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Exploring aerosol–cloud interactions in liquid-phase clouds over eastern China and its adjacent ocean using the WRF-Chem–SBM model

Jianqi Zhao et al.

Correspondence to: Xiaoyan Ma (xma@nuist.edu.cn)

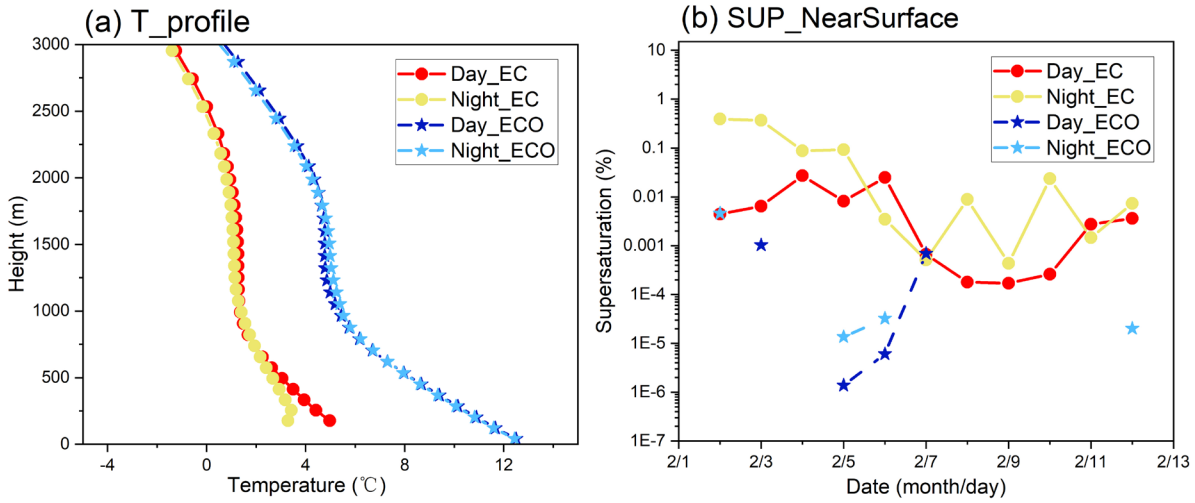

Figure S1. Diurnal variation of temperature profile (a, "Day" and "Night" refer to 7:00 to 18:00 and 19:00 to 06:00 of the next day in Beijing time respectively. The values in figure are averaged over all times of "Day" and "Night" period and grid points on each vertical layer) and near-surface supersaturation (b, the values in figure are averaged over all times and grid points on the near-surface layer during the "Day" and "Night" periods of each day)

