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Supplement of

Sudden changes in nitrogen dioxide emissions over Greece due to lockdown after the outbreak of COVID-19

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Table S1. Geographical distribution and population of the six main cities discussed in this work [HAS, 2011].

City	Region of	Latitude	Longitude	Population
Athens	Attica	37.98° N	23.72° E	3.218.218
Thessaloniki	Central Macedonia	40.64° N	22.94° E	789.191
Larisa	Thessaly	39.63° N	22.41° E	144.651
Volos	Thessaly	39.36° N	22.95° E	118.707
Patra	Western Greece	38.24° N	21.73° E	168.202
Heralkio	Crete	35.33° N	25.14° E	153.653

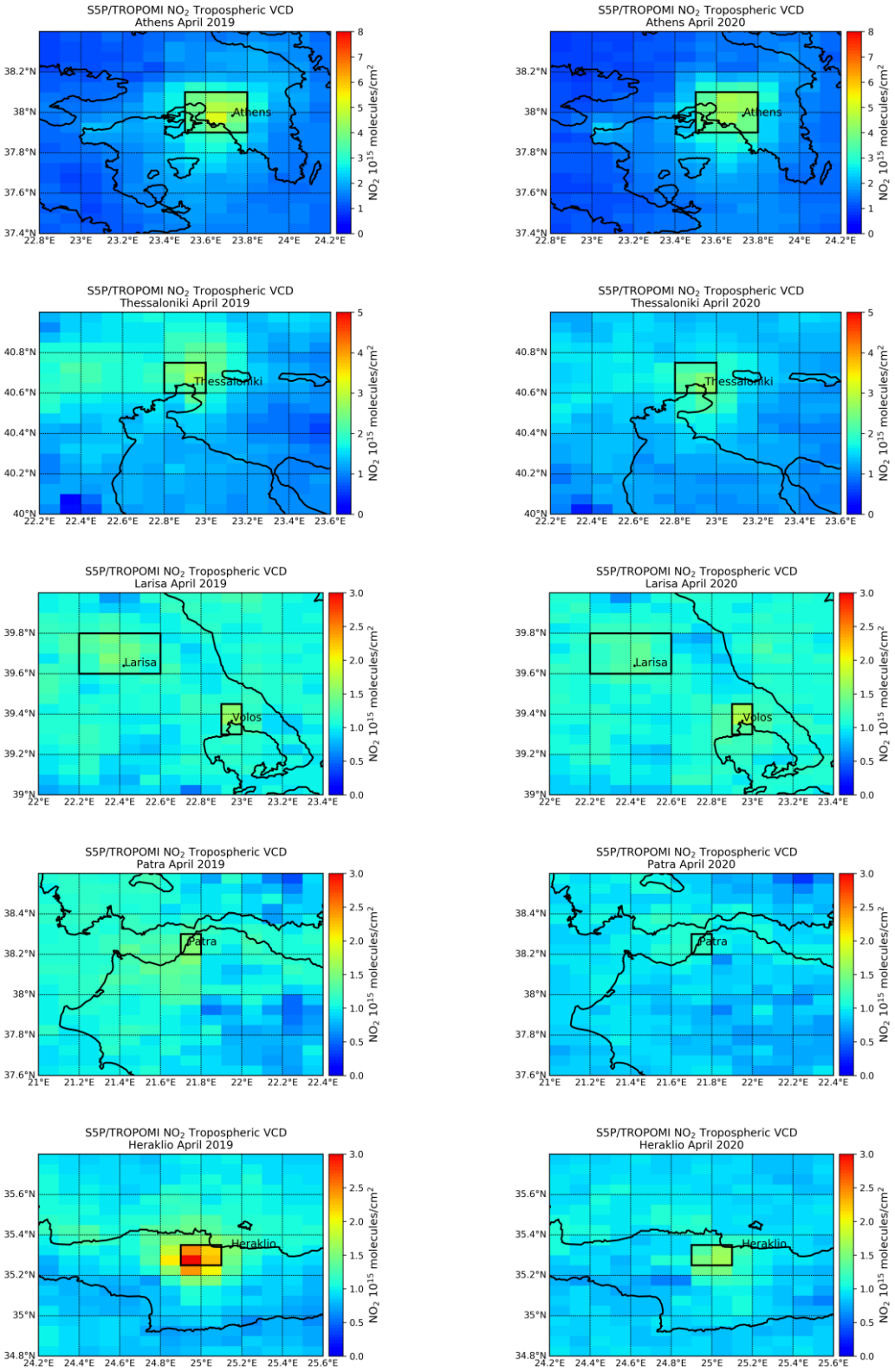


Figure S1. Monthly mean TROPOMI tropospheric NO_2 columns, in 10^{15} molecules/cm^2, for April 2019 [left] and April 2020 [right] for the five major cities in Greece. First row, Athens; second, Thessaloniki; third, Larisa and Volos; fourth, Patras and fifth, Heraklio. The boxes mark the pixels used in the numerical analysis.

