

Supplement of Atmos. Chem. Phys., 18, 3147–3171, 2018
<https://doi.org/10.5194/acp-18-3147-2018-supplement>
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Supplement of

Ozone impacts of gas–aerosol uptake in global chemistry transport models

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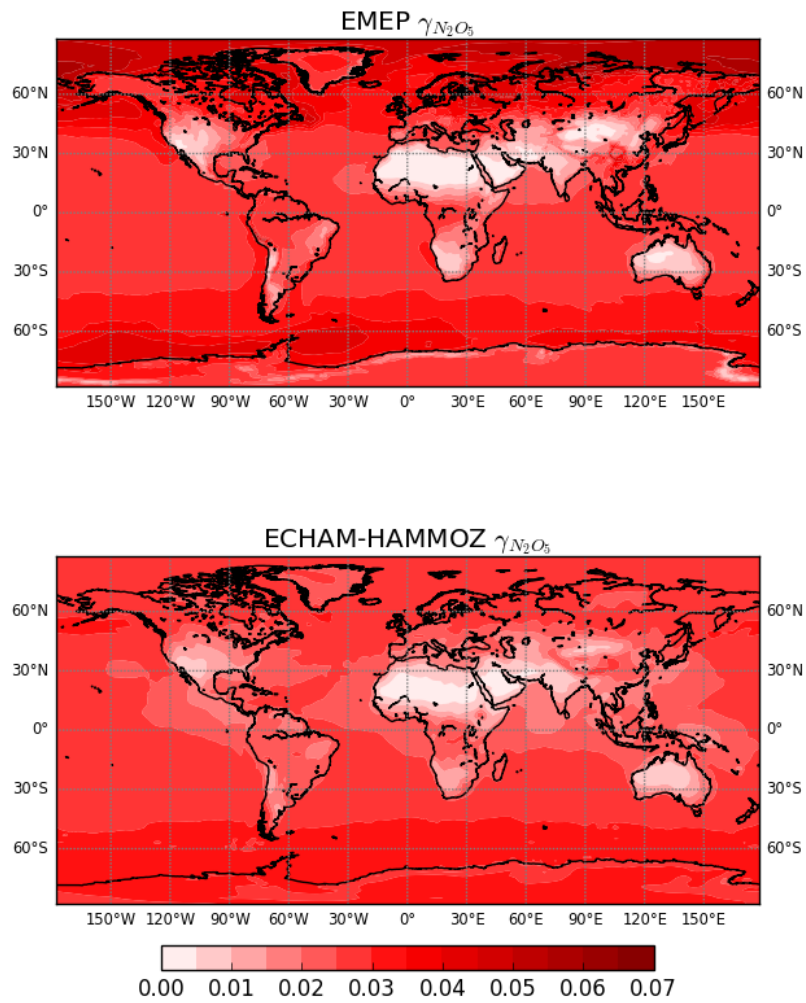


Figure S1. Annual average values of near-surface $\gamma_{N_2O_5}$ from the EMEP and ECHAM-HAMMOZ models, year 2012.

Table S1. Impacts (in mixing ratios) of gas-aerosol reactions on regional average mixing ratios (ground-level) of O₃ and key NO_y compounds: EMEP model. As Table 4 (main manuscript), but with changes (as test minus base) given in ppb or ppt as appropriate.

Region	Run	O ₃ (ppb)	NO _x (ppb)	NO _y (ppb)	HNO ₃ (ppb)	PAN (ppb)	N ₂ O ₅ (ppt)	NO ₃ (ppt)
NA	REF	40.334	0.820	1.806	0.205	0.550	5.083	4.539
NA	noN2O5	+2.203	+0.072	+0.076	-0.021	+0.046	+8.14	+2.70
NA	noHO2	+0.081	-0.009	-0.001	+0.002	+0.007	-0.11	-0.44
NA	noHNO3	+0.124	-0.000	-0.040	+0.037	+0.000	-0.00	+0.02
NA	noNO2	+0.167	+0.017	+0.012	-0.001	+0.001	+0.19	+0.09
NA	noNO3	+0.071	+0.000	+0.001	-0.000	+0.000	+0.04	+0.14
NA	noO3	+0.012	-0.000	-0.000	-0.000	+0.000	+0.00	+0.00
EUR	REF	40.890	1.013	2.431	0.251	0.544	7.730	6.479
EUR	noN2O5	+2.670	+0.158	+0.082	-0.041	+0.057	+21.66	+4.67
EUR	noHO2	+0.308	-0.026	-0.003	+0.002	+0.020	-0.30	-0.90
EUR	noHNO3	+0.272	-0.000	-0.149	+0.146	+0.001	+0.00	+0.19
EUR	noNO2	+0.141	+0.046	+0.027	-0.002	-0.004	+0.44	+0.25
EUR	noNO3	+0.141	+0.001	+0.001	-0.000	+0.001	+0.16	+0.65
EUR	noO3	+0.050	-0.000	-0.000	+0.000	-0.000	+ -0.01	+0.10
EA	REF	43.960	2.235	4.635	0.539	0.885	12.594	5.516
EA	noN2O5	+3.457	+0.322	+0.208	-0.101	+0.113	+34.99	+5.86
EA	noHO2	+0.852	-0.080	-0.005	+0.011	+0.064	+0.02	-0.39
EA	noHNO3	+0.118	-0.001	-0.082	+0.071	+0.001	-0.01	+0.01
EA	noNO2	-0.373	+0.662	+0.404	-0.060	-0.068	+1.63	+0.20
EA	noNO3	+0.082	+0.000	+0.000	-0.000	+0.001	+0.15	+0.17
EA	noO3	+0.017	-0.000	-0.000	+0.000	+0.000	+0.01	+0.00
SA	REF	47.329	1.124	2.897	0.416	0.325	10.369	12.037
SA	noN2O5	+2.921	+0.122	+0.025	-0.017	+0.048	+14.37	+7.60
SA	noHO2	+0.300	-0.030	-0.007	+0.004	+0.016	-0.48	-1.46
SA	noHNO3	+0.668	+0.000	-0.232	+0.255	+0.001	+0.11	+0.46
SA	noNO2	+0.343	+0.045	+0.031	-0.001	+0.003	+1.00	+0.63
SA	noNO3	+0.441	+0.003	+0.005	+0.000	+0.002	+0.51	+1.29
SA	noO3	+0.043	-0.000	+0.000	+0.000	+0.000	+0.02	+0.06

