.4	1.4	-1.2	-45.9	0.32	1.4	-1.1	-43.4	0.4	1.4	-1.1	-45.1	0.34
	d03	2.5	1.3	-1.2	-47.5	0.17	1.3	-1.2	-47.4	0.21	1.4	-1.2	-46.5	0.33	1.4	-1.2	-46.8	0.21

Table S7. Statistics of daily O_3 for JJA. „Obs“ refers to the JJA observed mean, „mod“ refers to the JJA modeled mean for the respective grid cell. MB is the mean bias for JJA, NMB refers to the normalized mean bias and r is the correlation of hourly values. Obs, Mod and MB are given in $\mu g\,m^{-3}$ and NMB is given in %.

St.			base				S1_urb				S2_mos				S3_mos			
		Obs	Mod	MB	NMB	r	Mod	MB	NMB	r	Mod	MB	NMB	r	Mod	MB	NMB	r
froh	d01	59	54.9	-4	-6.8	0.42	53.6	-5.4	-9.1	0.44	53.6	-5.3	-9	0.42	55.4	-3.5	-6	0.42
	d02	59	61.2	2.3	3.9	0.36	61	2	3.4	0.35	62.2	3.2	5.4	0.39	62.1	3.1	5.3	0.41
	d03	59	62.7	3.8	6.4	0.25	62.2	3.2	5.5	0.29	63.6	4.6	7.9	0.34	63.5	4.6	7.7	0.29
grun	d01	55.4	58.7	3.3	5.9	0.38	58.1	2.7	4.9	0.38	57.6	2.2	4	0.37	60.3	4.8	8.7	0.37
	d02	55.4	58.1	2.6	4.8	0.37	57.6	2.2	4	0.37	58.5	3.1	5.6	0.34	60	4.6	8.2	0.28
	d03	55.4	60.2	4.8	8.7	0.34	59.6	4.2	7.6	0.33	59.9	4.5	8.1	0.26	62.7	7.3	13.2	0.24
mueg	d01	69.2	58.6	-10.5	-15.2	0.53	57.5	-11.7	-16.9	0.56	57.7	-11.4	-16.5	0.59	59.2	-10	-14.4	0.52
	d02	69.2	60.1	-9	-13	0.5	58.9	-10.3	-14.9	0.57	60.2	-9	-13	0.5	60.3	-8.8	-12.8	0.49
	d03	69.2	62.7	-6.4	-9.3	0.45	61.6	-7.5	-10.9	0.5	62.6	-6.5	-9.4	0.44	63	-6.1	-8.8	0.47
schw	d01	65	54.5	-10.5	-16.1	0.5	53.2	-11.8	-18.2	0.52	53.7	-11.3	-17.3	0.48	54.7	-10.3	-15.9	0.48
	d02	65	58.9	-6.1	-9.4	0.53	58.2	-6.8	-10.4	0.59	59	-6	-9.2	0.53	60.8	-4.2	-6.4	0.51
	d03	65	61.9	-3.1	-4.8	0.46	60.8	-4.2	-6.5	0.53	62.1	-2.9	-4.5	0.42	63.1	-1.9	-2.9	0.46
blan	d01	61.9	57.4	-4.6	-7.4	0.56	57.4	-4.5	-7.3	0.61	58.4	-3.5	-5.7	0.57	57.6	-4.3	-7	0.54
	d02	61.9	59.4	-2.5	-4.1	0.55	58.6	-3.3	-5.3	0.62	59.2	-2.7	-4.3	0.53	60.4	-1.5	-2.4	0.52
	d03	61.9	62.5	0.6	1	0.52	62	0	0.1	0.58	62.5	0.6	1	0.47	63.4	1.5	2.3	0.49
buch	d01	64.1	54.9	-9.2	-14.3	0.52	53.6	-10.5	-16.4	0.53	53.6	-10.5	-16.3	0.51	55.4	-8.7	-13.6	0.53
	d02	64.1	60.8	-3.3	-5.2	0.52	60	-4.1	-6.4	0.53	61.2	-2.9	-4.5	0.55	61.4	-2.7	-4.3	0.54
	d03	64.1	63.1	-1	-1.6	0.45	62	-2.1	-3.3	0.47	63.3	-0.9	-1.3	0.52	63.6	-0.5	-0.8	0.49
glie	d01	60.9	58.6	-2.3	-3.8	0.53	58	-2.9	-4.7	0.52	57.5	-3.4	-5.5	0.49	60.1	-0.7	-1.2	0.52
	d02	60.9	57.2	-3.6	-6	0.54	57.3	-3.5	-5.8	0.5	57.4	-3.5	-5.7	0.43	60.8	-0.1	-0.1	0.54
	d03	60.9	60.6	-0.3	-0.4	0.48	60.4	-0.4	-0.7	0.48	60.5	-0.4	-0.7	0.38	63.1	2.2	3.6	0.49
amst	d01	61.7	54.9	-6.8	-11	0.52	53.6	-8.1	-13.2	0.55	53.6	-8.1	-13.1	0.52	55.4	-6.3	-10.2	0.55
	d02	61.7	54.7	-6.9	-11.3	0.48	53.1	-8.6	-14	0.44	55.4	-6.3	-10.3	0.42	54	-7.7	-12.5	0.46
	d03	61.7	57.6	-4.1	-6.6	0.43	55.5	-6.2	-10.1	0.43	57	-4.7	-7.5	0.38	55	-6.7	-10.8	0.43
nans	d01	61.1	54.5	-6.5	-10.7	0.55	53.2	-7.9	-12.9	0.57	53.7	-7.3	-12	0.51	54.7	-6.4	-10.5	0.54
	d02	61.1	54	-7.1	-11.6	0.53	52.5	-8.6	-14.1	0.52	55.9	-5.2	-8.4	0.46	52.1	-8.9	-14.6	0.46
	d03	61.1	58	-3.1	-5.1	0.45	56.1	-5	-8.2	0.47	58.1	-3	-4.9	0.39	57.6	-3.5	-5.7	0.41
pots	d01	64.1	58.6	-5.6	-8.7	0.51	58	-6.1	-9.6	0.52	57.5	-6.6	-10.3	0.45	60.1	-4	-6.2	0.52
