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Linking climate and air quality over Europe: effects of meteorology on PM$_{2.5}$ concentrations

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Table S1. Summary of expected effects on total $PM_{2.5}$ concentrations due to changes on meteorological parameters during the modelled summer, the modelled winter and the modelled fall period.

Meteorological Parameter	Expected Change of Parameter	Process Affected	Predicted Sensitivity Mean (10%, 90%)	Expected Concentration Change (ng m^{-3}) Mean (10%, 90%)
Summer Period				
Temperature	+1 - 5.5 K[a]	BVOC emissions	10.2 ng m^{-3} K^{-1} (-13, 44)	10.2 to 56.1 (-71.5 to 242)
		Aerosol partitioning	-49 ng m^{-3} K^{-1} (-142, 4.1)	-49 to -270 (-781 to 23)
		Reaction rates	26.3 ng m^{-3} K^{-1} (-1.1, 49)	26 to 145 (-6.1 to 270)
		Overall	-23.3 ng m^{-3} K^{-1} (-145, 67)	-23 to -128 (-797 to 369)
Wind Speed	-10 to 10%[b]	Overall (constant emissions)	-41.3 ng m^{-3} %$^{-1}$ (-109, 0.7)	-413 to 413 (-1090 to 1090)
		Sea salt emissions	39.2 ng m^{-3} (-1.3, 107)	-392 to 392 (-1070 to 1070)
Absolute humidity	+5 to 40%[c]	Overall	8.2 ng m^{-3} %$^{-1}$ (-13, 27)	41 to 330 (-520 to 1080)
Precipitation rate	-40 to +40%[b]	Overall	-12.9 ng m^{-3} %$^{-1}$ (-40, -1.6)	-516 to 516 (-1600 to 1600)
Precipitation area	-40 to +40%[b]	Overall	-7.8 ng m^{-3} %$^{-1}$ (-17, -1.1)	-312 to 312 (-680 to 680)
Mixing Height	-20 to +20%	Overall	-3.5 ng m^{-3} %$^{-1}$ (-9.5, 1)	-70 to 70 (-190 to 190)

[a] IPCC, 2007

[b] Based on IPCC A2 scenario

[c] Based on IPCC temperature projections and predicted base-case average RH during the three modeled periods

Table S1. *(continued)*

Meteorological Parameter	Expected Change of Parameter	Process Affected	Predicted Sensitivity Mean (10%, 90%)	Expected Concentration Change (ng m^{-3}) Mean (10%, 90%)
Winter Period				
Temperature	+1 - 5.5 K[a]	BVOC emissions	10 ng m^{-3} K^{-1} (-0.2, 23)	10 to 55 (-1.1 to 127)
		Aerosol partitioning	-25 ng m^{-3} K^{-1} (-73, 13)	-25 to -138 (-402 to 72)
		Reaction rates	13.3 ng m^{-3} K^{-1} (-1.1, 25)	13.3 to 73 (-6 to 138)
		Overall	-6.5 ng m^{-3} K^{-1} (-90, 65)	-6.5 to -36 (-495 to 358)
Wind Speed	-10 to 10%[b]	Overall (constant emissions)	-36.4 ng m^{-3} %$^{-1}$ (-83, -4.4)	-364 to 364 (-830 to 830)
		Sea salt emissions	52.5 ng m^{-3} (5, 132)	-525 to 525 (-1320 to 1320)
Absolute humidity	+5 to 40%[c]	Overall	-7.6 ng m^{-3} %$^{-1}$ (-35, 9)	-38 to -304 (-1400 to 360)
Precipitation rate	-40 to +40%[b]	Overall	-12.2 ng m^{-3} %$^{-1}$ (-33, -1.6)	-488 to 488 (-1320 to 1320)
Precipitation area	-40 to +40%[b]	Overall	-7.3 ng m^{-3} %$^{-1}$ (-15, -1.5)	-292 to 292 (-600 to 600)
Mixing Height	-20 to +20%	Overall	-1.8 ng m^{-3} %$^{-1}$ (-5, 0.3)	-36 to 36 (-100 to 100)

[a] IPCC, 2007

[b] Based on IPCC A2 scenario

[c] Based on IPCC temperature projections and predicted base-case average RH during the three modeled periods.

