A three-dimensional simulation and process analysis of tropospheric Ozone Depletion Events (ODEs) during the springtime of Arctic using CMAQ: Supplements

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Table S1. Values of statistical parameters for simulations of meteorological parameters and the surface ozone at Barrow (now known as Utqiagvik).

Variables	R	RMSEs
Pressure	0.991	3.081 hPa
T2	0.920	3.784 K
U10	0.881	2.153 m/s
V10	0.897	2.282 m/s
Surface ozone	0.793	8.407 ppb

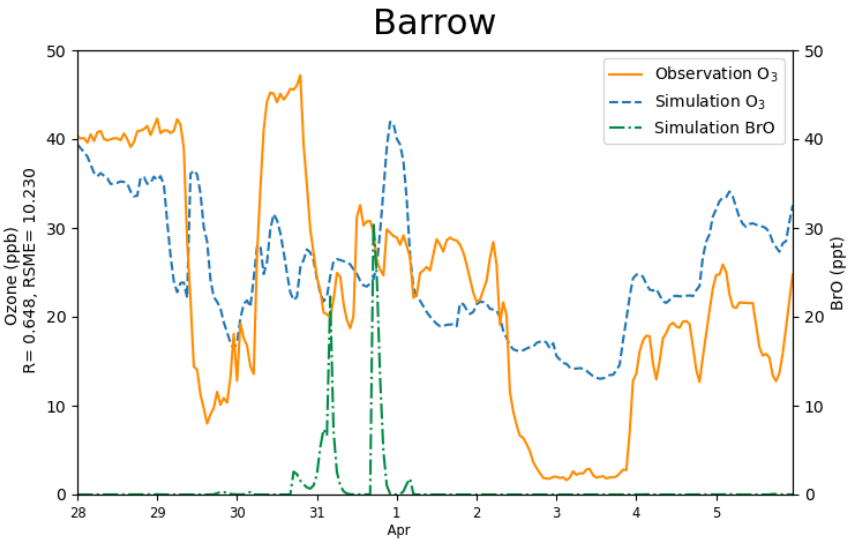
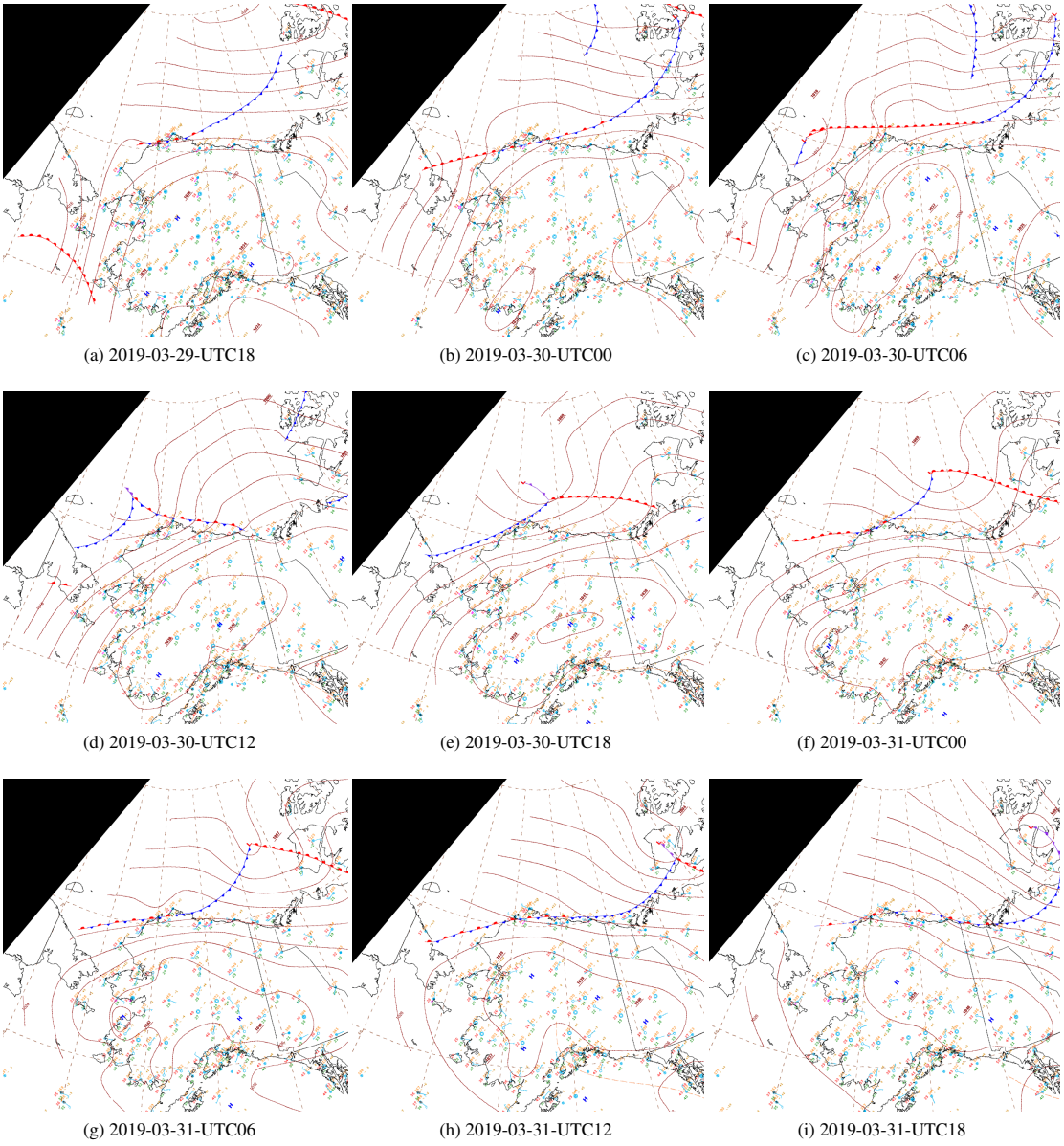


