Traffic Data – Preprocessing

17.01.2022

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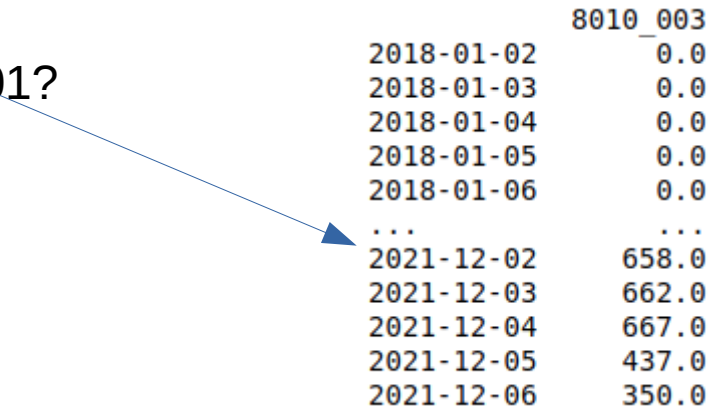
Questions & Remark

Q0: timestamp indicates the count of the previous date? (because time at 00:00:00)
→ 2021-12-02: means count of 2021-12-01?



	8010_003
2018-01-02	0.0
2018-01-03	0.0
2018-01-04	0.0
2018-01-05	0.0
2018-01-06	0.0
...	...
2021-12-02	658.0
2021-12-03	662.0
2021-12-04	667.0
2021-12-05	437.0
2021-12-06	350.0

Questions & Remarks

DZS_div_24h-Zählung-180101_211205.csv

Distinct Locations

```
'8010_202'
'8010_205'
'8010_209'
'8010_213'
'8010_214'
'8020_102'
'8020_103'
'8020_107'
'8041_218'
'8041_221'
'8045_203'
'8045_238'
'8051_101'
'8055_108'
```

Name	start	end	#expected_days	#actual_days	missing (days)
8010_202_Nord	2018-01-02	2021-12-06	1435	1427	8
8010_205	2018-01-02	2021-12-06	1435	1427	8
8010_205_Ost	2018-01-02	2021-12-06	1435	1427	8
8010_205_West	2018-01-02	2021-12-06	1435	1427	8
8010_209	2018-01-02	2021-12-06	1435	1427	8
8010_209_Ost	2018-01-02	2021-12-06	1435	1427	8
8010_209_West	2018-01-02	2021-12-06	1435	1427	8
8010_213_Ost	2018-01-02	2021-12-06	1435	1427	8
8010_214	2018-01-02	2021-12-06	1435	1427	8
8010_214_Nord	2018-01-02	2021-12-06	1435	1427	8
8010_214_Süd	2018-01-02	2021-12-06	1435	1427	8
8020_102	2018-01-02	2021-12-06	1435	1427	8
8020_102_Nord	2018-01-02	2021-12-06	1435	1427	8
8020_102_Süd	2018-01-02	2021-12-06	1435	1427	8
8020_103	2018-01-02	2021-12-06	1435	1427	8
8020_103_Nord	2018-01-02	2021-12-06	1435	1427	8
8020_103_Süd	2018-01-02	2021-12-06	1435	1427	8
8020_107	2018-01-02	2021-12-06	1435	1427	8
8020_107_Nord	2018-01-02	2021-12-06	1435	1427	8
8020_107_Süd	2018-01-02	2021-12-06	1435	1427	8
8041_218	2018-01-02	2021-12-06	1435	1427	8
8041_218_Nord	2018-01-02	2021-12-06	1435	1427	8
8041_218_Süd	2018-01-02	2021-12-06	1435	1427	8
8041_221	2018-01-02	2021-12-06	1435	1427	8
8041_221_Ost	2018-01-02	2021-12-06	1435	1427	8
8041_221_West	2018-01-02	2021-12-06	1435	1427	8
8045_203	2018-01-02	2021-12-06	1435	1427	8
8045_203_Nord	2018-01-02	2021-12-06	1435	1427	8
8045_203_Süd	2018-01-02	2021-12-06	1435	1427	8
8045_238	2021-05-27	2021-12-06	194	193	1
8051_101	2018-01-02	2021-12-06	1435	1427	8
8051_101_Nord	2018-01-02	2021-12-06	1435	1427	8
8051_101_Süd	2018-01-02	2021-12-06	1435	1427	8
8055_108	2021-01-25	2021-12-06	316	314	2
8055_108_Nord	2021-01-25	2021-12-06	316	314	2
8055_108_Nord_bis20210121	2018-01-02	2021-12-06	1435	1427	8
8055_108_Süd	2021-01-25	2021-12-06	316	314	2
8055_108_Süd_bis20210121	2018-01-02	2021-12-06	1435	1427	8

- **R1**: will be removed
- **Q1**: these 2 columns NOT coming from one station “8055_108_Nord”?
- **Q2**: these 2 columns NOT coming from one station “8055_108_Süd”?

Questions at *8055_108:* which columns are correct?

- **Q1**: these 2 columns NOT coming from one station “8055_108_Nord”?
- **Q2**: these 2 columns NOT coming from one station “8055_108_Süd”?

Identical to Nord?

Name Time	8055_108	8055_108_Nord	8055_108_Nord_bis20210121	8055_108_Süd	8055_108_Süd_bis20210121
2021-11-17	863	410	107	452	410
2021-11-18	855	406	107	449	406
2021-11-19	892	423	107	468	423
2021-11-20	950	446	119	503	446
2021-11-21	696	337	88	358	337
2021-11-22	471	233	63	238	233
2021-11-23	712	344	78	368	344
2021-11-24	714	347	77	367	347
2021-11-25	734	359	82	374	359
2021-11-26	749	358	85	390	358
2021-11-27	752	362	83	389	362
2021-11-28	461	225	48	235	225
2021-11-29	330	170	35	160	170
2021-11-30	766	369	83	397	369
2021-12-01	759	363	85	395	363
2021-12-02	780	379	85	400	379
2021-12-03	761	369	82	391	369
2021-12-04	809	381	88	428	381
2021-12-05	519	252	52	267	252
2021-12-06	337	172	40	164	172

Cleaning Steps

Cleaning Steps

- Drop columns
  - Remove columns [*8045_238, 8055_108*] (reason: few data available)
  - Because of unclear data, drop all stations belonging to *8055_108*
- Fill missing dates
  - If values of the previous date at 23:00 available → use this value for the next day
  - Else:
    - Create these rows in the dataframe
    - Then do FillNA (below)
- Correct 0 and negative values
  - replace these values with NA
  - Then do FillNA (below)
- FillNA
  - Fill with the average of the same day name at that location
    - For example, if the date needs filling is Monday at 8010_003 → assign it with the average value of all Mondays at this place

Result before FillNA step

	#notNA	%notNA
8010_003	1258	87.7
8010_208	1431	99.7
8020_110	1425	99.3
8020_119	1428	99.5
8020_122	1428	99.5
8053_111	1428	99.5
8010_202_Nord	1258	87.7
8010_205	1431	99.7
8010_205_Ost	1417	98.7
8010_205_West	1431	99.7
8010_209	1431	99.7
8010_209_Ost	1431	99.7
8010_209_West	1431	99.7
8010_213_Ost	1428	99.5
8010_214	1337	93.2
8010_214_Nord	1285	89.5
8010_214_Süd	1309	91.2
8020_102	1425	99.3
8020_102_Nord	1425	99.3
8020_102_Süd	1425	99.3
8020_103	1431	99.7
8020_103_Nord	1431	99.7
8020_103_Süd	1431	99.7
8020_107	1382	96.3
8020_107_Nord	1380	96.2
8020_107_Süd	1407	98.0
8041_218	1383	96.4
8041_218_Nord	686	47.8
8041_218_Süd	562	39.2
8041_221	1335	93.0
8041_221_Ost	1336	93.1
8041_221_West	1336	93.1
8045_203	1072	74.7
8045_203_Nord	1072	74.7
8045_203_Süd	1072	74.7
8051_101	1431	99.7
8051_101_Nord	1426	99.4
8051_101_Süd	1431	99.7

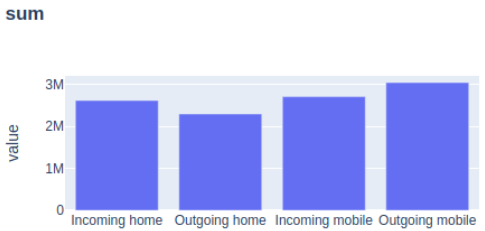
Less then 50%
→ Remove?

