



Supplement of

Limited effect of anthropogenic nitrogen oxides on Secondary Organic Aerosol formation

Y. Zheng et al.

Correspondence to: Y. Zheng (yiqi.zheng@yale.edu)

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Table S1. SOA mass yields using default 2-product scheme (Heald et al., 2008 and references therein). The reference temperature is 310K for monoterpenes and isoprene, and is 295K for benzene, toluene and xylenes. The enthalpy of evaporation is 42 kJ mol⁻¹.

Parent HC	Oxidants	Surrogate product	α and C* (C* in $\mu\text{g m}^{-3}$)		Yield at 10 $\mu\text{g m}^{-3}$
Monoterpenes C ₁₀ H ₁₆	OH; HO ₂	SOAM C ₁₀ H ₁₆ O ₄	C*=5.435 $\alpha=0.067$	C*=232.6 $\alpha=0.354$	0.06
	O ₃ ; HO ₂		C*=5.435 $\alpha=0.067$	C*=232.6 $\alpha=0.354$	0.06
	NO ₃		C*=61.35 $\alpha=1.000$	0	0.14
Isoprene C ₅ H ₈	OH; HO ₂	SOAI C ₅ H ₁₂ O ₄	C*=0.617 $\alpha=0.029$	C*=116.0 $\alpha=0.232$	0.05
Benzene C ₆ H ₆	OH; HO ₂	SOAB C ₆ H ₇ O ₃	C*=0.001 $\alpha=0.227$	0	0.23
	OH; NO		C*=0.302 $\alpha=0.044$	C*=111.1 $\alpha=0.545$	0.09
Toluene C ₇ H ₈	OH; HO ₂	SOAT C ₇ H ₉ O ₃	C*=0.001 $\alpha=0.235$	0	0.23
	OH; NO		C*=2.326 $\alpha=0.038$	C*=21.28 $\alpha=0.074$	0.05
Xylenes C ₈ H ₁₀	OH; HO ₂	SOAX C ₈ H ₁₁ O ₃	C*=0.001 $\alpha=0.205$	0	0.20

	OH; NO		C*=1.314 $\alpha=0.021$	C*=34.48 $\alpha=0.061$	0.03
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Table S2. SOA mass yields using updated 4-product VBS scheme (Pye et al., 2010 and references therein). The reference temperature is 295K and the enthalpy of evaporation is 73, 62, 51, 40 kJ mol⁻¹ for C* of 0.1, 1, 10, 100 µg m⁻³, respectively.

Parent HC	Oxidants	Surrogate product	α for C* (C* in µg m ⁻³)				Yield at 10 µg m ⁻³
			C*=0.1	C*=1	C*=10	C*=100	
Monoterpenes C ₁₀ H ₁₆	OH; HO ₂	SOAM C ₁₀ H ₁₆ O ₄	0.08	0.019	0.18	0.03	0.19
	OH; NO		0.04	0.0095	0.09	0.015	0.09
	O ₃ ; HO ₂		0.08	0.019	0.18	0.03	0.19
	O ₃ ; NO		0.04	0.0095	0.09	0.015	0.09
	NO ₃		0	0	0.321	1.083	0.26
Isoprene C ₅ H ₈	OH; HO ₂	SOAI C ₅ H ₁₂ O ₄	0	0.031	0	0.095	0.04
	NO ₃		0	0	0.217	0.092	0.12
Benzene C ₆ H ₆	OH; HO ₂	SOAB C ₆ H ₇ O ₃	0.37	0	0	0	0.37
	OH; NO		0	0.078	0	0.793	0.14
Toluene C ₇ H ₈	OH; HO ₂	SOAT C ₇ H ₉ O ₃	0.36	0	0	0	0.36
	OH; NO		0	0.032	0.094	0.080	0.08
Xylene C ₈ H ₁₀	OH; HO ₂	SOAX C ₈ H ₁₁ O ₃	0.30	0	0	0	0.30
	OH; NO		0	0.025	0.036	0.090	0.05