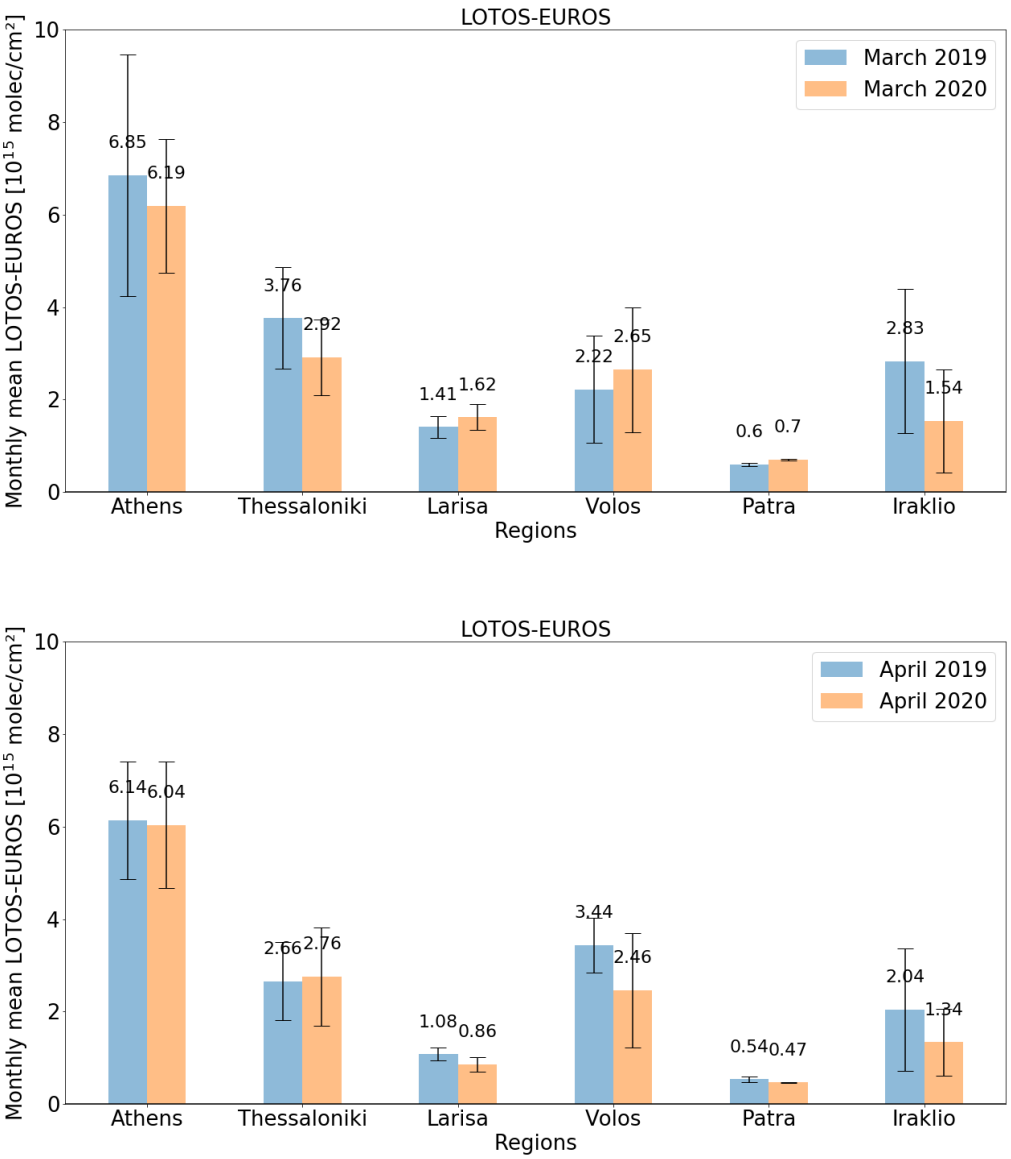


Figure S2. Monthly mean LOTOS-EUROS simulated NO_2 columns, in 10^{15} molecules/cm^2, for March [upper] and April [lower] for the 2019 [blue] and 2020 [orange] for the five major cities in Greece, from left to right, Athens, Thessaloniki, Larisa, Volos, Patra and Heraklio

Table S2. Monthly mean LOTOS-EUROS NO_2 levels [10^{15} molecules/cm^2] over major cities in Greece for March [left block] and April [right block] for year 2019 and 2020 and their relative difference, standard deviation and number of pixels [in brackets].

Location	**03.2019**	**03.2020**	**% diff**	**04.2019**	**04. 2020**	**% diff**
Athens [12]	6.85±2.61	6.19±1.44	-10%	6.14±1.27	6.04±1.37	-2%
Thessaloniki [6]	3.76±1.09	2.92±0.82	-22%	2.66±0.85	2.76±1.06	4%
Larisa [6]	1.41±0.23	1.62±0.28	15%	1.08±0.14	0.86±0.16	-20%
Volos [3]	2.22±1.16	2.65±1.35	19%	3.44±0.59	2.46±1.24	-28%
Patra [2]	0.6±0.04	0.7±0.02	17%	0.54±0.06	0.47±0.01	-13%
Heralkio [4]	2.83±1.56	1.54±1.11	-46%	2.04±1.32	1.34±0.72	-34%

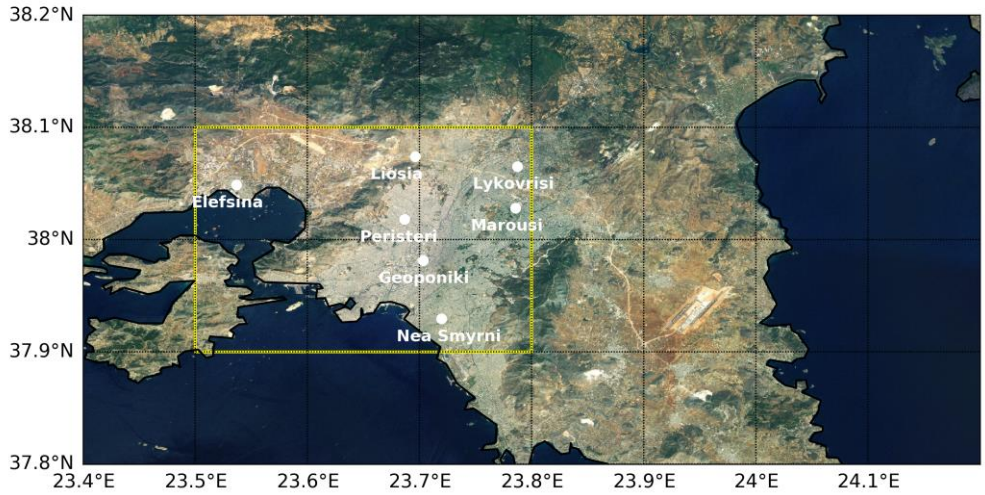


Figure S3. The location of the in situ air quality stations discussed in this work around the prefecture of Athens. [Created using background from the ArcGIS service].