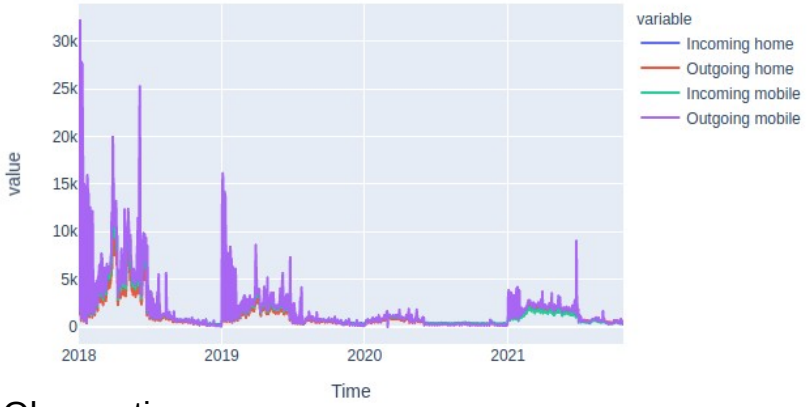
#days expected: 1435

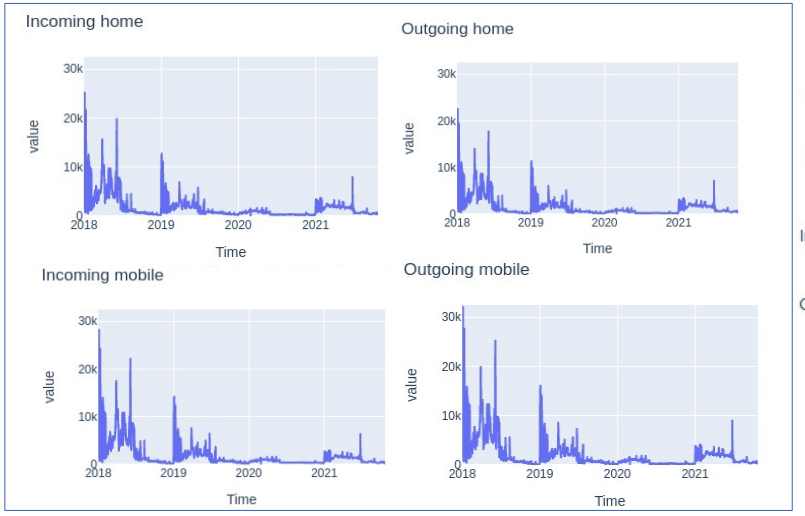
Phone Calls

Phone Calls – Overview

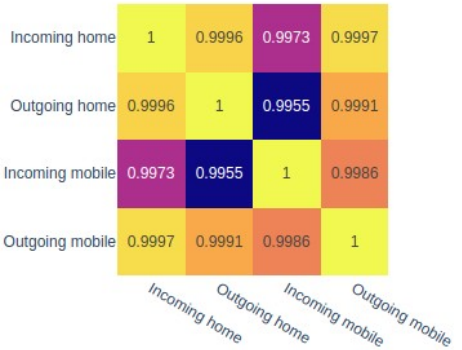
Start: 01.01.2018
End: 23.10.2021







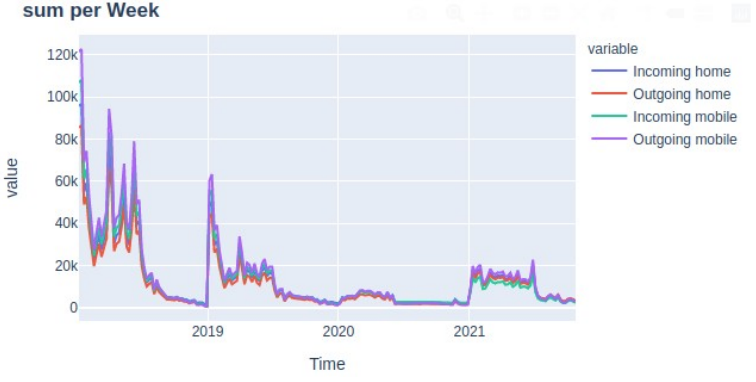
Correlation



Very closely correlated

Observations

- The number is considerably decreased with time
- Very much the same



	count	mean	min	max
Incoming home	1392	1882	75	25212
Outgoing home	1392	1650	60	22602
Incoming mobile	1392	1947	113	28252
Outgoing mobile	1392	2189	-13	32191

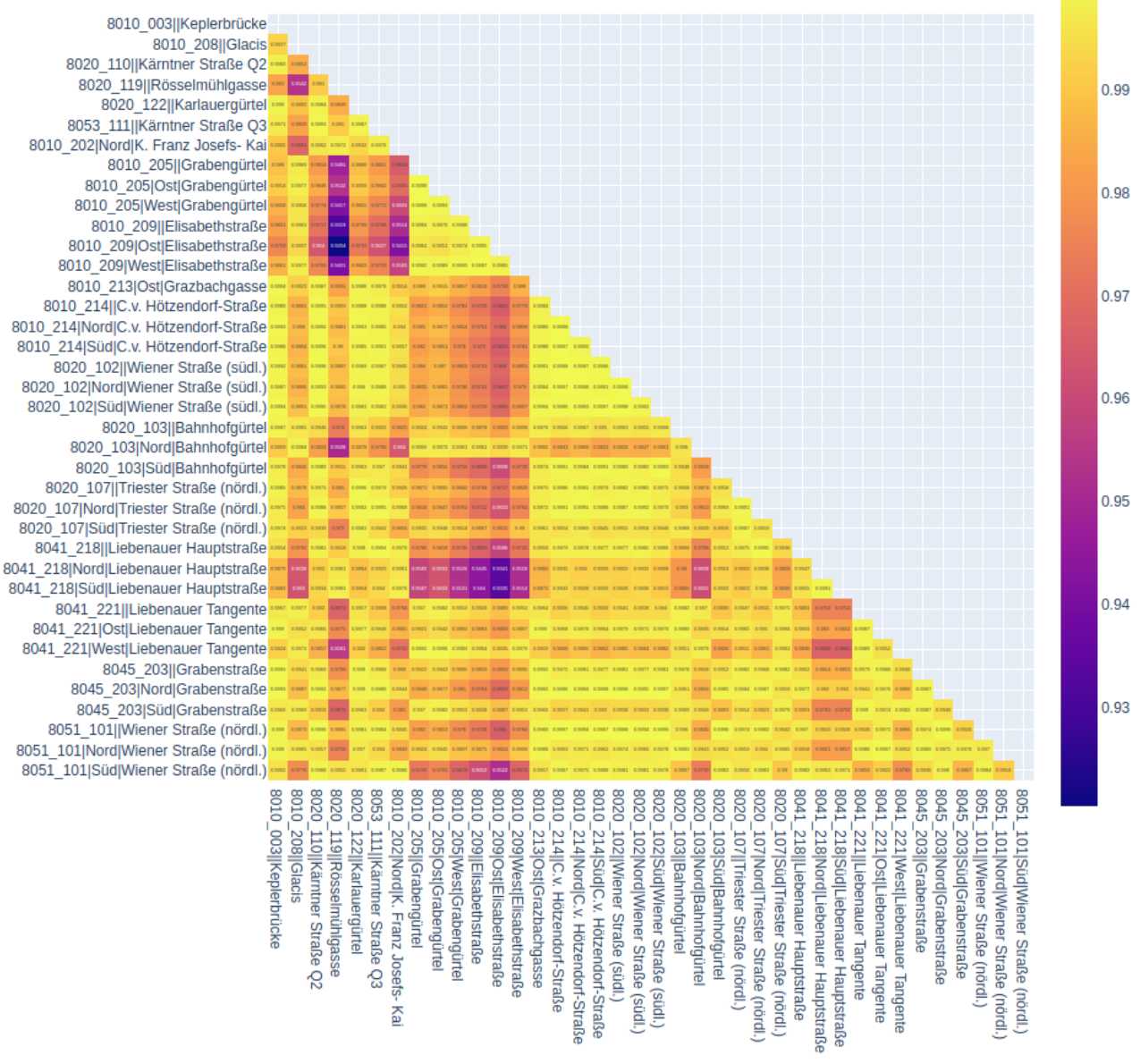
No NA but one negative value

Time	Incoming home	Outgoing home	Incoming mobile	Outgoing mobile
2020-02-29	75.0	60.0	165.0	-13.0

Correlations

Traffic Only

They’re very much related



Air pollution vs. Traffic & Phone Calls & ERA

Looks like the traffic is not related to the air parameters?