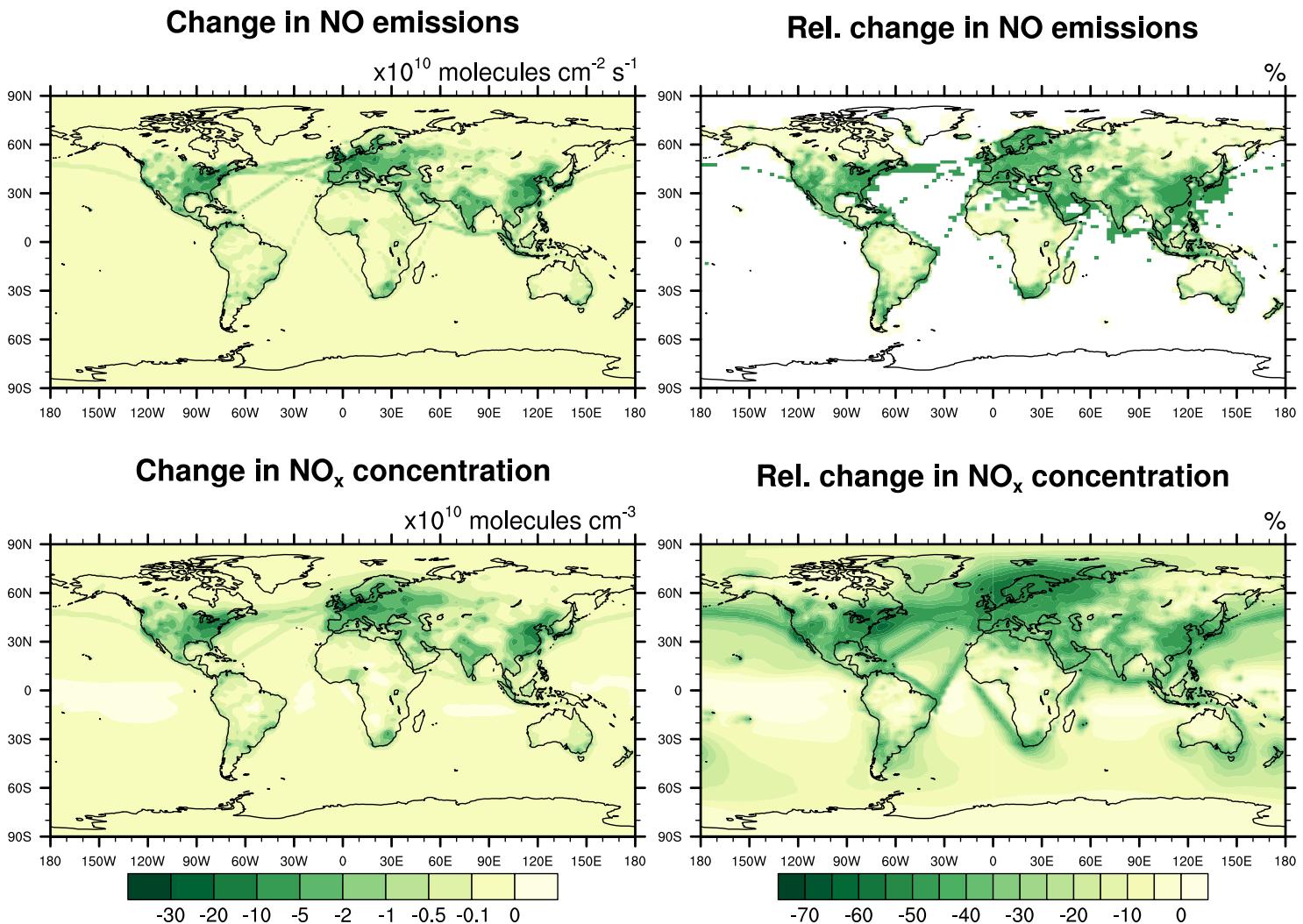


Figure S1. Absolute (left column) and relative (right column) changes of annual mean NO emissions (units: $\times 10^{10} \text{ molecules cm}^{-2} \text{ s}^{-1}$) and simulated surface NO_x concentration (units: $\times 10^{10} \text{ molecules cm}^{-3}$) in the sensitivity run compared to the control run using VBS_agHigh scheme. Data are averaged from 2005 to 2009.

