

Auxiliary material

Evaluating Inter-Continental Transport of Fine Aerosols:

(2) Global Health Impact

J. Liu¹ (jliu@princeton.edu), **D.L. Mauzerall**¹ (mauzeral@Princeton.EDU), and **L. W. Horowitz**² (Larry.Horowitz@noaa.gov)

1. Woodrow Wilson School of Public and International Affairs, Princeton University, Princeton, NJ, USA

2. Geophysical Fluid Dynamics Laboratory, Princeton, NJ, USA

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Table A1 Total population, fraction of age group 30 years and older, and baseline mortality rate in each receptor region. (NA, North America; SA, South America; EU, Europe; FSU, the Former Soviet Union; AF, Africa; IN, the Indian subcontinent; EA, East Asia; SE, Southeast Asia; AU, Australia; ME, the Middle East)

	NA	SA	EU	FSU	AF	IN	EA	SE	AU	ME
POP ^[1]	478	353	671	116	793	1316	1471	538	24	282
F ₃₀₊ ^[2]	0.53	0.42	0.58	0.50	0.30	0.38	0.51	0.39	0.57	0.33
M _{b30+} ^[3]	0.0131	0.0123	0.0180	0.0224	0.0213	0.0160	0.0117	0.0139	0.0112	0.0132

[1] Total population in 2000, GWP V3 (unit: millions)

[2] Fraction of population in age group 30 years and older, WHO 2000

[3] Baseline mortality rate for age group 30 years and older, WHO 2000

Table A2-1 Budget of annual average population-weighted (P-W) surface ammonium sulfate concentrations (units: $\mu\text{g}\cdot\text{m}^{-3}$) in each receptor region. (ROW indicates the source of PM_{2.5} from rest of the world including sources from the untagged regions; DMS indicates the sulfate aerosols produced from DMS). Note: the P-W surface concentrations due to domestic emissions could be underestimated due to the coarse resolution of global model.

		Receptor									
		NA	SA	EU	FSU	AF	IN	EA	SE	AU	ME
Source	NA	4.80	0.01	0.10	0.05	0.04	0.04	0.02	0.00	0.00	0.08
	SA	0.00	1.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	EU	0.01	0.00	3.65	0.51	0.27	0.04	0.08	0.00	0.00	0.78
	FSU	0.00	0.00	0.04	1.25	0.00	0.02	0.10	0.00	0.00	0.10
	AF	0.00	0.00	0.04	0.01	0.77	0.02	0.00	0.00	0.01	0.17
	IN	0.00	0.00	0.00	0.04	0.01	4.03	0.03	0.09	0.00	0.04
	EA	0.03	0.00	0.01	0.04	0.01	0.03	10.63	0.79	0.00	0.02
	SE	0.00	0.00	0.00	0.00	0.00	0.01	0.03	2.13	0.00	0.00
	AU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.05	0.00
	ME	0.00	0.00	0.07	0.19	0.15	0.21	0.03	0.01	0.00	2.18
	ROW	0.45	0.67	0.35	0.06	0.28	0.08	0.40	0.91	0.12	0.20
	DMS	0.10	0.19	0.21	0.05	0.10	0.10	0.04	0.07	0.39	0.05
	Total	5.41	2.57	4.47	2.21	1.64	4.58	11.38	4.02	1.58	3.62

Table A2-2 Same as Table A2-1, but for black carbon aerosols.

		Receptor									
		NA	SA	EU	FSU	AF	IN	EA	SE	AU	ME
Source	NA	0.579	0.001	0.004	0.002	0.001	0.001	0.001	0.000	0.000	0.003
	SA	0.001	0.489	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000
	EU	0.001	0.000	0.860	0.036	0.016	0.002	0.004	0.000	0.000	0.039
	FSU	0.000	0.000	0.002	0.145	0.000	0.000	0.009	0.000	0.000	0.002
	AF	0.000	0.004	0.003	0.001	0.492	0.005	0.001	0.001	0.002	0.012
	IN	0.000	0.000	0.000	0.007	0.001	1.212	0.007	0.026	0.000	0.009
	EA	0.003	0.000	0.001	0.009	0.001	0.004	2.678	0.073	0.000	0.002
	SE	0.000	0.000	0.000	0.000	0.000	0.006	0.009	0.509	0.000	0.000
	AU	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.146	0.000
	ME	0.000	0.000	0.005	0.015	0.006	0.012	0.001	0.000	0.000	0.306
	ROW	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000
	Total	0.585	0.494	0.877	0.214	0.518	1.244	2.711	0.613	0.149	0.373

Table A2-3 Same as Table A2-1, but for fine organic carbon aerosols.