Methods & Observations

Models – NeuralProphet

Train: 01.01.2018 – 31.12.2019
Test: 01.01.2020 – 15.03.202

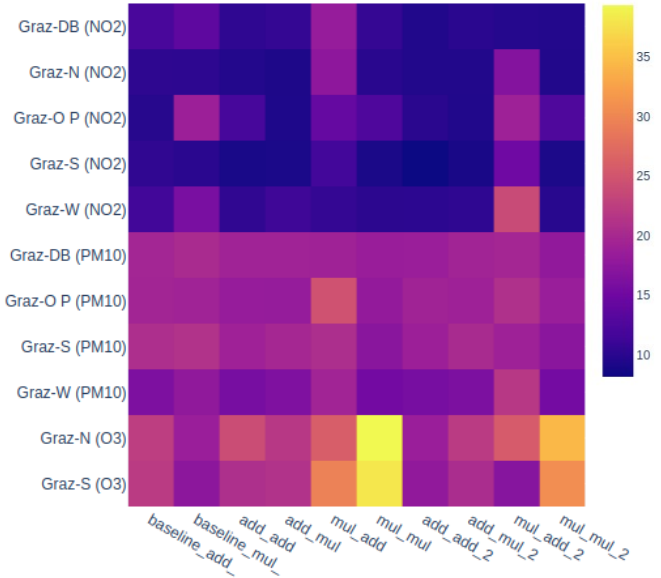
group1

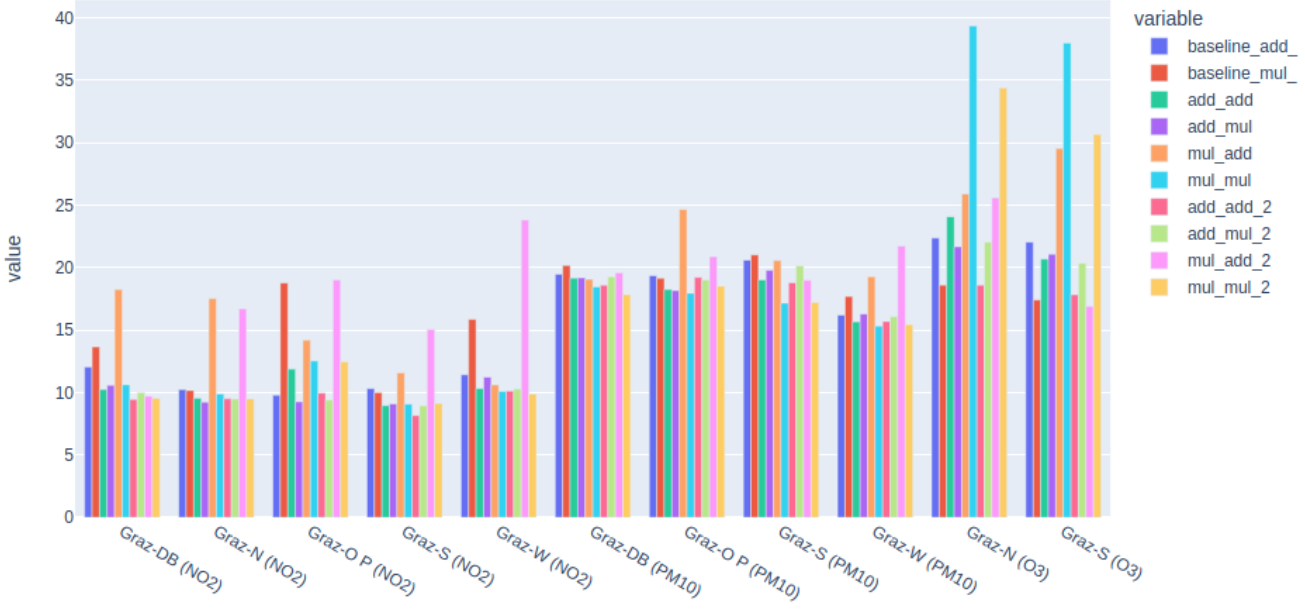
```
future_regressors = [
    'Incoming home',
    'Outgoing home',
    'Incoming mobile',
    'Outgoing mobile',
    'Dew_Point_Temperature_2m_Mean',
    'Vapour_Pressure_Mean',
    'Solar_Radiation_Flux',
    'Cloud_Cover_Mean',
    'Temperature_Air_2m_Max_Day_Time',
    'Temperature_Air_2m_Min_Night_Time',
    'Wind_Speed_10m_Mean'
]
```

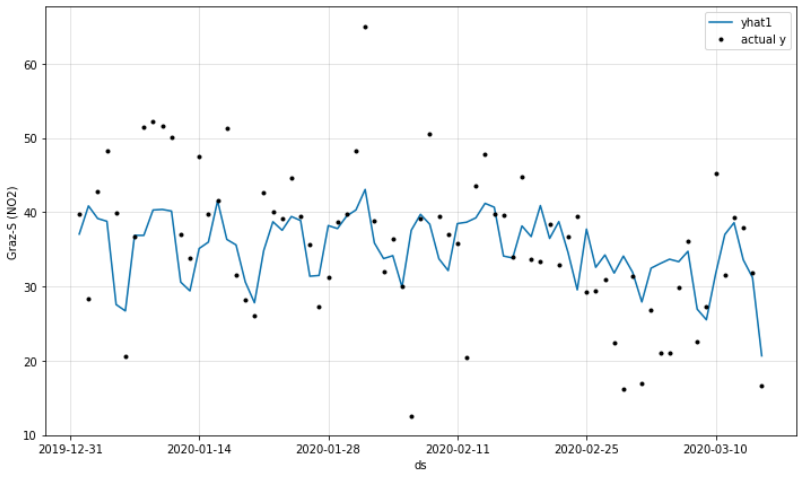
group2 = group1 +

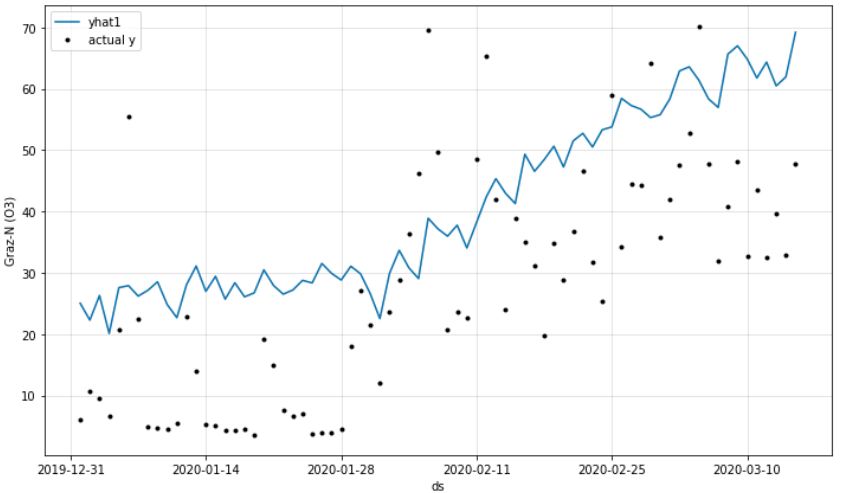
```
'8010_003||Keplerbrücke', '8010_208||Glacis',
'8020_110||Kärntner Straße Q2', '8020_119||Rösselmühlgasse',
'8020_122||Karlauergürtel', '8053_111||Kärntner Straße Q3',
'8010_202|Nord|K. Franz Josefs- Kai', '8010_205||Grabengürtel',
'8010_205|Ost|Grabengürtel', '8010_205|West|Grabengürtel',
'8010_209||Elisabethstraße', '8010_209|Ost|Elisabethstraße',
'8010_209|West|Elisabethstraße', '8010_213|Ost|Grazbachgasse',
'8010_214||C.v. Hötzendorf-Straße',
'8010_214|Nord|C.v. Hötzendorf-Straße',
'8010_214|Süd|C.v. Hötzendorf-Straße',
'8020_102||Wiener Straße (südl.)',
'8020_102|Nord|Wiener Straße (südl.)',
'8020_102|Süd|Wiener Straße (südl.)', '8020_103||Bahnhofgürtel',
'8020_103|Nord|Bahnhofgürtel', '8020_103|Süd|Bahnhofgürtel',
'8020_107||Triester Straße (nördl.)',
'8020_107|Nord|Triester Straße (nördl.)',
'8020_107|Süd|Triester Straße (nördl.)',
'8041_218||Liebenauer Hauptstraße',
'8041_218|Nord|Liebenauer Hauptstraße',
'8041_218|Süd|Liebenauer Hauptstraße', '8041_221||Liebenauer Tangente',
'8041_221|Ost|Liebenauer Tangente', '8041_221|West|Liebenauer Tangente',
'8045_203||Grabenstraße', '8045_203|Nord|Grabenstraße',
'8045_203|Süd|Grabenstraße', '8051_101||Wiener Straße (nördl.)',
'8051_101|Nord|Wiener Straße (nördl.)',
'8051_101|Süd|Wiener Straße (nördl.)'],
```

	baseline_add_	baseline_mul_	add_add	add_mul	mul_add	mul_mul	add_add_2	add_mul_2	mul_add_2	mul_mul_2
Graz-DB (NO2)	12.03	13.64	10.25	10.58	18.26	10.62	9.44	9.99	9.69	9.55
Graz-N (NO2)	10.23	10.16	9.53	9.22	17.52	9.88	9.49	9.48	16.69	9.48
Graz-O P (NO2)	9.78	18.77	11.86	9.25	14.20	12.52	9.95	9.40	19.01	12.45
Graz-S (NO2)	10.32	9.99	8.94	9.09	11.57	9.06	8.15	8.93	15.02	9.12
Graz-W (NO2)	11.42	15.86	10.32	11.22	10.61	10.08	10.11	10.29	23.80	9.87
Graz-DB (PM10)	19.48	20.18	19.15	19.17	19.06	18.46	18.58	19.26	19.59	17.82
Graz-O P (PM10)	19.36	19.14	18.25	18.15	24.66	17.94	19.21	19.02	20.87	18.50
Graz-S (PM10)	20.60	21.02	19.02	19.77	20.56	17.16	18.79	20.14	18.98	17.21
Graz-W (PM10)	16.18	17.70	15.65	16.29	19.26	15.30	15.68	16.07	21.71	15.43
Graz-N (O3)	22.37	18.60	24.07	21.66	25.89	39.34	18.59	22.03	25.60	34.38
Graz-S (O3)	22.04	17.41	20.68	21.07	29.55	37.98	17.82	20.35	16.90	30.65
Graz-DB (LUTE)	2.86	2.93	2.21	3.17	2.50	2.84	2.23	4.51	2.30	2.59
Graz-N (LUTE)	3.83	3.21	2.45	3.05	3.91	2.58	2.53	3.11	3.91	4.83
Graz-O P (LUTE)	2.99	3.06	2.37	4.10	2.87	2.73	2.13	3.79	2.27	4.11
Graz-S (LUTE)	3.15	2.89	2.10	4.70	3.43	2.42	2.51	3.63	2.37	3.97
Graz-W (LUTE)	3.77	3.68	2.23	2.53	2.49	3.20	2.78	3.43	2.69	3.03



