Supplementary Information

Global and Regional Impacts of HONO on the Chemical Composition of Clouds and Aerosols

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Table S 1: Summary of the comparison of the base_S1 and S1 model simulations to observations of 2001 annual mean aerosol concentrations. OAM and MAM are the arithmetic mean of the observations and of the model, respectively, in μg m^{-3}, while OSTD and MSTD are the standard deviation of the observations and of the model, respectively, in μg m^{-3}. MAM, OAM, MSTD and OSTD represent co-located measurements and model results (i.e., based on the locations of the observations). PF2 is the percentage of modelled point within a factor of two of the observations. RMS denotes the Root Mean Square error.

species	network	Nr. of stations	OAM [μg m^{-3}]	OSTD [μg m^{-3}]	MAM [μg m^{-3}]		MSTD [μg m^{-3}]		MAM/OAM		PF2 [%]		RMS	
					base_S1	S1	base_S1	S1	base_S1	S1	base_S1	S1	base_S1	S1
SO_4^{2-}	CASTNET	53	3.31	2.32	3.23	3.60	1.45	1.54	0.97	1.09	78	75	2.29	2.29
	EMEP	81	2.10	1.32	3.10	3.28	1.79	1.92	1.48	1.56	73	71	1.44	1.52
	EANET	12	2.42	1.84	2.74	2.93	2.12	2.33	1.13	1.21	72	69	2.49	2.64
NO_3^-	CASTNET	53	1.04	1.24	1.15	1.16	0.87	0.96	1.11	1.11	57	58	1.45	1.48
	EMEP	26	1.58	1.84	1.57	1.62	1.23	1.33	0.99	1.03	68	68	1.69	1.7
	EANET	11	0.63	0.80	0.93	0.86	1.09	1.01	1.48	1.38	68	68	1.48	1.42
NH_4^+	CASTNET	53	1.21	0.80	1.11	1.22	0.62	0.67	0.91	1.01	81	78	0.82	0.83
	EMEP	20	1.00	0.93	1.19	1.27	1.03	1.09	1.19	1.27	71	69	0.91	0.94
	EANET	12	0.81	0.74	0.77	0.81	0.83	0.90	0.94	1.00	78	76	0.92	0.98

Table S 2: Summary of the comparison of the base_S1 and S1 model simulations to observations of aerosol concentrations during January 2001. OAM and MAM are the arithmetic mean of the observations and of the model, respectively, in μg m^{-3}, while OSTD and MSTD are the standard deviation of the observations and of the model, respectively, in μg m^{-3}. MAM, OAM, MSTD and OSTD represent co-located measurements and model results (i.e., based on the locations of the observations). PF2 is the percentage of modeled point within a factor of two of the observations. RMS denotes the Root Mean Square error.

species	network	Nr. of stations	OAM [μg m^{-3}]	OSTD [μg m^{-3}]	MAM [μg m^{-3}]		MSTD [μg m^{-3}]		MAM/OAM		PF2 [%]		RMS	
					base_S1	S1	base_S1	S1	base_S1	S1	base_S1	S1	base_S1	S1
SO_4^{2-}	CASTNET	54	3.11	1.96	2.55	3.12	0.80	0.97	0.82	1.00	89	85	1.8	1.65
	EMEP	81	2.04	1.46	3.19	3.38	1.41	1.58	1.56	1.65	64	64	1.38	1.4
	EANET	12	2.53	1.44	2.55	2.72	1.46	1.61	1.01	1.07	75	67	1.95	2.07
NO_3^-	CASTNET	54	1.36	1.54	1.90	2.19	1.15	1.52	1.40	1.62	44	46	1.67	1.9
	EMEP	28	1.84	2.17	2.19	2.39	0.73	0.86	1.19	1.30	44	41	2.1	2.03
	EANET	10	0.66	0.62	1.20	1.12	0.92	0.86	1.82	1.70	60	60	1.44	1.36
NH_4^+	CASTNET	54	1.28	0.80	1.25	1.52	0.65	0.76	0.97	1.19	85	80	0.66	0.67
	EMEP	22	1.10	1.10	1.49	1.61	0.90	0.98	1.36	1.46	50	50	0.96	0.99
	EANET	10	0.78	0.51	0.79	0.84	0.67	0.73	1.02	1.08	60	60	0.65	0.7