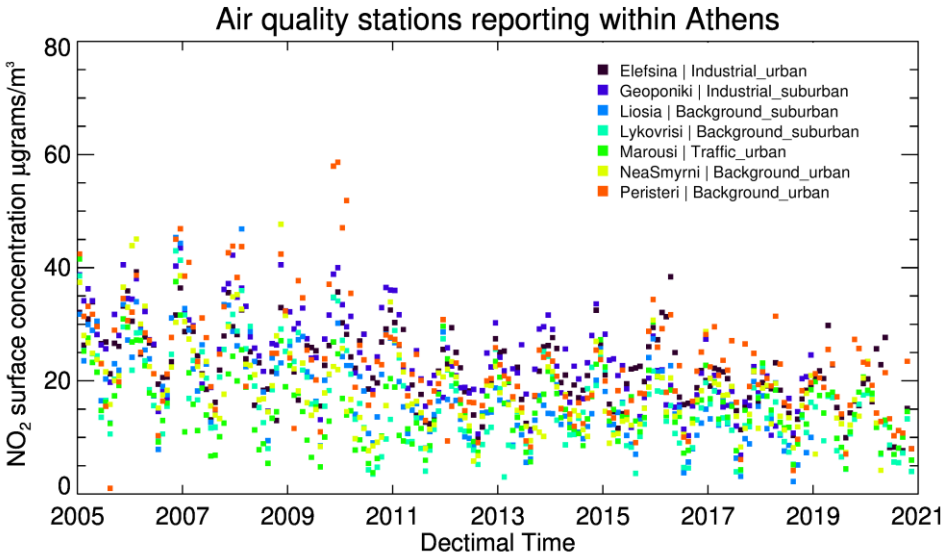
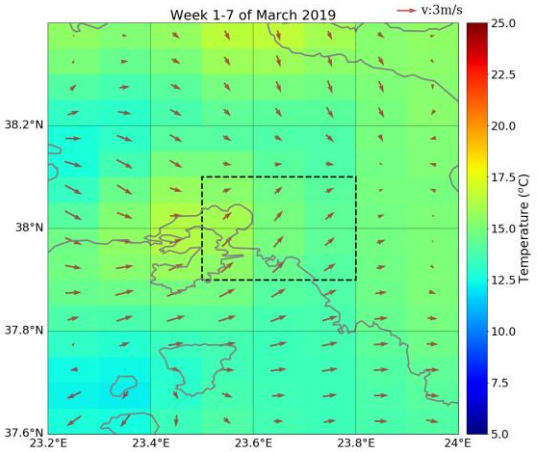
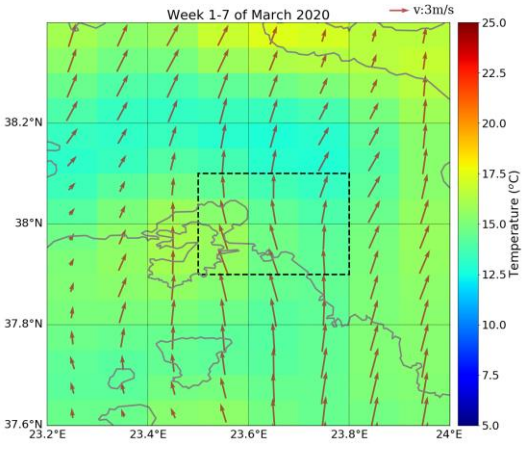
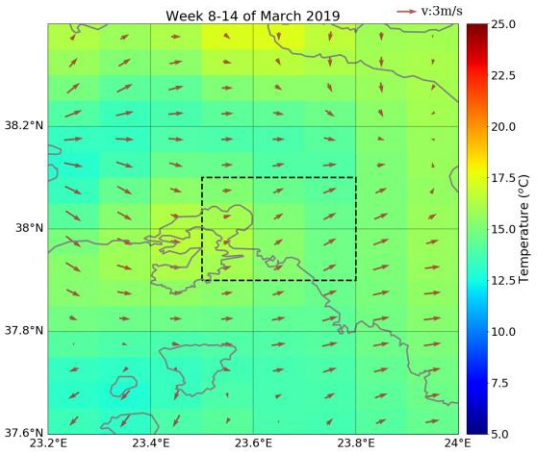
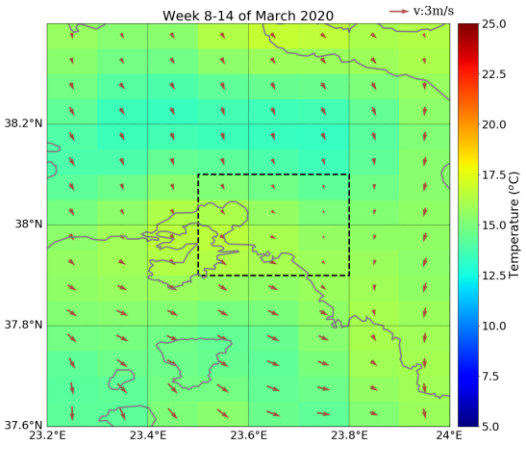


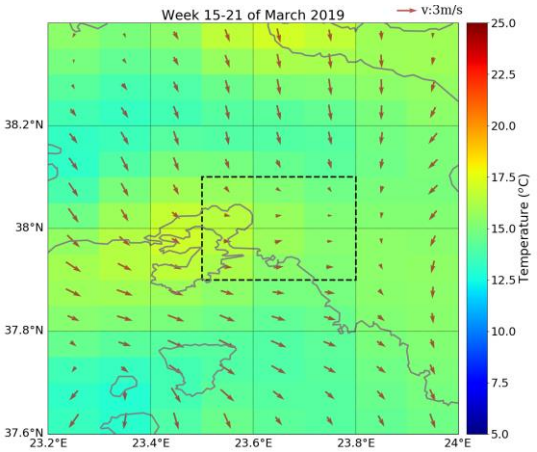
Figure S4. The long term monthly time series of the in situ measurements of NO_2 surface concentrations at 12:00 UTC in μgrams/m^3 for the seven stations discussed in this work, labeled in the legend alongside their official station type classification.