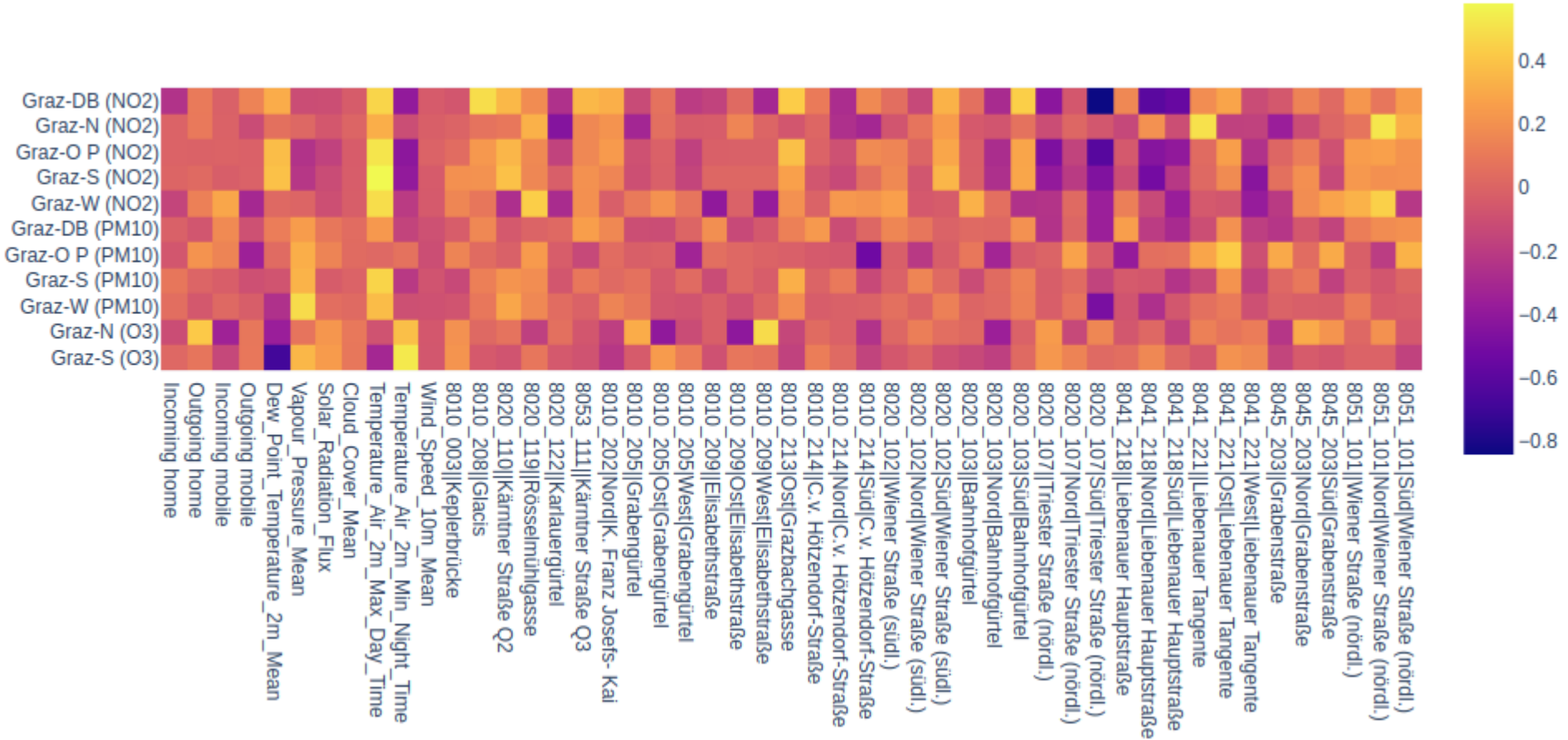



yhat1
actual y
Graz-S (NO2)
ds
10
20
30
40
50
60
2019-12-31
2020-01-14
2020-01-28
2020-02-11
2020-02-25
2020-03-10

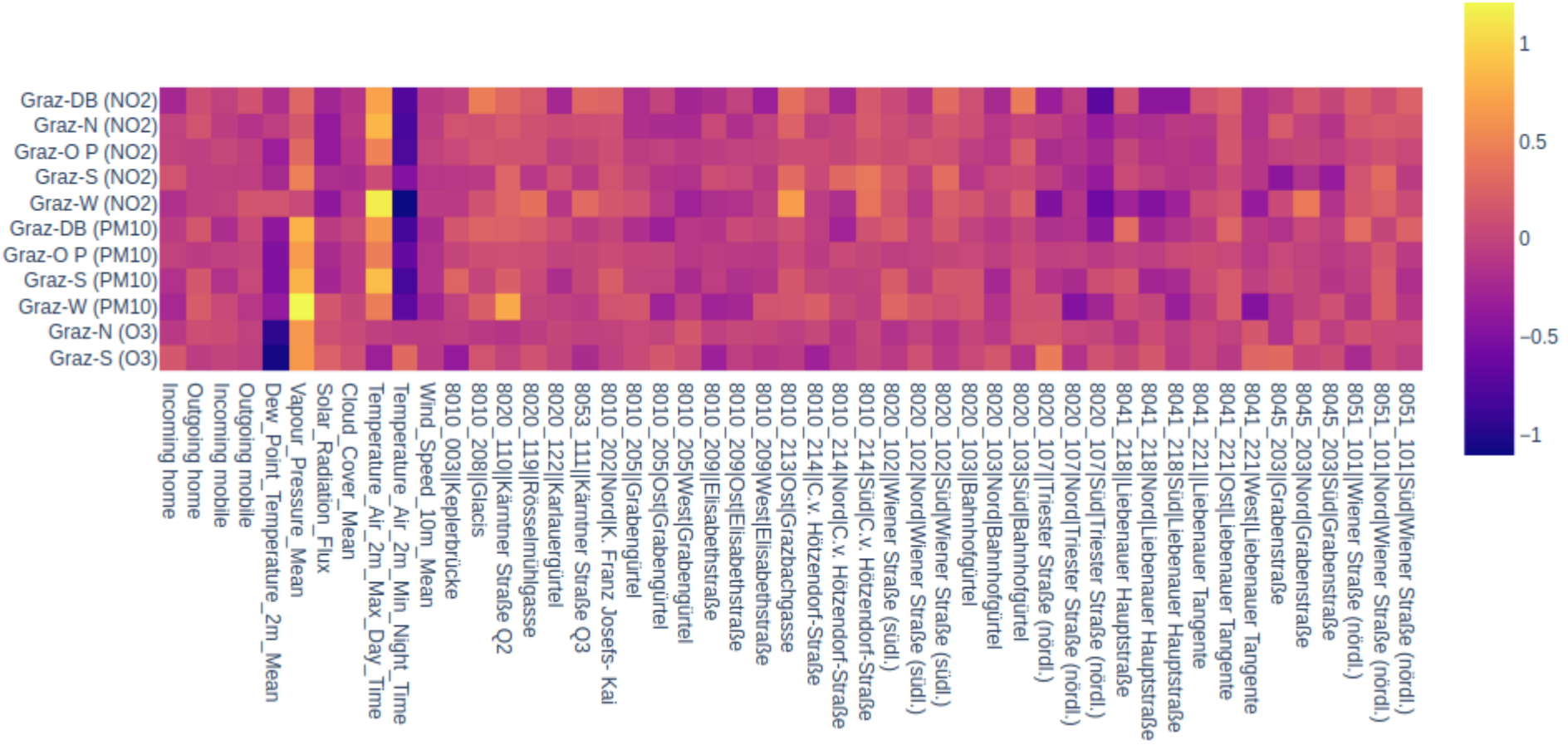

yhat1
actual y
Graz-N (O3)
ds
10
20
30
40
50
60
70
2019-12-31
2020-01-14
2020-01-28
2020-02-11
2020-02-25
2020-03-10

