Supplement of

Uncertainties in the effects of organic aerosol coatings on polycyclic aromatic hydrocarbon concentrations and their estimated health effects

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Table S1: 66 background sites information [*IADN*; *Hung et al.*, 2010; *Tørseth et al.*, 2012; *Shen et al.*, 2014; *Boruvkova*, 2015]

region	lat	lon	Location name	Obs. period
North America	47.5	–88.1	Eagle Harbor, MI	2005–2010
	43.8	–77.2	Point Petre, ON	2005–2010
	44.8	–86.1	Sleeping bear dunes, MI	2005–2010
	42.7	–79.1	Sturgeon point, NY	2005–2010
	45.8	–82.9	Burnt Island, ON	2005–2010
	33.9	–85.0	Yorkville, GA	2002, May
	39.2	–76.2	Chesapeake Bay, America	1997, summer
				1997, winter
	44.0	–121.7	Mount Bachelor Observatory	2004–2006, spring
Europe	40.6	22.9	Greater Athens Area, Greece	2001, May–2002, June
	42.0	13.3	Central Italy park, Italy	2000–2001
	43.3	5.5	Marseille, France, Plan d'Aups, rural	2004, July
	50.9	5.4	Hasselt, Flanders, Belgium	2002, spring
				2002, winter
	58.8	17.4	Aspvreten, Sweden	2005–2011
	58.4	8.3	Birkenes, Norway	2008–2009
	59.5	25.9	Lahemaa, Estonia	2007–2009
	47.9	7.9	Schauinsland, Germany	2007–2010
	50.7	10.8	Schmucke, Germany	2007–2010
	49.6	15.1	Kosetice, Czech Republic	2005–2011
	54.4	12.7	Zingst, Germany	2006–2009
	57.4	11.9	Rao, Sweden	2005–2011
	54.9	8.3	Westerland, Germany	2007–2010
	43.4	–4.9	Niembro	2004–2006, winter
	54.3	–0.8	High Muffles	2004–2007
	68.0	24.2	Pallas	2005–2011
	50.2	15	Europe group 1	2007–2011
	48.3	17.5	Europe group 2	2007–2011
	50.2	17.5	Europe group 3	2007–2011
	45.8	16.0	Zagreb, IMI	2007–2011
	47.0	19.6	K-puszta	2009–2011
	56.2	21.2	Rucava, EMEP	2009–2011
	46.5	28.3	Leova	2007–2011
	52.3	4.5	De Zilk	2009–2011
	54.1	22.0	Diabla Gora	2009–2011
	54.5	56.0	ERPC	2009–2011
	46.5	30.3	Petrodolinskoe	2009–2011
	42.6	23.1	Europe group 4	2007, Apr.– Aug.
	42.0	24.8	Plovdiv, UBMS Dolni Voden	2007, Apr.– Aug.
	50.2	12.5	Europe group 5	2009, Feb.–June
	50.2	17.5	Europe group 6	2010, Feb.–June
	50.2	15.0	Europe group 7	2008–2011, Sep.-Mar.
	50.2	20.0	Europe group 8	2007, Apr.– Aug.
	50.1	12.4	Cheb	2008, Sep.–Dec.
	50.5	13.4	Chomutov	2008–2011, Sep-Mar
	49.1	13.6	Churanov, Sumava	2007–2011, June-Dec
	48.9	14.3	Klet, Sumava	2007–2009, July-Dec
	50.5	13.6	Most	2008–2011, Aug–Feb
	56.0	21.9	Plateliai	2010, June–2011, Jan
	55.4	26.1	Rugsteliskes	2008–2010, Nov–Feb

	55.1	36.6	Obninsk	2009–2010, Sep–Dec
	55.4	21.1	Preila	2008–2010, Oct–Mar
	49.0	22.3	Starina	2009–2011, July-Mar
	50.6	30.5	Oseshchyna	2008, May–2008, Sep
	45.3	30.2	Zmiinyi Island	2009–2011, July–Dec
	46.5	29.5	Stefan Voda	2007, Apr.– Aug.
	42.4	19.3	Podgorica	2007, Apr.– Aug.
	46.5	15.7	Maribor OZADSE	2007, Apr.– Aug.
Africa	–4.3	15.2	Brazzaville, Congo	2008–2011
	6.7	–0.8	Abetefi, Ghana	2010–2011
	–20.2	57.5	Reduit	2008–2011
	8.9	7.1	Sheda	2008–2011
	15.6	32.5	Khartoum, Sudan	2008–2011
Asia	37.4	136.9	Wajima, Japan	2005, May–Sep. 2004, Oct.–2005, Apr.
	37.5	121.4	Yantai, China	annual
	40.7	45.0	Asia group 1	2008, June–Nov.
	47.1	51.9	Atyrau	2008, Apr.–Aug.
	49.8	73.1	Karaganda	2008, Apr.–Aug.

