

Supplementary Materials for
Changes in air pollution levels after COVID-19 outbreak in Korea

Supplementary Materials includes:

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Supplemental Figures 1 to 2

Supplemental Table 1. The year-on-year comparison of monthly mean of PM_{2.5}, PM₁₀, NO₂, and CO in December.

Year	2016	2017	2018	2019
PM _{2.5} (µg/m ³)	28.17 ± 10.07	27.53 ± 14.74	24.21 ± 5.56	24.99 ± 10.51
p-value	(ref)	0.862 (ref)	0.093 0.260 (ref)	0.257 0.419 0.722
PM ₁₀ (µg/m ³)	45.07 ± 13.52	44.33 ± 18.14	43.52 ± 8.87	38.18 ± 13.18
p-value	(ref)	0.878 (ref)	0.655 0.802 (ref)	0.075 0.132 0.079
NO ₂ (ppb)	25.00 ± 6.52	23.56 ± 8.13	23.09 ± 4.06	23.58 ± 5.88
p-value	(ref)	0.529 (ref)	0.179 0.761 (ref)	0.430 0.991 0.701
CO (ppm)	0.609 ± 0.124	0.581 ± 0.143	0.520 ± 0.063	0.557 ± 0.113
p-value	(ref)	0.495 (ref)	0.001 0.031 (ref)	0.139 0.416 0.118

All values present mean ± SD of all daily concentrations per each month.

Paired *t*-test was used for comparison of PM_{2.5}, PM₁₀, NO₂, and CO levels on the same day in the current year versus each prior year.

Supplemental Table 2. The year-on-year comparison of monthly mean of PM_{2.5}, PM₁₀, NO₂, and CO in January.

Year	2017	2018	2019	2020
PM _{2.5} (µg/m ³)	30.58 ± 15.38	29.67 ± 14.63	33.24 ± 17.75	25.39 ± 10.80
p-value	(ref)	0.797 (ref)	0.561 0.348 (ref)	0.038 0.209 0.046
PM ₁₀ (µg/m ³)	49.15 ± 18.32	48.01 ± 19.25	57.48 ± 21.51	37.95 ± 14.33
p-value	(ref)	0.775 (ref)	0.149 0.068 (ref)	0.002 0.018 0.001
NO ₂ (ppb)	23.95 ± 7.98	23.77 ± 7.81	24.60 ± 6.11	21.47 ± 6.25
p-value	(ref)	0.932 (ref)	0.734 0.663 (ref)	0.153 0.180 0.030
CO (ppm)	0.607 ± 0.157	0.601 ± 0.151	0.629 ± 0.136	0.572 ± 0.108
p-value	(ref)	0.884 (ref)	0.578 0.409 (ref)	0.220 0.382 0.056

All values present mean ± SD of all daily concentrations per each month.

Paired *t*-test was used for comparison of PM_{2.5}, PM₁₀, NO₂, and CO levels on the same day in the current year versus each prior year.

Supplemental Table 3. The year-on-year comparison of monthly mean of PM_{2.5}, PM₁₀, NO₂, and CO in February.

Year	2017	2018	2019	2020
PM _{2.5} (µg/m ³)	26.61 ± 10.01	33.54 ± 12.71	33.16 ± 12.46	24.30 ± 11.86
p-value	(ref)	0.059 (ref)	0.032 0.905 (ref)	0.484 0.011 0.020
PM ₁₀ (µg/m ³)	43.96 ± 11.42	50.42 ± 15.09	54.93 ± 17.52	37.42 ± 15.51
p-value	(ref)	0.128 (ref)	0.002 0.380 (ref)	0.122 0.003 0.001
NO ₂ (ppb)	22.53 ± 8.17	22.94 ± 8.22	21.92 ± 5.73	19.56 ± 6.59
p-value	(ref)	0.857 (ref)	0.750 0.551 (ref)	0.179 0.113 0.165
CO (ppm)	0.555 ± 0.123	0.556 ± 0.109	0.577 ± 0.079	0.515 ± 0.103
p-value	(ref)	0.976 (ref)	0.422 0.475 (ref)	0.227 0.152 0.028

All values present mean ± SD of all daily concentrations per each month.

Paired *t*-test was used for comparison of PM_{2.5}, PM₁₀, NO₂, and CO levels on the same day in the current year versus each prior year.

Supplemental Table 4. The year-on-year comparison of monthly mean of PM_{2.5}, PM₁₀, NO₂, and CO in April.