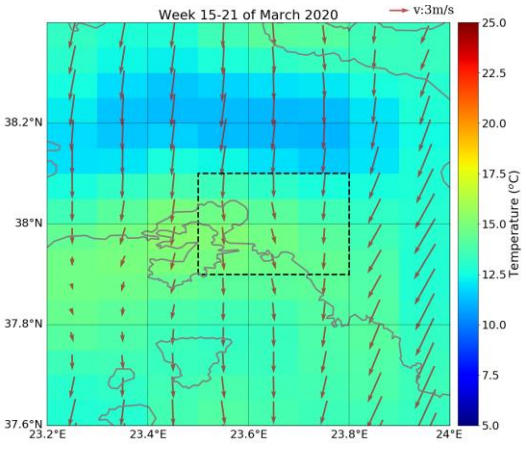

Week 1-7 of March 2019
v:3m/s
38.2°N
38°N
37.8°N
37.6°N
23.2°E
23.4°E
23.6°E
23.8°E
24°E
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Temperature (°C)

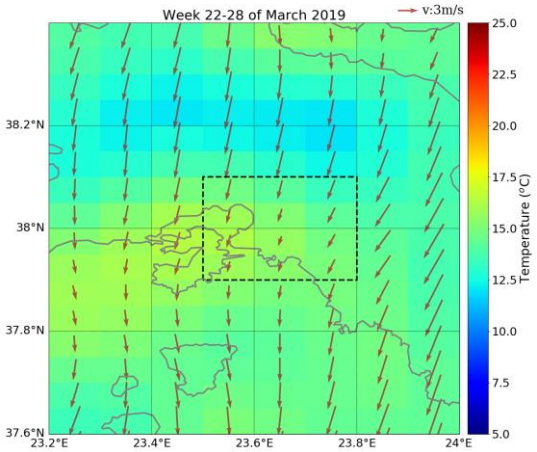

Week 1-7 of March 2020
v:3m/s
38.2°N
38°N
37.8°N
37.6°N
23.2°E
23.4°E
23.6°E
23.8°E
24°E
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Temperature (°C)

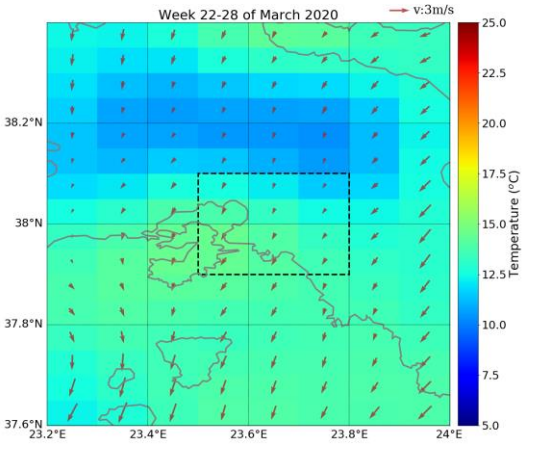

Week 8-14 of March 2019
v:3m/s
38.2°N
38°N
37.8°N
37.6°N
23.2°E
23.4°E
23.6°E
23.8°E
24°E
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Temperature (°C)

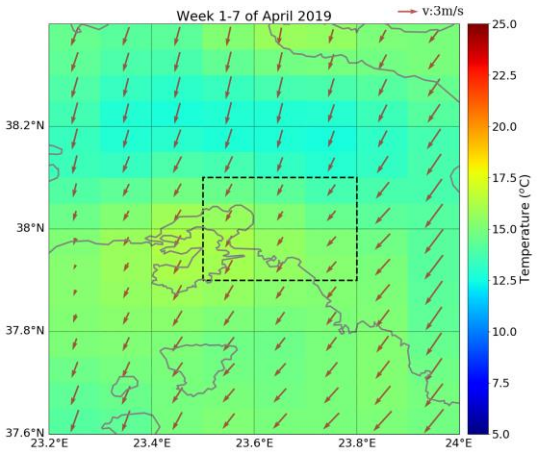

Week 8-14 of March 2020
v:3m/s
38.2°N
38°N
37.8°N
37.6°N
23.2°E
23.4°E
23.6°E
23.8°E
24°E
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Temperature (°C)

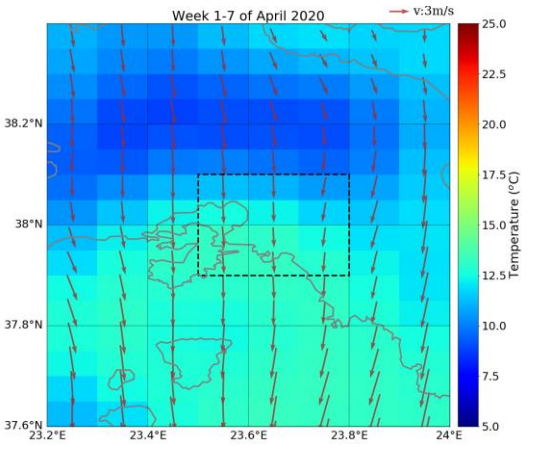

Week 15-21 of March 2019
v:3m/s
38.2°N
38°N
37.8°N
37.6°N
23.2°E
23.4°E
23.6°E
23.8°E
24°E
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Temperature (°C)

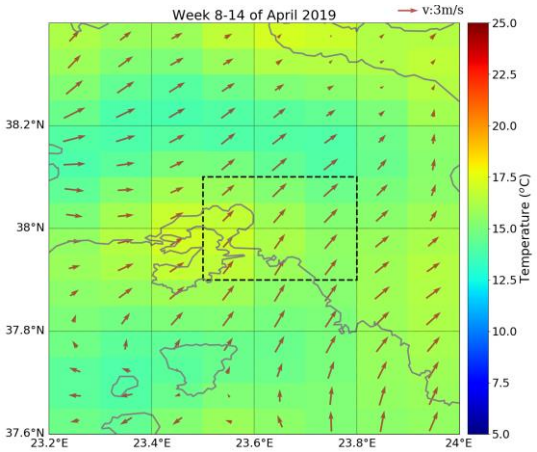

Week 15-21 of March 2020
v:3m/s
38.2°N
38°N
37.8°N
37.6°N
23.2°E
23.4°E
23.6°E
23.8°E
24°E
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Temperature (°C)