Feature importances

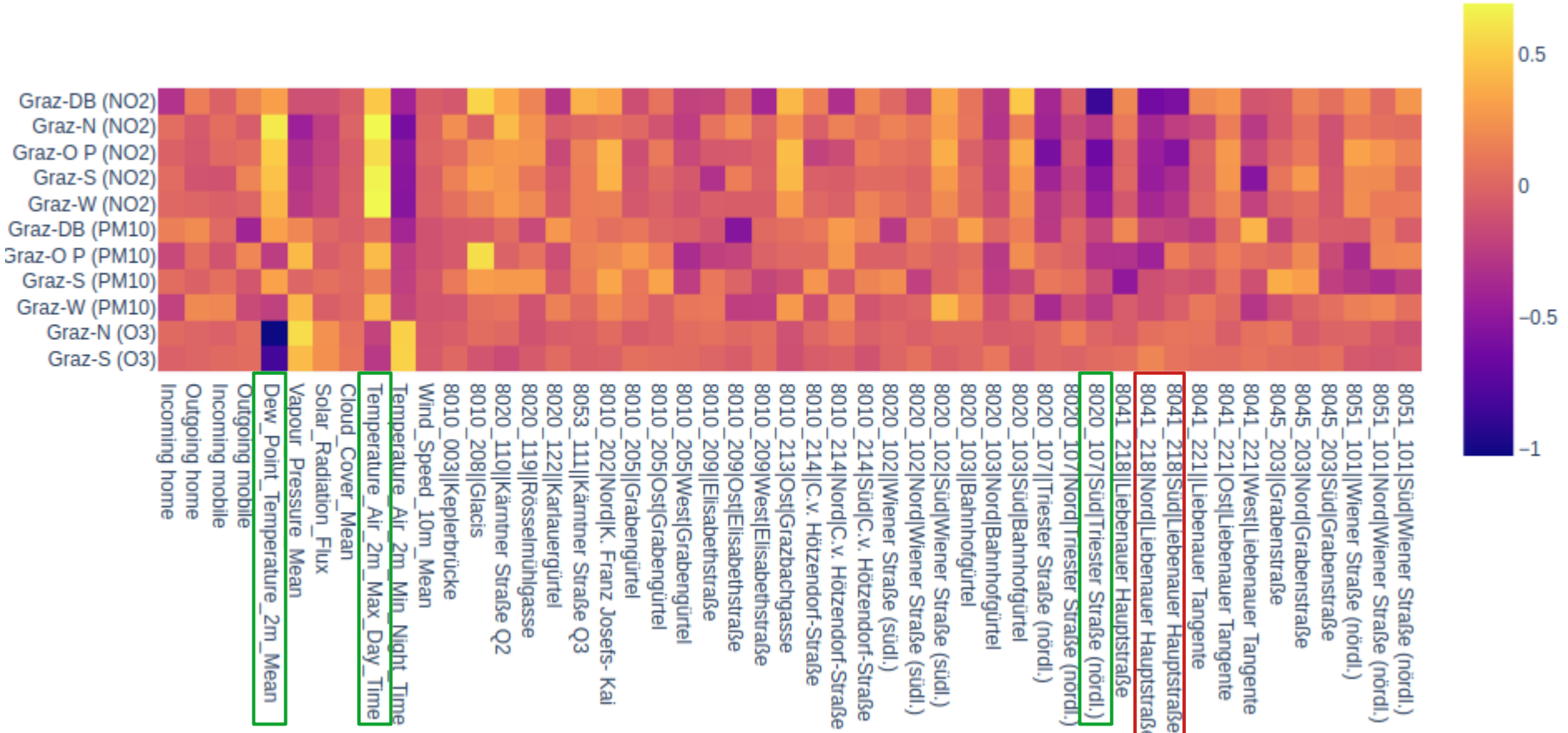
add_add2


Graz-DB (NO2)
Graz-N (NO2)
Graz-O P (NO2)
Graz-S (NO2)
Graz-W (NO2)
Graz-DB (PM10)
Graz-O P (PM10)
Graz-S (PM10)
Graz-W (PM10)
Graz-N (O3)
Graz-S (O3)
8051_101|Südl|Wiener Straße (nördl.)
8051_101|Nord|Wiener Straße (nördl.)
8051_101||Wiener Straße (nördl.)
8045_203|Südl|Grabenstraße
8045_203|Nord|Grabenstraße
8045_203||Grabenstraße
8041_221|West|Liebenauer Tangente
8041_221|Ost|Liebenauer Tangente
8041_221||Liebenauer Tangente
8041_218|Südl|Liebenauer Hauptstraße
8041_218|Nord|Liebenauer Hauptstraße
8041_218||Liebenauer Hauptstraße
8020_107|Südl|Triester Straße (nördl.)
8020_107|Nord|Triester Straße (nördl.)
8020_107||Triester Straße (nördl.)
8020_103|Südl|Bahnhofgürtel
8020_103|Nord|Bahnhofgürtel
8020_103||Bahnhofgürtel
8020_102|Südl|Wiener Straße (südl.)
8020_102|Nord|Wiener Straße (südl.)
8020_102||Wiener Straße (südl.)
8010_214|Südl|C.v. Hötzendorf-Straße
8010_214|Nord|C.v. Hötzendorf-Straße
8010_214||C.v. Hötzendorf-Straße
8010_213|Ost|Grazbachgasse
8010_209|West|Elisabethstraße
8010_209|Ost|Elisabethstraße
8010_209||Elisabethstraße
8010_205|West|Grabengürtel
8010_205|Ost|Grabengürtel
8010_205||Grabengürtel
8010_202|Nord|K. Franz Josefs- Kai
8053_111||Kärntner Straße Q3
8020_122||Karlauergürtel
8020_119||Rösselmühlgasse
8020_110||Kärntner Straße Q2
8010_208||Glacis
8010_003||Keplerbrücke
Wind_Speed_10m_Mean
Temperature_Air_2m_Min_Night_Time
Temperature_Air_2m_Max_Day_Time
Cloud_Cover_Mean
Solar_Radiation_Flux
Vapour_Pressure_Mean
Dew_Point_Temperature_2m_Mean
Outgoing mobile
Incoming mobile
Outgoing home
Incoming home
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8