		Receptor									
		NA	SA	EU	FSU	AF	IN	EA	SE	AU	ME
Source	NA	3.135	0.009	0.031	0.016	0.010	0.009	0.007	0.001	0.000	0.022
	SA	0.006	3.092	0.000	0.000	0.010	0.004	0.001	0.002	0.009	0.002
	EU	0.002	0.000	2.884	0.119	0.114	0.011	0.016	0.001	0.000	0.183
	FSU	0.005	0.000	0.016	1.053	0.001	0.002	0.114	0.001	0.000	0.017
	AF	0.004	0.044	0.012	0.008	4.615	0.055	0.005	0.011	0.022	0.075
	IN	0.002	0.000	0.001	0.042	0.007	7.187	0.044	0.177	0.000	0.061
	EA	0.009	0.000	0.004	0.041	0.002	0.017	8.246	0.270	0.000	0.005
	SE	0.002	0.001	0.001	0.001	0.002	0.057	0.081	3.206	0.001	0.003
	AU	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.039	0.785	0.000
	ME	0.001	0.000	0.023	0.094	0.027	0.079	0.007	0.002	0.000	1.245
	ROW	0.003	0.001	0.007	0.001	0.003	0.001	0.002	0.004	0.002	0.002
	Total	3.169	3.149	2.978	1.375	4.791	7.423	8.524	3.715	0.820	1.614

Table A2-4 Same as Table A2-1, but for fine dust aerosols.

		Receptor									
		NA	SA	EU	FSU	AF	IN	EA	SE	AU	ME
Source	NA	0.215	0.001	0.009	0.009	0.007	0.009	0.005	0.001	0.000	0.016
	SA	0.000	0.620	0.000	0.000	0.007	0.001	0.000	0.002	0.024	0.000
	EU	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	FSU	0.015	0.002	0.178	2.646	0.028	0.224	0.116	0.013	0.001	1.657
	AF	0.378	0.412	0.917	0.900	15.133	2.620	0.460	0.351	0.048	5.101
	IN	0.006	0.002	0.004	0.035	0.014	1.451	0.034	0.035	0.001	0.061
	EA	0.048	0.002	0.037	0.323	0.021	0.044	6.731	0.108	0.001	0.068
	SE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	AU	0.002	0.012	0.001	0.001	0.008	0.005	0.001	0.109	0.979	0.003
	ME	0.045	0.021	0.053	0.648	0.686	2.268	0.165	0.187	0.007	8.999
	ROW	0.000	0.001	0.000	0.000	0.003	0.001	0.000	0.001	0.016	0.001
	Total	0.709	1.072	1.198	4.563	15.908	6.625	7.512	0.808	1.075	15.906

Table A3 Ratios of population-weighted (P-W) annual mean PM2.5 concentrations to Area-weighted (A-W) concentrations for each pair of source-receptor regions.

		Receptor									
		NA	SA	EU	FSU	AF	IN	EA	SE	AU	ME
Source	NA	2.4	1.7	1.1	1.8	0.7	1.0	0.8	1.3	0.5	1.0
	SA	1.1	1.2	1.1	2.6	0.8	1.0	0.7	0.9	0.9	0.6
	EU	0.7	0.9	1.4	1.7	1.2	0.8	0.8	1.5	0.4	1.5
	FSU	0.9	0.9	0.6	1.6	1.0	0.8	0.6	1.3	0.5	1.3
	AF	1.1	1.0	0.9	2.7	0.9	1.0	0.7	1.2	0.6	0.7
	IN	1.2	0.9	1.1	4.3	1.0	1.4	0.4	1.4	0.5	0.9
	EA	1.0	1.0	1.1	1.6	0.7	0.7	1.9	1.7	0.5	1.0
	SE	1.3	1.0	1.1	2.5	0.9	1.2	1.3	2.1	0.2	0.7
	AU	1.5	1.0	1.0	2.4	0.9	1.0	0.8	1.1	0.6	0.7
	ME	1.2	0.9	0.8	3.8	1.3	0.8	0.6	1.2	0.5	0.8
	ROW	1.8	1.5	1.0	0.7	0.9	0.9	1.1	1.8	1.4	1.0
	Total	2.2	1.2	1.2	1.8	0.9	1.2	1.7	1.8	0.6	0.9

Table A4 Annual premature mortalities for adults (age 30 and over) as a result of domestic and inter-continental transport of PM2.5.