Table S2: 208 non-background sites information [*IADN*; *Hung et al.*, 2010; *Tørseth et al.*, 2012; *Shen et al.*, 2014; *Boruvkova*, 2015]

region	lat	lon	Location name	Obs. period
North America	34.0	-118.1	Long Beach Freeway, Los Angeles Basin	2004, May-June 2005, Jan.
	34.1	-118.2	the California State Highway, Los Angeles Basin	2004, May-June 2005, Jan.
	34.1	-118.2	the California State Highway, Los Angeles Basin	2006, Feb.-June.
	29.8	-95.4	Houston	1991
	40.5	-74.4	New Brunswick, NJ	1997, Oct.–1998, Oct.
	42.4	-71.1	Boston	1991
	44.3	-79.9	Borden, Ontario, Canada	2001, Oct.–2002, Dec.
	41.7	-87.6	Chicago, USA	2004, Winter
	41.9	-87.6	Chicago, USA	1995, Summer
	41.9	-87.6	Chicago, America	2004, Summer
	34.2	-118.2	Los Angeles	2005, Winter
	34.1	-117.9	Los Angeles	2005, Winter
	34.1	-118.2	Los Angeles, USA	1976, Winter
	27.7	-82.7	Gulfport, FL	2002, May
	28.0	-82.2	Sydney, Fla	2002, May
	33.8	-84.4	Jefferson St, GA	2002, May
	30.4	-89.1	Gulfport, MS	2002, May
	43.8	-71.8	Thompson Farm, NH	2002, May
	41.9	-87.6	Chicago, America	1995, Summer
	34.1	-118.2	Los Angeles, USA	1976, Summer
	39.1	-76.6	Baltimore, America	1997, July
Europe	38.0	23.7	Athens, Greece	2003, Dec.–2004, Feb.
	60.2	25.0	Helsinki, Finland	2002, Jan.
	60.2	25.0	Helsinki, Finland	2002, Feb
	61.9	25.7	Kurkimäki, Finland	2006, winter
	61.9	25.7	Kurkimäki, in Central Finland	2006, Winter
	50.1	14.4	Prague 5—Smichov	2004, Jan.
	50.1	14.4	Prague, Czech Republic	2005, Nov.-Dec.
	43.8	11.1	Bagnoli	2005, Nov.-Dec.
	51.3	4.5	Point-source	2002
	51.2	4.5	Residential	2002
	52.5	-1.9	Birmingham, UK	1996, Winter
	51.0	-3.7	Borgerhout, Flanders, Belgium	2001, Nov.-Dec.
	51.0	-3.7	Mechelen, Flanders, Belgium	2002, Nov.-Dec.
	51.0	-3.7	Zelzate, Flanders, Belgium	2002, Winter
	51.0	-3.7	Petroleumkaai, Flanders, Belgium	2003, Winter
	43.2	131.9	Vladivostok, Russia	1999, Winter
	51.5	7.0	Essen, Germany	1981, Winter
	45.2	9.2	Pavia, Italy	1996, Feb.-June
	40.6	22.9	Greater Athens Area, Greece	2001, May–2002, June
	44.5	18.7	Tuzla	2004, May
	44.5	18.7	Tuzla ,Herzegovina	2004, May
	43.8	18.3	Sarajevo	2004, May
	43.8	18.3	Sarajevo ,Bosnia	2004, May
	51.0	-3.7	Borgerhout, Flanders, Belgium	2003, Apr.-May