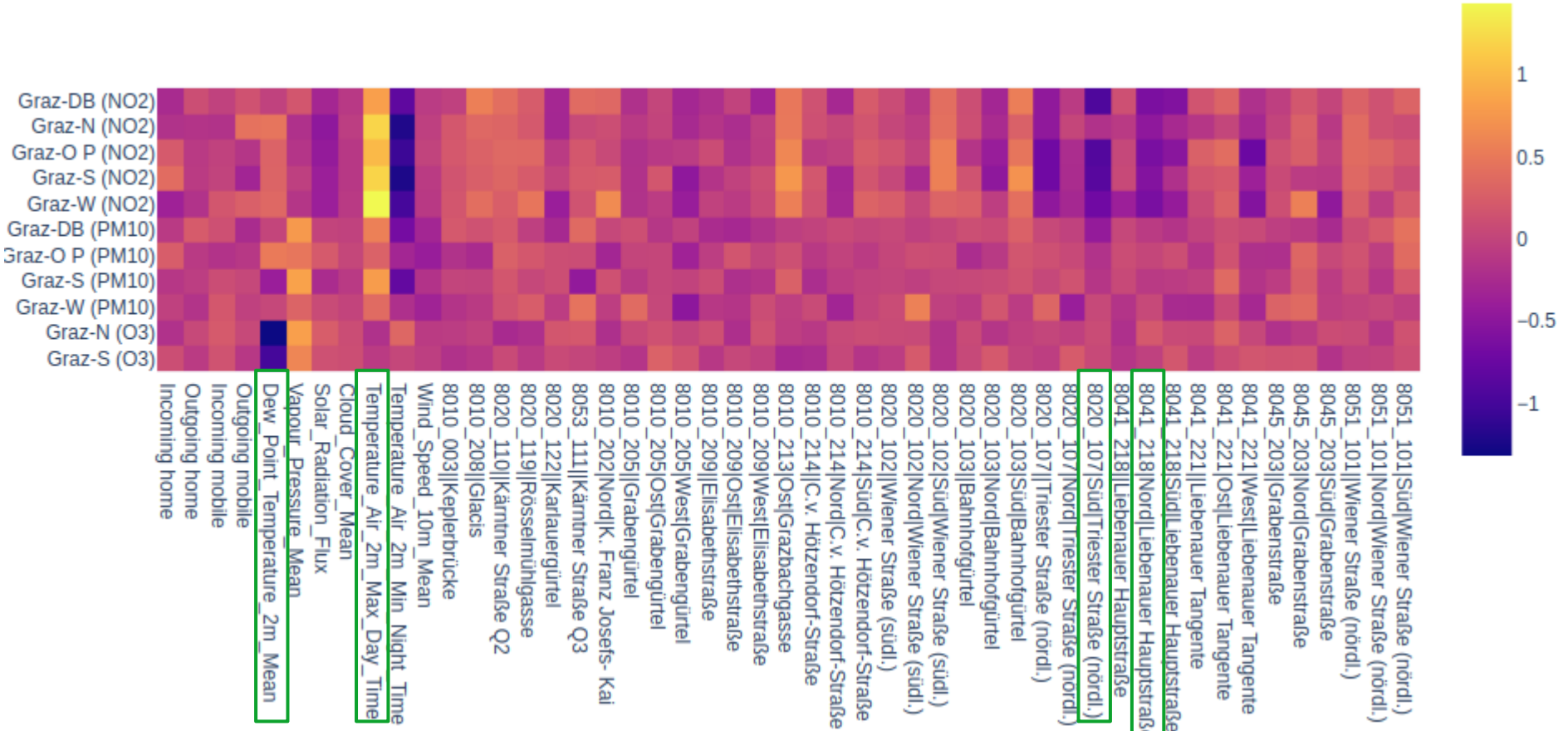
add_mul2


Graz-DB (NO2)
Graz-N (NO2)
Graz-O P (NO2)
Graz-S (NO2)
Graz-W (NO2)
Graz-DB (PM10)
Graz-O P (PM10)
Graz-S (PM10)
Graz-W (PM10)
Graz-N (O3)
Graz-S (O3)
8051_101|Süd|Wiener Straße (nördl.)
8051_101|Nord|Wiener Straße (nördl.)
8051_101||Wiener Straße (nördl.)
8045_203|Süd|Grabenstraße
8045_203|Nord|Grabenstraße
8045_203||Grabenstraße
8041_221|West|Liebenauer Tangente
8041_221|Ost|Liebenauer Tangente
8041_221||Liebenauer Tangente
8041_218|Süd|Liebenauer Hauptstraße
8041_218|Nord|Liebenauer Hauptstraße
8041_218||Liebenauer Hauptstraße
8020_107|Süd|Triester Straße (nördl.)
8020_107|Nord|Triester Straße (nördl.)
8020_107||Triester Straße (nördl.)
8020_103|Süd|Bahnhofgürtel
8020_103|Nord|Bahnhofgürtel
8020_103||Bahnhofgürtel
8020_102|Süd|Wiener Straße (südl.)
8020_102|Nord|Wiener Straße (südl.)
8020_102||Wiener Straße (südl.)
8010_214|Süd|C.v. Hötzendorf-Straße
8010_214|Nord|C.v. Hötzendorf-Straße
8010_214||C.v. Hötzendorf-Straße
8010_213|Ost|Grazbachgasse
8010_209|West|Elisabethstraße
8010_209|Ost|Elisabethstraße
8010_209||Elisabethstraße
8010_205|West|Grabengürtel
8010_205|Ost|Grabengürtel
8010_205||Grabengürtel
8010_202|Nord|K. Franz Josefs- Kai
8053_111||Kärntner Straße Q3
8020_122||Karlauergürtel
8020_119||Rösselmühlgasse
8020_110||Kärntner Straße Q2
8010_208||Glacis
8010_003||Keplerbrücke
Wind_Speed_10m_Mean
Temperature_Air_2m_Min_Night_Time
Temperature_Air_2m_Max_Day_Time
Cloud_Cover_Mean
Solar_Radiation_Flux
Vapour_Pressure_Mean
Dew_Point_Temperature_2m_Mean
Outgoing mobile
Incoming mobile
Outgoing home
Incoming home
1
0.5
0
−0.5
−1

mul_add2


Graz-DB (NO2)
Graz-N (NO2)
Graz-O P (NO2)
Graz-S (NO2)
Graz-W (NO2)
Graz-DB (PM10)
Graz-O P (PM10)
Graz-S (PM10)
Graz-W (PM10)
Graz-N (O3)
Graz-S (O3)
8051_101|Süd|Wiener Straße (nördl.)
8051_101|Nord|Wiener Straße (nördl.)
8051_101|Wiener Straße (nördl.)
8045_203|Süd|Grabenstraße
8045_203|Nord|Grabenstraße
8045_203||Grabenstraße
8041_221|West|Liebenauer Tangente
8041_221|Ost|Liebenauer Tangente
8041_221||Liebenauer Tangente
8041_218|Süd|Liebenauer Hauptstraße
8041_218|Nord|Liebenauer Hauptstraße
8041_218||Liebenauer Hauptstraße
8020_107|Süd|Triester Straße (nördl.)
8020_107|Nord|Triester Straße (nordl.)
8020_107||Triester Straße (nördl.)
8020_103|Süd|Bahnhofgürtel
8020_103|Nord|Bahnhofgürtel
8020_103||Bahnhofgürtel
8020_102|Süd|Wiener Straße (südl.)
8020_102|Nord|Wiener Straße (südl.)
8020_102||Wiener Straße (südl.)
8010_214|Süd|C.v. Hötzendorf-Straße
8010_214|Nord|C.v. Hötzendorf-Straße
8010_214||C.v. Hötzendorf-Straße
8010_213|Ost|Grazbachgasse
8010_209|West|Elisabethstraße
8010_209|Ost|Elisabethstraße
8010_209||Elisabethstraße
8010_205|West|Grabengürtel
8010_205|Ost|Grabengürtel
8010_205||Grabengürtel
8010_202|Nord|K. Franz Josefs- Kai
8053_111||Kärntner Straße Q3
8020_122||Karlauergürtel
8020_119||Rösselmühlgasse
8020_110||Kärntner Straße Q2
8010_208||Glacis
8010_003||Keplerbrücke
Wind_Speed_10m_Mean
Temperature_Air_2m_Min_Night_Time
Temperature_Air_2m_Max_Day_Time
Cloud_Cover_Mean
Solar_Radiation_Flux
Vapour_Pressure_Mean
Dew_Point_Temperature_2m_Mean
Outgoing mobile
Incoming mobile
Outgoing home
Incoming home
0.5
0
−0.5
−1

mul_mul2

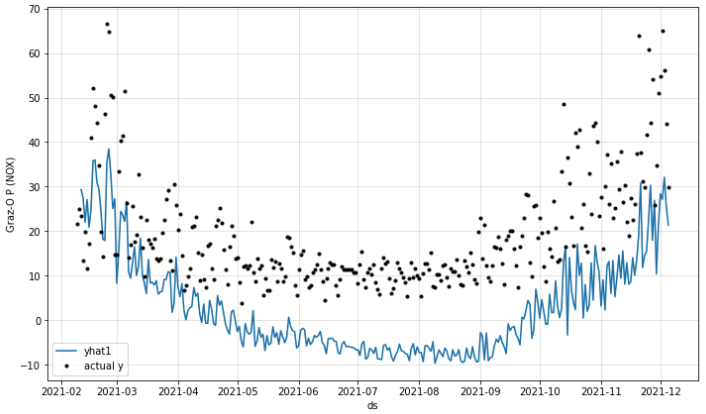

Graz-DB (NO2)
Graz-N (NO2)
Graz-O P (NO2)
Graz-S (NO2)
Graz-W (NO2)
Graz-DB (PM10)
Graz-O P (PM10)
Graz-S (PM10)
Graz-W (PM10)
Graz-N (O3)
Graz-S (O3)
Incoming home
Outgoing home
Incoming mobile
Outgoing mobile
Dew_Point_Temperature_2m_Mean
Vapour_Pressure_Mean
Solar_Radiation_Flux
Cloud_Cover_Mean
Temperature_Air_2m_Max_Day_Time
Temperature_Air_2m_Min_Night_Time
Wind_Speed_10m_Mean
8010_003||Keplerbrücke
8010_208||Glacis
8020_110||Kärntner Straße Q2
8020_119||Rösselmühlgasse
8020_122||Karlauergürtel
8053_111||Kärntner Straße Q3
8010_202|Nord|K. Franz Josefs- Kai
8010_205||Grabengürtel
8010_205|Ost|Grabengürtel
8010_205|West|Grabengürtel
8010_209||Elisabethstraße
8010_209|Ost|Elisabethstraße
8010_209|West|Elisabethstraße
8010_213|Ost|Grazbachgasse
8010_214||C.v. Hötzendorf-Straße
8010_214|Nord|C.v. Hötzendorf-Straße
8010_214|Süd|C.v. Hötzendorf-Straße
8020_102||Wiener Straße (südl.)
8020_102|Nord|Wiener Straße (südl.)
8020_102|Süd|Wiener Straße (südl.)
8020_103||Bahnhofgürtel
8020_103|Nord|Bahnhofgürtel
8020_103|Süd|Bahnhofgürtel
8020_107||Triester Straße (nördl.)
8020_107|Nord|Triester Straße (nördl.)
8020_107|Süd|Triester Straße (nördl.)
8041_218||Liebenauer Hauptstraße
8041_218|Nord|Liebenauer Hauptstraße
8041_218|Süd|Liebenauer Hauptstraße
8041_221||Liebenauer Tangente
8041_221|Ost|Liebenauer Tangente
8041_221|West|Liebenauer Tangente
8045_203||Grabenstraße
8045_203|Nord|Grabenstraße
8045_203|Süd|Grabenstraße
8051_101||Wiener Straße (nördl.)
8051_101|Nord|Wiener Straße (nördl.)
8051_101|Süd|Wiener Straße (nördl.)
1
0.5
0
−0.5
−1

AR?

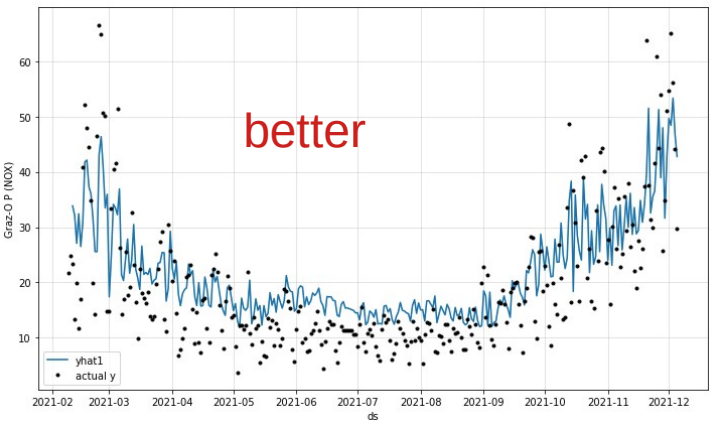
Thank you!