	d02	64.1	61.3	-2.8	-4.4	0.5	61.3	-2.9	-4.5	0.48	62.1	-2.1	-3.2	0.46	62.2	-1.9	-3	0.5
	d03	64.1	64.1	0	0	0.46	63.8	-0.4	-0.6	0.45	64.8	0.7	1	0.38	64.6	0.5	0.8	0.45

Table S8. Statistics of daily PM_{10} for JJA. „Obs“ refers to the JJA observed mean, „mod“ refers to the JJA modeled mean for the respective grid cell. MB is the mean bias for JJA, NMB refers to the normalized mean bias and r is the correlation of hourly values. Obs, Mod and MB are given in $\mu g\,m^{-3}$ and NMB is given in %.

St.			base				S1_urb				S2_mos				S3_mos			
		Obs	Mod	MB	NMB	r	Mod	MB	NMB	r	Mod	MB	NMB	r	Mod	MB	NMB	r
mueg	d01	17.1	8.7	-8.4	-49.1	0.26	8.7	-8.4	-49.3	0.22	8.9	-8.2	-48.1	0.26	7.6	-9.4	-55.3	0.18
	d02	17.1	8.5	-8.6	-50.5	0.31	8.6	-8.5	-49.9	0.26	8.8	-8.3	-48.7	0.26	8.3	-8.7	-51.2	0.28
	d03	17.1	8.2	-8.9	-52.1	0.34	8.3	-8.7	-51.2	0.31	8.5	-8.6	-50.2	0.29	8.2	-8.9	-52.2	0.31
blan	d01	17.1	8.6	-8.5	-49.7	0.38	8.4	-8.7	-50.8	0.33	8.6	-8.5	-49.7	0.41	7.5	-9.6	-55.9	0.24
	d02	17.1	8.6	-8.5	-49.5	0.4	8.7	-8.4	-48.9	0.4	9.1	-8	-46.8	0.4	8.2	-9	-52.3	0.37
	d03	17.1	8.3	-8.8	-51.2	0.43	8.4	-8.7	-50.8	0.45	8.8	-8.3	-48.3	0.42	8	-9.2	-53.5	0.41
buch	d01	18.2	9.1	-9	-49.8	0.36	9.1	-9.1	-49.9	0.33	9.4	-8.8	-48.4	0.36	7.9	-10.3	-56.7	0.3
	d02	18.2	8.2	-10	-54.9	0.4	8.2	-9.9	-54.6	0.36	8.5	-9.6	-53.1	0.33	7.9	-10.3	-56.5	0.39
	d03	18.2	8	-10.1	-55.8	0.42	8.1	-10	-55.2	0.4	8.4	-9.8	-53.9	0.35	7.7	-10.4	-57.3	0.4
glie	d01	14.6	8.6	-6	-41.4	0.38	8.4	-6.1	-42.1	0.38	8.7	-5.9	-40.5	0.4	7.6	-7	-47.9	0.31
	d02	14.6	8.4	-6.1	-42.1	0.46	8.4	-6.2	-42.2	0.45	8.8	-5.8	-39.9	0.42	8	-6.6	-45.4	0.44
	d03	14.6	8.1	-6.4	-44.2	0.49	8.2	-6.4	-43.9	0.49	8.5	-6.1	-41.6	0.46	7.8	-6.8	-46.7	0.47
amst	d01	14.8	9.1	-5.7	-38.4	0.46	9.1	-5.7	-38.6	0.39	9.4	-5.4	-36.7	0.49	7.9	-6.9	-46.9	0.34
	d02	14.8	9.2	-5.6	-37.5	0.51	9.3	-5.5	-37.2	0.45	9.6	-5.2	-35	0.5	9.3	-5.5	-37.4	0.47
	d03	14.8	9	-5.8	-39.2	0.56	9.1	-5.7	-38.4	0.5	9.5	-5.3	-36	0.53	9.1	-5.7	-38.5	0.51
brue	d01	19.4	9.5	-9.8	-50.8	0.37	9.5	-9.9	-51	0.36	9.8	-9.5	-49.2	0.41	8.4	-10.9	-56.6	0.32
	d02	19.4	9.4	-9.9	-51.3	0.43	9.5	-9.8	-50.8	0.39	9.7	-9.7	-49.9	0.37	9.3	-10	-51.7	0.39
	d03	19.4	9.1	-10.2	-52.9	0.47	9.2	-10.1	-52.3	0.44	9.5	-9.9	-51	0.4	9.1	-10.3	-53	0.44
nans	d01	19.1	9.5	-9.6	-50.1	0.37	9.5	-9.6	-50.3	0.36	9.8	-9.2	-48.4	0.39	8.4	-10.7	-55.9	0.31
	d02	19.1	9.4	-9.7	-50.6	0.41	9.5	-9.6	-50.1	0.38	9.7	-9.4	-49.2	0.35	9.3	-9.7	-51	0.38
	d03	19.1	9.1	-10	-52.4	0.45	9.2	-9.9	-51.8	0.43	9.5	-9.6	-50.5	0.4	9.2	-9.9	-51.9	0.43
pots	d01	16.6	8.6	-8	-48.4	0.32	8.4	-8.1	-49	0.29	8.7	-7.9	-47.6	0.32	7.6	-9	-54.1	0.21
	d02	16.6	8.2	-8.4	-50.4	0.36	8.2	-8.4	-50.8	0.35	8.5	-8	-48.5	0.31	8	-8.6	-51.8	0.34
	d03	16.6	8.1	-8.5	-51.3	0.4	8.1	-8.5	-51.4	0.4	8.4	-8.2	-49.5	0.36	7.9	-8.7	-52.5	0.36

Table S9. Statistics of daily $PM_{2.5}$ for JJA. „Obs“ refers to the JJA observed mean, „mod“ refers to the JJA modeled mean for the respective grid cell. MB is the mean bias for JJA, NMB refers to the normalized mean bias and r is the correlation of hourly values. Obs, Mod and MB are given in $\mu g\,m^{-3}$ and NMB is given in %.