Figure S1. The simulated surface ozone (ppb) in Barrow from March 28th to April 6th, 2019 without the adjustment at the Chukotka Peninsula in the boundary condition, together with the simulated BrO. The correlation coefficient R and the root-mean-square errors RMSE were also presented.

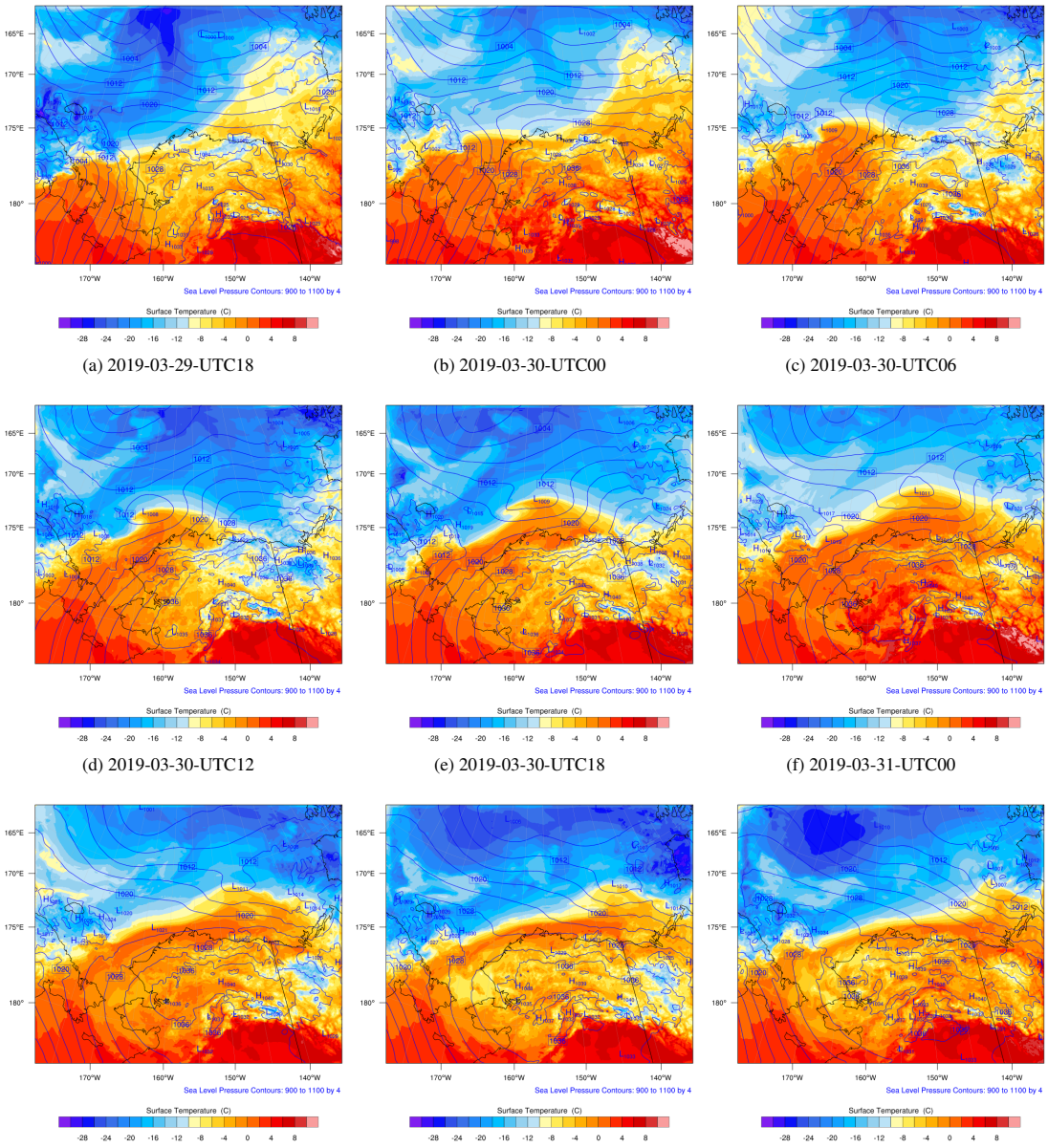


(a) 2019-03-29-UTC18 (b) 2019-03-30-UTC00 (c) 2019-03-30-UTC06

(d) 2019-03-30-UTC12 (e) 2019-03-30-UTC18 (f) 2019-03-31-UTC00

(g) 2019-03-31-UTC06 (h) 2019-03-31-UTC12 (i) 2019-03-31-UTC18

Figure S2. The surface analysis provided by Weather Prediction Center (WPC) from March 29th to March 31st, 2019.