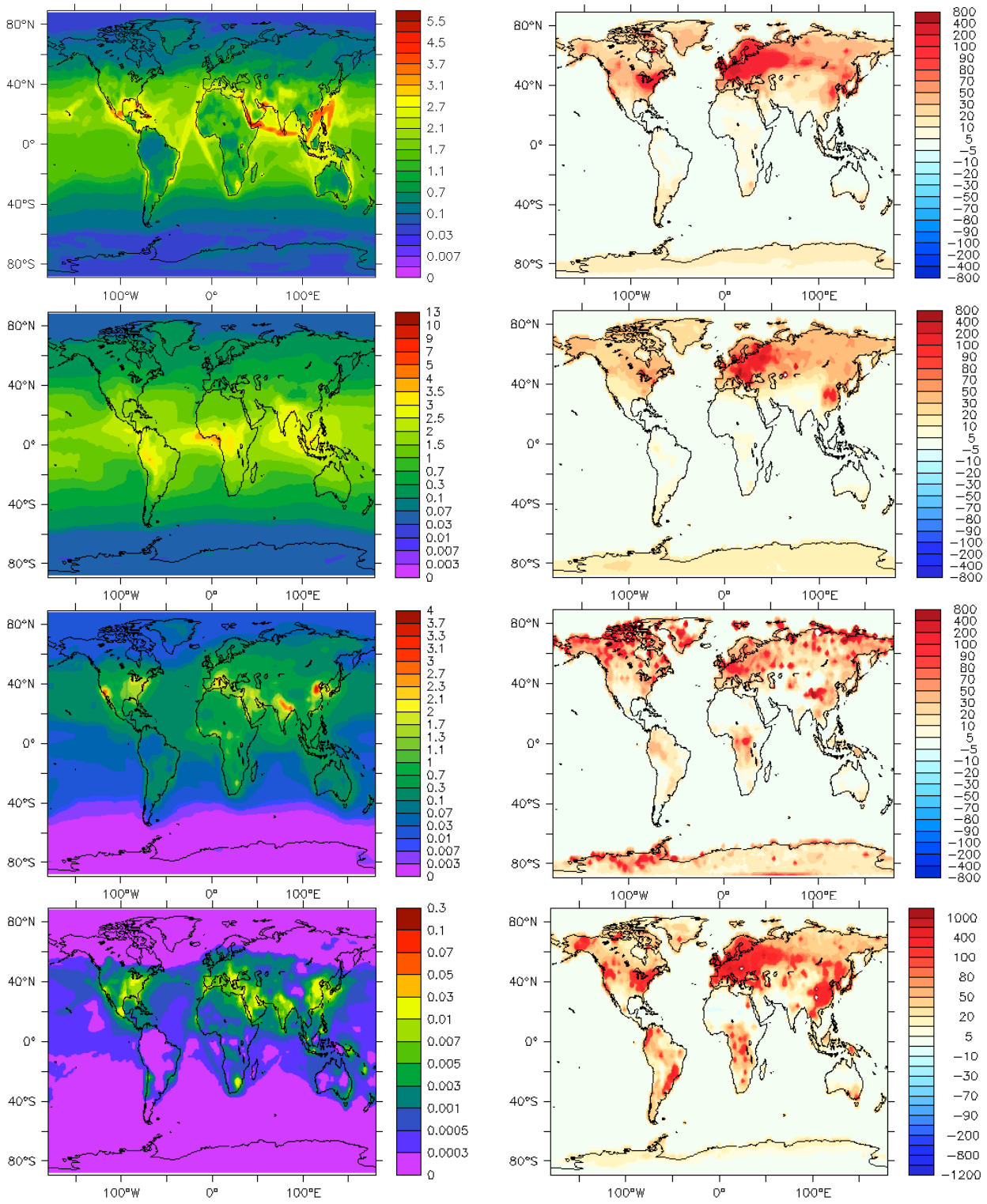

Figure S 1: Average annual simulated OH (from top to bottom) (10^6 molecules cm^{-3}), H_2O_2, HNO_3, H_2SO_4 (ppbv) near the surface from the reference run (left panels) and their relative enhancements (%) by using a $HONO/NO_x$ ratio of 0.02 (right panels) in 2001.