Table S2. Same as Table S1 (c.f. Table 5, main manuscript), but for ECHAM-HAMMOZ.

Region	Run	O ₃ (ppb)	NO _x (ppb)	NO _y (ppb)	HNO ₃ (ppb)	PAN (ppb)	N ₂ O ₅ (ppt)	NO ₃ (ppt)
NA	REF	38.936	1.293	1.591	0.146	0.135	14.85	2.71
NA	noN2O5	+2.163	+0.086	+0.125	+0.012	+0.011	+13.99	+1.52
NA	noHO2	+0.089	-0.014	-0.009	+0.003	+0.002	-0.04	-0.07
NA	noHNO3	+2.233	-0.01	+0.18	+0.186	+0.003	+0.91	+0.29
NA	noNO2	+0.186	+0.027	+0.025	-0.001	-0.001	+0.46	+0.06
NA	noNO3	+0.039	-0.0	-0.001	-0.0	-0.0	+0.05	+0.04
NA	noO3	+0.071	-0.001	-0.001	+0.0	-0.0	+0.05	+0.01
EUR	REF	39.566	2.034	2.376	0.154	0.161	21.51	4.7
EUR	noN2O5	+2.815	+0.215	+0.297	+0.019	+0.022	+38.0	+2.88
EUR	noHO2	+0.385	-0.036	-0.023	+0.005	+0.009	-0.16	-0.17
EUR	noHNO3	+2.163	-0.019	+0.335	+0.349	+0.003	+1.37	+0.68
EUR	noNO2	+0.113	+0.118	+0.106	-0.005	-0.008	+1.16	+0.15
EUR	noNO3	+0.052	+0.0	+0.001	+0.0	-0.0	+0.13	+0.13
EUR	noO3	+0.09	-0.003	-0.003	-0.0	-0.0	+0.07	+0.02
EA	REF	38.505	2.101	2.541	0.17	0.258	10.05	2.64
EA	noN2O5	+3.333	+0.24	+0.338	+0.026	+0.038	+31.27	+3.02
EA	noHO2	+0.816	-0.098	-0.054	+0.009	+0.034	+0.14	-0.05
EA	noHNO3	+1.852	-0.013	+0.242	+0.252	+0.003	+0.52	+0.24
EA	noNO2	-0.062	+0.606	+0.542	-0.013	-0.053	+0.97	+0.12
EA	noNO3	+0.02	+0.001	+0.001	+0.0	-0.001	+0.04	+0.05
EA	noO3	+0.053	+0.001	+0.0	+0.0	-0.0	+0.02	+0.0
SA	REF	44.255	1.29	1.535	0.099	0.125	15.5	6.15
SA	noN2O5	+2.219	+0.083	+0.13	+0.013	+0.017	+14.85	+2.18
SA	noHO2	+0.287	-0.036	-0.024	+0.005	+0.007	-0.1	-0.22
SA	noHNO3	+3.453	-0.009	+0.604	+0.606	+0.005	+1.27	+1.06
SA	noNO2	+0.33	+0.046	+0.047	-0.001	-0.0	+1.25	+0.3
SA	noNO3	+0.115	-0.001	+0.001	+0.0	+0.0	+0.26	+0.21
SA	noO3	+0.077	+0.0	+0.001	+0.0	+0.0	+0.04	+0.02

Table S3. Impacts (in percent) of gas-aerosol reactions on regional average mixing ratios (ground-level) of O₃ and key NO_y compounds: EMEP model. As Table 4 (main manuscript), but for year 2011.