Table S1. *(continued)*

Meteorological Parameter	Expected Change of Parameter	Process Affected	Predicted Sensitivity Mean (10%, 90%)	Expected Concentration Change (ng m^{-3}) Mean (10%, 90%)
Fall Period				
Temperature	+1 - 5.5 K[a]	BVOC emissions	20.3 ng m^{-3} K^{-1} (-1.4, 52)	20.3 to 112 (-7.7 to 286)
		Aerosol partitioning	-88 ng m^{-3} K^{-1} (-285, 2.3)	-88 to -484 (-1570 to 13)
		Reaction rates	47.1 ng m^{-3} K^{-1} (-0.1, 115)	47.1 to 259 (-0.6 to 633)
		Overall	-33 ng m^{-3} K^{-1} (-210, 85)	-33 to -182 (-1156 to 468)
Wind Speed	-10 to 10%[b]	Overall (constant emissions)	-38.3 ng m^{-3} %$^{-1}$ (-115, 2)	-383 to 383 (-1150 to 1150)
		Sea salt emissions	40 ng m^{-3} (-1.9, 123)	-400 to 400 (-1230 to 1230)
Absolute humidity	+5 to 40%[c]	Overall	11.5 ng m^{-3} %$^{-1}$ (-21, 57)	58 to 460 (-840 to 2280)
Precipitation rate	-40 to +40%[b]	Overall	-17.7 ng m^{-3} %$^{-1}$ (-43, -3)	-708 to 708 (-1720 to 1720)
Precipitation area	-40 to +40%[b]	Overall	-13.4 ng m^{-3} %$^{-1}$ (-33, -3.3)	-536 to 536 (-1320 to 1320)
Mixing Height	-20 to +20%	Overall	-2.2 ng m^{-3} %$^{-1}$ (-6.5, 1.1)	-44 to 44 (-130 to 130)