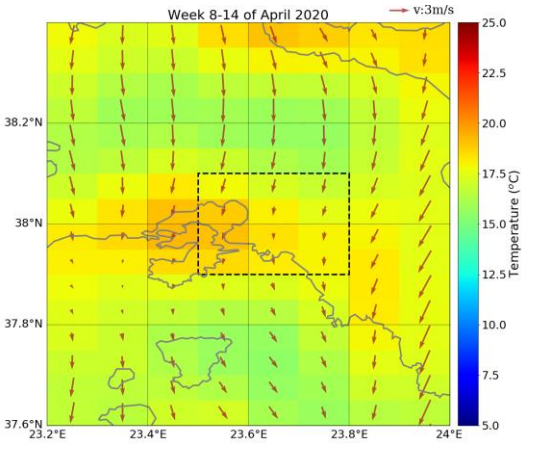

Week 22-28 of March 2019
v:3m/s
38.2°N
38°N
37.8°N
37.6°N
23.2°E
23.4°E
23.6°E
23.8°E
24°E
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Temperature (°C)


Week 22-28 of March 2020
v:3m/s
38.2°N
38°N
37.8°N
37.6°N
23.2°E
23.4°E
23.6°E
23.8°E
24°E
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Temperature (°C)


Week 1-7 of April 2019
v:3m/s
38.2°N
38°N
37.8°N
37.6°N
23.2°E
23.4°E
23.6°E
23.8°E
24°E
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Temperature (°C)


Week 1-7 of April 2020
v:3m/s
38.2°N
38°N
37.8°N
37.6°N
23.2°E
23.4°E
23.6°E
23.8°E
24°E
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Temperature (°C)


Week 8-14 of April 2019
v:3m/s
38.2°N
38°N
37.8°N
37.6°N
23.2°E
23.4°E
23.6°E
23.8°E
24°E
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Temperature (°C)


Week 8-14 of April 2020
v:3m/s
38.2°N
38°N
37.8°N
37.6°N
23.2°E
23.4°E
23.6°E
23.8°E
24°E
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
Temperature (°C)

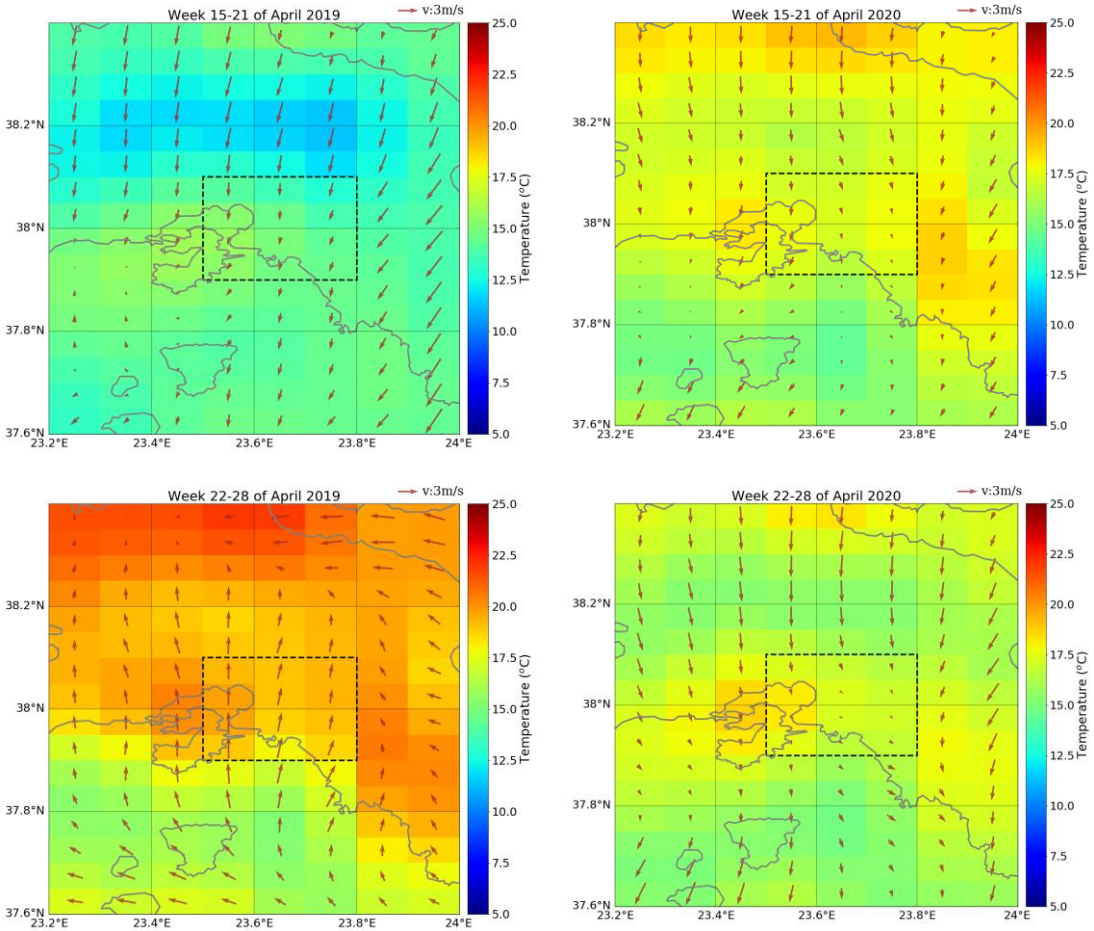
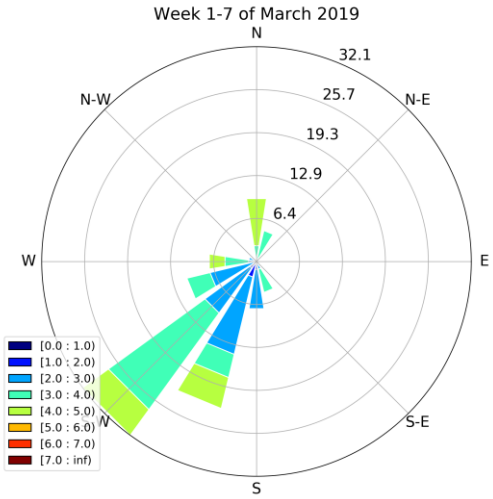
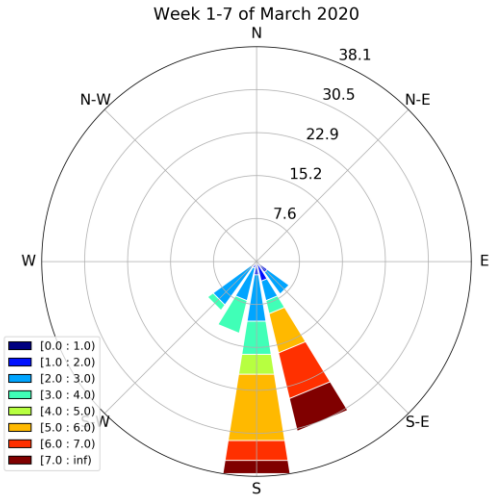
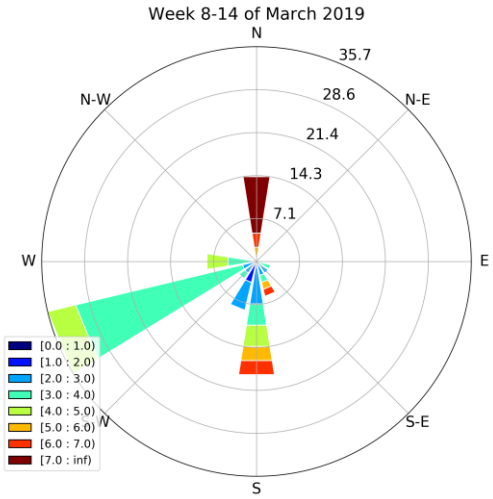
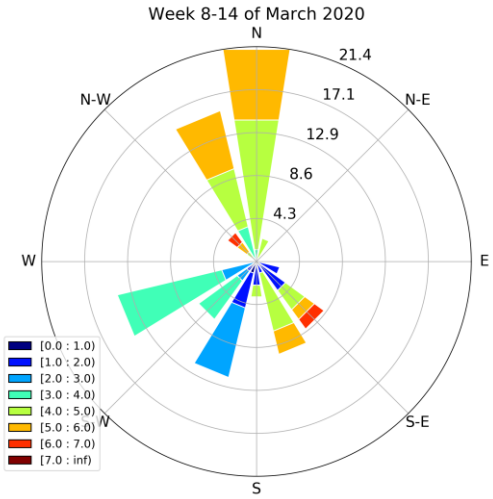


