Supplement of Atmos. Chem. Phys., 24, 12575–12593, 2024
https://doi.org/10.5194/acp-24-12575-2024-supplement

Atmospheric Chemistry and Physics
Open Access

Supplement of

An investigation into atmospheric nitrous acid (HONO) processes in South Korea

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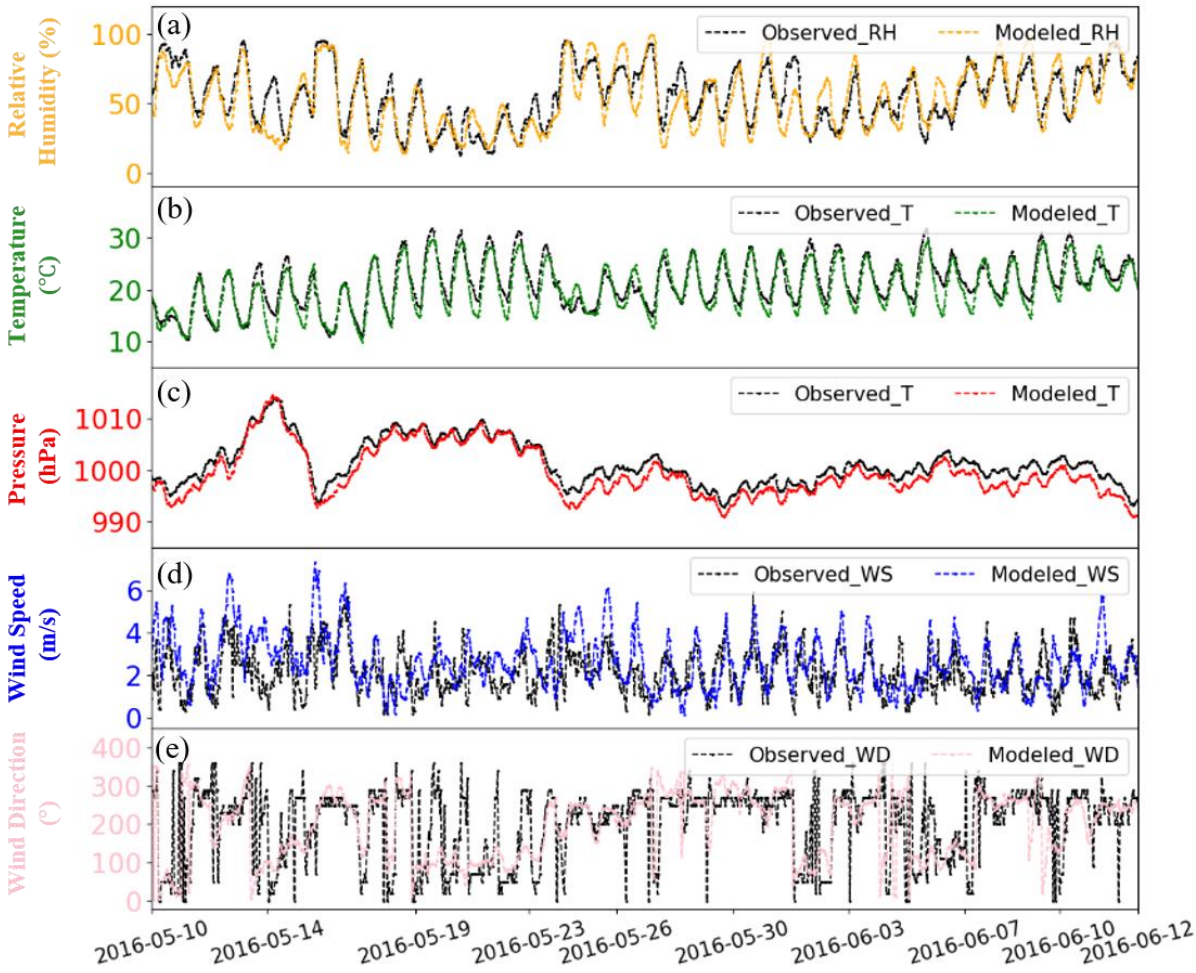

Fig. S1. Temporal variations of (a) relative humidity (RH); (b) temperature (T); (c) pressure; (d) wind speed (WS) at 10m above the surface; and (e) wind direction (WD) at 10m above the surface during period of the KORUS-AQ campaign.