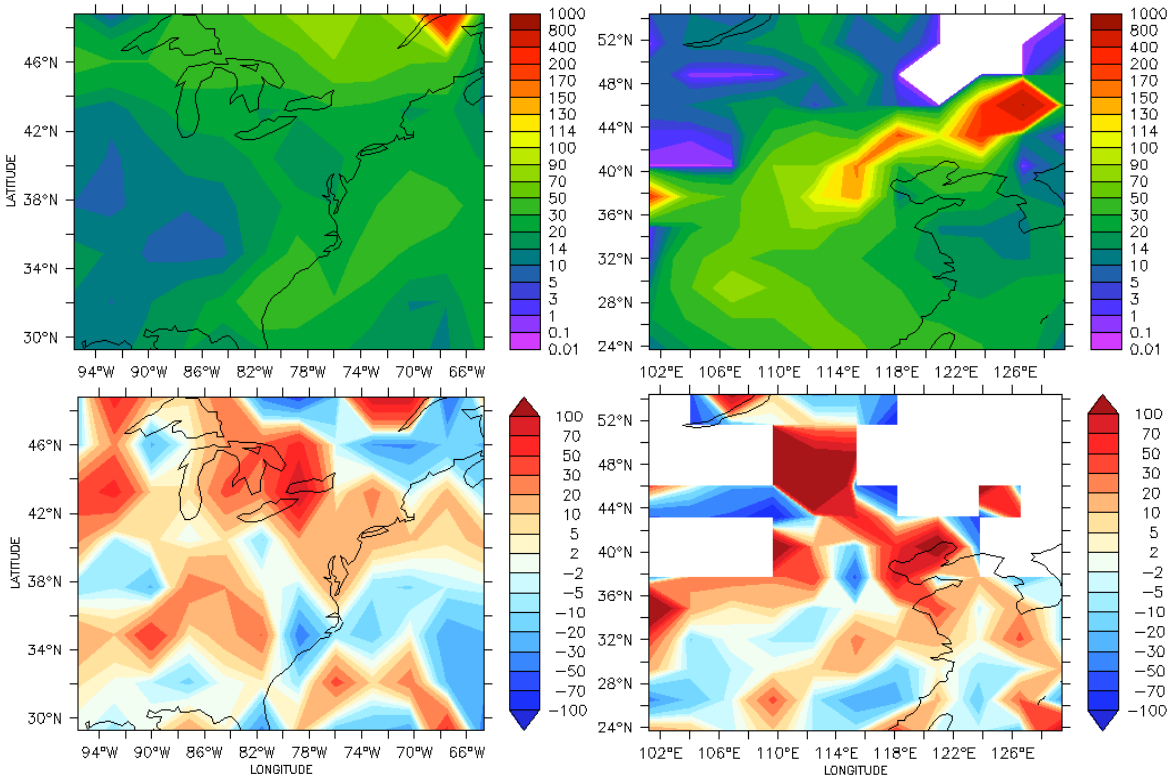

Figure S 2: Monthly mean aqueous phase concentration of NO_3^- (10^{-6} M, upper panel, base_S1) during winter (January) and the relative enhancements (lower panel) due to HONO enhancements (S1) in the model over the eastern US (left) and China (right).