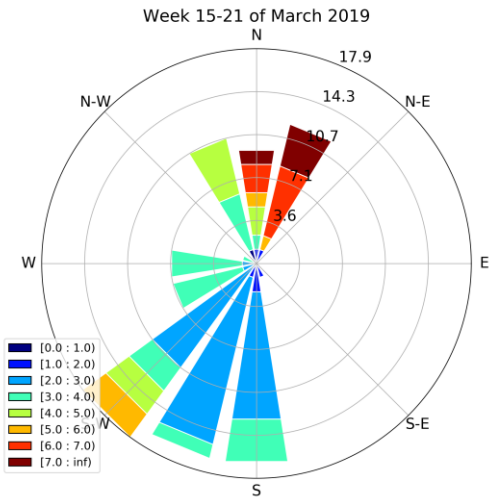
Figure S5. Mean temperature in Celsius [in colours], mean vector wind speed and mean vector direction [arrows] for the eight weeks of March and April 2019 [left column] and 2020 [right column] at 12 UTC. Black box denotes the grids designated as Athens in this work.

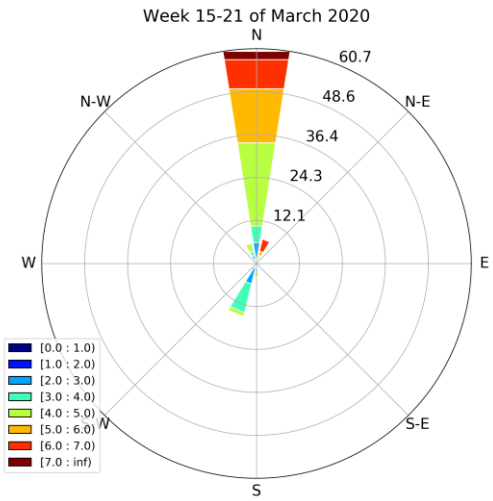

Week 1-7 of March 2019
N
N-E
E
S-E
S
W
N-W
32.1
25.7
19.3
12.9
6.4
[0.0 : 1.0)
[1.0 : 2.0)
[2.0 : 3.0)
[3.0 : 4.0)
[4.0 : 5.0)
[5.0 : 6.0)
[6.0 : 7.0)
[7.0 : inf)

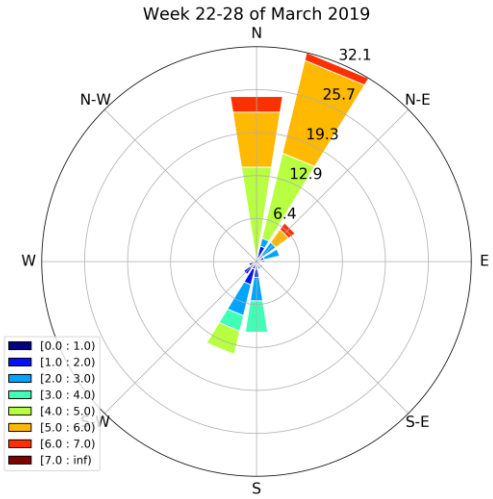

Week 1-7 of March 2020
N
N-E
E
S-E
S
W
N-W
38.1
30.5
22.9
15.2
7.6
[0.0 : 1.0)
[1.0 : 2.0)
[2.0 : 3.0)
[3.0 : 4.0)
[4.0 : 5.0)
[5.0 : 6.0)
[6.0 : 7.0)
[7.0 : inf)