[a] IPCC, 2007

[b] Based on IPCC A2 scenario

[c] Based on IPCC temperature projections and predicted base-case average RH during the three modeled periods.
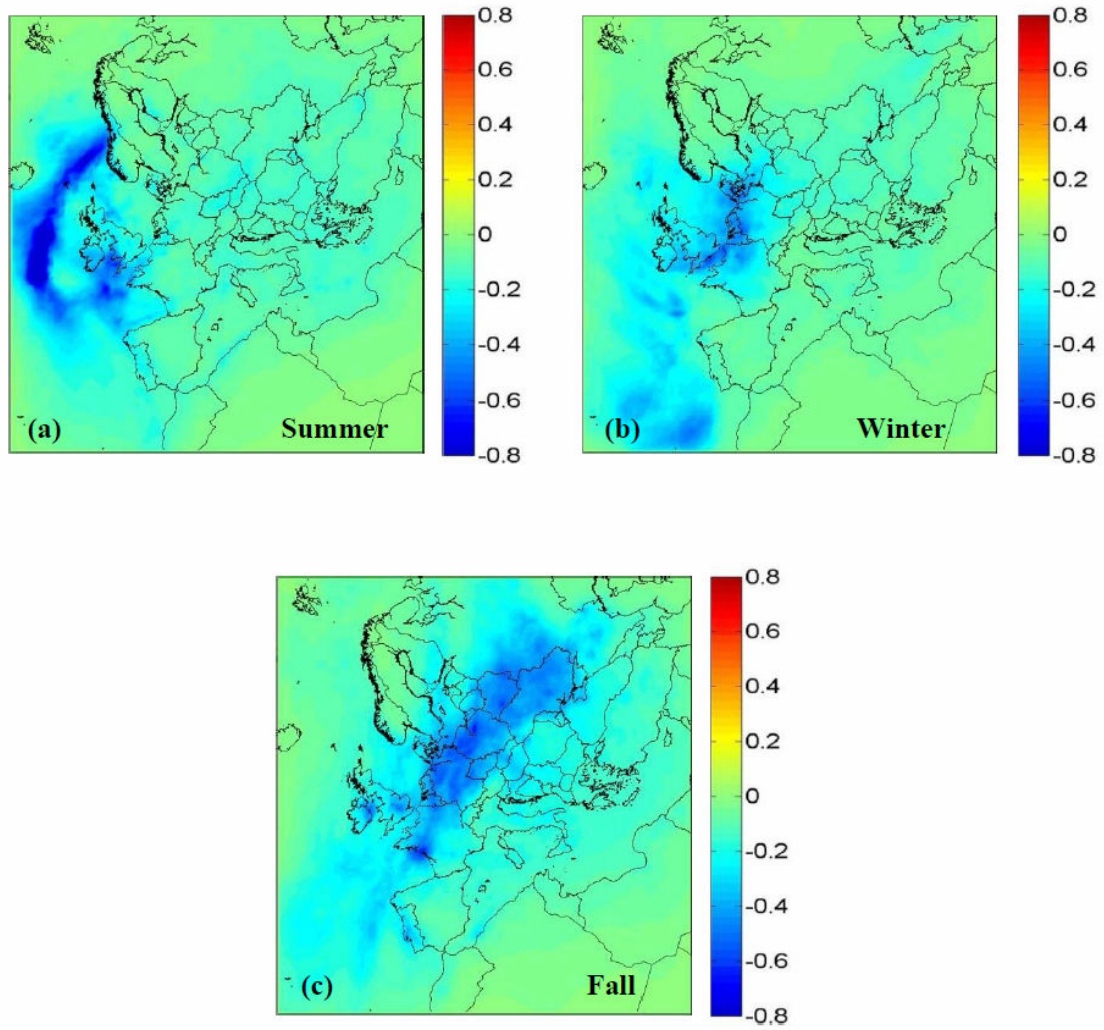
Figure S1. Predicted average change in ground-level concentrations (μg m^{-3}) of total PM$_{2.5}$ due to a 10% increase in precipitation rate during the modeled (a) summer, (b) winter and (c) fall periods. A positive value corresponds to an increase.
