

Supplementary Information

Table S1. Multivariate linear regression analysis of modeled IEPOX-SOA. β_1 , β_2 and β_3 are standardized partial regression coefficients associated with sulfate, aerosol H⁺ activity and isoprene emission. R² represent the square of correlation between IEPOX-SOA and the linear-fitted function. The r_1^2 , r_2^2 and r_3^2 within parentheses are square of direct correlation between IEPOX-SOA and each variable.

	Sulfate β_1 (r_1^2)	H⁺ activity β_2 (r_2^2)	ISOP emission β_3 (r_3^2)	R²
2000-2013	0.39 (0.64)	0.50 (0.71)	0.34 (0.18)	0.88
2000-2004	0.46 (0.76)	0.43 (0.64)	0.25 (0.55)	0.93
2005-2008	0.34 (0.62)	0.57 (0.82)	0.31 (0.24)	0.94
2009-2013	0.45 (0.55)	0.27 (0.56)	0.42 (0.53)	0.84

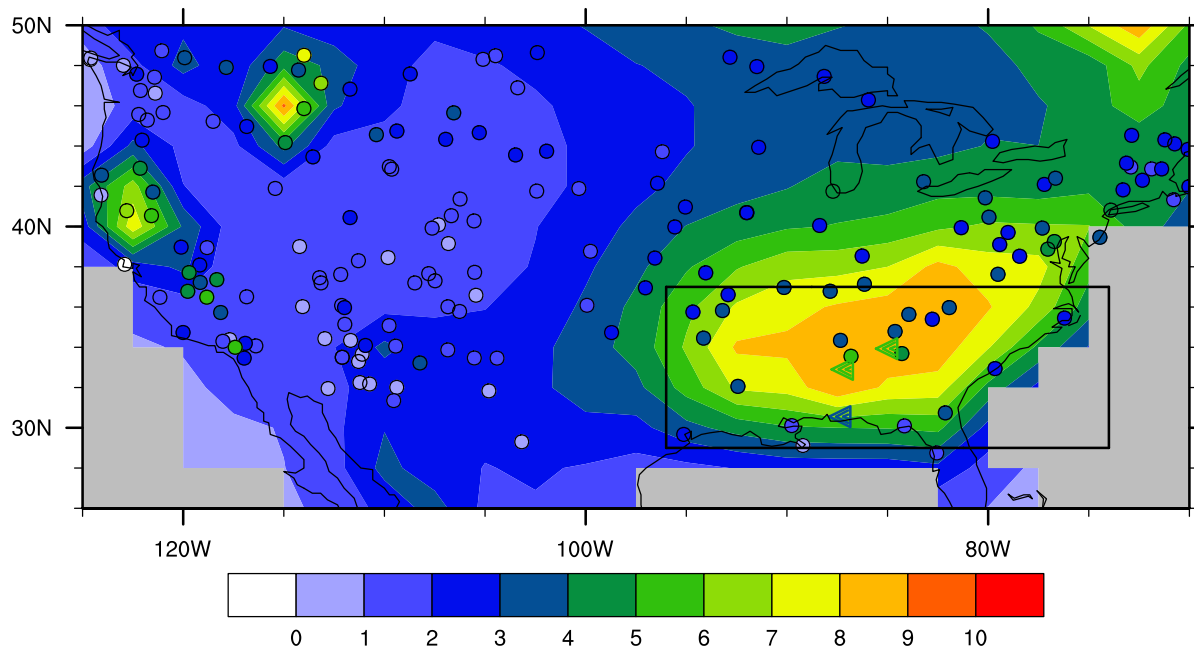


Figure S1. OA concentration ($\mu\text{g}/\text{m}^3$) averaged in JJA 2000-2013 from the default model and the IMPROVE and SEARCH networks. Rectangle defines the SEUS region. Circles and triangles represent sites from IMPROVE and SEARCH, respectively.