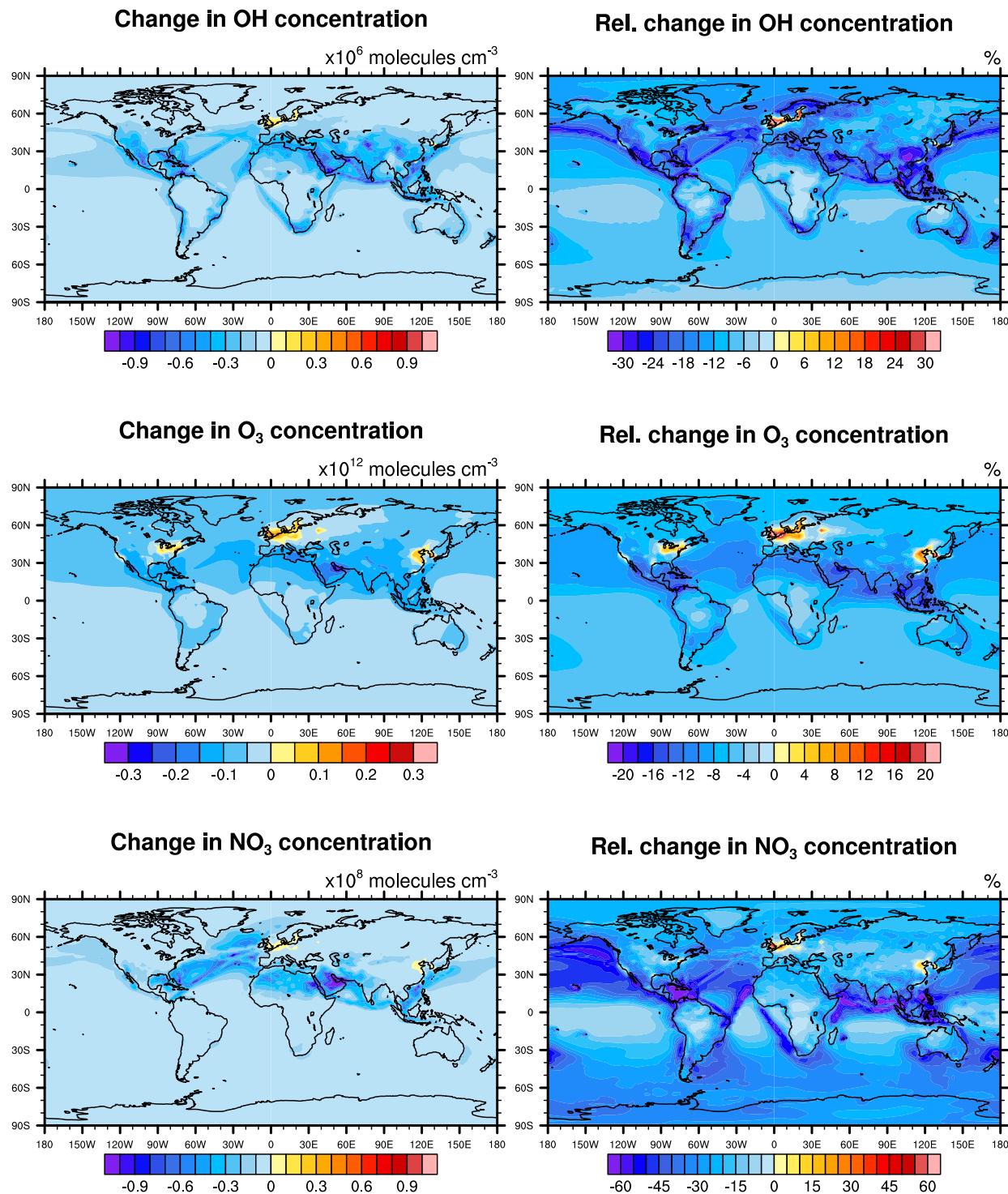


Figure S2. Absolute (left column) and relative (right column) changes of simulated annual mean surface OH ($\times 10^6$ molecules cm^{-3}), O₃ ($\times 10^{12}$ molecules cm^{-3}) and NO₃ concentrations ($\times 10^8$ molecules cm^{-3}) in the sensitivity run compared to the control run using VBS_agHigh scheme. Data are averaged from 2005 to 2009. Note that the range of color bars are different in each subplot.