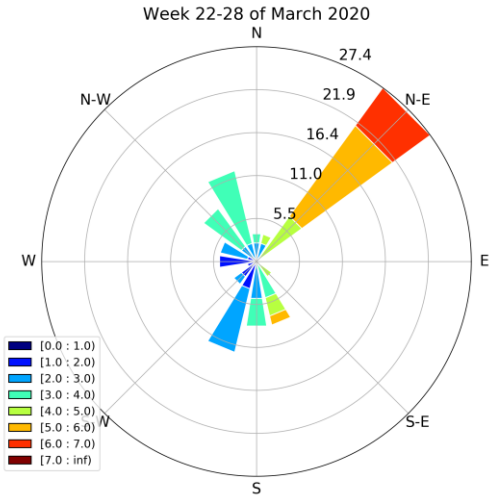

Week 8-14 of March 2019
N
N-E
E
S-E
S
W
N-W
35.7
28.6
21.4
14.3
7.1
[0.0 : 1.0)
[1.0 : 2.0)
[2.0 : 3.0)
[3.0 : 4.0)
[4.0 : 5.0)
[5.0 : 6.0)
[6.0 : 7.0)
[7.0 : inf)

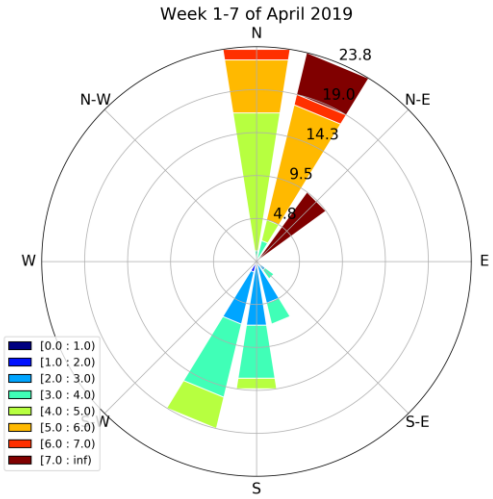

Week 8-14 of March 2020
N
N-E
E
S-E
S
W
N-W
21.4
17.1
12.9
8.6
4.3
[0.0 : 1.0)
[1.0 : 2.0)
[2.0 : 3.0)
[3.0 : 4.0)
[4.0 : 5.0)
[5.0 : 6.0)
[6.0 : 7.0)
[7.0 : inf)

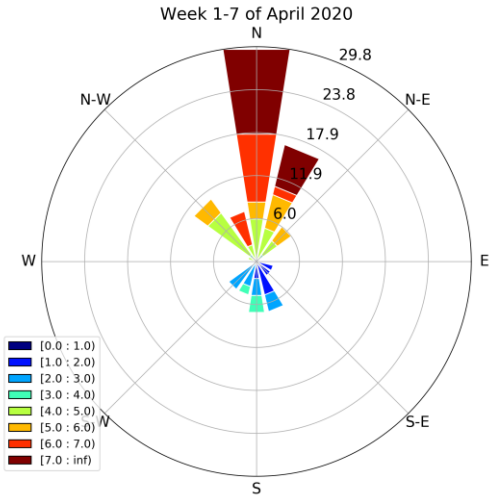

Week 15-21 of March 2019
N
N-E
E
S-E
S
W
N-W
17.9
14.3
10.7
7.1
3.6
[0.0 : 1.0)
[1.0 : 2.0)
[2.0 : 3.0)
[3.0 : 4.0)
[4.0 : 5.0)
[5.0 : 6.0)
[6.0 : 7.0)
[7.0 : inf)

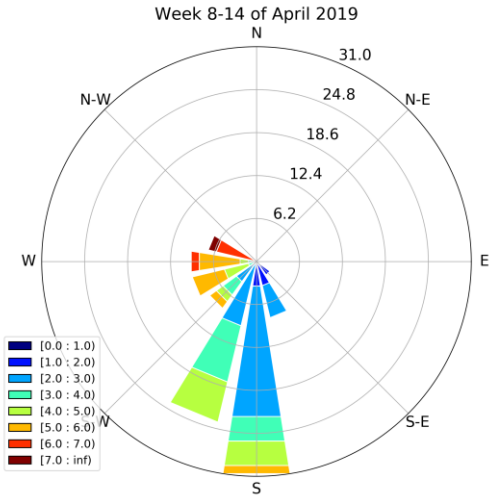

Week 15-21 of March 2020
N
N-E
E
S-E
S
W
N-W
60.7
48.6
36.4
24.3
12.1
[0.0 : 1.0)
[1.0 : 2.0)
[2.0 : 3.0)
[3.0 : 4.0)
[4.0 : 5.0)
[5.0 : 6.0)
[6.0 : 7.0)
[7.0 : inf)

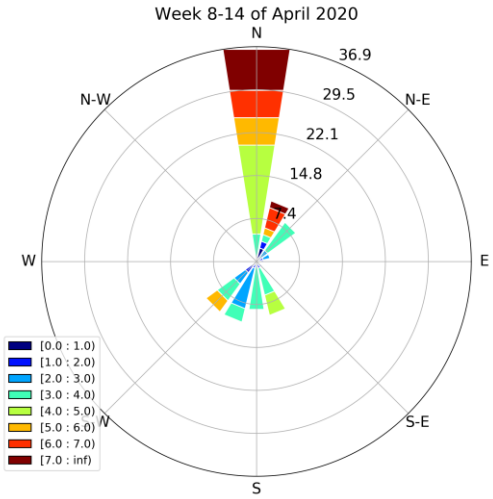

Week 22-28 of March 2019
N
N-E
E
S-E
S
S-W
W
N-W
32.1
25.7
19.3
12.9
6.4
[0.0 : 1.0)
[1.0 : 2.0)
[2.0 : 3.0)
[3.0 : 4.0)
[4.0 : 5.0)
[5.0 : 6.0)
[6.0 : 7.0)
[7.0 : inf)