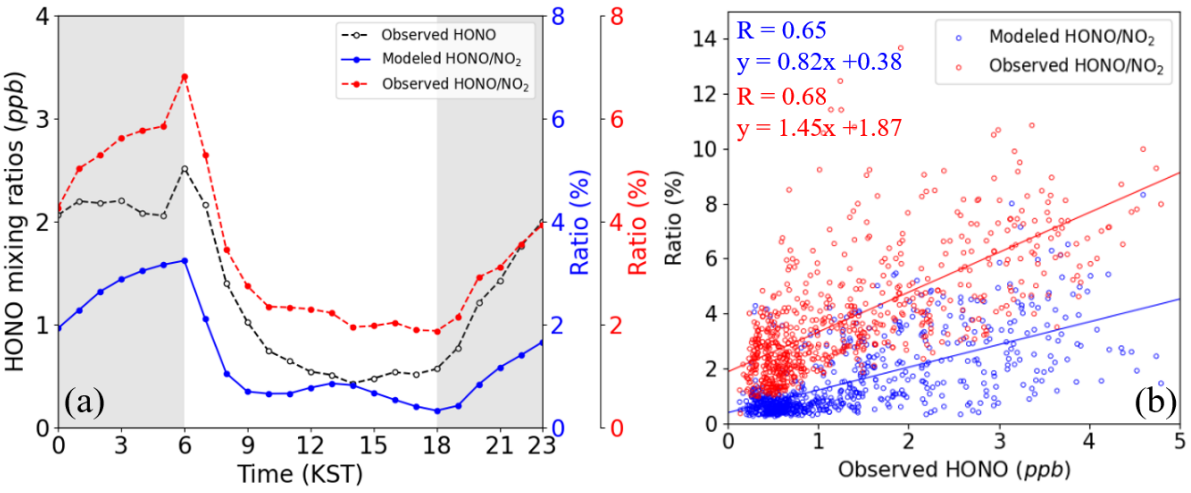

Fig. S2. (a) Diurnal variations of observed HONO (black open circles, left y-axis), modeled HONO to NO_2 ratio (blue line, right y-axis), and observed HONO to NO_2 ratio (red line, right y-axis) and (b) their scatter-plots between the observed HONO and the modeled ratio of HONO to NO_2 (blue circles), and observed HONO to NO_2 (red circles) at the Olympic Park station during the period of the KORUS-AQ campaign.