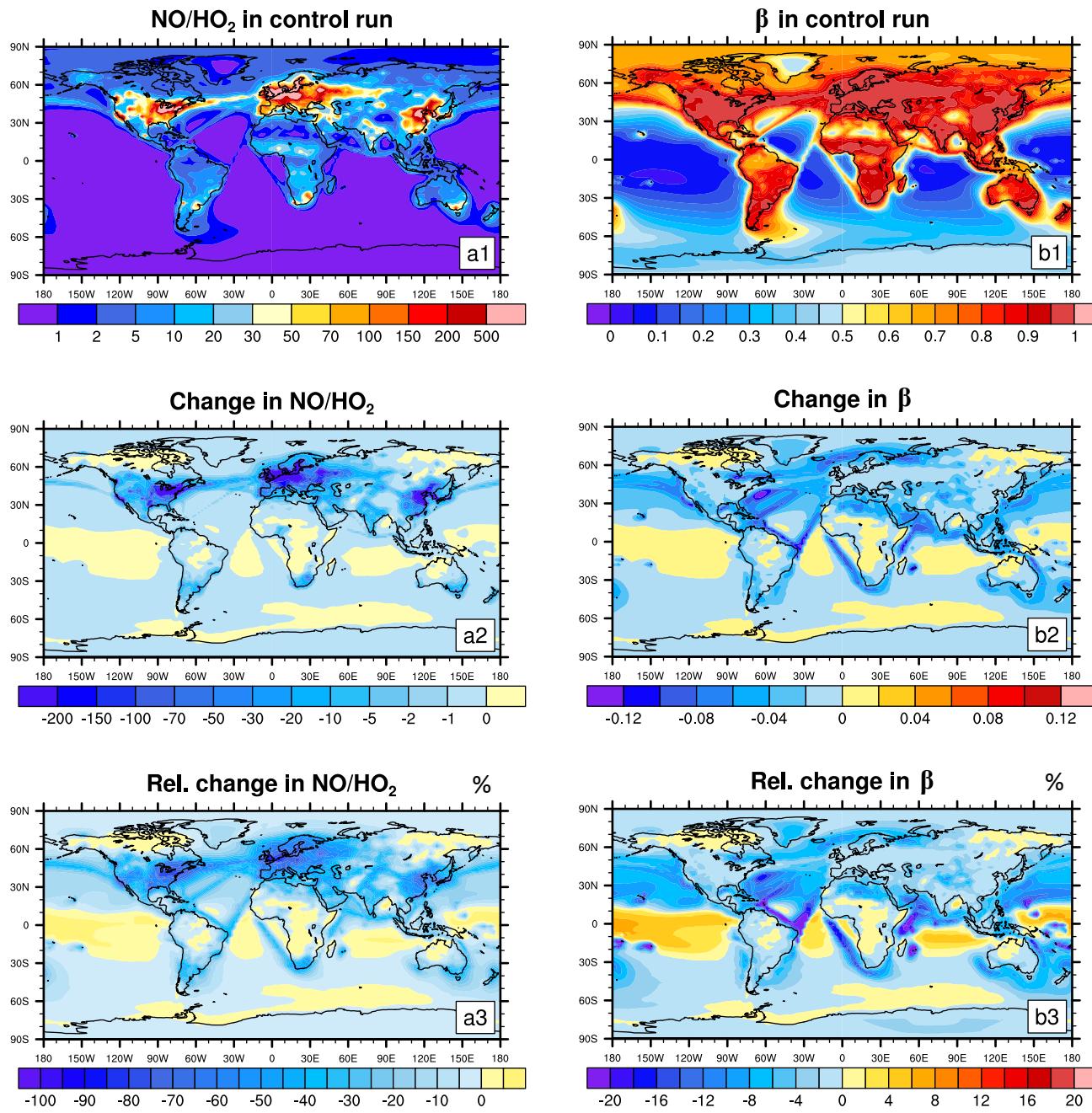


Figure S3. Left column: (a1) is the annual mean surface NO-to-HO₂ ratio (NO/HO₂) in the control run; (a2) and (a3) are the absolute and relative change of NO/HO₂ in the sensitivity run compared to the control run. Right column is similar to the left column but for annual mean surface branching ratio (β). Simulations use VBS_agHigh scheme. Data are averaged from 2005 to 2009. Note that the range of color bars are different in each subplot.

