

Supplementary material to ‘The impact of differences in large-scale circulation output from climate models on the regional modeling of ozone and PM’

Statistical evaluation

Table S1a. Annual average behavior of temperatures for the period 1989-2009. Standard deviations represent the day-to-day variability. Numbers in italics indicate that the difference with RLE_ERA is not significant at the P=0.05 level.

Station	RLE_ERA				RLE_ECHAM				RLE_MIROC			
	# T>25	# T<5	T _{max}	std	# T>25	# T<5	T _{max}	Std	# T>25	# T<5	T _{max}	std
Vredepeel	28	54	13.6	7.9	16	46	13.1	7.0	30	44	14.1	7.7
Sniezka	30	105	11.9	9.4	17	96	11.6	8.5	29	101	<i>12.2</i>	9.1
Melpitz	37	81	13.1	9.1	20	73	12.6	8.2	39	74	13.6	8.9
Paris	37	41	14.6	7.9	25	35	14.1	7.1	29	33	<i>14.6</i>	7.3
Els Torms	126	1	21.4	8.5	124	1	<i>21.2</i>	8.2	99	1	20.1	7.00
Madrid	109	6	19.2	9.3	105	7	18.6	9.4	76	4	17.4	7.9
Montelibretti	63	0	18.3	5.9	19	0	17.2	5.0	55	0	<i>18.2</i>	5.5

Table S1b. Annual average behavior of rain 1989-2009. Wet days are days with more than 0.5 mm rain.

Station	RLE_ERA		RLE_ECHAM		RLE_MIROC	
	wet days	yearly rain (mm)	wet days	yearly rain (mm)	wet days	yearly rain (mm)
Vredepeel	196	748	227	956	199	752
Sniezka	184	653	212	803	198	708
Melpitz	168	533	194	668	175	584
Paris	179	690	212	872	201	759
Els Torms	71	336	80	383	93	453
Madrid	93	431	124	675	116	544
Montelibretti	98	482	109	595	137	803

Table S1c. Annual averages wind speed 1989-2009

Station	RLE_ERA		RLE_ECHAM		RLE_MIROC	
	#v<2m/s	average v	#v<2m/s	average v	#v<2m/s	average v
Vredepeel	40	4.0	32	4.3	44	3.9
Sniezka	55	3.2	48	3.4	66	3.1
Melpitz	34	4.0	28	4.2	41	3.8
Paris	26	3.9	23	4.2	31	3.8
Els Torms	123	2.8	101	3.1	125	2.9
Madrid	64	3.0	52	3.4	67	3.1
Montelibretti	34	3.9	30	4.4	40	4.0

Table S2a. Average behavior of temperature, 2041-2060. Differences with respect to the present-day simulation are significant for all stations

Station	RLE_ECHAM				RLE_MIROC			
	# T>25 C	# T<5 C	T _{max}	std	# T>25 C	# T<5 C	T _{max}	Std
Vredepeel	25	33	14.3	7.1	55	21	16.3	7.7
Sniezka	26	76	12.8	8.4	53	65	14.4	9.0
Melpitz	27	53	13.8	8.0	65	42	15.7	8.7
Paris	38	21	15.2	7.3	65	12	17.0	7.5
Els Torms	148	0	22.9	8.6	145	0	23.2	7.5
Madrid	129	2	20.7	10.0	123	0	21.0	8.8
Montelibretti	59	0	18.5	5.3	102	0	20.8	5.8

Table S2b. Average rain 2041-2060. Wet days are days with more than 0.5 mm rain

Station	RLE_ECHAM		RLE_MIROC	
	wet days	yearly rain (mm)	wet days	yearly rain (mm)
Vredepeel	228	993	199	832
Sniezka	219	869	202	770
Melpitz	200	745	177	635
Paris	210	888	193	788
Els Torms	74	336	87	394
Madrid	104	617	97	464
Montelibretti	103	610	129	759

Table S2c. Average wind speed 2041-2060.

Station	RLE_ECHAM		RLE_MIROC	
	#v<2m/s	average v	#v<2m/s	average v
Vredepeel	31	4.3	50	3.8
Sniezka	47	3.4	68	3.0
Melpitz	31	4.2	47	3.7
Paris	23	4.2	34	3.7
Els Torms	99	3.2	123	2.9
Madrid	54	3.4	61	3.1
Montelibretti	26	4.4	41	4.0

Table S3. Summer (JJA) average daily maximum O₃ concentrations and annual average PM10 concentrations, present-day and future period for each of the model runs. Standard deviations represent the day to day variability.

