

Budget of nitrous acid (HONO) and its impacts on atmospheric oxidation capacity at an urban site in the fall season of Guangzhou, China

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Evaluation of model performance

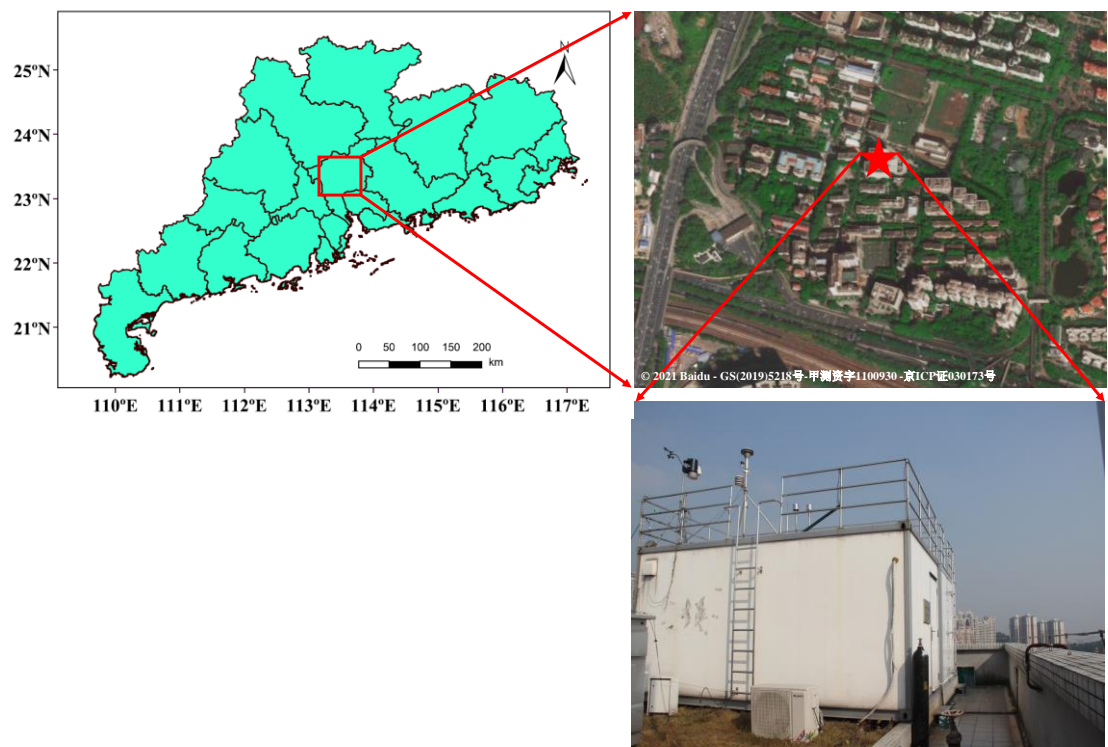
The index of agreement (IOA) can be calculated by E S1 to further evaluate the performance of O₃ simulation against the measurement.

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$$\text{IOA} = 1 - \frac{\sum_{i=1}^n (O_i - S_i)^2}{\sum_{i=1}^n (|O_i - \bar{O}| + |S_i - \bar{O}|)^2} \quad (\text{E S1})$$

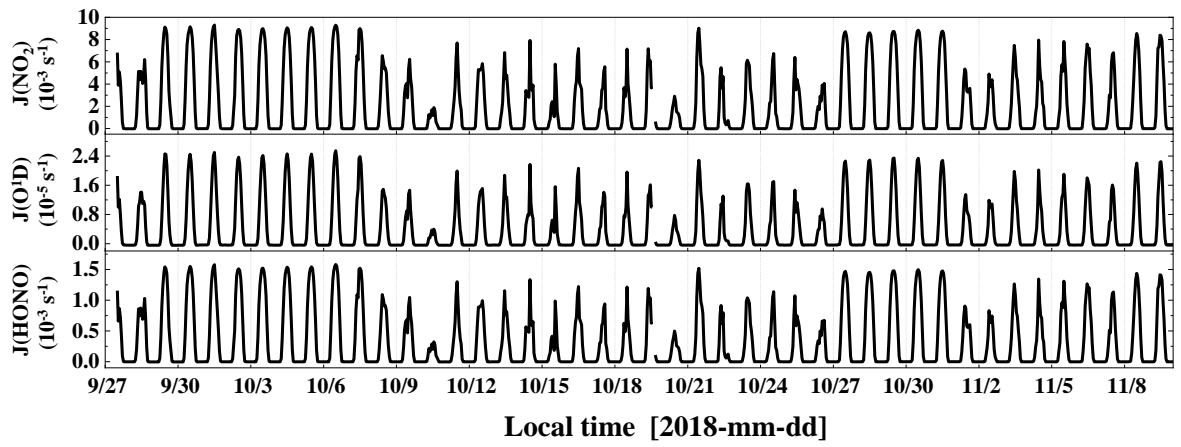
where n is a number of data points, and S_i and O_i denote box model simulated and observed concentrations, respectively. The IOA ranges from 0 to 1, and a larger IOA value suggests better agreement between model and observation. The IOA of O₃ simulation is 0.78, showing the good performance of model in this study.