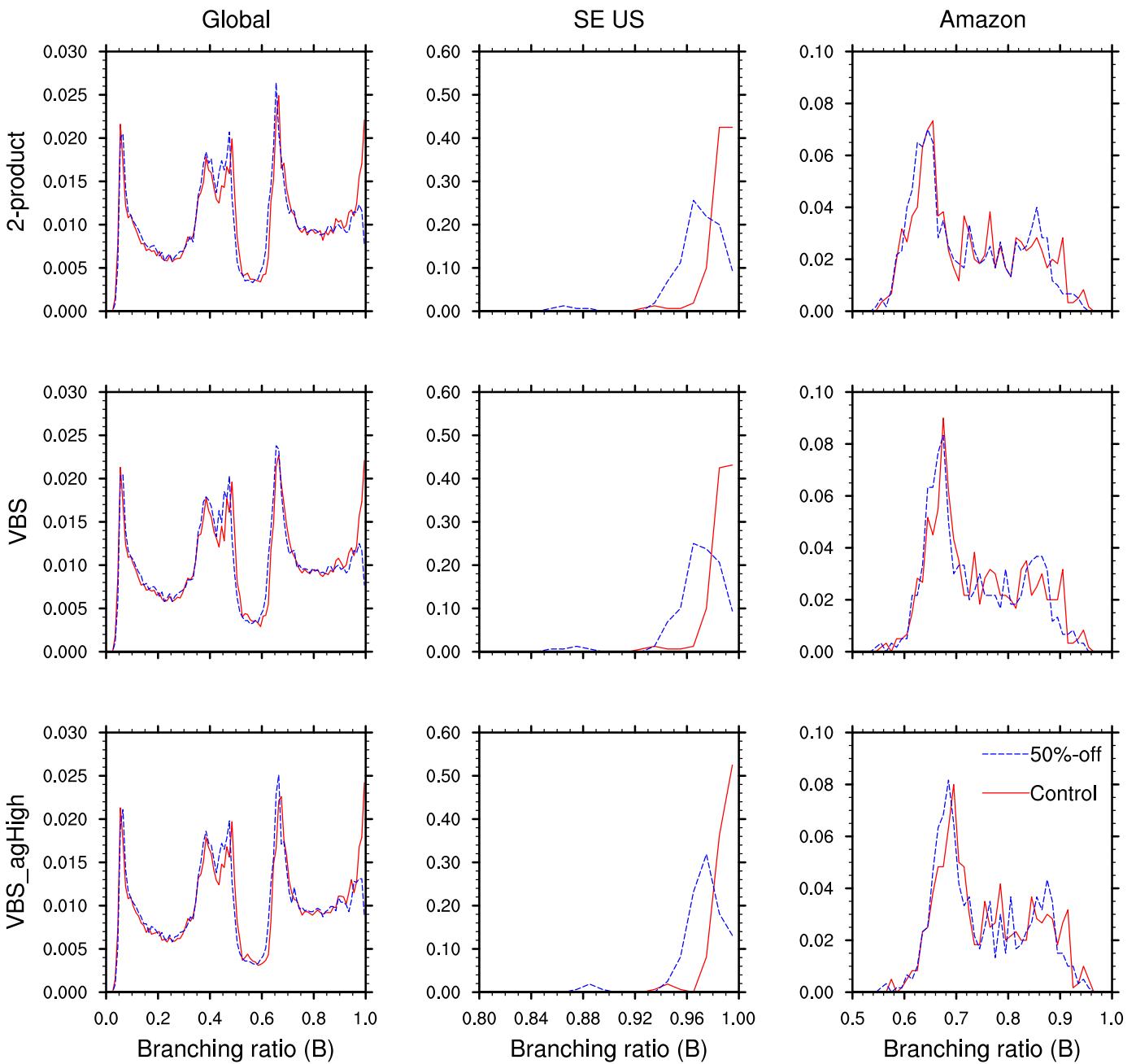


Figure S4. Probability density function of annual mean surface branching ratio (β) at global scale, in the southeast US and in the Amazon.