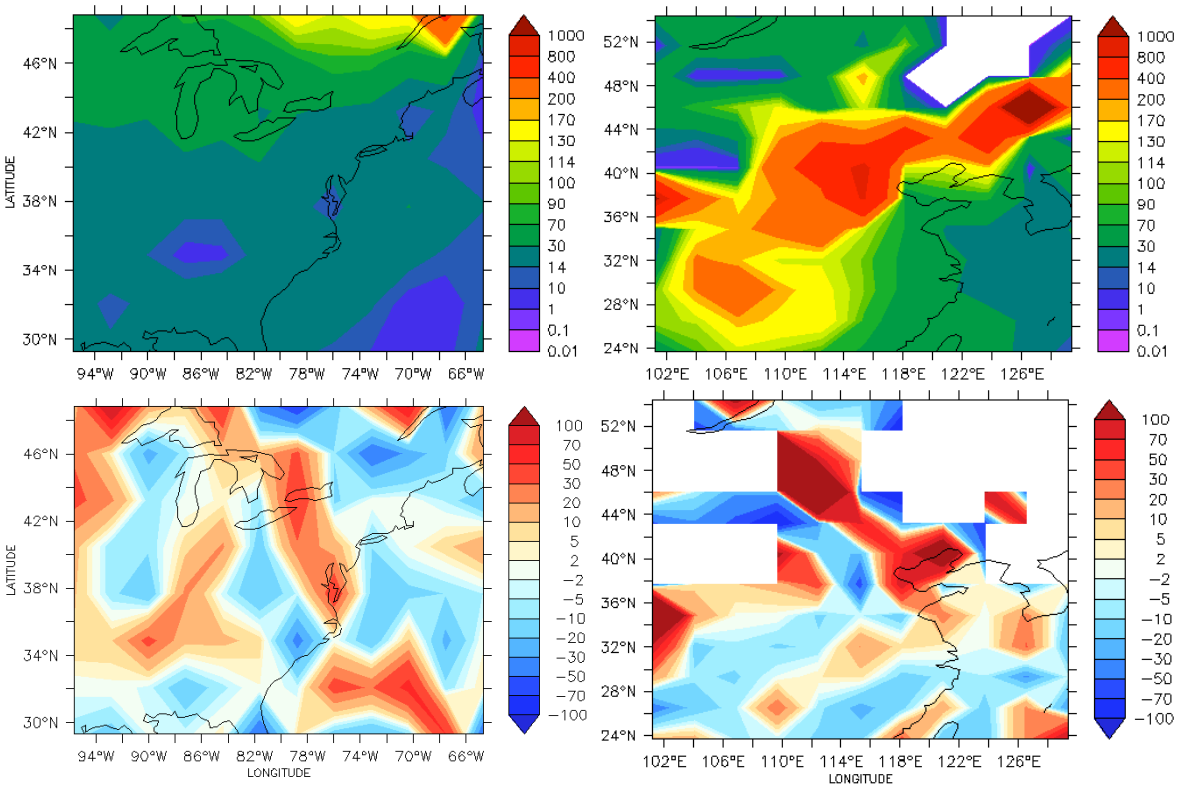

Figure S 3: Monthly mean aqueous phase concentration of NH_4^+ (10^{-6} M, upper panel, base_S1) during winter (January) and the relative enhancements (lower panel) due to HONO enhancements (S1) in the model over the eastern US (left) and China (right).