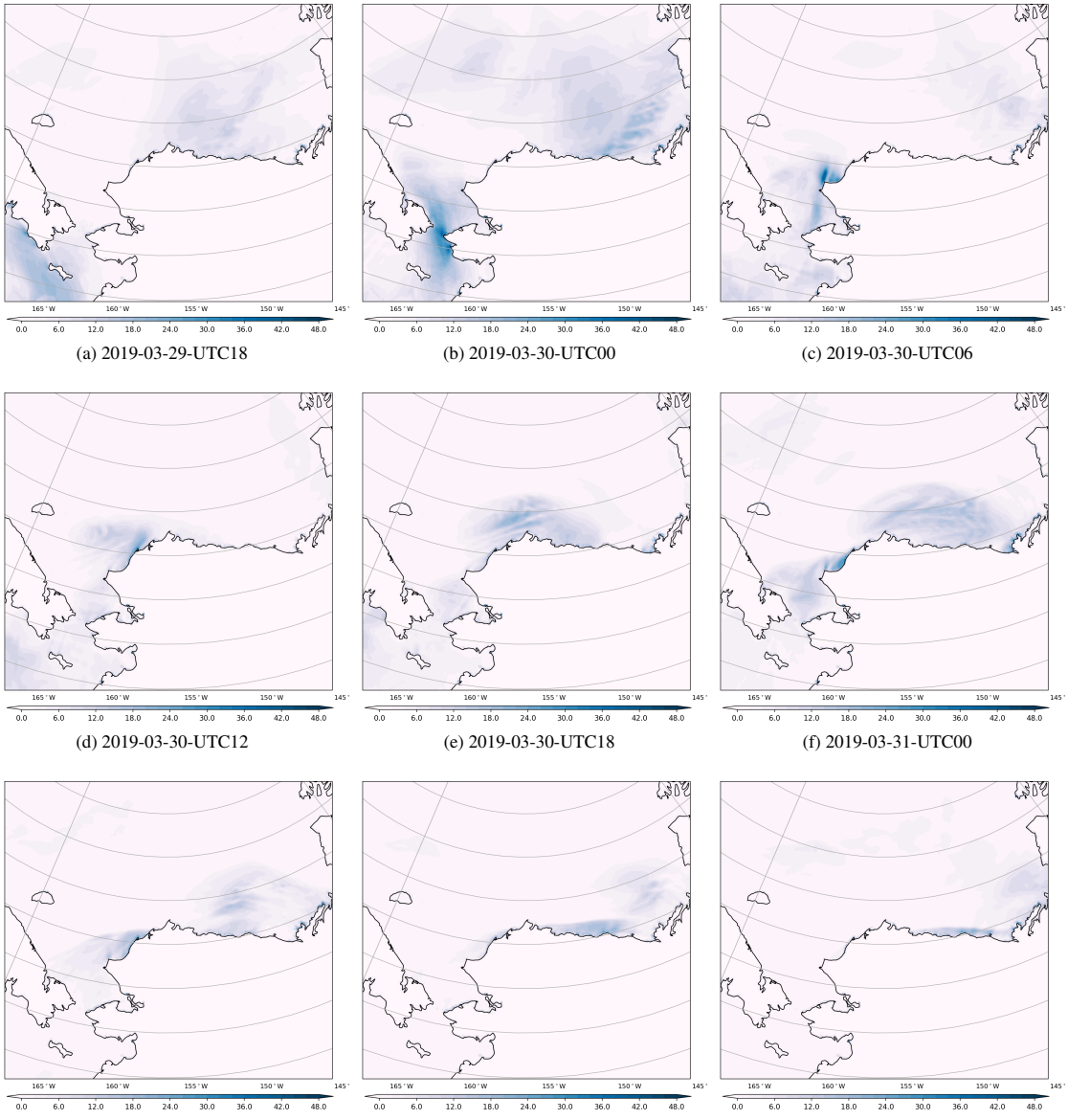


(a) 2019-03-29-UTC18 (b) 2019-03-30-UTC00 (c) 2019-03-30-UTC06

(d) 2019-03-30-UTC12 (e) 2019-03-30-UTC18 (f) 2019-03-31-UTC00

(g) 2019-03-31-UTC06 (h) 2019-03-31-UTC12 (i) 2019-03-31-UTC18

Figure S3. The spatial distribution of the sea level pressure (hPa, contour lines) and surface temperature (°C, contour fills) simulated by WRF from March 29th to March 31st, 2019, with a time resolution of 6 hrs.