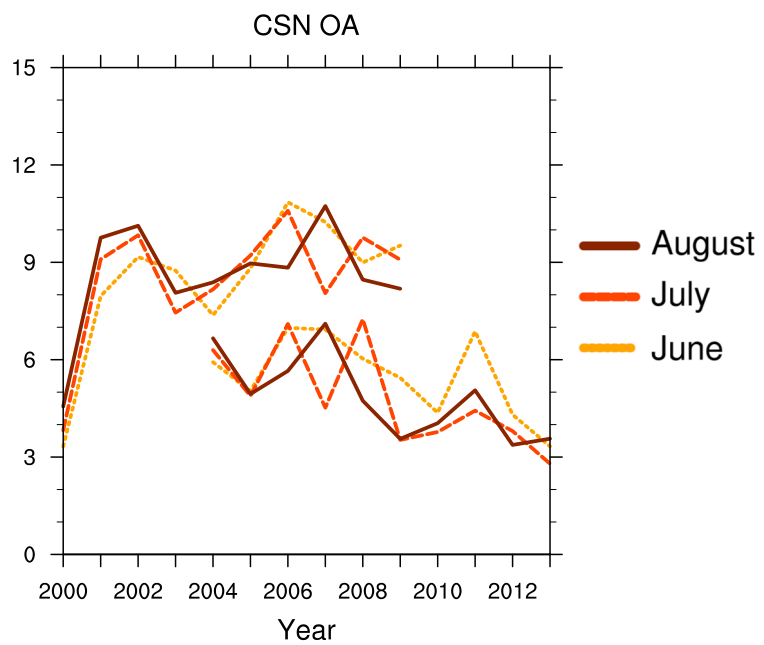


Figure S2. Monthly observed OA from the CSN networks. Units are $\mu\text{g}/\text{m}^3$.