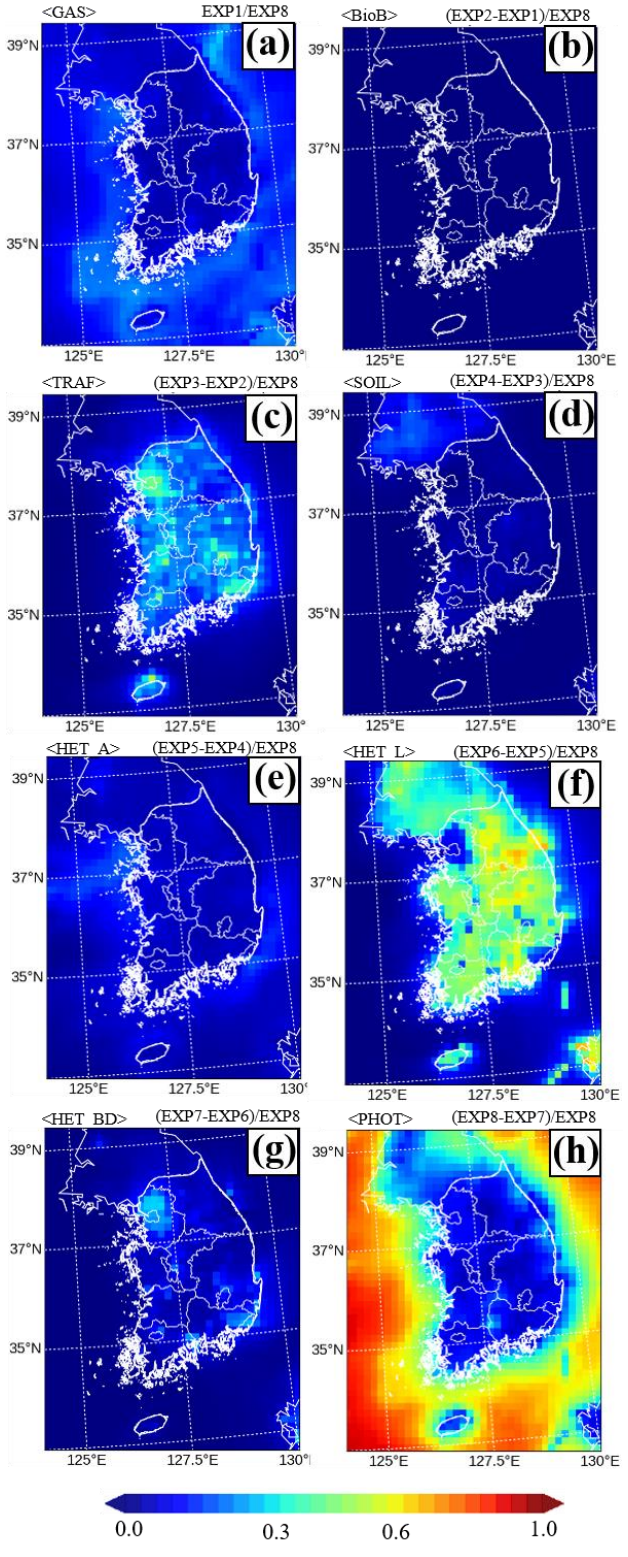

Fig. S3. Incremental ratio of (a) gas phase reactions; (b) biomass burning emissions; (c) traffic emissions and (d) soil emissions; (e) heterogeneous reactions on the aerosol surfaces, (f) heterogeneous reactions on the leaf surfaces, and (g) heterogeneous reactions on the building surfaces; and (h) renoxification on HONO mixing ratios (unit: dimensionless).

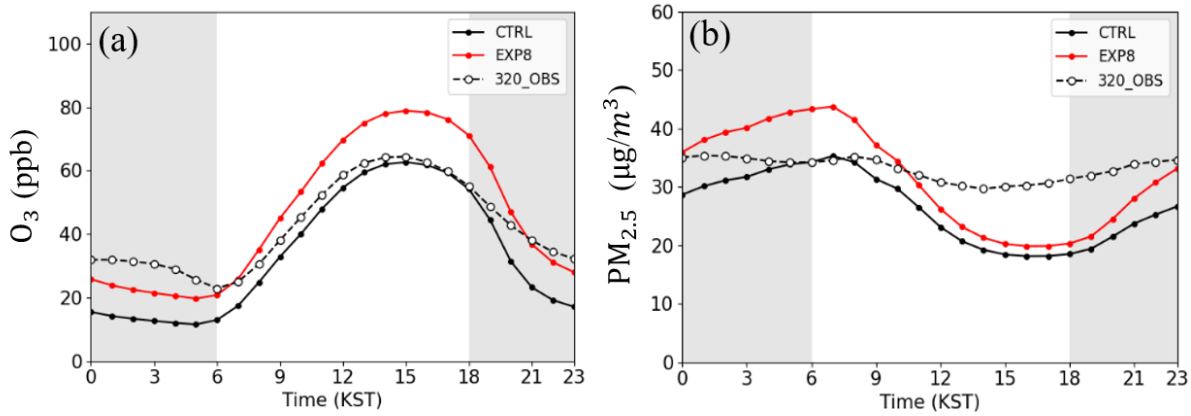

Fig. S4. Comparison of diurnal variations of the mixing ratios of (a) O_3, and (b) $PM_{2.5}$. Both are averaged for 320 AIR KOREA monitoring stations during the period of the KORUS-AQ campaign. The black open circles, black lines, and red lines represent observed values and values from the CTRL and EXP8 simulations, respectively.