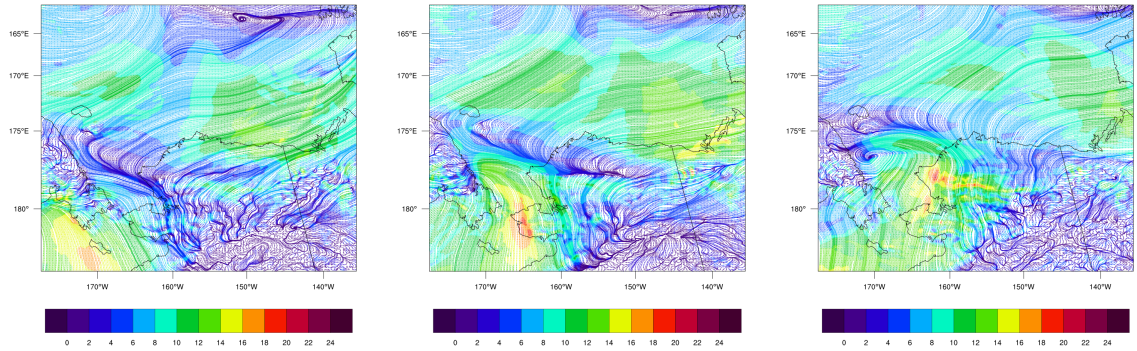


(a) 2019-03-29-UTC18 (b) 2019-03-30-UTC00 (c) 2019-03-30-UTC06

(d) 2019-03-30-UTC12 (e) 2019-03-30-UTC18 (f) 2019-03-31-UTC00

(g) 2019-03-31-UTC06 (h) 2019-03-31-UTC12 (i) 2019-03-31-UTC18

Figure S4. The spatial distribution of the