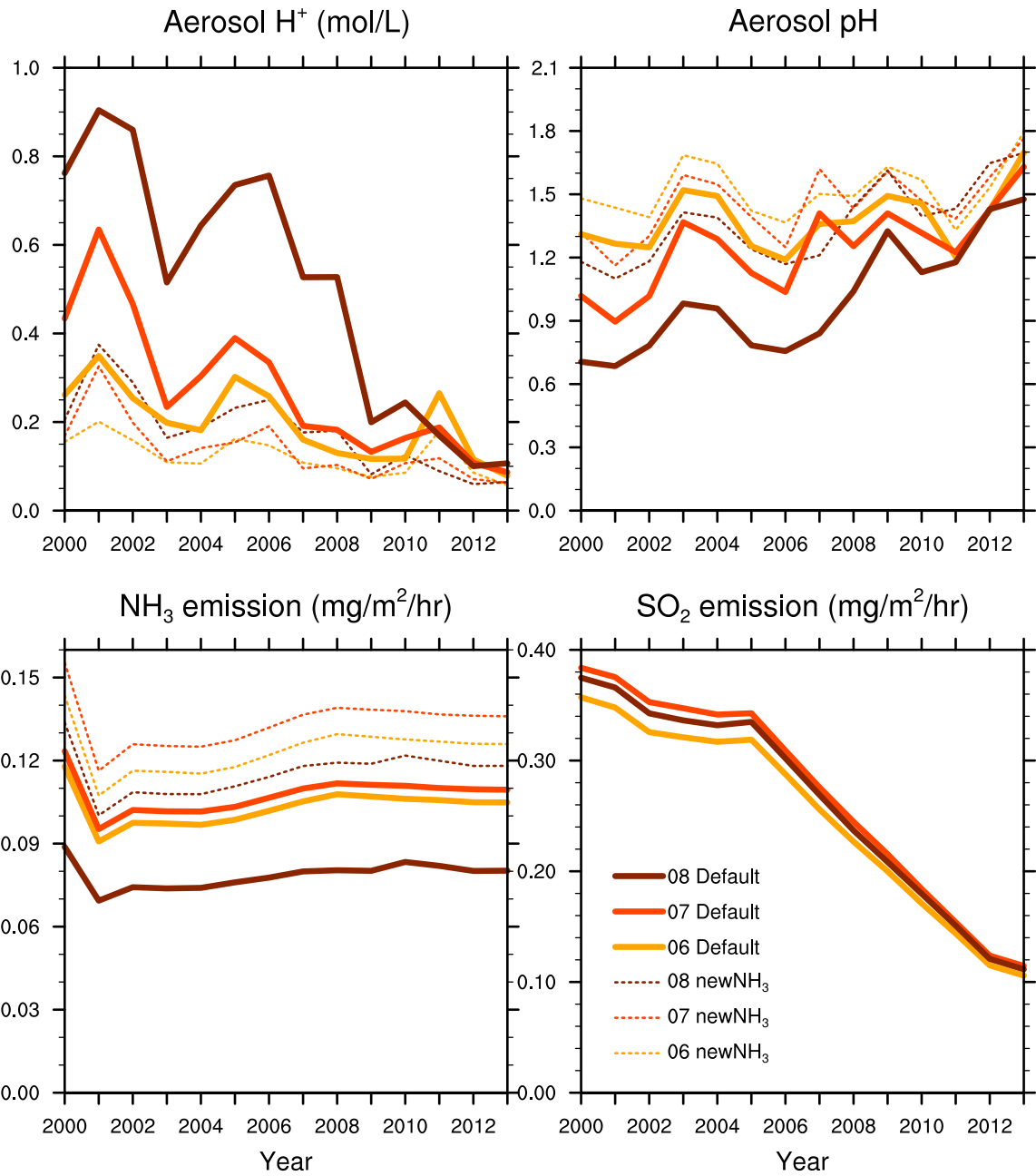


Figure S3. Monthly surface aerosol H⁺ activity (mol/L), NH₃ emission and SO₂ emission (mg/m²/hr) from the default and 'CT_newNH₃' simulations.

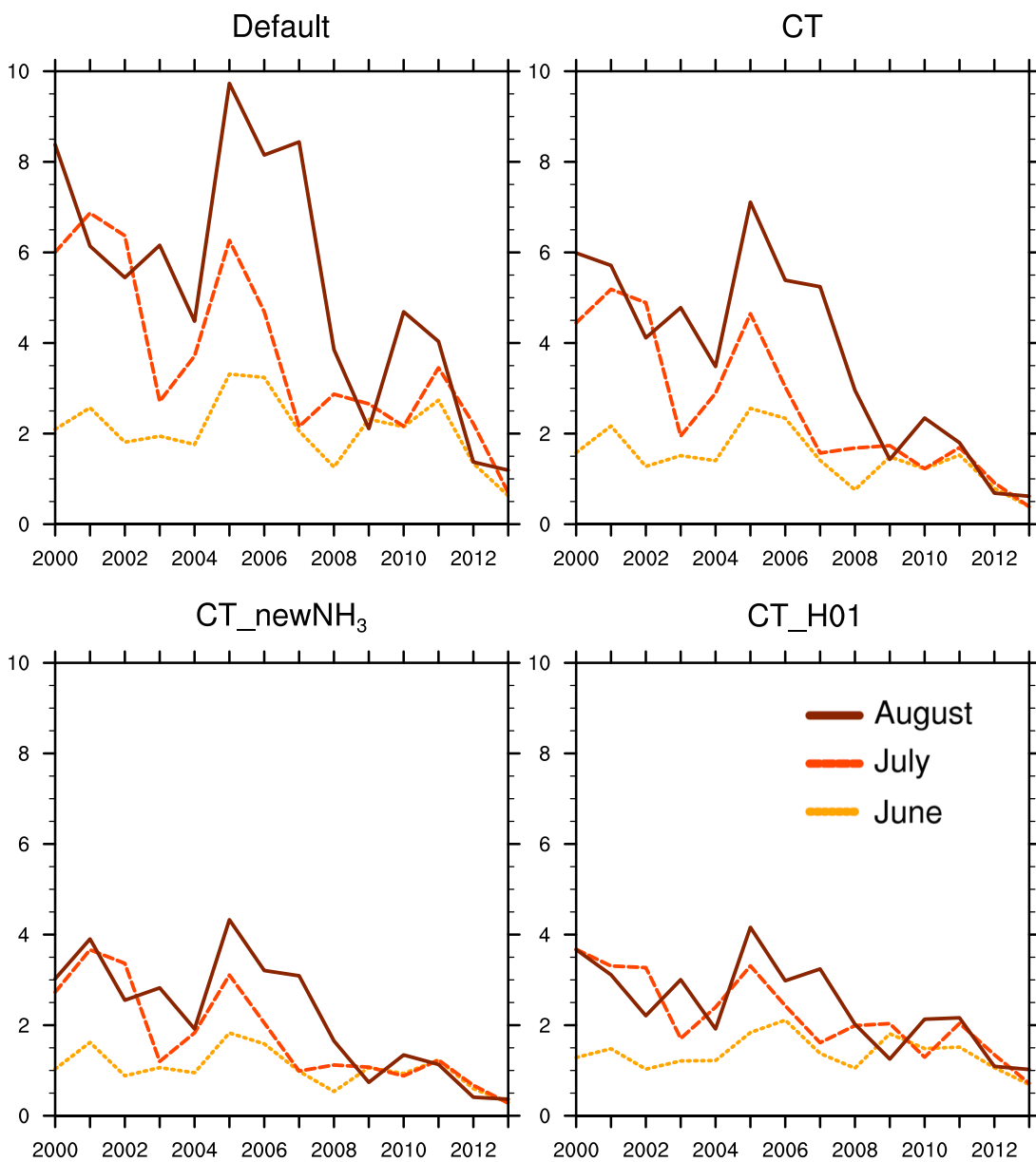


Figure S4. The monthly surface IEPOX-SOA concentration ($\mu\text{g}/\text{m}^3$) over the SEUS from all simulations.