St.			base				S1_urb				S2_mos				S3_mos			
		Obs	Mod	MB	NMB	r	Mod	MB	NMB	r	Mod	MB	NMB	r	Mod	MB	NMB	r
blan	d01	11.2	7.8	-3.4	-30.4	0.47	7.6	-3.6	-32	0.42	7.8	-3.4	-30.1	0.48	6.7	-4.4	-39.8	0.35
	d02	11.2	7.8	-3.4	-30.5	0.48	7.8	-3.3	-29.8	0.46	8.2	-3	-26.6	0.45	7.3	-3.9	-34.7	0.45
	d03	11.2	7.5	-3.7	-33	0.5	7.6	-3.6	-32.3	0.5	8	-3.2	-28.5	0.45	7.1	-4.1	-36.3	0.48
amst	d01	11.6	9.5	-2.1	-18.1	0.26	9.4	-2.3	-19.6	0.1	10.3	-1.4	-12.2	0.08	7.7	-3.9	-33.4	0.17
	d02	11.6	9.7	-1.9	-16.8	0.17	9.9	-1.7	-14.8	0.2	10.6	-1.1	-9.6	0.13	9.8	-1.9	-16.2	0.14
	d03	11.6	9.4	-2.2	-18.8	0.22	9.7	-1.9	-16.7	0.19	10.4	-1.2	-10.6	0.15	9.8	-1.9	-16.4	0.17
brue	d01	12.1	10.2	-2.2	-17.9	0.19	10	-2.3	-19.1	0.02	11	-1.2	-10	0.15	8.6	-3.6	-29.7	0.08
	d02	12.1	9.9	-2.3	-18.7	0.18	10.1	-2.2	-17.9	0.13	10.5	-1.7	-14.3	0.07	9.6	-2.6	-21.8	0.09
	d03	12.1	9.4	-2.7	-22.7	0.17	9.8	-2.4	-19.9	0.15	10.2	-2.1	-17.1	0.1	9.5	-2.8	-23.4	0.13
nans	d01	10.5	8.5	-2.1	-19.6	0.36	8.3	-2.2	-20.7	0.32	8.8	-1.7	-16.6	0.39	7.3	-3.2	-30.6	0.28
	d02	10.5	8.3	-2.2	-21	0.37	8.4	-2.2	-20.4	0.28	8.6	-2	-18.7	0.29	8.1	-2.4	-22.8	0.34
	d03	10.5	8	-2.6	-24.3	0.44	8	-2.5	-23.6	0.35	8.3	-2.2	-20.9	0.32	7.9	-2.6	-25	0.38
pots	d01	10.9	7.7	-3.2	-29.7	0.4	7.6	-3.3	-30.5	0.35	7.8	-3.1	-28.5	0.4	6.7	-4.2	-38.5	0.3
	d02	10.9	7.4	-3.5	-32.6	0.45	7.3	-3.6	-32.9	0.41	7.7	-3.2	-29.7	0.36	7.1	-3.8	-34.8	0.41
	d03	10.9	7.2	-3.7	-34.1	0.47	7.2	-3.7	-33.9	0.44	7.5	-3.4	-31.1	0.4	7	-3.9	-35.9	0.42

S3 Base run namelist

```
&time_control
 start_year = 2014, 2014, 2014
 start_month = 05, 05, 05
 start_day = 30, 30, 30
 start_hour                          = 00, 00, 00,
 start_minute                        = 00, 00, 00,
 start_second                        = 00, 00, 00,
 end_year = 2014, 2014, 2014
 end_month = 08, 08, 08
 end_day = 29, 29, 29
 end_hour                            = 00, 00, 00,
 end_minute                          = 00, 00, 00,
 end_second                          = 00, 00, 00,
 interval_seconds                    = 21600
 input_from_file                     = .true., .true., .true.,
 iofields_filename                   = "iofields_d01.txt", "iofields_d02.txt", "iofields_d03
 history_interval                    = 60, 60, 60,
 frames_per_outfile                  = 24, 24, 24,
 frames_per_auxinput5                =   1, 1, 1,
 restart = .true.
 restart_interval                    = 1440,
 io_form_history                     = 2,
 io_form_input                       = 2,
 io_form_boundary                    = 2,
 debug_level                         = 0,
 auxinput4_inname                    = 'wrflowinp_d<domain>',
 auxinput5_inname                    = 'wrfchemi_d<domain>_<date>',
 auxinput6_inname                    = 'wrfbiochemi_d<domain>',
 auxinput4_interval                  = 360, 360, 360,
 auxinput5_interval_m                = 60, 60, 60,
 io_form_auxinput2                   = 2,
 io_form_auxinput4                   = 2,
