Supplementary Material for the paper

Formation of secondary organic aerosol from isoprene oxidation over Europe

Matthias Karl[1,3], Kostas Tsigaridis[2], Elisabetta Vignati[1], and Frank Dentener[1,*]

[1] European Commission, Joint Research Centre, Institute for Environment and Sustainability, Ispra
[2] NASA Goddard Institute for Space Studies, New York, USA
[3] now at: NILU, Norwegian Institute for Air Research, Kjeller, Norway

* Corresponding author: frank.dentener@jrc.it

Table A1: Seasonal comparison of modelled versus observed POM and modelled ratios of SOA/POM for the EMEP campaign 2002/2003. Model results from the base simulation S1. Ratio modelled to observed POM (M/O).

Station	ID	MAM		JJA		SON		DJF	
		M/O	SOA/POM	M/O	SOA/POM	M/O	SOA/POM	M/O	SOA/POM
Illmitz	AT02	0.62	0.32	0.91	0.61	0.73	0.27	0.28	0.18
Ghent	BE05	0.47	0.33	0.48	0.53	0.41	0.32	0.33	0.23
Kosetice	CZ03	0.39	0.46	0.52	0.60	0.49	0.36	0.33	0.24
Langenbru	DE02	0.35	0.40	0.55	0.66	0.44	0.42	0.23	0.27
Virolahti	FI17	0.52	0.35	0.28	0.60	0.21	0.34	0.41	0.42
Penicuik	GB46	0.41	0.48	0.68	0.68	0.40	0.50	0.29	0.31
Mace Head	IE31	0.31	0.43	0.23	0.42	0.39	0.52	0.21	0.25
S.P.C.	IT08	0.41	0.57	0.80	0.79	0.28	0.52	0.20	0.26
Kollumerw	NL09	0.40	0.37	0.55	0.63	0.43	0.37	0.35	0.27
Braganca	PT01	0.25	0.66	0.37	0.63	0.20	0.51	0.05	0.55
Aspvreten	SE12	0.82	0.21	0.35	0.54	0.49	0.27	0.44	0.26
Stara Lesna	SK04	0.31	0.50	0.30	0.61	0.19	0.40	0.16	0.29
Ispra	IT04	0.32	0.47	1.03	0.77	0.30	0.43	0.15	0.24
Average		0.43	0.43	0.54	0.62	0.38	0.40	0.26	0.29
STDEV		0.15	0.12	0.25	0.10	0.15	0.09	0.11	0.10

Table A2: Seasonal comparison of modelled versus observed POM and modelled ratios of SOA/POM for the EMEP campaign 2002/2003. Model results from the base simulation S2. Ratio modelled to observed POM (M/O).

Station	ID	MAM		JJA		SON		DJF	
		M/O	SOA/POM	M/O	SOA/POM	M/O	SOA/POM	M/O	SOA/POM
Illmitz	AT02	0.59	0.29	0.85	0.59	0.74	0.28	0.26	0.09
Ghent	BE05	0.43	0.28	0.44	0.51	0.40	0.31	0.30	0.15
Kosetice	CZ03	0.31	0.53	0.51	0.60	0.52	0.40	0.29	0.12
Langenbru	DE02	0.34	0.38	0.54	0.65	0.46	0.44	0.20	0.16
Virolahti	FI17	0.45	0.26	0.29	0.61	0.21	0.34	0.28	0.15
Penicuik	GB46	0.40	0.48	0.66	0.67	0.44	0.54	0.28	0.29
Mace Head	IE31	0.33	0.49	0.26	0.54	0.47	0.61	0.22	0.28
S.P.C.	IT08	0.38	0.55	0.73	0.78	0.28	0.53	0.18	0.21
Kollumerw	NL09	0.38	0.35	0.54	0.63	0.45	0.40	0.32	0.21
Braganca	PT01	0.23	0.68	0.37	0.64	0.21	0.54	0.06	0.56
Aspvreten	SE12	0.48	0.23	0.36	0.55	0.48	0.27	0.36	0.12
Stara Lesna	SK04	0.29	0.48	0.31	0.63	0.21	0.47	0.14	0.15
Ispra	IT04	0.29	0.44	0.98	0.76	0.29	0.42	0.13	0.15
Average		0.38	0.42	0.53	0.63	0.40	0.43	0.23	0.20
STDEV		0.10	0.13	0.22	0.08	0.15	0.11	0.09	0.12