emission rate of sea-salt aerosols (g/s) simulated by CMAQ from March 29th to March 31st, 2019.



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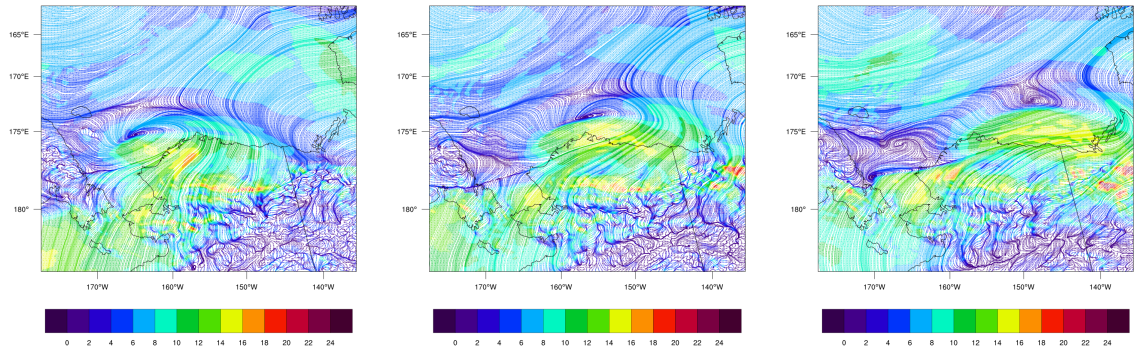
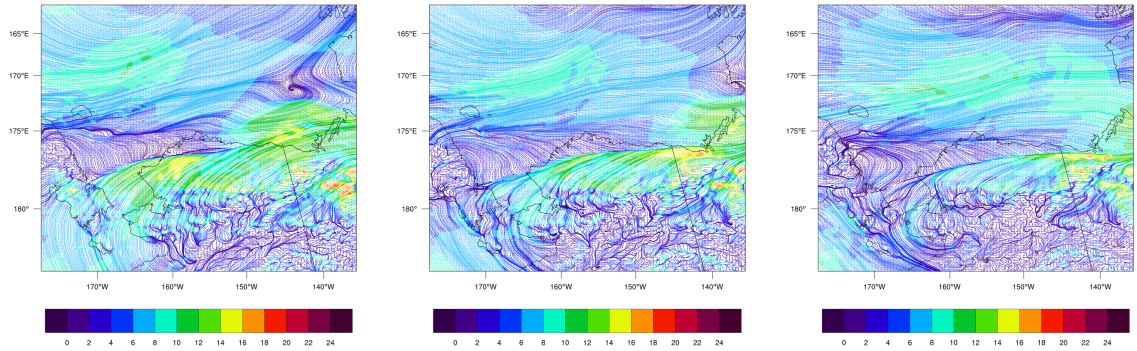
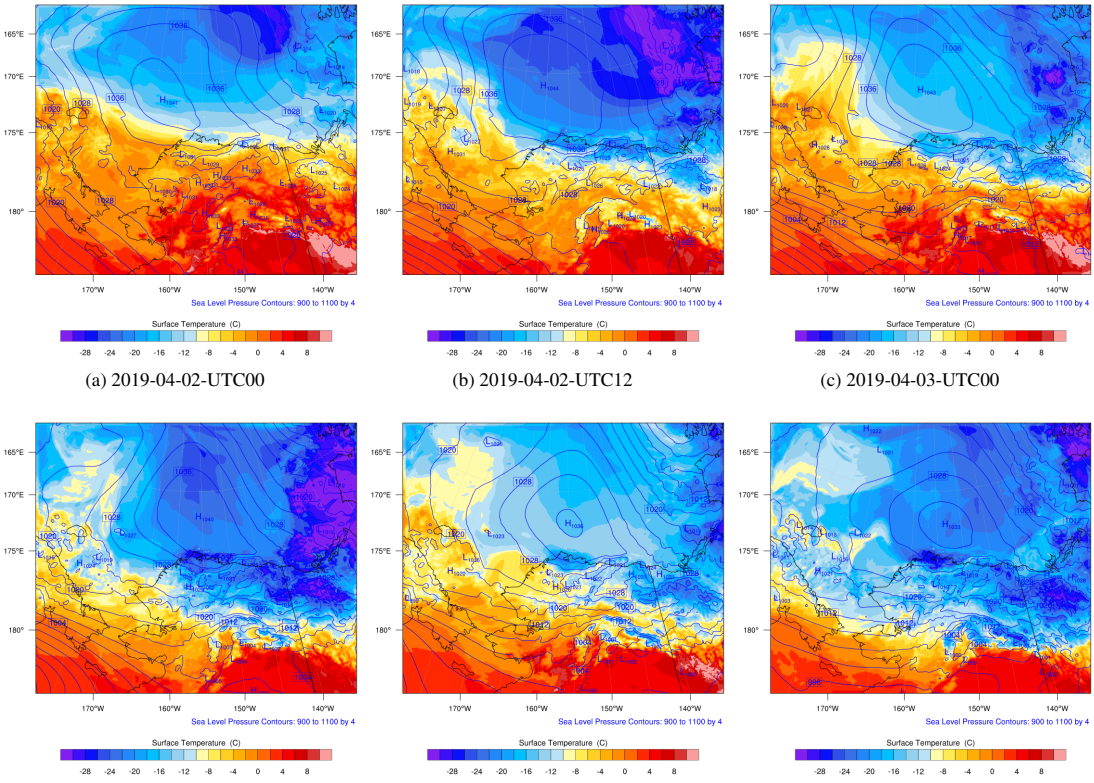