RLE_ERA (1989-2009)				
	O _{3max}		PM10	
Station	average	stdev	average	stdev
Vredepeel	100	28	13.6	6.3
Sniezka	108	18	8.7	4.3
Melpitz	107	20	8.7	4.3
Paris	99	26	36.3	20.9
Els Torms	118	19	8.9	4.8
Madrid	98	15	17.8	7.4
Montelibretti	123	17	10.8	4.3

RLE_ECHAM	(1989-2009)				(2041-2060)				Relative change %	
	O _{3max}		PM10		O _{3max}		PM10		O ₃	PM10
	average	stdev	average	stdev	average	stdev	average	stdev		
Vredepeel	91	24	12.6	5.9	93	27	12.6	6.0	+2.9	+0.5
Sniezka	102	17	8.2	4.1	106	20	7.8	3.9	+3.2	-4.2
Melpitz	100	19	8.2	4.1	103	21	8.0	4.0	+2.7	-2.7
Paris	91	24	32.3	20.1	96	27	31.7	19.6	+6.1	-2.0
Els Torms	113	19	7.6	4.4	119	21	7.8	4.5	+5.0	+2.6
Madrid	98	15	15.3	7.4	102	16	15.7	7.5	+4.0	+2.3
Montelibretti	120	17	10.1	4.0	124	19	10.0	4.1	+3.4	-0.4

RLE_MIROC	(1989-2009)				(2041-2060)				Relative change %	
	O _{3max}		PM10		O _{3max}		PM10		O ₃	PM10
	average	stdev	average	stdev	average	stdev	average	stdev		
Vredepeel	107	26	13.8	6.4	115	29	14.5	7.2	+7.7	+4.6
Sniezka	110	16	8.6	4.2	116	18	8.4	4.3	+5.6	-2.0
Melpitz	111	19	8.5	4.3	117	20	8.5	4.6	+5.2	+0.2
Paris	105	27	35.6	20.4	113	30	36.4	19.7	+6.9	+2.0
Els Torms	115	18	8.0	4.5	122	19	8.2	4.6	+6.7	+0.1
Madrid	96	15	17.3	7.5	101	16	17.3	7.4	+4.8	+0.2
Montelibretti	123	17	10.1	4.2	130	12	10.3	4.3	+5.8	+1.6

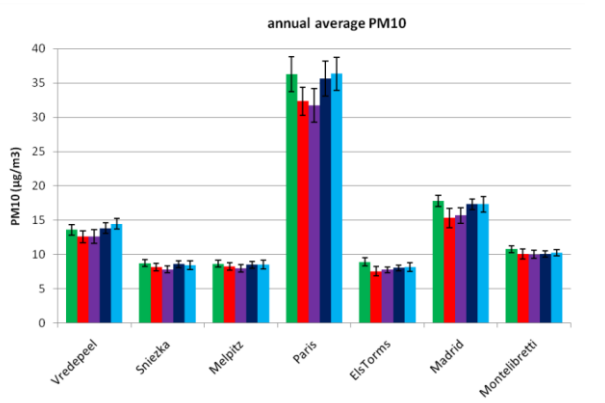
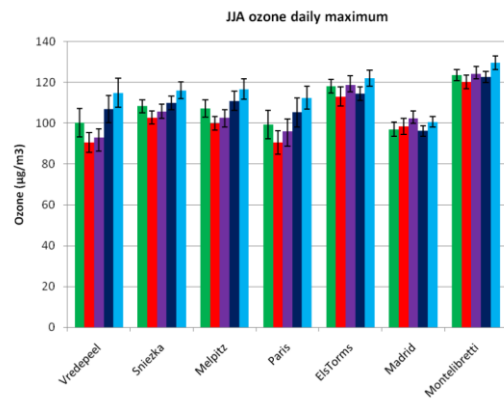
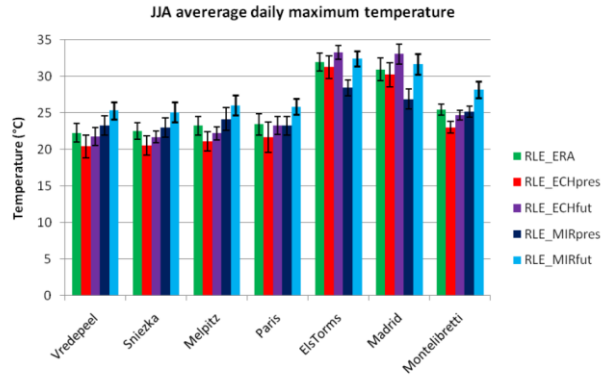
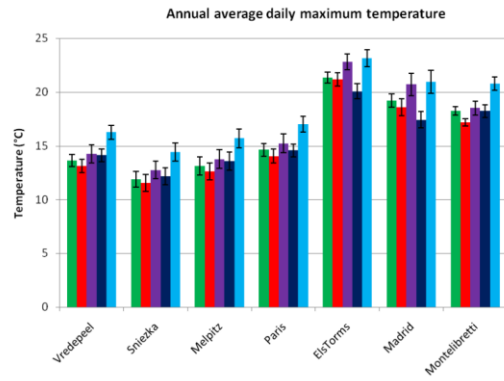


Figure S1. Average values for daily maximum temperature (annual and summer averages) and PM10 (annual) and ozone concentrations (summer averages), with standard deviations to indicate the interannual variability.