		Receptor									
		NA	SA	EU	FSU	AF	IN	EA	SE	AU	ME
Source	NA	113,260	146	3,706	311	827	1,727	1,276	82	0	603
	SA	77	40,920	11	2	491	170	26	51	21	12
	EU	198	5	197,900	3,538	5,421	1,648	3,542	67	0	5,612
	FSU	317	11	8,101	21,337	535	7,256	11,371	188	0	8,851
	AF	4,024	2,598	23,974	3,060	358,040	82,672	15,847	4,104	46	24,417
	IN	131	15	150	379	641	422,000	3,875	3,926	0	1,022
	EA	1,194	19	1,445	1,514	501	2,716	928,800	12,638	0	474
	SE	31	9	23	5	61	2,039	3,954	62,950	1	20
	AU	16	110	15	3	189	159	37	1,642	1,641	12
	ME	587	134	4,510	2,815	16,298	77,412	6,963	2,276	4	57,760
	ROW	5,634	5,853	13,640	519	6,994	5,666	16,022	10,269	293	1,278
	Total	125,467	49,821	253,476	33,483	389,997	603,465	991,713	98,192	2,006	100,061

Table A5 Annual premature mortalities for adults (age 30 and over) as a result of domestic and inter-continental transport of non-dust PM2.5.

		Receptor									
		NA	SA	EU	FSU	AF	IN	EA	SE	AU	ME
Source	NA	110,380	142	3,478	276	722	1,448	1,110	70	0	521
	SA	74	35,570	9	2	319	142	21	32	8	10
	EU	198	5	197,900	3,538	5,421	1,648	3,542	67	0	5,612
	FSU	118	0	2,131	13,237	44	536	7,451	43	0	641
	AF	54	318	1,274	70	117,040	2,572	347	164	20	1,217
	IN	60	3	53	273	368	378,200	2,735	3,507	0	702
	EA	534	6	435	384	160	1,386	709,800	11,538	0	121
	SE	31	9	23	5	61	2,039	3,954	62,950	1	20
	AU	0	25	0	0	16	3	1	492	1,102	0
	ME	53	1	2,970	925	3,098	9,012	1,403	136	0	19,460
	ROW	5,634	5,848	13,639	518	6,926	5,622	16,019	10,261	285	1,274
	Total	117,135	41,928	221,913	19,228	134,174	402,608	746,382	89,259	1,415	29,579

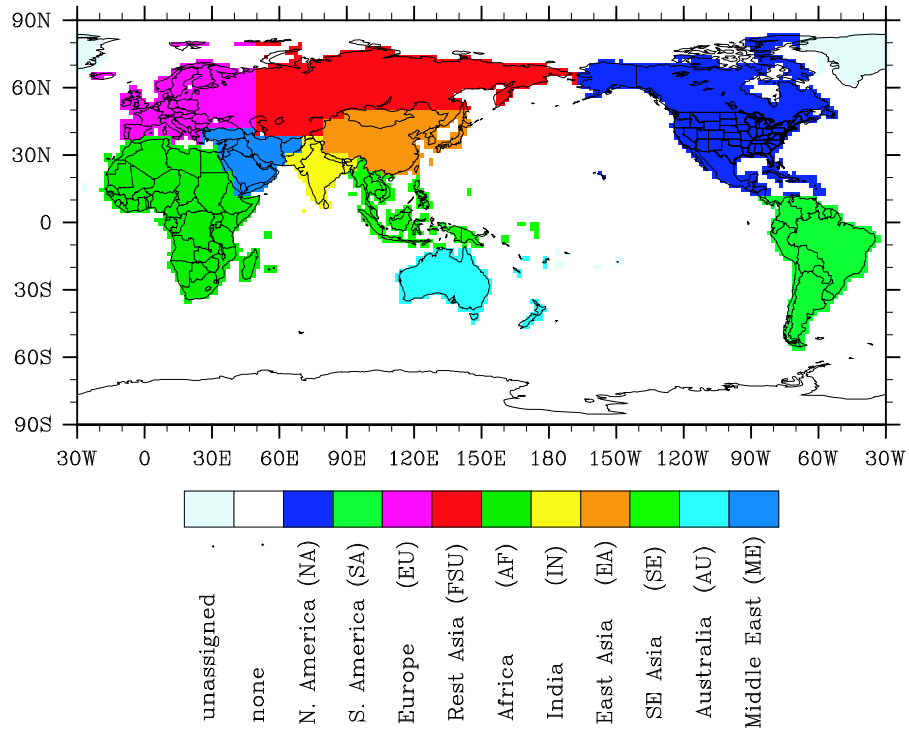


Figure A1 The ten continental regions tagged in our MOZART-2 simulations.