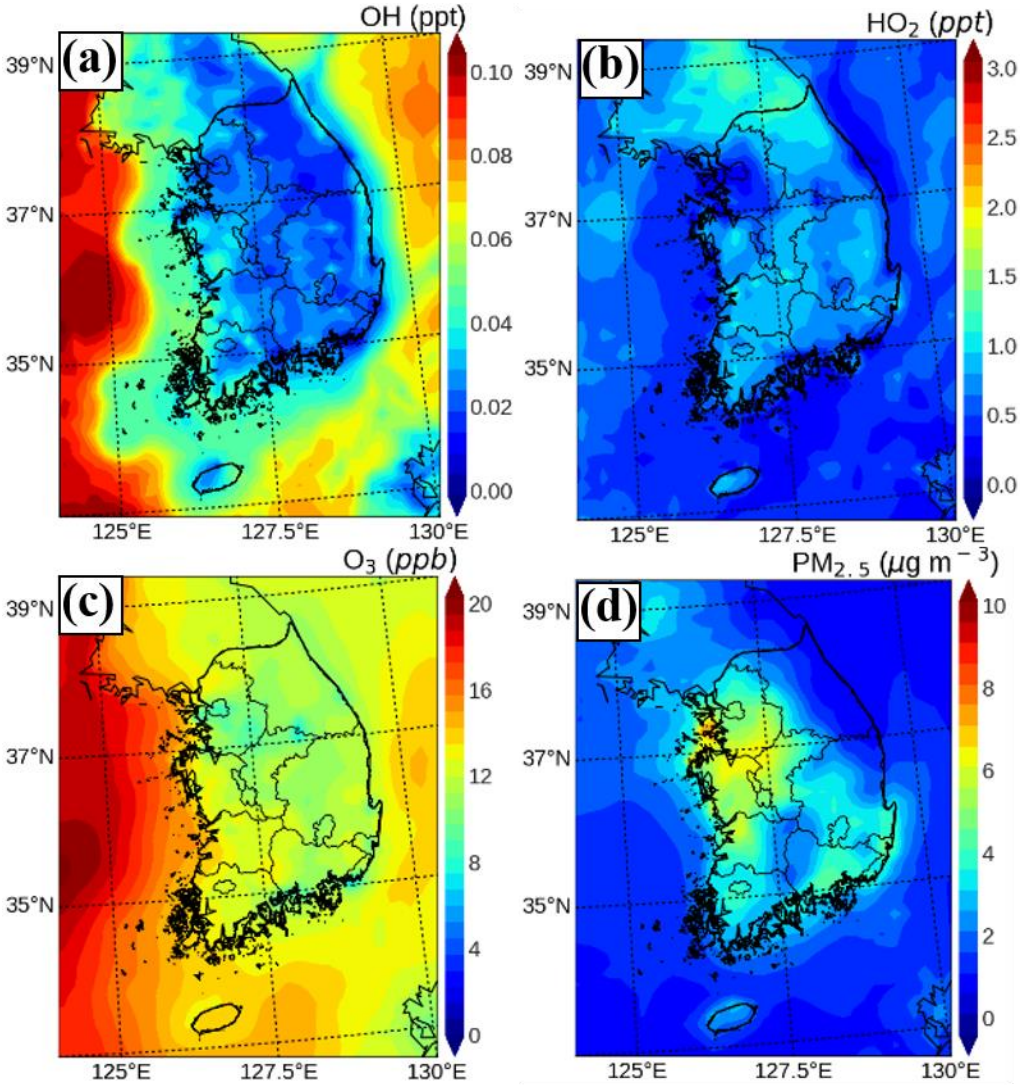

Fig. S5. Spatial distributions of the differences levels of (a) HONO, (b) OH, (c) HO_2, and (d) $PM_{2.5}$ between the EXP8 and CTRL simulations in South Korea during the period of the KORUS-AQ campaign.

Table S1. Detection limits and uncertainties of instruments for observed HONO, NO_2, O_3, and $PM_{2.5}$ at Olympic Park station, Korea.

Species	Instruments	Detection limit	Uncertainty	Time resolution
HONO	Monitor for Aerosols and Gases in Ambient Air (MARGA, model ADI 2080)	0.02ppbv	±20%	1 hour
NO_2	Ecotech gas sensor, EC8941	0.5ppbv	±10%	1 hour
O_3	Ecotech gas sensor, EC9810	0.5ppbv	±5%	1 hour
$PM_{2.5}$	Thermo Fisher Scientific, FH62C14	4μg/m^3	±10%	1 hour

Table S2. Statistical analysis of modeled and observed meteorological parameters at the Olympic Park station during the period of the KORUS-AQ campaign.

Parameter	Observed mean	Modeled mean	R	RMSE	MB	IOA
RH (%)	55.81	53.33	0.85	11.95	-2.48	0.92
T (℃)	21.27	20.28	0.93	1.96	-0.99	0.96
Pressure (hPa)	1001.38	999.62	0.98	2.01	-1.77	0.95
WS (m s^{-1})	2.14	2.65	0.47	1.30	0.51	0.66
WD (°)	202.71	196.01	0.53	88.87	-6.70	0.75