Table A3: Seasonal comparison of modelled versus observed POM and modelled ratios of SOA/POM for the EMEP campaign 2002/2003. Model results from the base simulation S3. Ratio modelled to observed POM (M/O).

| Station	ID	MAM		JJA		SON		DJF	
		M/O	SOA/ POM	M/O	SOA/ POM	M/O	SOA/ POM	M/O	SOA/ POM
Illmitz	AT02	0.55	0.23	0.73	0.52	0.69	0.24	0.26	0.10
Ghent	BE05	0.41	0.26	0.39	0.45	0.38	0.27	0.30	0.16
Kosetice	CZ03	0.33	0.36	0.41	0.49	0.45	0.32	0.30	0.14
Langenbru	DE02	0.32	0.32	0.44	0.57	0.41	0.37	0.20	0.16
Virolahti	FI17	0.43	0.22	0.24	0.53	0.20	0.30	0.29	0.19
Penicuik	GB46	0.35	0.40	0.56	0.62	0.36	0.45	0.26	0.25
Mace Head	IE31	0.27	0.38	0.20	0.40	0.36	0.49	0.19	0.22
S.P.C.	IT08	0.33	0.48	0.58	0.72	0.25	0.47	0.18	0.20
Kollumerw	NL09	0.35	0.30	0.44	0.54	0.40	0.33	0.32	0.19
Braganca	PT01	0.19	0.63	0.29	0.54	0.18	0.47	0.05	0.50
Aspvreten	SE12	0.47	0.20	0.29	0.45	0.46	0.23	0.37	0.13
Stara Lesna	SK04	0.24	0.38	0.23	0.50	0.17	0.36	0.14	0.16