(d) 2019-03-30-UTC12 (e) 2019-03-30-UTC18 (f) 2019-03-31-UTC00



(g) 2019-03-31-UTC06 (h) 2019-03-31-UTC12 (i) 2019-03-31-UTC18

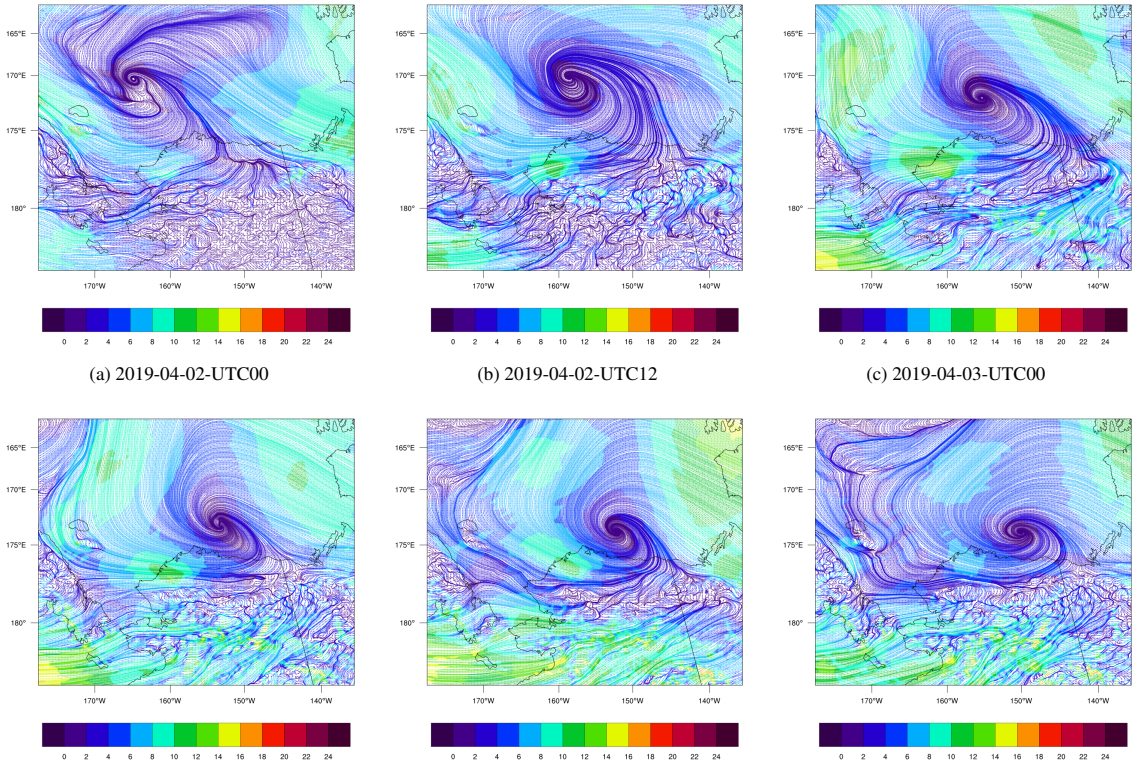
Figure S5. The spatial distribution of surface wind (m/s) and the streamline simulated by WRF from March 29th to March 31st, 2019, with a time resolution of 6 hrs.