50.4	18.8	Repty Ś ląskie, Poland	1995, May
45.5	10.2	Brcscia, Lombardy, Italy	1991, Mar.-May
45.7	7.3	Aosta, Italy	1995, Mar.
38.0	23.7	Koropi, Athens, Greece	2003, July-Dec.
38.0	23.7	Spata, Athens, Greece	2003, July-Dec.
38.0	23.7	Athens, Greece	2003, June-Nov.
38.0	23.7	Athens, Greece	2004, May-July
60.2	25.0	Helsinki, Finland	2001, Sep.-Oct.
50.1	14.4	Prague, Czech Republic	2000, Summer
43.8	11.1	Bagnoli	2000, Summer
43.3	5.5	Marseille, France, Penne, sub-urban	2004, July
43.3	5.4	Marseille, France, 5 avenues, urban	2004, July
52.5	-1.9	Birmingham, UK	1996, Summer
43.2	131.9	Vladivostok, Russia	1999, Summer
51.5	7.0	Essen, Germany	1981, Summer
51.2	3.8	Flanders, Belgium	2002, Sep.-Nov.
50.1	14.4	Prague, Czech Republic	2004, Sep.
51.2	4.4	Petroleumkaai, Flanders, Belgium	2001, Sep.
51.0	4.5	Flanders, Belgium	2002, Sep.-Nov.
40.6	22.9	MAR	2001, May–2002, June
40.6	22.9	ARI	2001, May–2002, June
40.6	22.9	ELE	2001, May–2002, June
40.6	23.0	Thessaloniki, Greece	1996, Jan.–1997, Feb.
50.1	14.4	Prague, Czech Republic	2000, Apr.–2001, Mar.
57.2	14.6	Ro¨rvik	1994–1999
57.2	14.6	Pallas	1996–1999
43.8	11.1	Bagnoli	2000, Dec.–2001, July
44.5	11.3	Bologna, Italy	2003
43.9	11.1	Prato (Italy)	2003, Mar.-Nov.
51.5	-0.2	London	1991–1998
51.5	-0.2	London	1992
43.3	-1.9	Errenteria	1996, Feb.–1997, Dec.
43.3	-1.9	Errenteria, Basque Country, Spain	1996, Jan.–1997, Dec.
51.3	12.4	Leipzig, Germany.	1999–2002
53.5	10.0	Wervikstraat,border between Belgium and France	2003
41.4	2.2	Barcelona, Spain	2004–2005
53.5	-2.2	Mancherster	1991–1998
Asia			
43.1	141.4	Sapporo, Japan	1997, Winter
43.1	141.4	Sapporo, Japan	1997, Winter
35.7	139.7	Tokyo, Japan	1997, Winter
35.7	139.7	Tokyo, Japan	1997, Winter
36.6	136.6	Kanazawa, Japan	1999, Winter
36.6	136.6	Kanazawa, Japan	1999, Winter
37.6	127.0	Seoul, South Korea	2002, Winter
37.6	127.0	Seoul, South Korea	2002, Winter
39.9	116.4	Beijing, China	2005, Dec.–2006, Jan.
22.3	114.1	Hung Hom (PU)	2000, Nov.–2001, Feb.
23.1	113.4	Wushan, Guangzhou, China	2004, Jan.
23.1	113.3	Guangzhou, China	2003, Winter
23.1	113.3	Guangzhou, China	2004, Jan.
11.0	106.6	Ho Chi Minh City,Vietnam	2005, Jan.–2006, Mar.
39.8	28.9	Bursa, Turkey	2005, Jan.-Feb.