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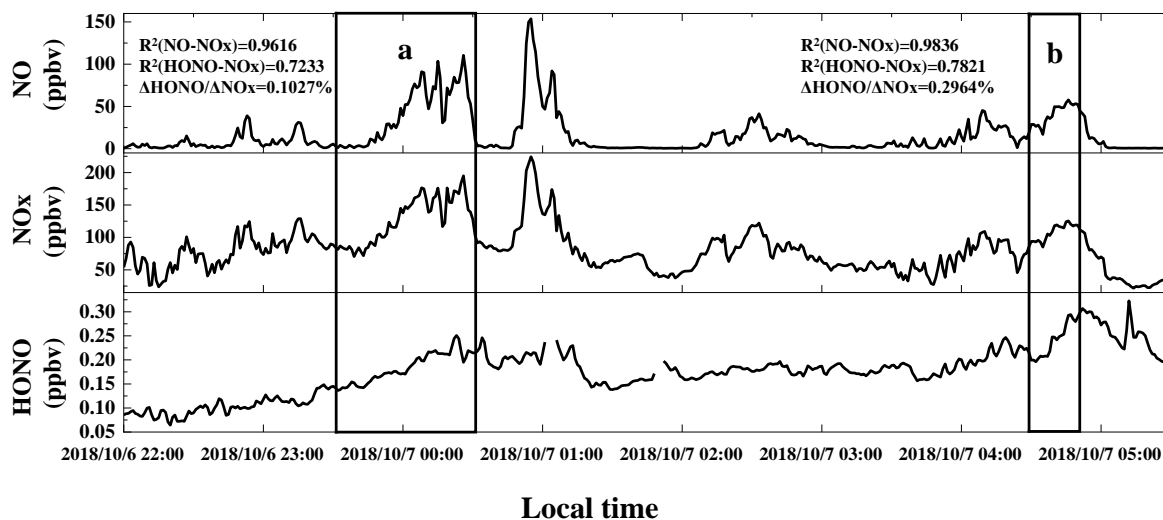
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Figure S1. Schematic map of the measurement site in Guangzhou. The red star represents specimen building of the Guangzhou Institute of Geochemistry, Chinese Academy of Sciences (GIGCAS).



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Figure S2. Temporal variations of photolysis rates $J(\text{HONO})$, $J(\text{O}^1\text{D})$ and $J(\text{NO}_2)$ during the observation period.



45 Figure S3. Temporal variations of nocturnal HONO, NO_x and NO on October 6–7, 2018. The HONO emission factors were obtained according to the data in the black frames a and b.