Year	2017	2018	2019	2020
PM _{2.5} (µg/m ³)	25.29 ± 7.67	24.86 ± 9.72	19.26 ± 6.12	18.04 ± 5.24
p-value	(ref)	0.853 (ref)	0.002 0.030 (ref)	< 0.001 0.002 0.471
PM ₁₀ (µg/m ³)	55.06 ± 16.94	55.99 ± 24.05	40.85 ± 16.04	37.79 ± 12.13
p-value	(ref)	0.866 (ref)	0.002 0.008 (ref)	0.001 0.005 0.734
NO ₂ (ppb)	19.28 ± 4.27	17.73 ± 5.23	17.62 ± 3.39	13.12 ± 3.44
p-value	(ref)	0.252 (ref)	0.073 0.934 (ref)	< 0.001 0.002 < 0.001
CO (ppm)	0.455 ± 0.065	0.424 ± 0.047	0.412 ± 0.038	0.387 ± 0.040
p-value	(ref)	0.045 (ref)	0.001 0.361 (ref)	< 0.001 0.002 0.038

All values present mean ± SD of all daily concentrations per each month.

Paired *t*-test was used for comparison of PM_{2.5}, PM₁₀, NO₂, and CO levels on the same day in the current year versus each prior year.

Supplemental Table 5. The year-on-year comparison of monthly mean of SO₂ and O₃ in December.

Year	2016	2017	2018	2019
SO ₂ (ppb)	4.35 ± 0.61	3.90 ± 0.60	3.69 ± 0.60	3.41 ± 0.31
p-value	(ref)	0.025	0.001	< 0.001
		(ref)	0.156	0.001
			(ref)	0.030
O ₃ (ppb)	16.20 ± 5.52	18.20 ± 4.72	17.91 ± 5.32	17.90 ± 5.12
p-value	(ref)	0.181	0.174	0.227
		(ref)	0.827	0.798
			(ref)	0.993

All values present mean ± SD of all daily concentrations per each month.

Paired *t*-test was used for comparison of SO₂ and O₃ levels on the same day in the current year versus each prior year.

Supplemental Table 6. The year-on-year comparison of monthly mean of SO₂ and O₃ in January.

Year	2017	2018	2019	2020
SO ₂ (ppb)	4.62 ± 0.80	4.14 ± 0.55	4.25 ± 0.48	3.37 ± 0.43
p-value	(ref)	0.007	0.036	< 0.001
		(ref)	0.456	< 0.001
			(ref)	< 0.001
O ₃ (ppb)	20.60 ± 6.29	19.49 ± 5.29	20.18 ± 4.29	20.99 ± 6.04
p-value	(ref)	0.414	0.767	0.770
		(ref)	0.581	0.293
			(ref)	0.512

All values present mean ± SD of all daily concentrations per each month.

Paired *t*-test was used for comparison of SO₂ and O₃ levels on the same day in the current year versus each prior year.

Supplemental Table 7. The year-on-year comparison of monthly mean of SO₂ and O₃ in February.

Year	2017	2018	2019	2020
SO ₂ (ppb)	4.54 ± 0.79	4.37 ± 0.64	3.88 ± 0.45	3.12 ± 0.38
p-value	(ref)	0.403	0.002	< 0.001
		(ref)	0.003	< 0.001
			(ref)	< 0.001
O ₃ (ppb)	26.46 ± 6.80	26.01 ± 5.18	26.12 ± 5.13	25.89 ± 5.69
p-value	(ref)	0.757	0.828	0.828
		(ref)	0.922	0.969
			(ref)	0.974

All values present mean ± SD of all daily concentrations per each month.

Paired *t*-test was used for comparison of SO₂ and O₃ levels on the same day in the current year versus each prior year.

Supplemental Table 8. The year-on-year comparison of monthly mean of SO₂ and O₃ in March.

Year	2017	2018	2019	2020
SO ₂ (ppb)	4.84 ± 0.92	3.72 ± 0.72	3.67 ± 0.63	3.05 ± 0.24
p-value	(ref)	< 0.001	< 0.001	< 0.001
		(ref)	0.781	< 0.001
			(ref)	< 0.001
O ₃ (ppb)	33.77 ± 4.32	32.96 ± 6.81	37.04 ± 5.70	33.58 ± 5.87
p-value	(ref)	0.582	0.012	0.901
		(ref)	0.003	0.708
			(ref)	0.030

All values present mean ± SD of all daily concentrations per each month.