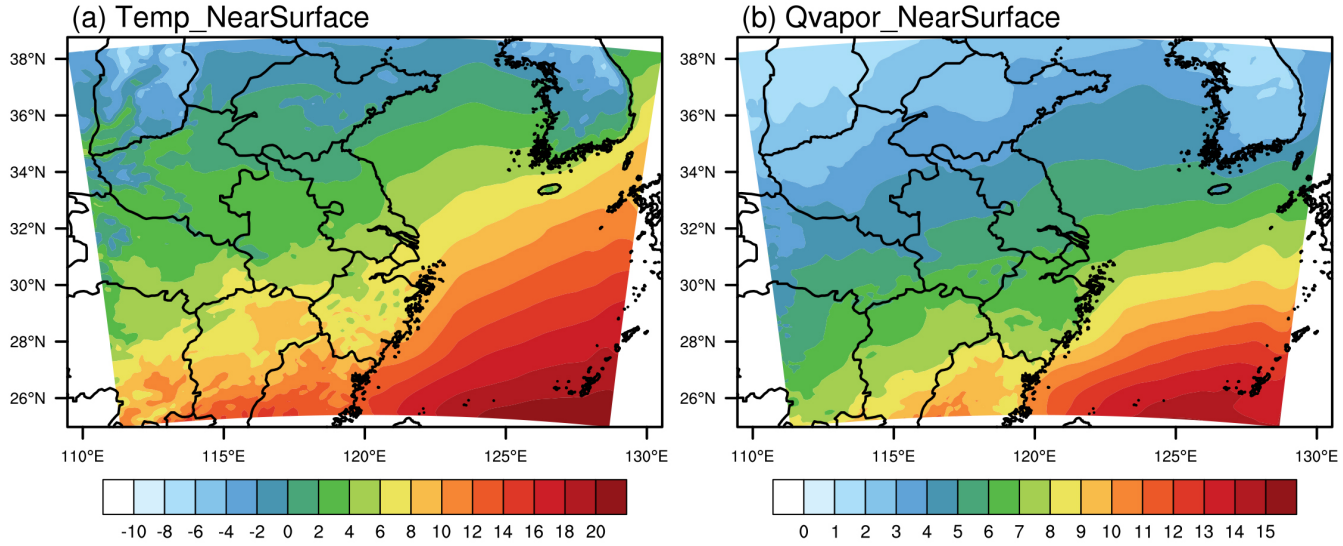

Figure S2. Average distributions of near-surface average temperature (unit: °C, a) and water vapor content (unit: g·m^{-3}, b) during the simulation