Ispra	IT04	0.26	0.37	0.78	0.70	0.27	0.39	0.13	0.17
Average		0.35	0.35	0.43	0.54	0.35	0.36	0.23	0.20
STDEV		0.10	0.12	0.19	0.09	0.14	0.09	0.09	0.10
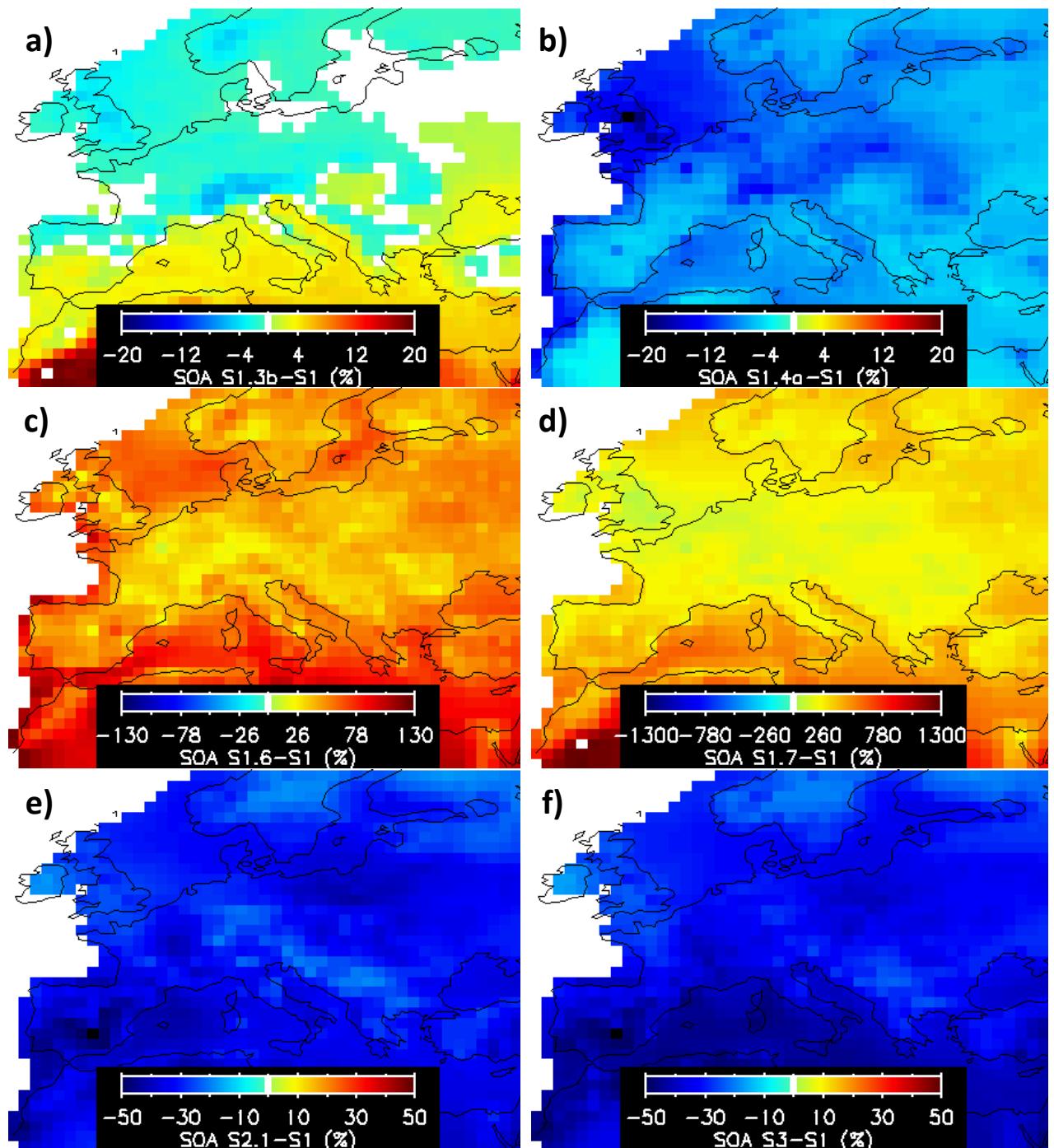
Figure A1: Relative differences of surface SOA between sensitivity cases and the reference simulation S1 over Europe for JJA 2002: a) S1.3b applying ΔH_{vap}=72.7 kJ mol^{-1} for the temperature dependence of K for isoprene oxidation products, b) S1.4a, with wet removal of isoprene gas phase oxidation products, H=10^5 Matm^{-1}, c) S1.6, additional condensation of semi volatile vapours on ammonium and sulphate aerosols, d) S1.7, as S1.6 but applying irreversible sticking, e) S2.1, as S2 but without condensation on ammonium and sulphate aerosols, f) S3, as S1 but without SOA production from isoprene oxidation. Changes are only plotted for areas where SOA surface concentrations are above 0.25 μg m^{-3}. Thus white colours either indicate low concentrations or small changes.