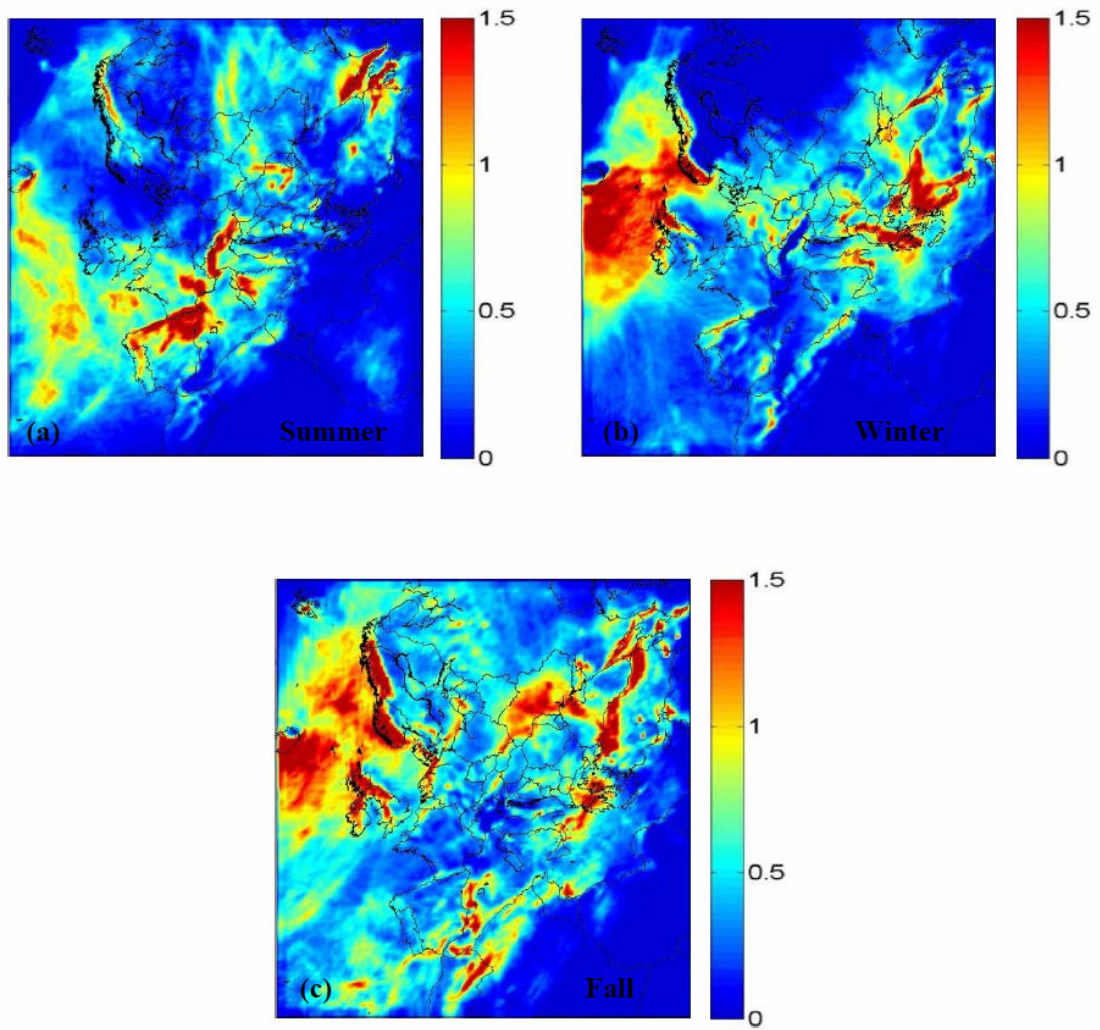
Figure S2. Predicted base case rainfall rate (mm month^{-1}) during the modeled (a) summer, (b) winter and (c) fall periods.
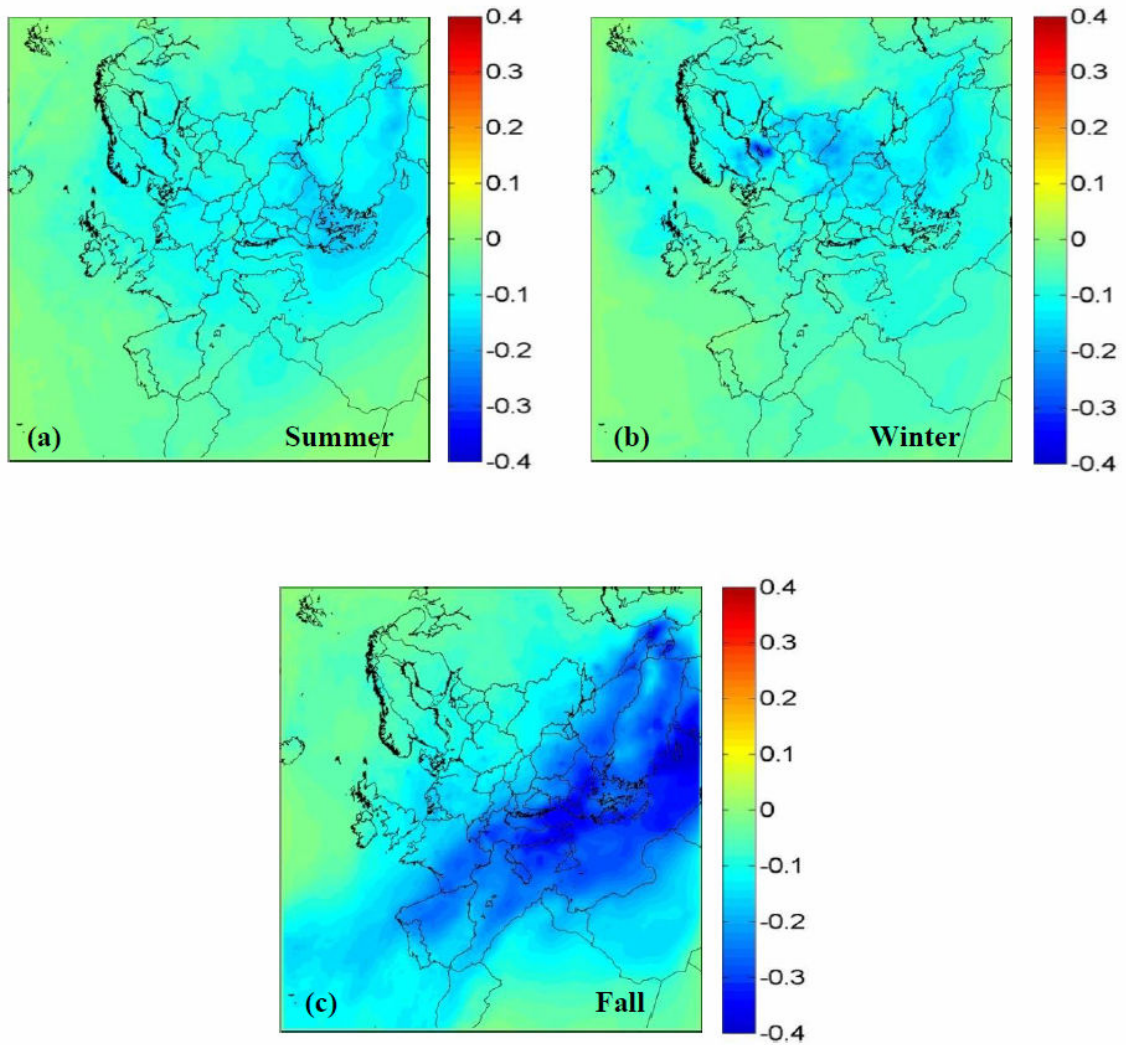
Figure S3. Predicted average change in ground-level concentrations (µg m⁻³) of total PM$_{2.5}$ due to a 10% increase in area undergoing precipitation during the modeled (a) summer, (b) winter and (c) fall periods. A positive value corresponds to an increase.
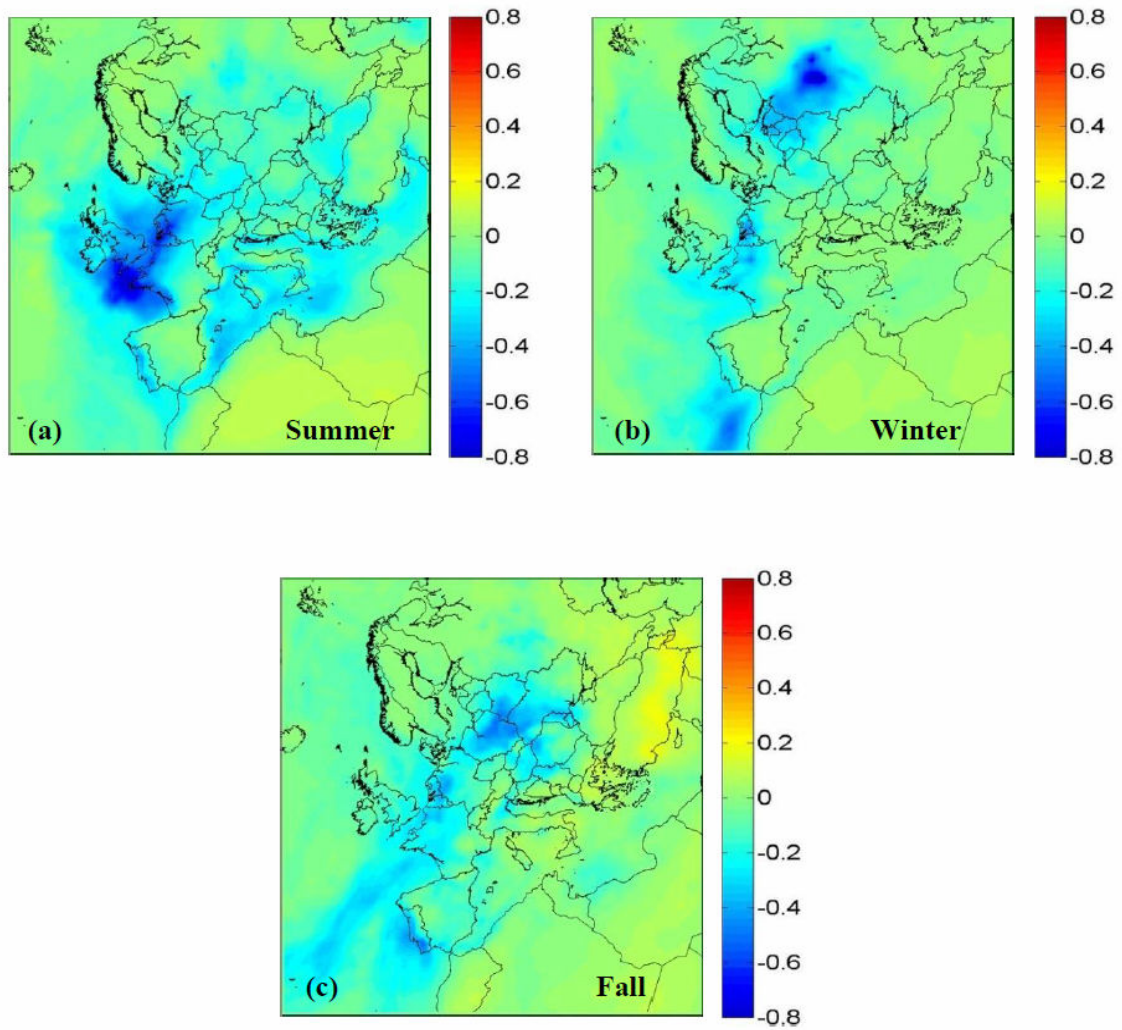
Figure S4. Predicted average change in ground-level concentrations ($\mu g\ m^{-3}$) of total PM$_{2.5}$ due to an increase of mixing height by one model layer (approximately 150 m) during the modeled (a) summer, (b) winter and (c) fall periods. A positive value corresponds to an increase.