Test: 300 days

addictive



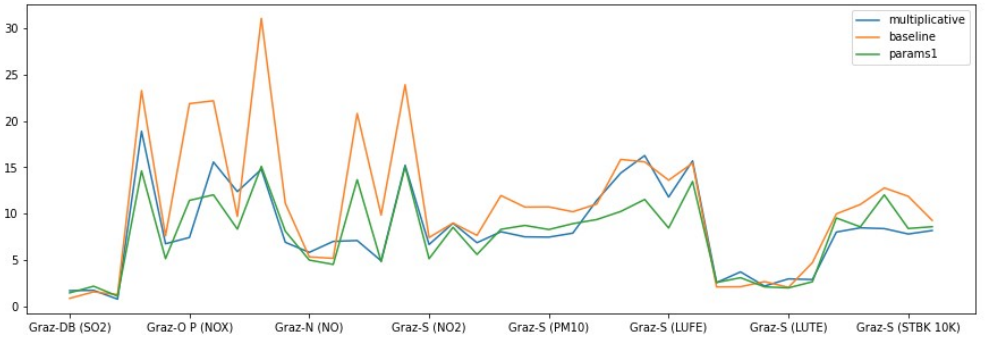
multiplicative



better

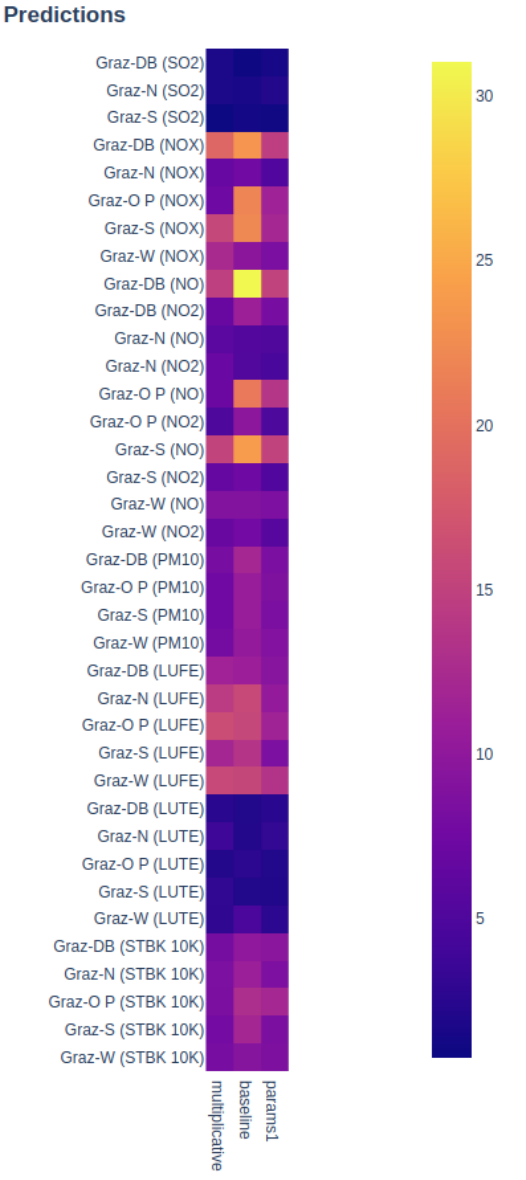
	multiplicative	baseline	diff
Graz-DB (SO2)	1.696511	0.871010	0.825500
Graz-N (SO2)	1.732917	1.564935	0.167982
Graz-S (SO2)	0.782479	1.277678	-0.495199
Graz-DB (NOX)	18.880075	23.264060	-4.383985
Graz-N (NOX)	6.753974	7.600421	-0.846447
Graz-O P (NOX)	7.430017	21.858114	-14.428097
Graz-S (NOX)	15.563041	22.163633	-6.600593
Graz-W (NOX)	12.371496	9.694627	2.676869
Graz-DB (NO)	14.774393	31.043263	-16.268870
Graz-DB (NO2)	6.911424	11.112988	-4.201564
Graz-N (NO)	5.826016	5.341481	0.484534
Graz-N (NO2)	7.004690	5.176646	1.828044
Graz-O P (NO)	7.100022	20.794825	-13.694803
Graz-O P (NO2)	4.914900	9.855665	-4.940765
Graz-S (NO)	15.215131	23.888328	-8.673198
Graz-S (NO2)	6.671653	7.422800	-0.751147
Graz-W (NO)	8.967261	8.978693	-0.011432
Graz-W (NO2)	6.865062	7.659042	-0.793980
Graz-DB (PM10)	8.050782	11.951966	-3.901184
Graz-O P (PM10)	7.499064	10.706483	-3.207419
Graz-S (PM10)	7.469681	10.723072	-3.253391
Graz-W (PM10)	7.897139	10.203673	-2.306534
Graz-DB (LUFE)	11.432195	11.035418	0.396777
Graz-N (LUFE)	14.374542	15.845208	-1.470665
Graz-O P (LUFE)	16.259137	15.583990	0.675147
Graz-S (LUFE)	11.786726	13.600698	-1.813972
Graz-W (LUFE)	15.687295	15.450356	0.236939
Graz-DB (LUTE)	2.570063	2.101600	0.468463
Graz-N (LUTE)	3.720021	2.121867	1.598154
Graz-O P (LUTE)	2.191382	2.671708	-0.480326
Graz-S (LUTE)	2.967308	2.052983	0.914325
Graz-W (LUTE)	2.895856	4.714245	-1.818390
Graz-DB (STBK 10K)	8.012783	9.975475	-1.962692
Graz-N (STBK 10K)	8.469683	10.987460	-2.517777
Graz-O P (STBK 10K)	8.385844	12.770929	-4.385086
Graz-S (STBK 10K)	7.803181	11.867889	-4.064708
Graz-W (STBK 10K)	8.175450	9.274915	-1.099465

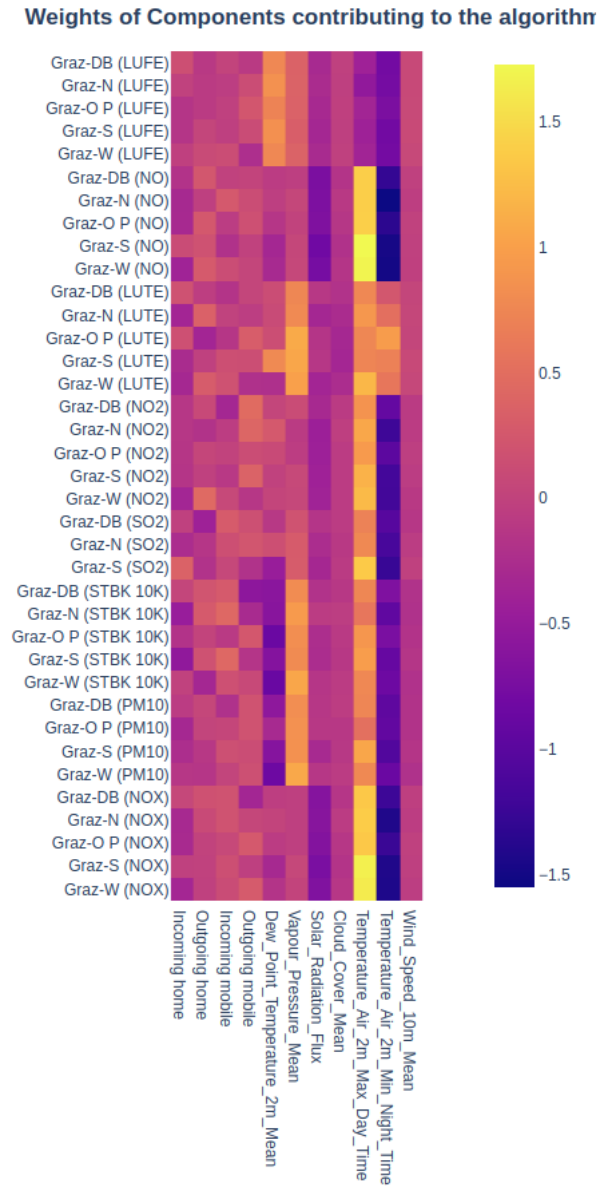
	multiplicative	baseline	params1
Graz-DB (SO2)	1.696511	0.871010	1.460497
Graz-N (SO2)	1.732917	1.564935	2.176914
Graz-S (SO2)	0.782479	1.277678	1.105443
Graz-DB (NOX)	18.880075	23.264060	14.607371
Graz-N (NOX)	6.753974	7.600421	5.145725
Graz-O P (NOX)	7.430017	21.858114	11.424354
Graz-S (NOX)	15.563041	22.163633	12.028613
Graz-W (NOX)	12.371496	9.694627	8.327579
Graz-DB (NO)	14.774393	31.043263	15.099064
Graz-DB (NO2)	6.911424	11.112988	8.108489
Graz-N (NO)	5.826016	5.341481	4.993304
Graz-N (NO2)	7.004690	5.176646	4.524373
Graz-O P (NO)	7.100022	20.794825	13.655898
Graz-O P (NO2)	4.914900	9.855665	4.821051
Graz-S (NO)	15.215131	23.888328	15.061271
Graz-S (NO2)	6.671653	7.422800	5.139935
Graz-W (NO)	8.967261	8.978693	8.532570
Graz-W (NO2)	6.865062	7.659042	5.601560
Graz-DB (PM10)	8.050782	11.951966	8.310477
Graz-O P (PM10)	7.499064	10.706483	8.729175
Graz-S (PM10)	7.469681	10.723072	8.287524
Graz-W (PM10)	7.897139	10.203673	8.918627
Graz-DB (LUFE)	11.432195	11.035418	9.362576
Graz-N (LUFE)	14.374542	15.845208	10.233101
Graz-O P (LUFE)	16.259137	15.583990	11.528506
Graz-S (LUFE)	11.786726	13.600698	8.448414
Graz-W (LUFE)	15.687295	15.450356	13.464889
Graz-DB (LUTE)	2.570063	2.101600	2.575707
Graz-N (LUTE)	3.720021	2.121867	3.094804
Graz-O P (LUTE)	2.191382	2.671708	2.107879
Graz-S (LUTE)	2.967308	2.052983	1.995426
Graz-W (LUTE)	2.895856	4.714245	2.657662
Graz-DB (STBK 10K)	8.012783	9.975475	9.530959
Graz-N (STBK 10K)	8.469683	10.987460	8.573997
Graz-O P (STBK 10K)	8.385844	12.770929	12.022186
Graz-S (STBK 10K)	7.803181	11.867889	8.395814
Graz-W (STBK 10K)	8.175450	9.274915	8.587841



average

```
multiplicative     8.246194
baseline          10.897517
params1            7.801070
```