Supplement A. namelist.input file of WRF-Chem-SBM (EC simulation)

```
 &time_control
  run_days                            = 0,
  run_hours                           = 0,
  run_minutes                         = 0,
  run_seconds                         = 0,
  start_year                          = 2019, 2019,
  start_month                         = 02,   02,
  start_day                           = 01,   01,
  start_hour                          = 00,   00,
  start_minute                        = 00,   00,
  start_second                        = 00,   00,
```

```
end_year                            = 2019, 2019,
end_month                           = 02,      02,
end_day                             = 13,      13,
end_hour                            = 00,      00,
end_minute                          = 00,      00,
end_second                          = 00,      00,
interval_seconds                    = 21600
input_from_file                     = .true.,.true.,
history_interval                    = 60,    60,
frames_per_outfile                  = 10000, 1000,
restart                             = .false.,
restart_interval                    = 99999999,
io_form_history                     = 2
io_form_restart                     = 2
io_form_input                       = 2
io_form_boundary                    = 2
io_form_auxinput5                   = 2
auxinput5_interval                  = 60, 60,
io_form_auxinput6                   = 2,
auxinput6_inname                    = "wrfbiochemi_d0<domain>",
auxinput11_interval                 = 1,       1,
auxinput11_end_h                    = 99999, 99999,
debug_level                         = 10
/

&domains
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time_step_fract_num                 = 0,
time_step_fract_den                 = 1,
max_dom                             = 2,
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e_sn                                = 125,       160,
e_vert                              = 48,       48,
eta_levels                          = 1.000, 0.990, 0.980, 0.970, 0.960, 0.950,
                                      0.940, 0.930, 0.920, 0.910, 0.900, 0.890,
                                      0.880, 0.870, 0.860, 0.850, 0.840, 0.830,
                                      0.820, 0.810, 0.800, 0.790, 0.780, 0.770,
                                      0.760, 0.740, 0.720, 0.700, 0.680, 0.660,
                                      0.640, 0.620, 0.600, 0.570, 0.540, 0.510,
                                      0.480, 0.450, 0.410, 0.370, 0.330, 0.290,
                                      0.250, 0.200, 0.150, 0.100, 0.050, 0.000,
p_top_requested                     = 5000,
num_metgrid_levels                  = 32,
num_metgrid_soil_levels             = 4,
dx                                  = 12000, 4000,
dy                                  = 12000, 4000,
grid_id                             = 1,         2,
parent_id                           = 0,         1,
```

```
i_parent_start                      = 1,        20,
j_parent_start                      = 1,        30,
parent_grid_ratio                   = 1,        3,
parent_time_step_ratio              = 1,        3,
feedback                            = 1,
smooth_option                       = 0,
/

&physics
mp_physics                          = 30,       30,
ra_lw_physics                       = 4,        4,
ra_sw_physics                       = 5,        5,
radt                                = 12,       12,
sf_sfclay_physics                   = 1,        1,
sf_surface_physics                  = 2,        2,
bl_pbl_physics                      = 1,        1,
bldt                                = 0,        0,
cu_physics                          = 5,        5,
cudt                                = 0,        0,
cugd_avedx                          = 1,
cu_diag                             = 1,        1,
icloud                              = 1,
isfflx                              = 1,
ifsnow                              = 0,
mp_zero_out                         = 2,
mp_zero_out_thresh                  = 1.e-12,
do_radar_ref                        = 1,
surface_input_source                = 1,
num_soil_layers                     = 4,
cu_rad_feedback                     = .true.,   .true.,
progn                               = 1, 1,
sbm_mosaic_interact                 = 1,
/

&fdda
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gfdda_end_h                         = 312,      211,      720,
gfdda_interval_m                    = 360,      360,      360,
fgdt                                = 0,        0,        0,
if_no_pbl_nudging_uv                = 0,        0,        0,
if_no_pbl_nudging_t                 = 1,        1,        1,
if_no_pbl_nudging_q                 = 1,        1,        1,
if_zfac_uv                          = 0,        0,        0,
k_zfac_uv                           = 10,       10,       10,
if_zfac_t                           = 0,        0,        0,
k_zfac_t                            = 10,       10,       10,
if_zfac_q                           = 0,        0,        0,
```

```
 k_zfac_q                            = 10,       10,       10,
 guv                                 = 0.0003, 0.0003, 0.0003,
 gt                                  = 0.0003, 0.0003, 0.0003,
 gq                                  = 0.0003, 0.0003, 0.0003,
 if_ramping                          = 1,
 dtramp_min                          = 60.0,
 io_form_gfdda                       = 2,
 obs_nudge_opt                       = 1,1,1,1,
 max_obs                             = 150000,
 fdda_start                          = 0., 0., 0., 0., 0.
 fdda_end                            = 99999., 99999., 99999., 99999., 99999.
 obs_nudge_wind                      = 1,1,1,1,1
 obs_coef_wind                       = 6.E-4,6.E-4,6.E-4,6.E-4,6.E-4
 obs_nudge_temp                      = 1,1,1,1,1
 obs_coef_temp                       = 6.E-4,6.E-4,6.E-4,6.E-4,6.E-4
 obs_nudge_mois                      = 1,1,1,1,1
 obs_coef_mois                       = 6.E-4,6.E-4,6.E-4,6.E-4,6.E-4
 obs_rinxy                           = 240.,240.,180.,180,180
 obs_rinsig                          = 0.1,
 obs_twindo                          = 0.6666667,0.6666667,0.6666667,0.6666667,0.6666667,
 obs_npfi                            = 10,
 obs_ionf                            = 2, 2, 2, 2, 2,
 obs_idynin                          = 0,
 obs_dtramp                          = 40.,
 obs_prt_freq                        = 10, 10, 10, 10, 10,
 obs_prt_max                         = 10
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 obs_ipf_nudob                       = .false.
 obs_ipf_in4dob                      = .false.
 obs_ipf_init                        = .false.
/

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 km_opt                              = 4,          4,          4,
 diff_6th_opt                        = 0,          0,          0,
 diff_6th_factor                     = 0.12,     0.12,     0.12,
 base_temp                           = 290.
 damp_opt                            = 0,
 zdamp                               = 5000.,    5000.,    5000.,
 dampcoef                            = 0.2,       0.2,       0.2
 khdif                               = 0,          0,          0,
 kvdif                               = 0,          0,          0,
 non_hydrostatic                     = .true., .true., .true.,
 chem_adv_opt                        = 2,          2,          2,          2,
 moist_adv_opt                       = 2,          2,          1,
 scalar_adv_opt                      = 2,          2,          1,
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gwd_opt                             = 0,
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relax_zone                          = 9,
spec_exp                            = 0.33,
specified                           = .true., .false.,.false.,
nested                              = .false., .true., .true.,
/

&chem
kemit                               = 1,
chem_opt                            = 9,        9,
bio_emiss_opt                       = 3,        3,
bioemdt                             = 30,       30,
photdt                              = 30,       30,
chemdt                              = 0,        0,
io_style_emissions                  = 1,
emiss_inpt_opt                      = 1,        1,
emiss_opt                           = 3,        3,
chem_in_opt                         = 1,        1,
phot_opt                            = 2,        2,
gas_drydep_opt                      = 1,        1,
aer_drydep_opt                      = 1,        1,
dust_opt                            = 13,
dmsemis_opt                         = 0,
seas_opt                            = 2,
gas_bc_opt                          = 1,        1,
gas_ic_opt                          = 1,        1,
aer_bc_opt                          = 1,        1,
aer_ic_opt                          = 1,        1,
gaschem_onoff                       = 1,        1,
aerchem_onoff                       = 1,        1,
wetscav_onoff                       = 1,        1,
cldchem_onoff                       = 1,        1,
vertmix_onoff                       = 1,        1,
chem_conv_tr                        = 1,        1,
biomass_burn_opt                    = 1,        1,
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aer_ra_feedback                     = 1,        1,
aer_op_opt                          = 4,        4,
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have_bcs_tracer                     = .true., .true.,
opt_pars_out                        = 1,
ne_area                             = 1000,
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&grib2
/

&namelist_quilt
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/
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