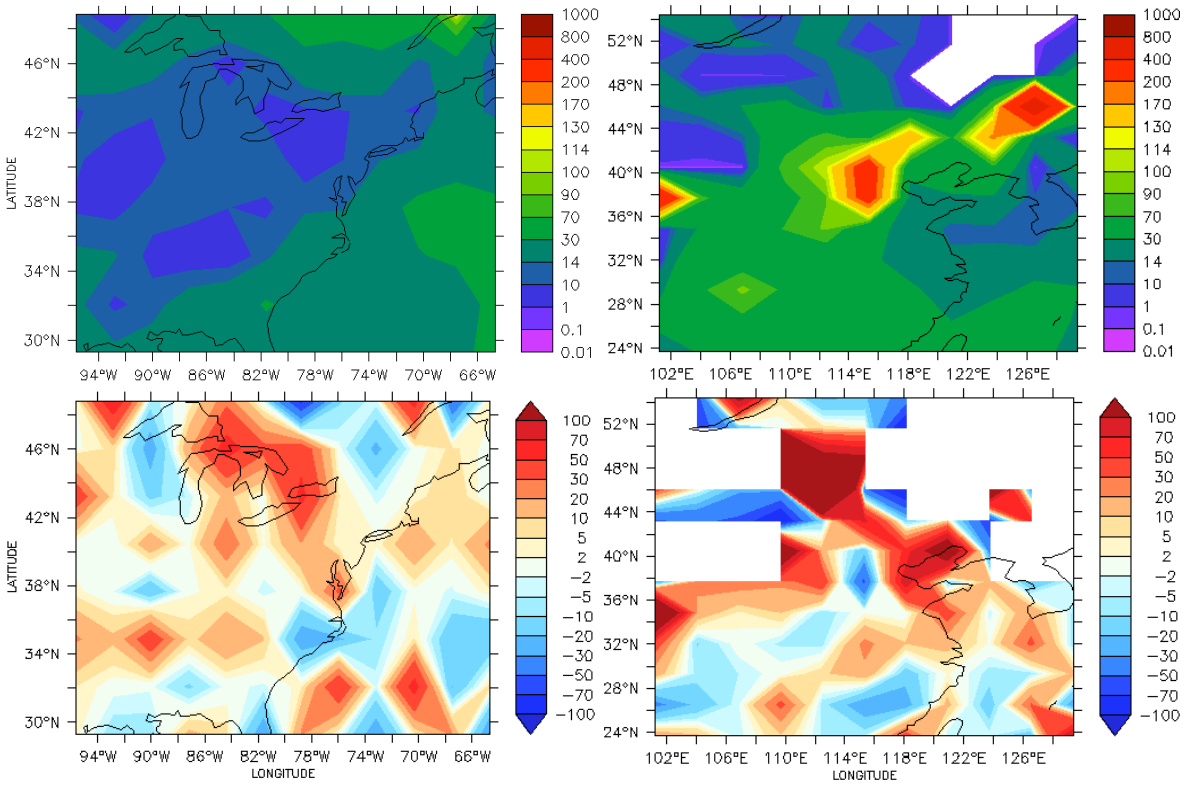

Figure S 4: Monthly mean aqueous phase concentration of SO_4^{2-} (10^{-6} M, upper panel, base_S1) during winter (January) and the relative enhancements (lower panel) due to HONO enhancements (S1) in the model over the eastern US (left) and China (right).