35.0	138.4	Shimizu	2001, Winter
33.9	130.8	Kitakyushu, Japan	1997, Winter
41.9	123.4	Shenyang, China	2001, Winter
3.2	101.7	Kuala Lumpur, Malaysia	1998, Sep.–1999, Jan.
26.8	80.9	Lucknow city, India	2005, Feb.
38.9	127.1	Dalian, China	2004
40.0	116.4	Beijing, China	2004
23.1	113.3	Guangzhou, China	2003
23.1	113.4	Wushan, Guangzhou, China	2004, Apr.
23.1	113.3	Guangzhou, China	2004, Apr.
22.8	108.3	Yulin, Guangxi, China	2004, Mar.–Apr.
22.8	108.3	Yulin, Guangxi, China	2004, Mar.
34.7	135.5	Osaka, Japan	2005, Apr.–2006, May
31.2	121.5	Shanghai, China	2004, Mar.-Apr.
43.1	141.4	Sapporo, Japan	1997, Summer
43.1	141.4	Sapporo, Japan	1997, Summer
35.7	139.7	Tokyo, Japan	1997, Summer
35.7	139.7	Tokyo, Japan	1997, Summer
36.6	136.6	Kanazawa, Japan	1999, Summer
36.6	136.6	Kanazawa, Japan	1999, Summer
39.1	117.3	Tianjin	2005, July-Aug.
39.1	117.3	Tianjin	2005, July-Aug.
39.1	117.3	Tianjin	2005, July-Aug.
22.3	114.1	Kwun Tong (KT)	2001, June-Aug.
22.3	114.2	Hung Hom (PU)	2001, June-Aug.
23.1	113.4	Wushan, Guangzhou, China	2003, Aug.
23.1	113.3	Guangzhou, China	2003, Summer
23.1	113.3	Guangzhou, China	2002, Summer
39.8	28.9	Bursa, Turkey	2004, July-Aug.
34.7	135.5	Osaka, Japan	2005, Apr.–2006, May
33.9	130.8	Kitakyushu, Japan	1997, Summer
41.9	123.4	Shenyang, China	2001, Summer
23.7	121.0	Taiwan,suburban	Annual
23.1	113.3	Guangzhou, China	2002, Sep.-Nov.
23.1	113.3	Guangzhou, China	2003, Nov.
23.1	113.4	Wushan, Guangzhou, China	2003, Nov.
35.2	138.7	Shizuoka, Japan	2001, Feb.–2002, Jan.
35.0	138.4	Shizuoka, Japan	2001, Feb.–2002, Jan.
38.9	121.5	Dalian, China	Annual
37.6	127.0	Seoul, Korea	1993, Mar.-Dec.
37.6	127.0	Seoul, Korea	1998, Oct.–1999. Dec
32.1	118.8	Nanjing, China	2001–2002
32.1	118.8	Nanjing urban, China	2001–2002
24.5	118.1	Xiamen	2005
24.5	118.1	Xiamen	2005
24.9	118.0	Xiamen	2005
37.6	116.7	Dezhou, China	Annual
37.4	116.3	Dezhou, China	Annual
23.1	113.3	Gunagzhou, China	2001, Apr.–2002, Mar.
40.0	116.3	Beijing, China	Annual
22.4	114.1	Hong Kong	Annual
22.3	114.1	Kwun Tong (KT)	2000, Nov.–2001, Mar.
37.9	112.1	Taiyuan, China	Annual

	37.9	112.5	Taiyuan, China	Annual
	10.8	106.7	VNU, Vietnam National University	2005, Jan.–2006, Mar.
	10.8	106.7	DOSTE	2005, Jan.–2006, Mar.
	10.8	106.7	ITTE	2005, Jan.–2006, Mar.
	38.9	106.1	Yinchuan, China	Annual
	38.9	106.1	Yinchuan, China	Annual
	38.1	102.7	Wuyi, China	Annual
	37.9	102.6	Wuyi, China	Annual
	23.5	88.4	Kolkata (Calcutta), India	2003, Nov.–2004, Nov.
	23.5	88.4	Kolkata (Calcutta), India	2003, Nov.–2004, Nov.
	28.6	77.2	New Delhi, India	2003
	28.6	77.2	New Delhi, India	2002
	28.6	77.2	New Delhi, India	2001, Apr.–2002, Mar.
	31.5	74.3	Lahore, Pakistan	1992, Sep.–1993, Oct.
	31.5	74.3	Lahore, Pakistan	1992, Sep.–1993, Oct.
	31.5	74.3	Lahore, Pakistan	1992, Sep.–1993, Oct.
	40.2	29.0	Merinos, Turkey	2004, Aug.–2005, Apr.
	40.2	29.1	Merinos, Turkey	2004, Aug.–2005, May
	39.8	28.9	Bursa, Turkey	2004, Aug.–2005, Apr.
	34.4	132.8	Higashi Hiroshima, Japan	2006, Jan.–2007, Jan.
	32.8	129.9	Nagasaki city, Japan	1997, July–1998, June
	35.2	128.6	Changwon-Masan, Korea	2004, Oct.-Nov.
	35.9	127.8	Korea	2002
	37.4	121.5	Yantai, China	Annual
	23.7	120.6	Tunghai university, Taiwan	2001, Aug.–2002, Apr.
	-6.3	106.9	Jakarta, Indonesia	1992, Dec.–1993, Dec.
	1.3	103.8	Singapore	1994
	3.0	101.7	university of Malaya	2001, Mar.-Dec.
	15.9	101.0	Thailand	2000
	13.8	100.5	Bangkok, Thailand	1993, Apr.-Oct. 1994, Feb.-Apr.
	19.0	72.9	The creek adjoining Mumbai harbour, India	2000, June–2001, May
	40.4	116.9	Miyun	2004, Mar.-May
	36.7	3.1	Oued Smar, Algeria	2002, Aug.–Sep.,
Africa	36.7	3.1	Oued Smar, Algeria	2002, Nov.–2003, Feb.
	-37.8	145.0	Melbourne, Australia	1993
Oceanic	-27.7	153.0	Brisbane, Australia	2002, Winter
	-27.7	153.0	Brisbane, Australia	1998, Winter
	-27.7	153.0	Brisbane, Australia	1998, Summer
	-27.5	153.0	Brisbane, Australia	2004, Summer
	-34.9	-58.0	La Plata, Argentina	2000–2002
South America	-34.9	-58.0	La Plata, Argentina	1999–2002
	-34.9	-58.0	La Plata, Argentina	2000–2002
	-34.9	-58.0	La Plata, Argentina	2000–2002
	-30.0	-51.2	Metropolitan Area of Porto Alegre (MAPA), Brazil	2002–2005
	-31.7	-54.1	Candiota region, Brazil	2001, Feb.-Oct.
	-30.0	-51.2	Metropolitan Area of Porto Alegre, Rio Grande do Sul, Brazil	2001, Oct.–2002, Dec.
	-30.0	-51.6	Charqueadas	2001, Oct.–2002, Dec., Winter
	-30.0	-51.2	CEASA	2001, Oct.–2002, Dec., Winter