a)

b)

c)

d)

e)

f)
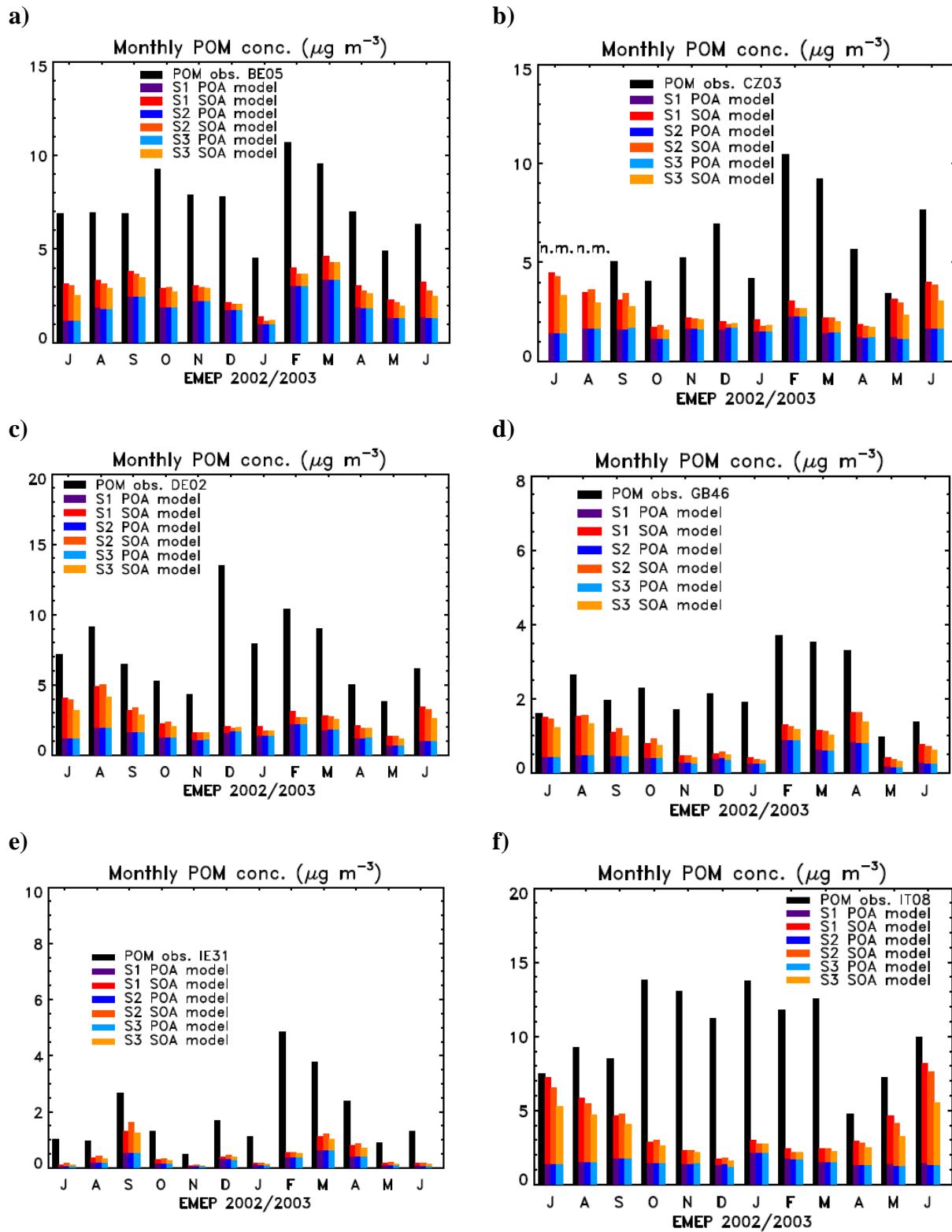
Figure A2: Continued.
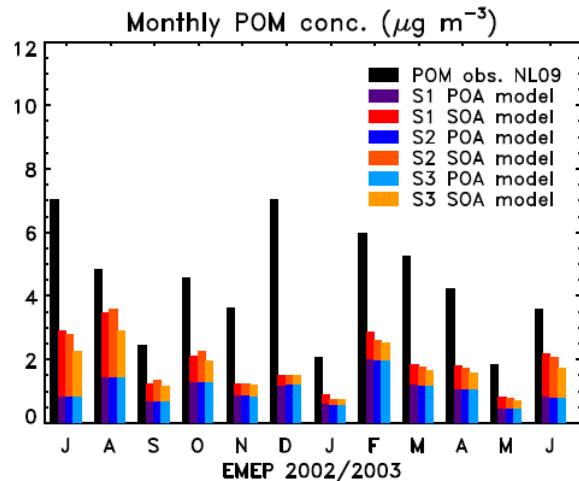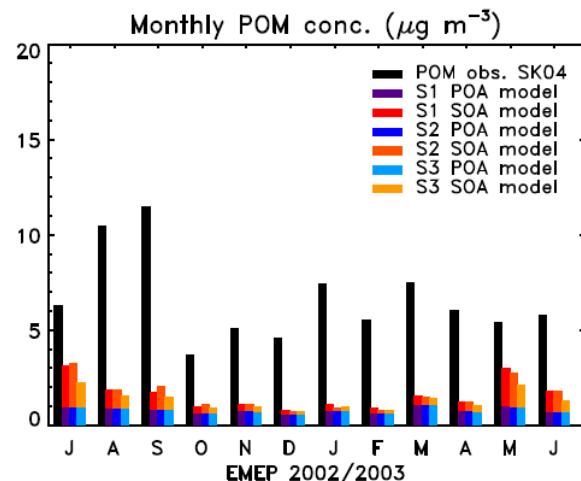
**Figure A2:** Comparison of monthly averaged POM concentrations for the other EMEP stations: a) BE05, Ghent [3º43'E, 51º03'N], b) CZ03, Košetice [15º05'E, 49º35'N], c) DE02, Langenbrügge [10º46'E, 52º48'N], d) GB46, Penicuik [3º13'W, 55º57'N], e) IE31, Mace Head [9º30'W, 53º10'N] f) IT08, S.P.C. (San Pietro Capofiume) [11º20'E, 44º29'N], g) NL09, Kollumerwaard [6º17'E, 53º20'N], h) SK04, Stara Lesna [20º17'E, 49º09'N].