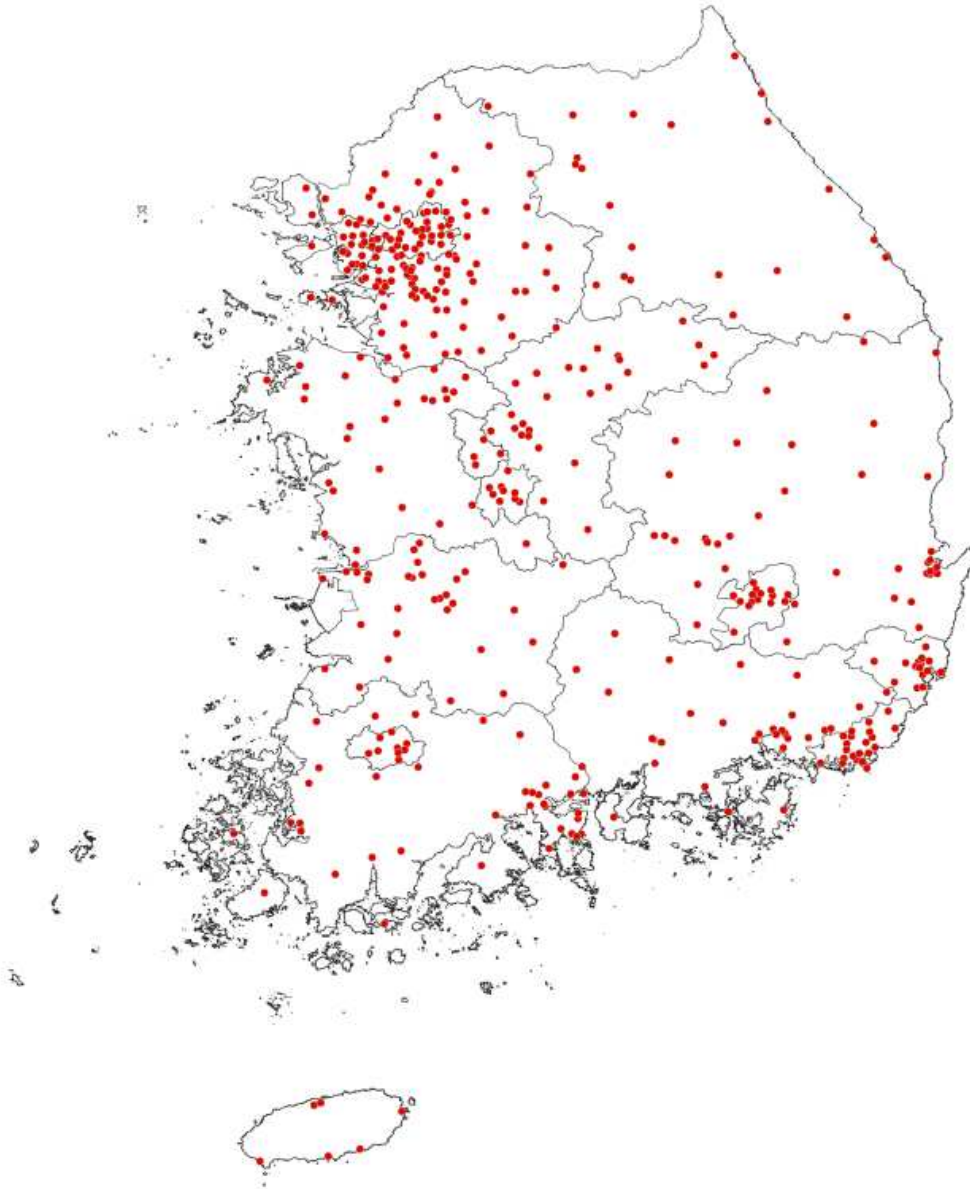
Paired *t*-test was used for comparison of SO₂ and O₃ levels on the same day in the current year versus each prior year.

Supplemental Table 9. The year-on-year comparison of monthly mean of SO₂ and O₃ in April.