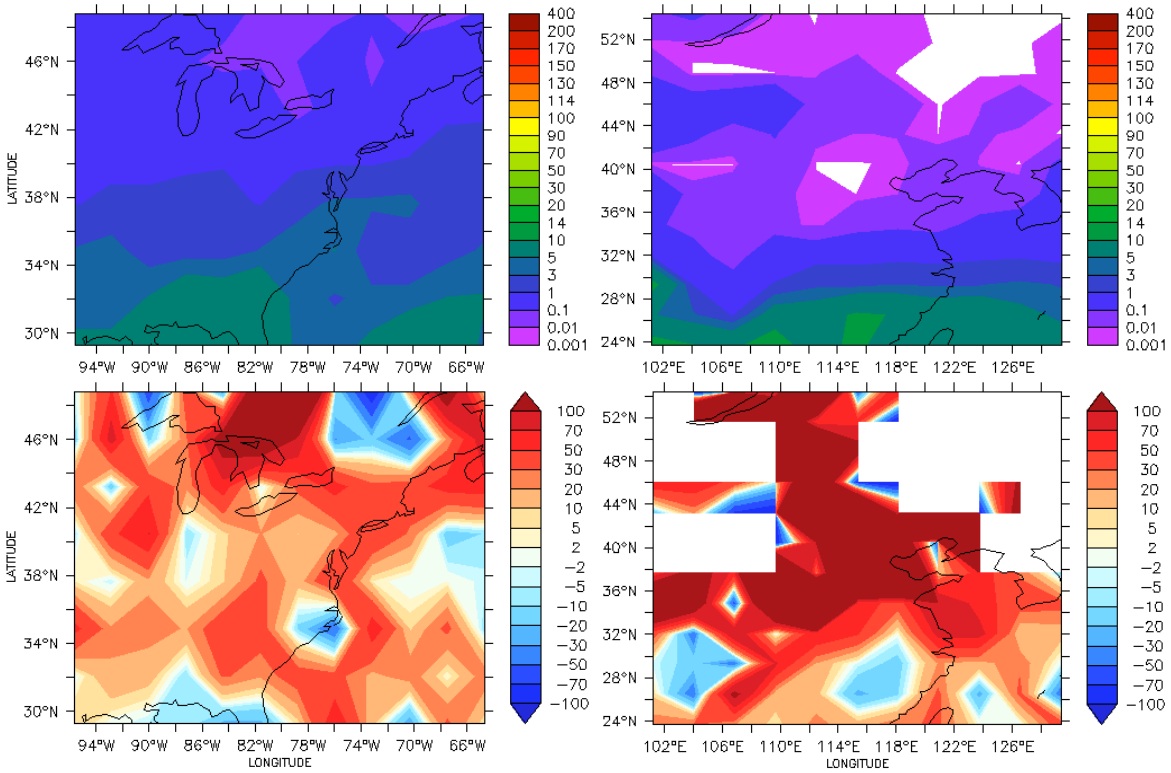

Figure S 5: Monthly mean aqueous phase concentration of H_2O_2 (10^{-6} M, upper panel, base_S1) during winter (January) and the relative enhancements (lower panel) due to HONO enhancements (S1) in the model over the eastern US (left) and China (right).