Region	Run	Unit	O ₃	NO _x	NO _y	HNO ₃	PAN	N ₂ O ₅	NO ₃
NA	Base	Conc*:	39.85	0.80	1.79	0.20	0.54	4.50	4.09
NA	noN2O5pm	%:	6	10	4	-11	9	202	70
NA	noHO2pm	%:	0	-1	0	1	1	-2	-11
NA	noHNO3pm	%:	0	0	-3	23	0	0	0
NA	noNO2pm	%:	0	2	1	0	0	4	2
NA	noNO3pm	%:	0	0	0	0	0	1	4
NA	noO3pm	%:	0	0	0	0	0	0	0
EUR	Base	Conc*:	40.15	0.99	2.40	0.25	0.50	6.98	5.90
EUR	noN2O5pm	%:	7	17	3	-16	11	316	86
EUR	noHO2pm	%:	1	-3	0	1	4	-4	-14
EUR	noHNO3pm	%:	1	0	-6	59	0	0	3
EUR	noNO2pm	%:	0	5	1	-1	-1	6	4
EUR	noNO3pm	%:	0	0	0	0	0	2	10
EUR	noO3pm	%:	0	0	0	0	0	0	2
EA	Base	Conc*:	42.65	2.17	4.50	0.54	0.79	10.88	4.62
EA	noN2O5pm	%:	8	15	5	-19	13	316	127
EA	noHO2pm	%:	2	-4	0	2	7	0	-8
EA	noHNO3pm	%:	0	0	-2	16	0	0	0
EA	noNO2pm	%:	-1	29	9	-11	-7	12	3
EA	noNO3pm	%:	0	0	0	0	0	1	3
EA	noO3pm	%:	0	0	0	0	0	0	0
SA	Base	Conc*:	47.12	1.09	2.83	0.40	0.29	8.78	11.27
SA	noN2O5pm	%:	7	12	1	-4	15	175	73
SA	noHO2pm	%:	1	-3	0	1	5	-5	-12
SA	noHNO3pm	%:	1	0	-8	63	0	1	4
SA	noNO2pm	%:	1	4	1	0	1	9	5
SA	noNO3pm	%:	1	0	0	0	1	5	10
SA	noO3pm	%:	0	0	0	0	0	0	0

Table S4. Sensitivity Study: As in Table 4 (main manuscript), but with $\gamma(\text{N}_2\text{O}_5)$ set to either 0.01 or 0.1. Calculations with EMEP model, year 2012.

Region	Run	Unit	O ₃	NO _x	NO _y	HNO ₃	PAN	N ₂ O ₅	NO ₃
Test 1: $\gamma(\text{N}_2\text{O}_5) = 0.01$									
NA	Base	Conc*:	41.18	0.84	1.83	0.20	0.57	7.35	5.62
NA	noN2O5pm	%:	3	6	3	-7	5	80	29
NA	noHNO3pm	%:	0	0	-2	18	0	0	1
NA	noNO2pm	%:	0	2	1	-1	0	5	2
EUR	Base	Conc*:	41.89	1.06	2.46	0.24	0.56	12.75	7.88
EUR	noN2O5pm	%:	4	11	2	-12	6	131	41
EUR	noHNO3pm	%:	1	0	-6	60	0	0	3
EUR	noNO2pm	%:	0	5	1	-1	-1	7	4
EA	Base	Conc*:	45.00	2.28	4.68	0.53	0.92	16.98	7.05
EA	noN2O5pm	%:	5	12	3	-16	9	180	61
EA	noHNO3pm	%:	0	0	-2	13	0	0	1
EA	noNO2pm	%:	-1	30	9	-12	-7	16	5
SA	Base	Conc*:	48.05	1.15	2.91	0.41	0.33	11.95	13.39
SA	noN2O5pm	%:	5	9	0	-3	12	107	47
SA	noHNO3pm	%:	1	0	-8	62	0	1	4
SA	noNO2pm	%:	1	4	1	0	1	10	6
Test 2: $\gamma(\text{N}_2\text{O}_5) = 0.1$									
NA	Base	Conc*:	39.30	0.79	1.78	0.21	0.53	2.91	3.24
NA	noN2O5pm	%:	8	13	6	-14	12	354	123
NA	noHNO3pm	%:	0	0	-2	17	0	0	1
NA	noNO2pm	%:	0	2	1	0	0	3	2
EUR	Base	Conc*:	39.69	0.97	2.40	0.26	0.52	4.20	4.55
EUR	noN2O5pm	%:	10	21	5	-20	14	600	145
EUR	noHNO3pm	%:	1	0	-6	56	0	1	4
EUR	noNO2pm	%:	0	5	1	0	-1	5	4
EA	Base	Conc*:	42.83	2.15	4.58	0.56	0.86	8.25	3.95
EA	noN2O5pm	%:	11	19	6	-22	16	477	188
EA	noHNO3pm	%:	0	0	-2	13	0	0	1
EA	noNO2pm	%:	-1	30	9	-10	-8	10	3
SA	Base	Conc*:	45.80	1.06	2.87	0.43	0.31	7.18	8.57
SA	noN2O5pm	%:	10	18	2	-7	22	245	129
SA	noHNO3pm	%:	1	0	-8	60	0	1	4
SA	noNO2pm	%:	1	4	1	0	1	9	5