Year	2017	2018	2019	2020
SO ₂ (ppb)	4.62 ± 0.80	4.14 ± 0.55	4.25 ± 0.48	3.37 ± 0.43
p-value	(ref)	0.006	< 0.001	< 0.001
		(ref)	0.495	< 0.001
			(ref)	< 0.001
O ₃ (ppb)	41.91 ± 8.92	38.35 ± 6.52	37.16 ± 5.42	42.25 ± 5.29
p-value	(ref)	0.045	0.040	0.831
		(ref)	0.532	0.008
			(ref)	0.004

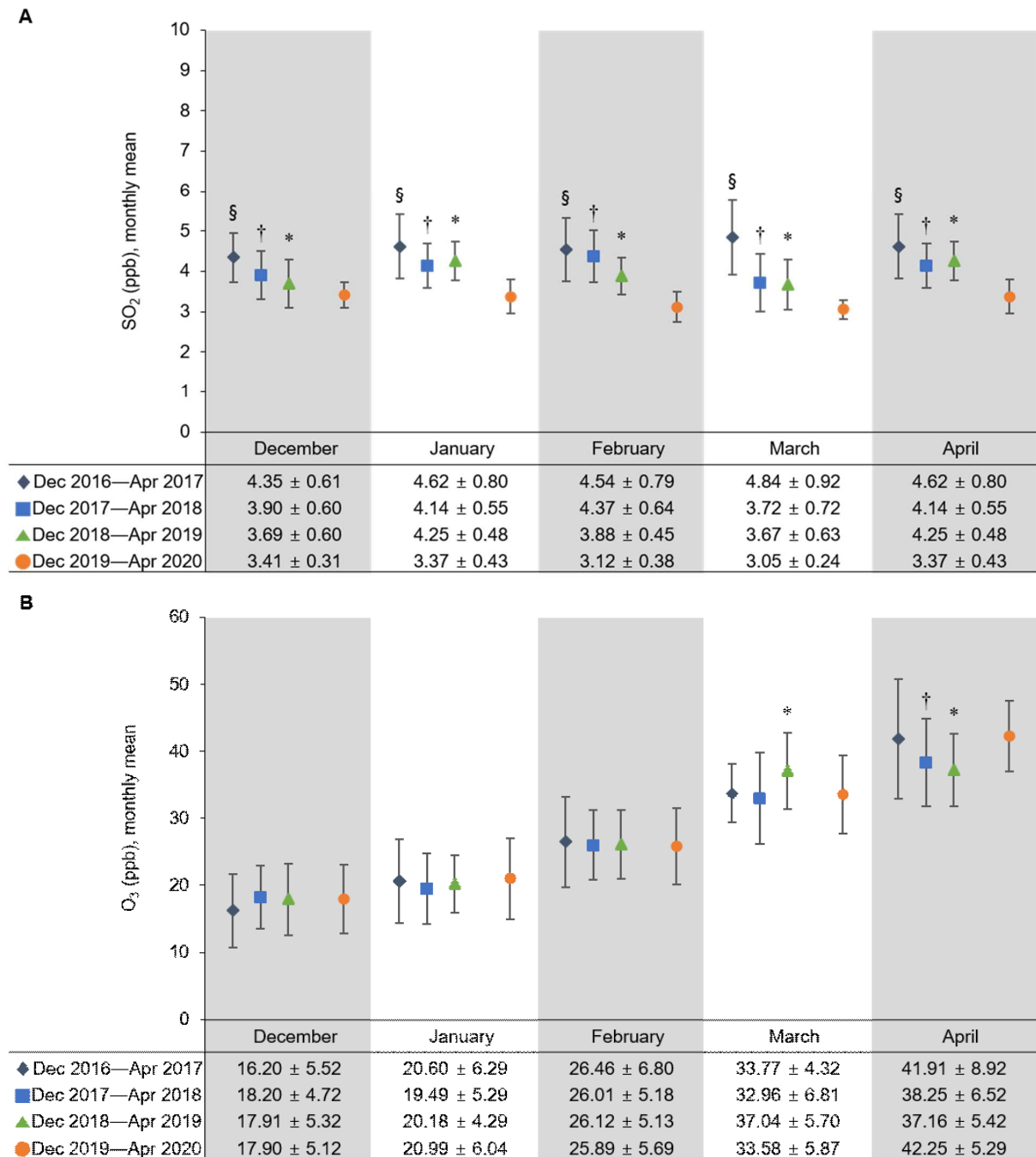
All values present mean ± SD of all daily concentrations per each month.

Paired *t*-test was used for comparison of SO₂ and O₃ levels on the same day in the current year versus each prior year.



Supplemental Figure 1. The location of monitoring stations in Korea.

Red dots present the location of monitoring stations.



Supplemental Figure 2. Monthly mean ± standard deviation of air pollutants in Korea, between December and April of the most recent four years.

All values present mean ± standard deviation of all daily concentrations per each month.

Paired *t*-test was used for comparison of (A) SO₂ and (B) O₃ levels on the same day in the current year versus each prior year.

* *p* < 0.05 vs. 1 prior year; † *p* < 0.05 vs. 2 prior year; § *p* < 0.05 vs. 3 prior year