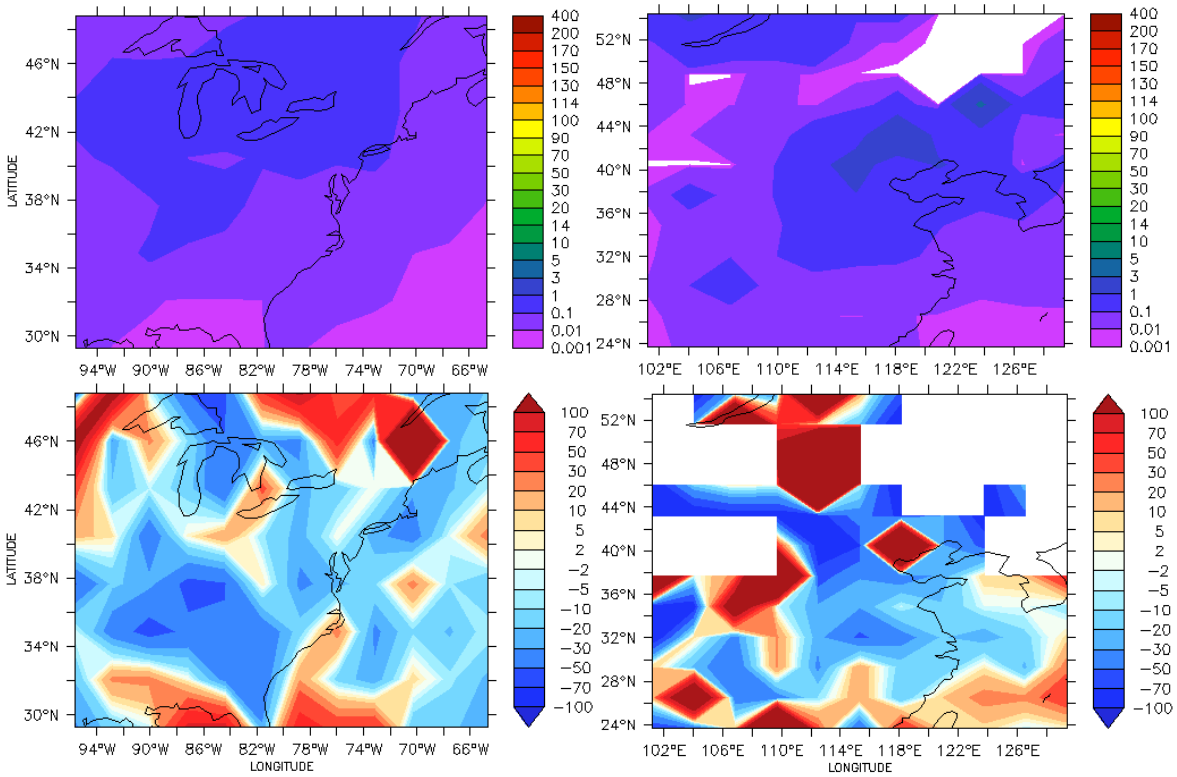

Figure S 6: Monthly mean aqueous phase concentration of HSO_3^- (10^{-6} M, upper panel, base_S1) during winter (January) and the relative enhancements (lower panel) due to HONO enhancements (S1) in the model over the eastern US (left) and China (right).

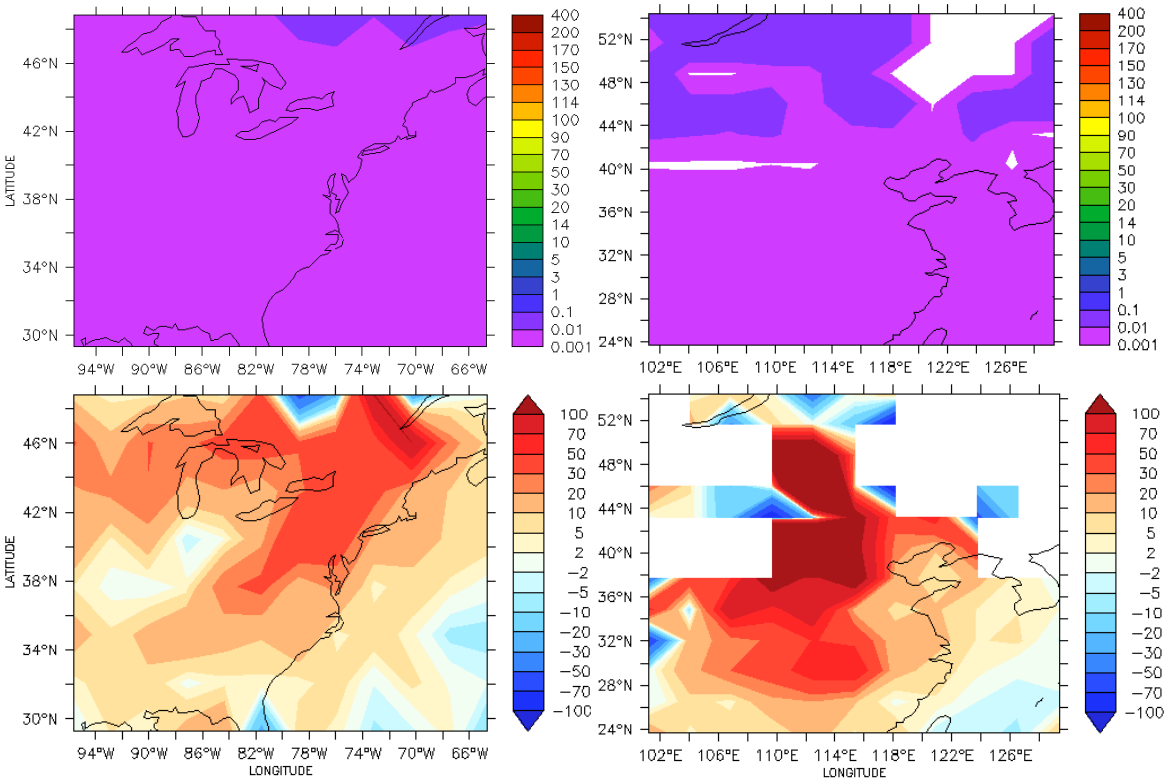

Figure S 7: Monthly mean aqueous phase concentration of O_3 (10^{-9} M, upper panel, base_S1) during winter (January) and the relative enhancements (lower panel) due to HONO enhancements (S1) in the model over the eastern US (left) and China (right).