-30.0	-51.2	Porto Alegre, Brazil	2002, Mar.-May
-22.8	-43.2	Rio de Janeiro, Brazil	1998, Nov.
-23.7	-46.6	Sao Paulo City, Brazil	2000, Aug.-Dec.
-23.6	-46.6	Sao Paulo City, Brazil	2002, May-July
-20.5	-54.7	Indubrasil	2003, July-Dec.
-20.4	-54.6	Campo Grande City, Brazil	1998, July-Nov.
-20.4	-54.6	Campo Grande, Brazil	2003, July-Dec.
-20.4	-54.6	Campo Grande, Brazil	2003, July-Dec.
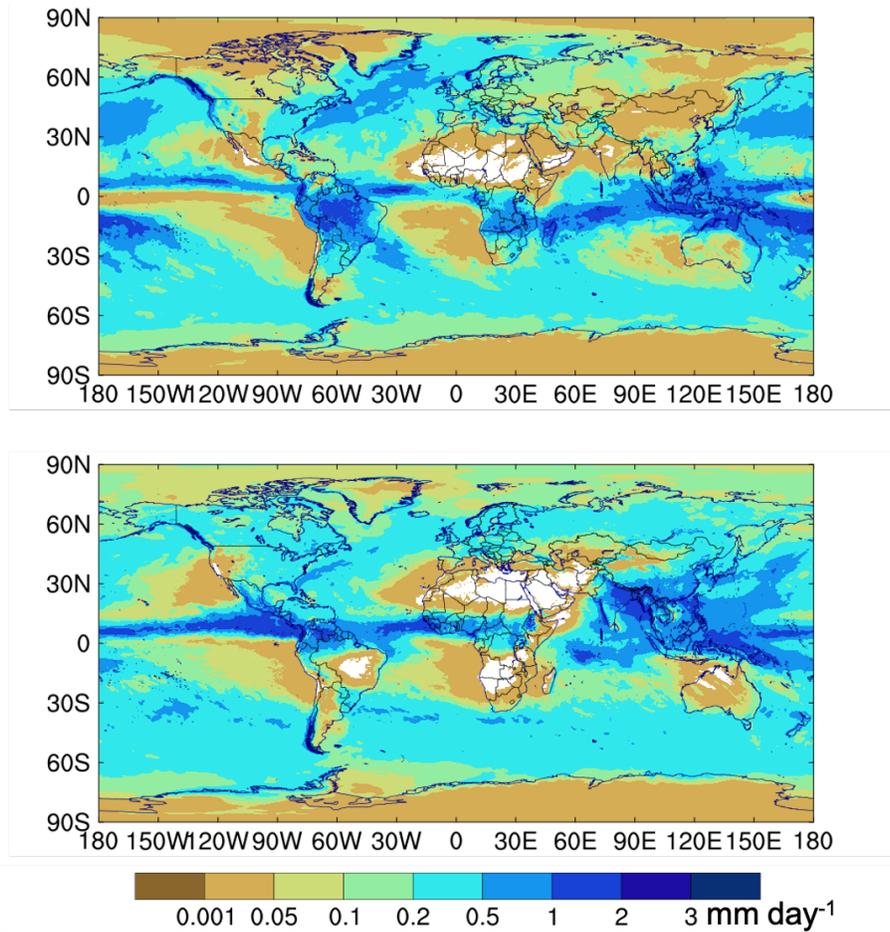
Figure S1. The spatial distribution of surface-layer average precipitation (unit: mm day^{-1}) in DJF (December-January-February) and JJA (June-July-August), respectively.

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