 io_form_auxinput5                   = 2,
 io_form_auxinput6                   = 2,
 auxhist3_outname          = "wrfxtrm_d<domain>_<date>",
 auxhist3_interval         = 1440,     1440,     1440,
 frames_per_auxhist3       = 1,        1,        1,
 io_form_auxhist3          = 2,
 write_hist_at_0h_rst                = .true.,

/

&dfi_control
/

&domains
```

```
 time_step                  = 75,
 time_step_fract_num        = 0,
 time_step_fract_den        = 1,
 max_dom                    = 3,
 e_we                       = 150, 146, 154,
 e_sn                       = 150, 156, 154,
 e_vert                     = 35,       35,       35,
 p_top_requested            = 5000,
 num_metgrid_levels         = 38,
 eta_levels                 = 1.0, 0.993, 0.983, 0.97,
                  0.954, 0.934, 0.909, 0.88, 0.845,
                  0.807, 0.765, 0.719, 0.672, 0.622,
                  0.571, 0.52, 0.468, 0.42, 0.376,
                  0.335, 0.298, 0.263, 0.231, 0.202,
                  0.175, 0.15, 0.127, 0.106, 0.088,
                  0.07, 0.055, 0.04, 0.026, 0.013,
                  0.0,
 num_metgrid_soil_levels    = 4,
 dx                         = 15000,     3000,     1000,
 dy                         = 15000,     3000,     1000,
 grid_id                    = 1,         2,        3,
 parent_id                  = 1,         1,        2,
 i_parent_start             = 1,        61,       43,
 j_parent_start             = 1,        60,       55,
 parent_grid_ratio          = 1,         5,        3,
 parent_time_step_ratio     = 1,         5,        3,
 feedback                   = 0,
 smooth_option              = 0,
 /

 &physics
  mp_physics                        = 10,     10,     10,
  ra_lw_physics                     = 4,      4,      4,
  ra_sw_physics                     = 4,      4,      4,
  radt                              = 15,     15,     15,
  sf_sfclay_physics                 = 1,      1,      1,
  sf_surface_physics                = 2,      2,      2,
  bl_pbl_physics                    = 1,      1,      1,
  bldt                              = 0,      0,      0,
  cu_physics                        = 3,      3,      3,
  cu_rad_feedback                   = .true.,
  cudt                              = 0,      0,      0,
  isfflx                            = 1,
  icloud                            = 1,
  num_soil_layers                   = 4,
  mp_zero_out                       = 2,
  mp_zero_out_thresh                = 1.e-12,
  sf_urban_physics                  = 1,    1,      1,
  sst_update                        = 1,
```

```
 sf_urban_physics                    = 1,     1,      1,
 usemonalb                           = .true.,
 progn                               = 1,      1,      1,
 cu_diag                             = 1,      1,      1,
 num_land_cat                        = 33,
/

&fdda
/

&dynamics
rk_ord                              = 3,
w_damping                           = 0,
diff_opt                            = 1,1,1,
km_opt                              = 4,4,4,