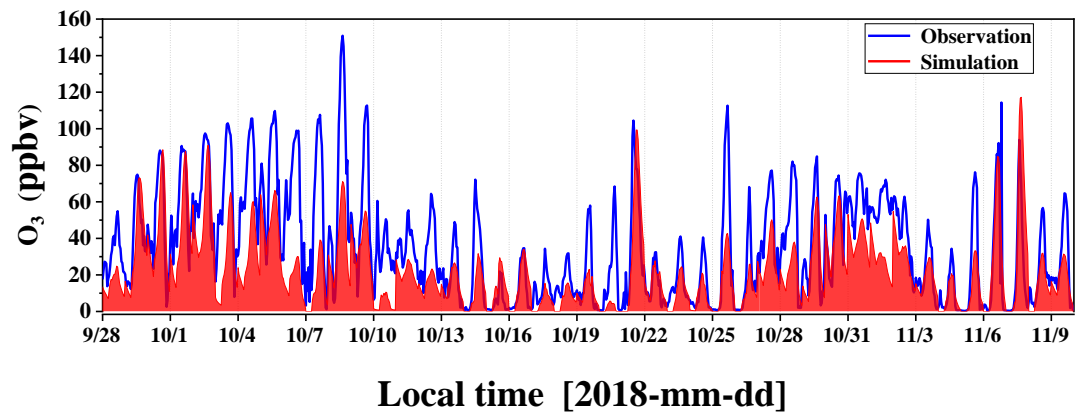
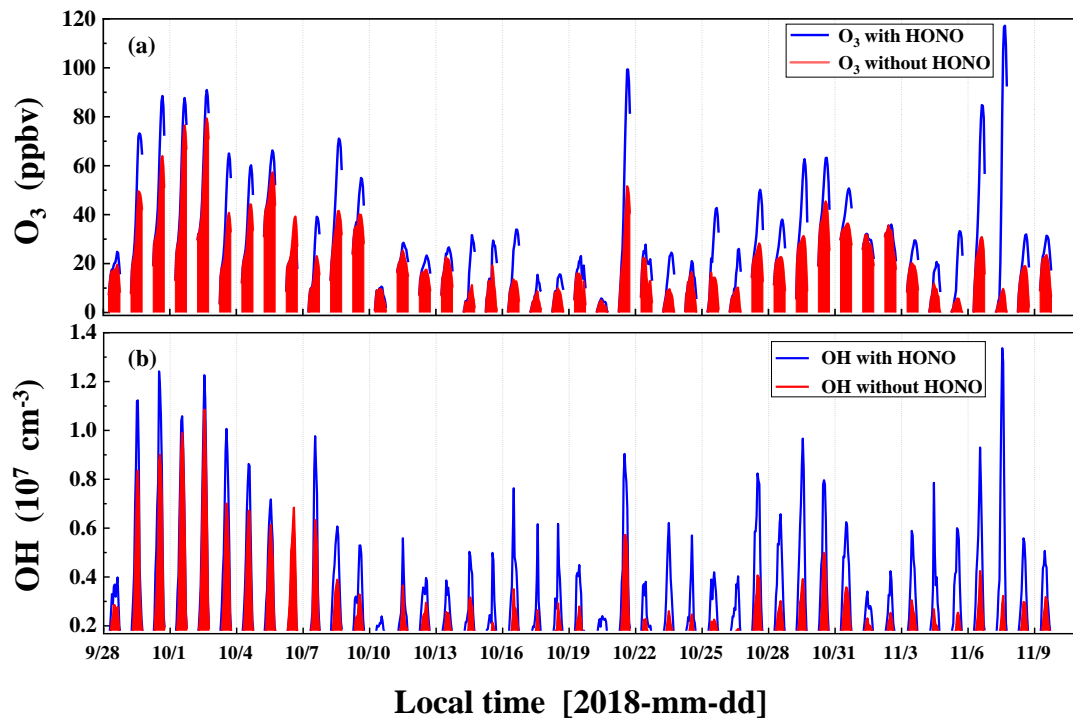


Figure S4. The time series of measured and simulated O₃ values.



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Figure S5. The time series of simulation results of O₃ and OH.

Table S1. Emission factors ($\Delta\text{HONO}/\Delta\text{NO}_x$) and other information in 11 fresh plumes.

Starting time	Duration (min)	$R^2(\text{NO}-\text{NO}_x)$	$R^2(\text{HONO}-\text{NO}_x)$	$\Delta\text{NO}/\Delta\text{NO}_x$	HONO/NO_x	$\Delta\text{HONO}/\Delta\text{NO}_x$
2018/10/6 23:29	62	0.9616	0.7233	0.90	0.002	0.001
2018/10/7 4:29	22	0.9836	0.7821	0.97	0.002	0.003
2018/10/7 20:44	34	0.9559	0.7054	0.88	0.011	0.010
2018/10/7 22:49	22	0.9904	0.8051	1.05	0.013	0.008
2018/10/20 0:33	24	0.9621	0.7826	0.96	0.020	0.007
2018/10/21 6:28	40	0.9959	0.9403	0.89	0.021	0.014
2018/10/25 6:55	20	0.9615	0.7291	1.04	0.024	0.014
2018/11/4 19:04	22	0.9761	0.8148	1.05	0.022	0.011
2018/11/4 22:01	78	0.9892	0.7684	1.02	0.016	0.007
2018/11/6 7:31	29	0.9835	0.7902	1.03	0.029	0.009
2018/11/7 4:56	30	0.975	0.7007	0.93	0.027	0.015

Table S2. The OH concentration is assumed of 1.0×10^6 molecules cm^{-3} . The integrated P_{net} of homogeneous reaction of NO + OH from 18:00 to 6:00.

OH/molecules cm^{-3}	Integrated P_{net} /ppbv	Measured HONO /ppbv
1×10^5	0.34	
5×10^5	1.54	
1×10^6	3.24	0.26
2×10^6	6.17	