(a) 2019-04-02-UTC00 (b) 2019-04-02-UTC12 (c) 2019-04-03-UTC00

(d) 2019-04-03-UTC12 (e) 2019-04-04-UTC00 (f) 2019-04-04-UTC12

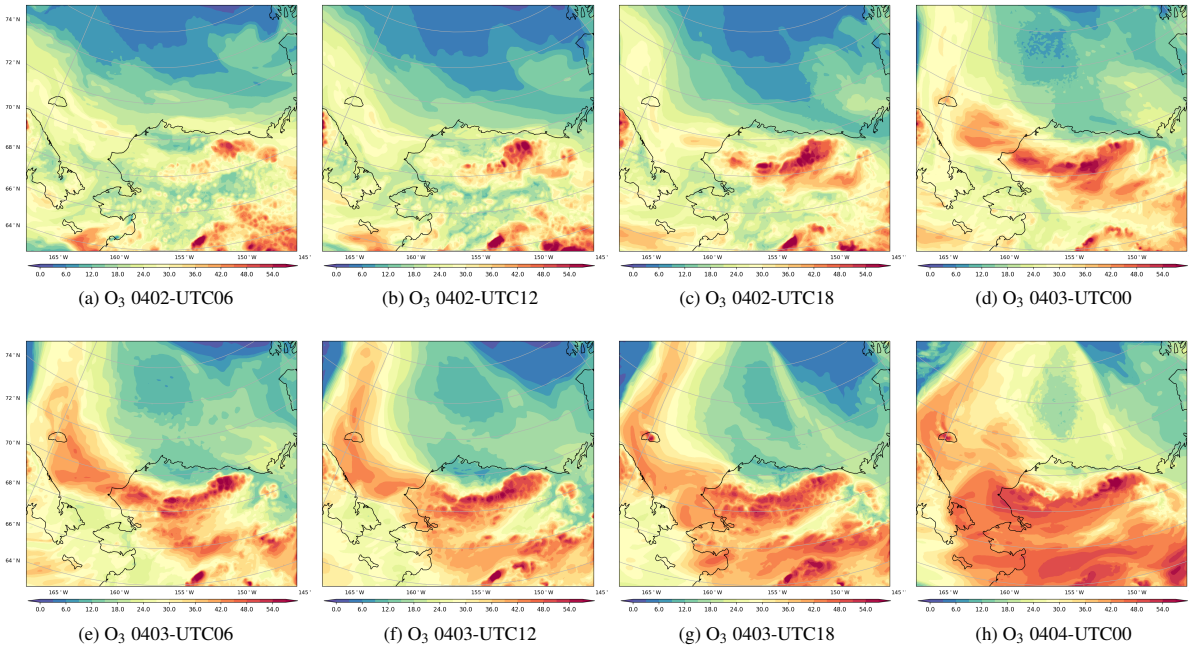
Figure S6. The spatial distribution of the sea level pressure (hPa, contour lines) and surface temperature (°C, contour fills) simulated by WRF from April 2nd to April 4th, 2019.