diff_6th_opt                        = 0, 0, 0,
diff_6th_factor                     = 0.12, 0.12, 0.12,
base_temp                           = 290.
damp_opt                            = 0,
zdamp                               = 5000.,  5000.,  5000.,
dampcoef                            = 0.01,   0.01,   0.01
khdif                               = 0,      0,      0,
kvdif                               = 0,      0,      0,
non_hydrostatic                     = .true., .true., .true.,
moist_adv_opt                       = 2,      2,      2,
scalar_adv_opt                      = 2,      2,      2,
chem_adv_opt                        = 2,      2,      2,
tke_adv_opt                         = 2,      2,      2,
time_step_sound                     = 4,      4,      4,
h_mom_adv_order                     = 5,      5,      5,
v_mom_adv_order                     = 3,      3,      3,
h_sca_adv_order                     = 5,      5,      5,
v_sca_adv_order                     = 3,      3,      3,
/

&bdy_control
spec_bdy_width                      = 5,
spec_zone                           = 1,
relax_zone                          = 4,
specified                           = .true., .false., .false.,
nested                              = .false., .true., .true.,
/

&grib2
/

&namelist_quilt
nio_tasks_per_group = 0,
nio_groups = 1,
```

```
/

&chem
kemit                               = 1,
ne_area                             = 100,
chem_opt                            = 106, 106, 106,
bioemdt                             = 15., 15., 15.,
photdt                              = 15, 15, 15,
chemdt                              = 2.5, 2.5, 2.5,
io_style_emissions                  = 2,
emiss_inpt_opt                      = 1, 1, 1,
emiss_opt                           = 3, 3, 3,
chem_in_opt                         = 1, 1, 1,
phot_opt                            = 3, 3, 3,
gas_drydep_opt                      = 1, 1, 1,
aer_drydep_opt                      = 1, 1, 1,
bio_emiss_opt                       = 3, 3, 3,
gas_bc_opt                          = 1, 1, 1,
gas_ic_opt                          = 1, 1, 1,
aer_bc_opt                          = 1, 1, 1,
aer_ic_opt                          = 1, 1, 1,
gaschem_onoff                       = 1, 1, 1,
aerchem_onoff                       = 1, 1, 1,
wetscav_onoff                       = 0, 0, 0,
cldchem_onoff                       = 0, 0, 0,
vertmix_onoff                       = 1, 1, 1,
chem_conv_tr                        = 1, 1, 1,
seas_opt                            = 2,
dust_opt                            = 3,
biomass_burn_opt                    = 0, 0, 0,
plumerisefire_frq                   = 30, 30, 30,
have_bcs_chem                       = .true., .false., .false.,
aer_ra_feedback                     = 1, 1, 1,
aer_op_opt                          = 1, 1, 1,
opt_pars_out                        = 1,
diagnostic_chem                     = 1, 1, 1,
chemdiag                            = 1, 1, 1,
diagnostic_dep                      = 1,1,1,
/
```