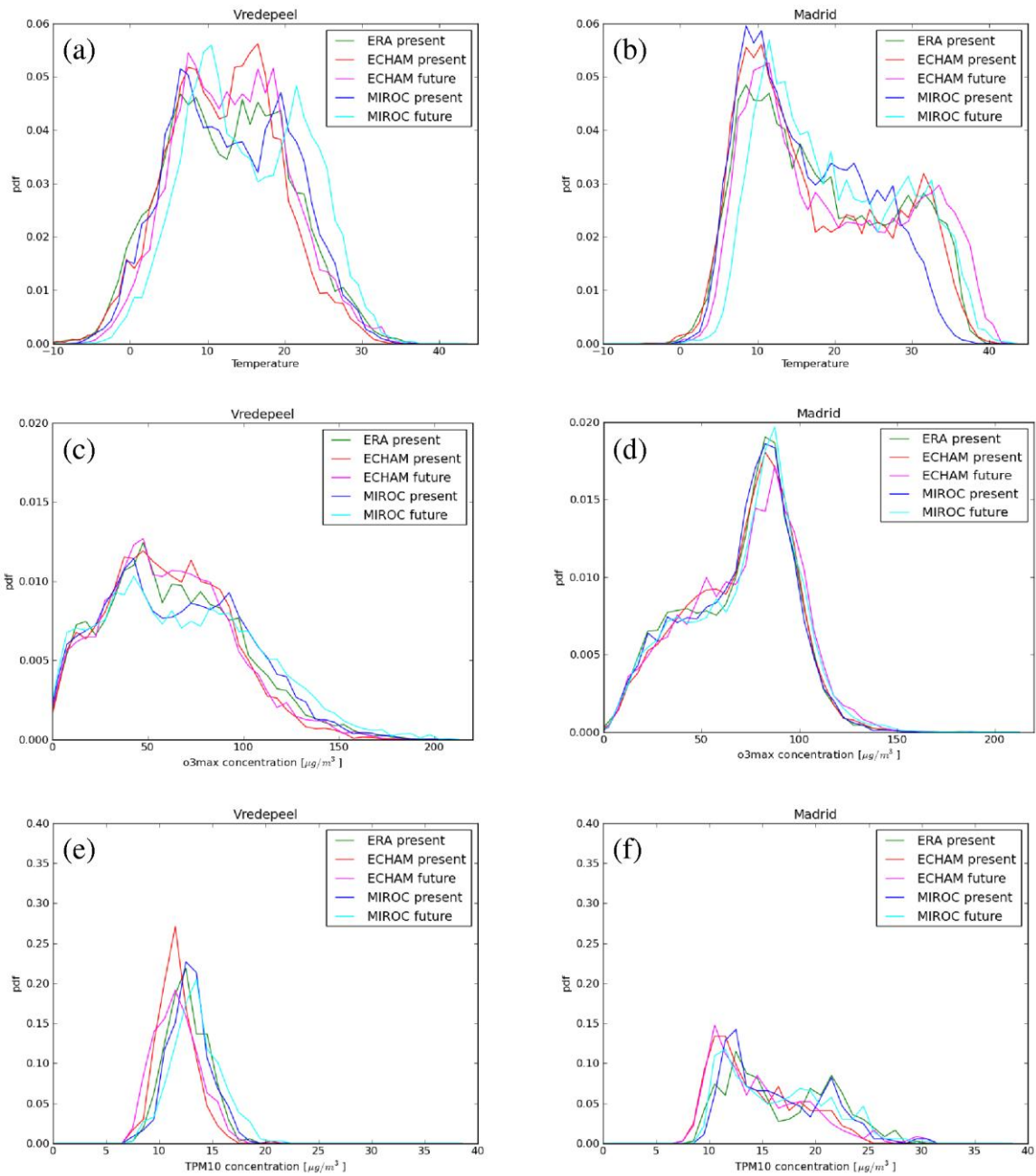


Figure S2. Histogram plots (probability distribution) of daily maximum temperature (a,b), daily maximum ozone concentration, not restricted to summer (c,d) and daily average total PM10 concentration(e,f) for Vredepeel (left) and Madrid (right).