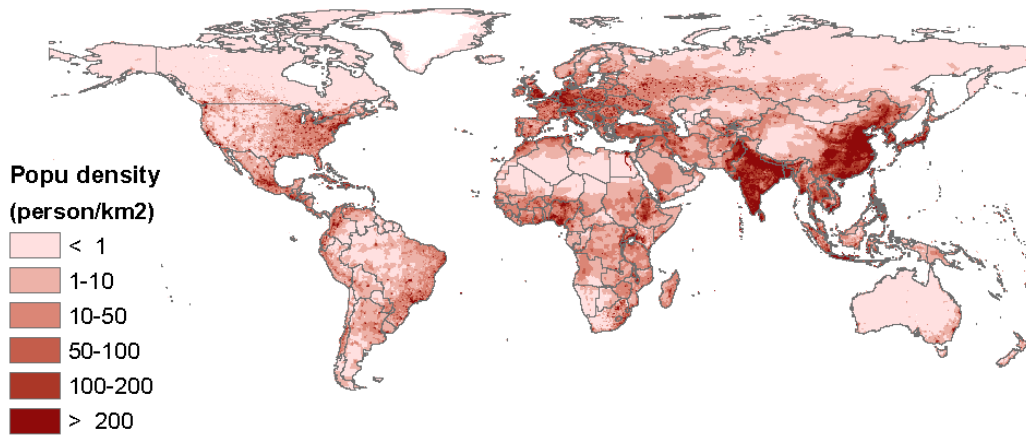


Figure A2 Global population distribution in 2000 (unit: person/km², from GWP3).

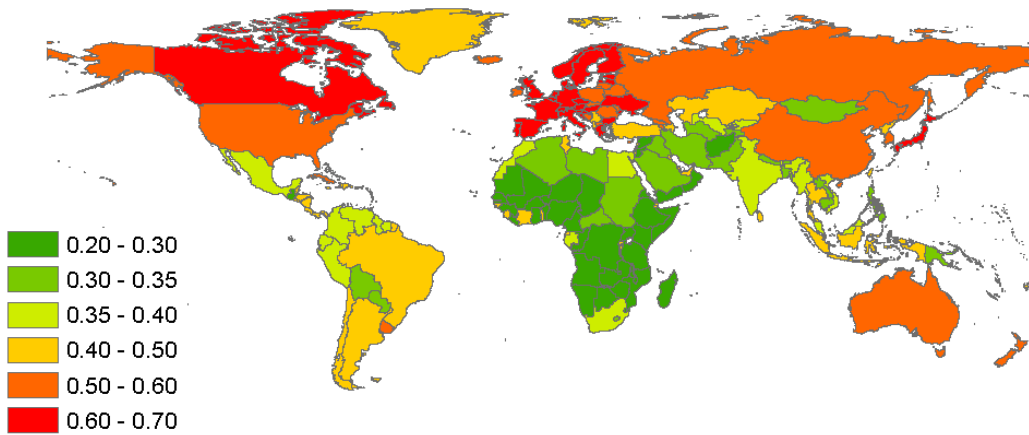


Figure A3 Fraction of population age 30 and over in each country in 2000 (from WHO 2000).

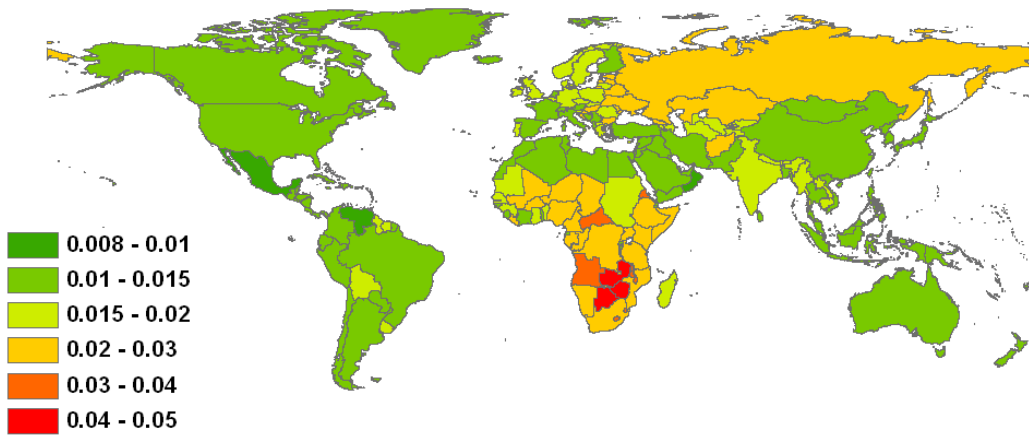


Figure A4 Baseline mortality rates for adults age 30 and over in each country in 2000 (from WHO 2000).