Week 22-28 of March 2020
N
N-E
E
S-E
S
S-W
W
N-W
27.4
21.9
16.4
11.0
5.5
[0.0 : 1.0)
[1.0 : 2.0)
[2.0 : 3.0)
[3.0 : 4.0)
[4.0 : 5.0)
[5.0 : 6.0)
[6.0 : 7.0)
[7.0 : inf)


Week 1-7 of April 2019
N
N-E
E
S-E
S
S-W
W
N-W
23.8
19.0
14.3
9.5
4.8
[0.0 : 1.0)
[1.0 : 2.0)
[2.0 : 3.0)
[3.0 : 4.0)
[4.0 : 5.0)
[5.0 : 6.0)
[6.0 : 7.0)
[7.0 : inf)


Week 1-7 of April 2020
N
N-E
E
S-E
S
S-W
W
N-W
29.8
23.8
17.9
11.9
6.0
[0.0 : 1.0)
[1.0 : 2.0)
[2.0 : 3.0)
[3.0 : 4.0)
[4.0 : 5.0)
[5.0 : 6.0)
[6.0 : 7.0)
[7.0 : inf)


Week 8-14 of April 2019
N
N-E
E
S-E
S
S-W
W
N-W
31.0
24.8
18.6
12.4
6.2
[0.0 : 1.0)
[1.0 : 2.0)
[2.0 : 3.0)
[3.0 : 4.0)
[4.0 : 5.0)
[5.0 : 6.0)
[6.0 : 7.0)
[7.0 : inf)


Week 8-14 of April 2020
N
N-E
E
S-E
S
S-W
W
N-W
36.9
29.5
22.1
14.8
7.4
[0.0 : 1.0)
[1.0 : 2.0)
[2.0 : 3.0)
[3.0 : 4.0)
[4.0 : 5.0)
[5.0 : 6.0)
[6.0 : 7.0)
[7.0 : inf)

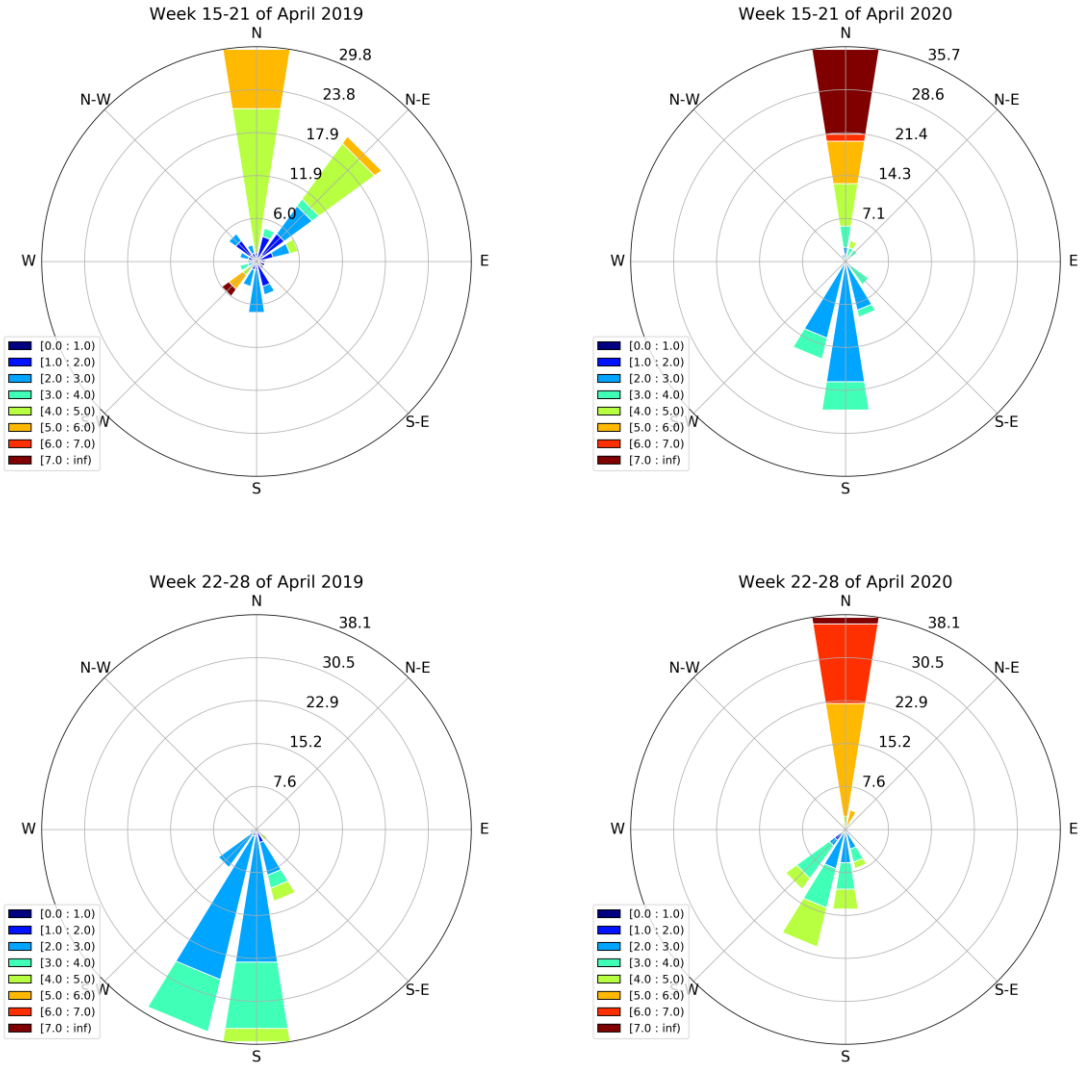


Figure S6. Rose diagram of the daily wind speed and direction for the 12 grids designated as Athens shown in Figure S5. From top to bottom the eight weeks in March and April for 2019 [left column] and 2020 [right column.]