(a) 2019-04-02-UTC00 (b) 2019-04-02-UTC12 (c) 2019-04-03-UTC00

(d) 2019-04-03-UTC12 (e) 2019-04-04-UTC00 (f) 2019-04-04-UTC12

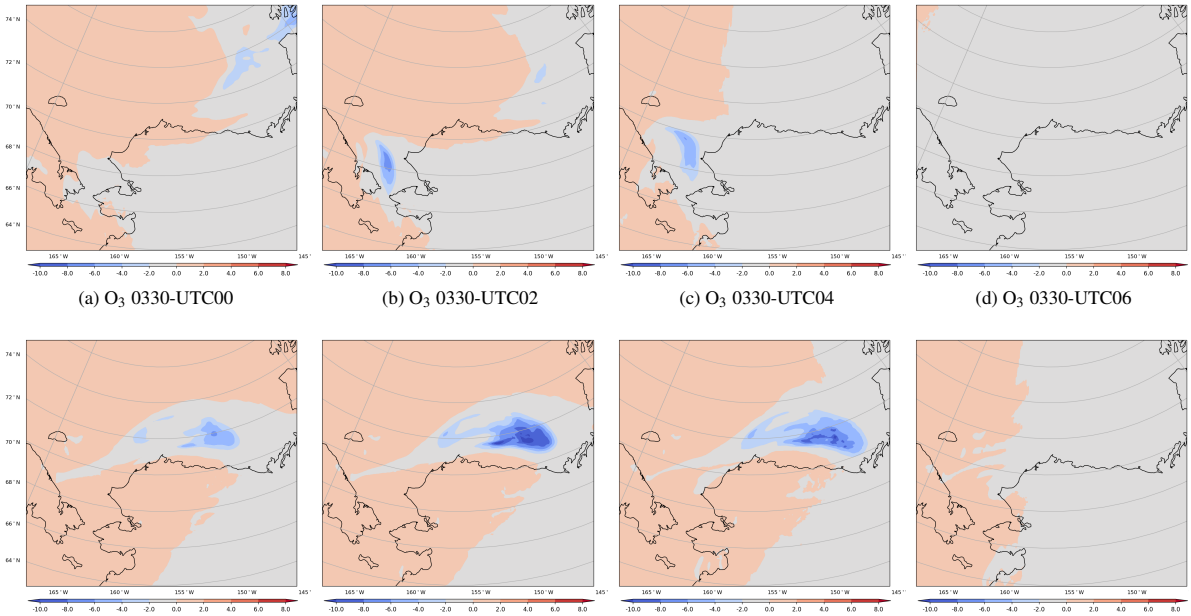
Figure S7. The spatial distribution of surface wind (m/s) and the streamline simulated by WRF from April 2nd to April 4th, 2019.



(a) O_3 0402-UTC06 (b) O_3 0402-UTC12 (c) O_3 0402-UTC18 (d) O_3 0403-UTC00

(e) O_3 0403-UTC06 (f) O_3 0403-UTC12 (g) O_3 0403-UTC18 (h) O_3 0404-UTC00

Figure S8. The spatial distribution of the surface ozone (ppb) simulated by CMAQ from April 2nd to 4th, 2019, with a time resolution of 6 hrs.



(a) O_3 0330-UTC00 (b) O_3 0330-UTC02 (c) O_3 0330-UTC04 (d) O_3 0330-UTC06

(e) O_3 0330-UTC22 (f) O_3 0331-UTC00 (g) O_3 0331-UTC02 (h) O_3 0331-UTC04

Figure S9. The change of surface ozone (ppb) caused by local chemistry from March 30th to March 31st, 2019, with a time resolution of 2 hrs. The positive value represents a chemical production of ozone, while the negative value represents a chemical consumption of ozone.