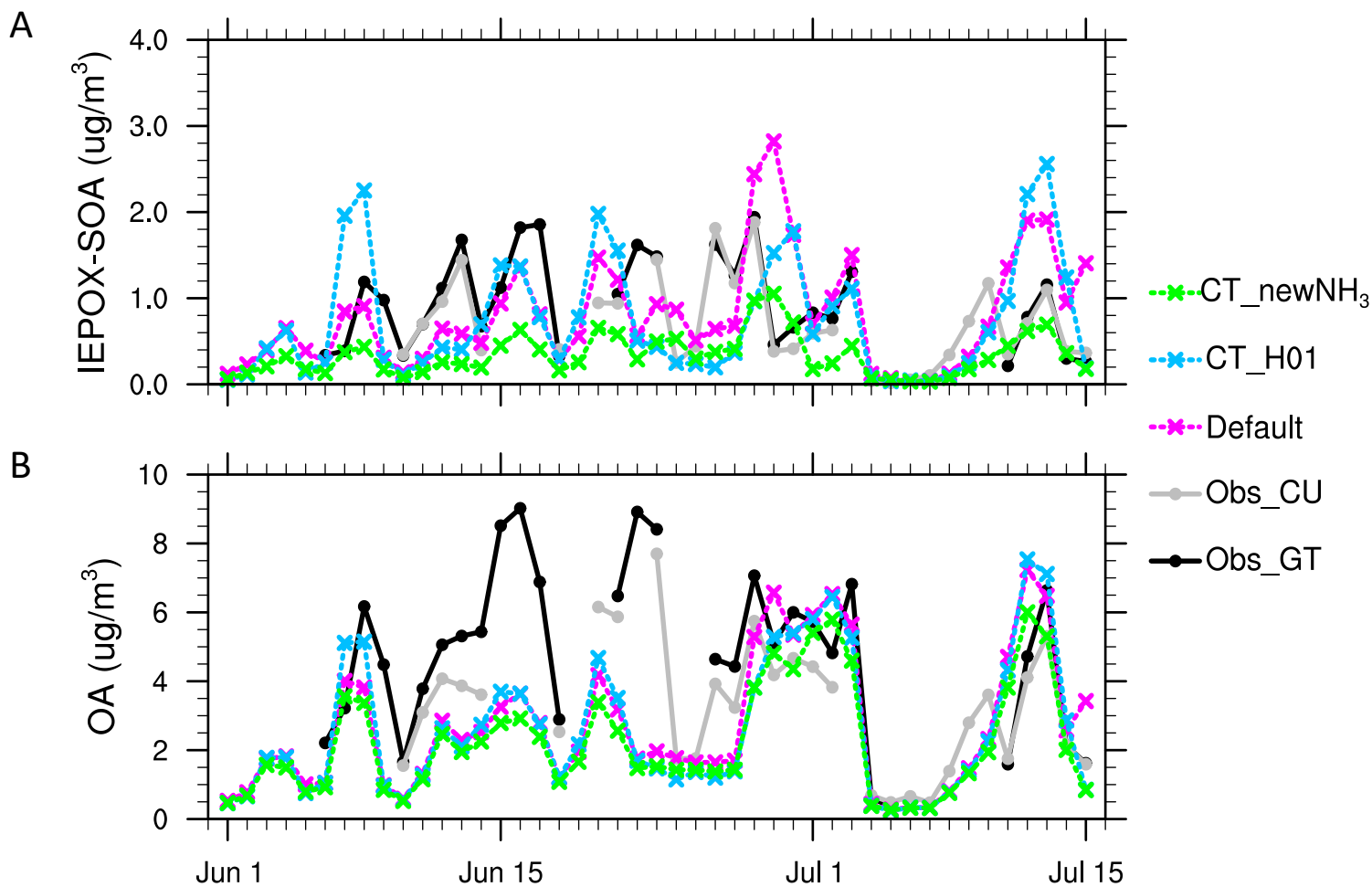


Figure S5. Comparison of (A) IEPOX-SOA, (B) OA between AMS measurement and the default and CT_H01 simulations in the SOAS campaign from June 01 to July 15, 2013. In (A), IEPOX-SOA is obtained by a Positive Matrix Factorization (PMF) analysis of the AMS-measured OA. Units are $\mu\text{g}/\text{m}^3$.