Weights of Components contributing to the algorithm
Graz-DB (LUFE)
Graz-N (LUFE)
Graz-O P (LUFE)
Graz-S (LUFE)
Graz-W (LUFE)
Graz-DB (NO)
Graz-N (NO)
Graz-O P (NO)
Graz-S (NO)
Graz-W (NO)
Graz-DB (LUTE)
Graz-N (LUTE)
Graz-O P (LUTE)
Graz-S (LUTE)
Graz-W (LUTE)
Graz-DB (NO2)
Graz-N (NO2)
Graz-O P (NO2)
Graz-S (NO2)
Graz-W (NO2)
Graz-DB (SO2)
Graz-N (SO2)
Graz-S (SO2)
Graz-DB (STBK 10K)
Graz-N (STBK 10K)
Graz-O P (STBK 10K)
Graz-S (STBK 10K)
Graz-W (STBK 10K)
Graz-DB (PM10)
Graz-O P (PM10)
Graz-S (PM10)
Graz-W (PM10)
Graz-DB (NOX)
Graz-N (NOX)
Graz-O P (NOX)
Graz-S (NOX)
Graz-W (NOX)
1.5
1
0.5
0
−0.5
−1
−1.5
Incoming home
Outgoing home
Incoming mobile
Outgoing mobile
Dew_Point_Temperature_2m_Mean
Vapour_Pressure_Mean
Solar_Radiation_Flux
Cloud_Cover_Mean
Temperature_Air_2m_Max_Day_Time
Temperature_Air_2m_Min_Night_Time
Wind_Speed_10m_Mean

Overview

- Duration: **01.01.2010 → 31.12.2021** (4383 days)
- Output file: *main_data.csv*

Locations
- 'Graz-DB'
- 'Graz-N'
- 'Graz-O'
- 'Graz-S'
- 'Graz-W'

Parameters
- 'LUFE'
- 'LUTE'
- 'NO'
- 'NO2'
- 'NOX'
- 'PM10'
- 'SO2'
- 'STBK 10K'

	count	mean	min	max
Graz-DB (LUFE)	4374.0	73.391237	35.674780	99.004456
Graz-DB (LUTE)	4357.0	11.192806	-10.208468	29.853119
Graz-DB (NO)	4368.0	48.214157	2.958353	352.157200
Graz-DB (NO2)	4368.0	43.080762	8.024886	137.524250
Graz-DB (NOX)	4368.0	61.206508	7.545592	328.891450
Graz-DB (PM10)	4327.0	30.255570	1.848000	157.200070
Graz-DB (SO2)	4355.0	2.417012	0.000000	36.756634
Graz-DB (STBK 10K)	4310.0	30.504152	2.248819	193.199520
Graz-N (LUFE)	4365.0	73.091360	41.842500	98.992500
Graz-N (LUTE)	4340.0	11.165058	-10.161504	28.844315
Graz-N (NO)	4368.0	10.051693	0.000000	183.434200
Graz-N (NO2)	4368.0	21.733773	1.144127	93.462555
Graz-N (NOX)	4368.0	19.419067	0.736744	172.437160
Graz-N (PM10)	2683.0	21.627798	2.507002	182.700070
Graz-N (SO2)	4355.0	2.409465	0.000000	30.587595
Graz-N (STBK 10K)	4305.0	22.531820	0.000000	208.103590
Graz-O P (LUFE)	1676.0	77.779661	32.852955	100.000000
Graz-O P (LUTE)	1680.0	11.933546	-10.223562	28.975866
Graz-O P (NO)	4345.0	21.657809	0.120182	228.799970
Graz-O P (NO2)	4347.0	28.573913	1.981802	102.040640
Graz-O P (NOX)	4347.0	32.296763	1.243688	215.523200
Graz-O P (PM10)	2251.0	24.169234	1.974999	134.799940
Graz-O P (STBK 10K)	4340.0	29.381407	4.071145	176.834300
Graz-S (LUFE)	4356.0	73.295695	33.787075	99.908240
Graz-S (LUTE)	4332.0	11.018339	-10.264407	29.475939
Graz-S (NO)	4352.0	26.875318	0.041904	357.565520
Graz-S (NO2)	4352.0	29.552777	2.919650	116.251520
Graz-S (NOX)	4352.0	37.001531	2.276396	336.050780
Graz-S (PM10)	4350.0	26.685638	2.262001	182.799930
Graz-S (SO2)	4371.0	1.707022	0.000000	32.737830
Graz-S (STBK 10K)	4345.0	29.279796	3.718005	189.072590
Graz-W (LUFE)	4348.0	70.856761	34.736824	99.462560
Graz-W (LUTE)	4369.0	11.317166	-9.584766	29.578932
Graz-W (NO)	4321.0	15.959863	0.000000	234.508030
Graz-W (NO2)	4321.0	26.324693	2.341851	102.439360
Graz-W (NOX)	4321.0	26.544436	1.180270	238.361770
Graz-W (PM10)	4311.0	24.618504	1.535183	177.517240
Graz-W (STBK 10K)	4311.0	24.618504	1.535183	177.517240
Graz-W (SO2)	62.0	4.739745	1.899000	15.509576
Graz-N (O3)	4331.0	42.372002	0.000000	114.304600
Graz-S (O3)	4308.0	37.895917	0.069498	107.530620

Value Counts per Year

year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Graz-DB (LUFE)	365	365	366	364	363	365	366	365	365	365	366	359
Graz-DB (LUTE)	365	365	366	347	363	365	366	365	365	365	366	359
Graz-DB (NO)	360	364	364	365	363	365	366	364	365	363	365	364
Graz-DB (NO2)	360	364	364	365	363	365	366	364	365	363	365	364
Graz-DB (NOX)	360	364	364	365	363	365	366	364	365	363	365	364
Graz-DB (PM10)	357	365	364	361	364	363	365	363	341	357	366	361
Graz-DB (SO2)	362	365	365	361	363	365	366	365	365	356	365	357
Graz-DB (STBK 10K)	347	332	364	364	361	363	362	364	363	363	362	365
Graz-N (LUFE)	365	365	366	365	365	365	358	363	361	365	366	361
Graz-N (LUTE)	365	365	346	360	365	365	358	363	361	365	366	361
Graz-N (NO)	365	365	366	365	364	364	362	364	362	365	365	361
Graz-N (NO2)	365	365	366	365	364	364	362	364	362	365	365	361
Graz-N (NOX)	365	365	366	365	364	364	362	364	362	365	365	361
Graz-N (PM10)	365	354	366	362	364	337	0	0	157	361	17	0
Graz-N (SO2)	365	365	365	365	364	359	362	365	363	365	366	351
Graz-N (STBK 10K)	361	365	354	326	365	365	356	365	363	361	365	359
Graz-O P (LUFE)	0	0	0	0	0	0	0	223	364	365	360	364
Graz-O P (LUTE)	0	0	0	0	0	0	0	227	365	365	360	363
Graz-O P (NO)	347	365	366	363	362	363	362	364	365	364	366	358
Graz-O P (NO2)	347	365	366	363	362	363	362	364	365	364	366	360
Graz-O P (NOX)	347	365	366	363	362	363	362	364	365	364	366	360
Graz-O P (PM10)	0	0	0	0	0	77	365	364	362	363	360	360
Graz-O P (STBK 10K)	347	365	362	361	364	365	358	362	361	365	366	364
Graz-S (LUFE)	365	364	366	365	346	365	366	365	358	365	366	365
Graz-S (LUTE)	365	364	366	365	336	362	355	365	358	365	366	365
Graz-S (NO)	365	360	365	363	364	363	365	361	359	363	365	359
Graz-S (NO2)	365	360	365	363	364	363	365	361	359	363	365	359
Graz-S (NOX)	365	360	365	363	364	363	365	361	359	363	365	359
Graz-S (PM10)	353	365	366	363	364	362	365	364	364	362	364	358
Graz-S (SO2)	365	364	366	365	365	365	366	365	359	360	366	365
Graz-S (STBK 10K)	365	364	365	365	365	365	340	363	357	365	366	365
Graz-W (LUFE)	365	365	365	348	361	365	366	365	364	358	366	360
Graz-W (LUTE)	365	365	356	365	361	365	366	365	365	365	366	365
Graz-W (NO)	364	359	351	365	357	356	365	349	365	365	366	359
Graz-W (NO2)	364	359	351	365	357	356	365	349	365	365	366	359
Graz-W (NOX)	364	359	351	365	357	356	365	349	365	365	366	359
Graz-W (PM10)	354	346	359	364	354	365	349	362	365	362	366	365
Graz-W (STBK 10K)	354	346	359	364	354	365	349	362	365	362	366	365
Graz-W (SO2)	62	0	0	0	0	0	0	0	0	0	0	0
Graz-N (O3)	361	361	365	355	364	361	363	360	362	356	364	359
Graz-S (O3)	361	358	359	363	358	361	362	363	356	352	360	355