Air pollution

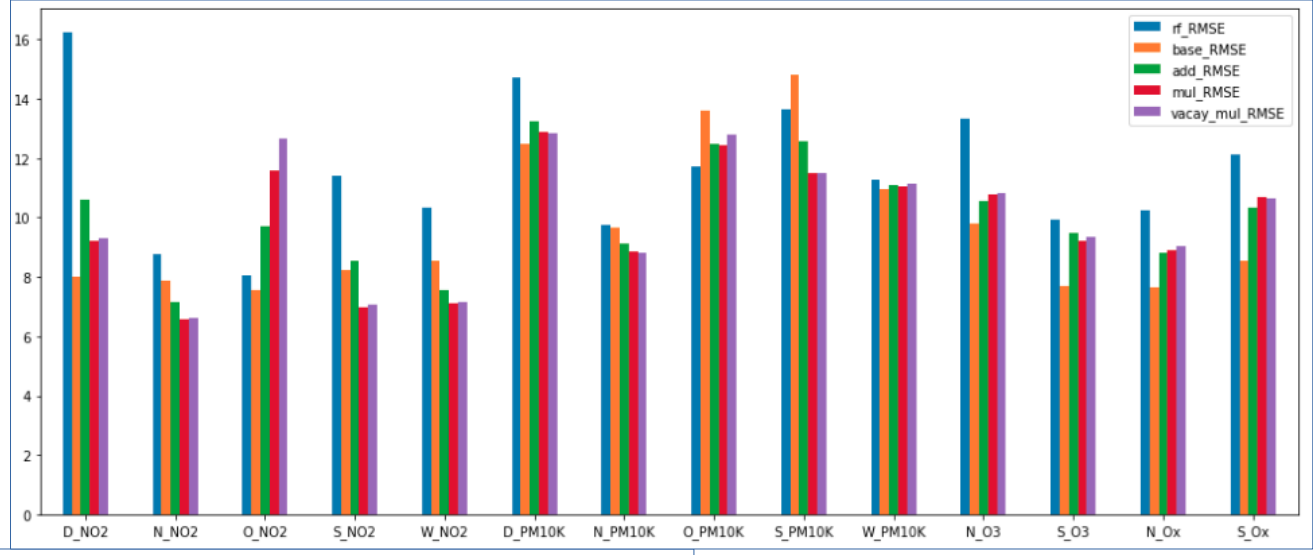
Graz

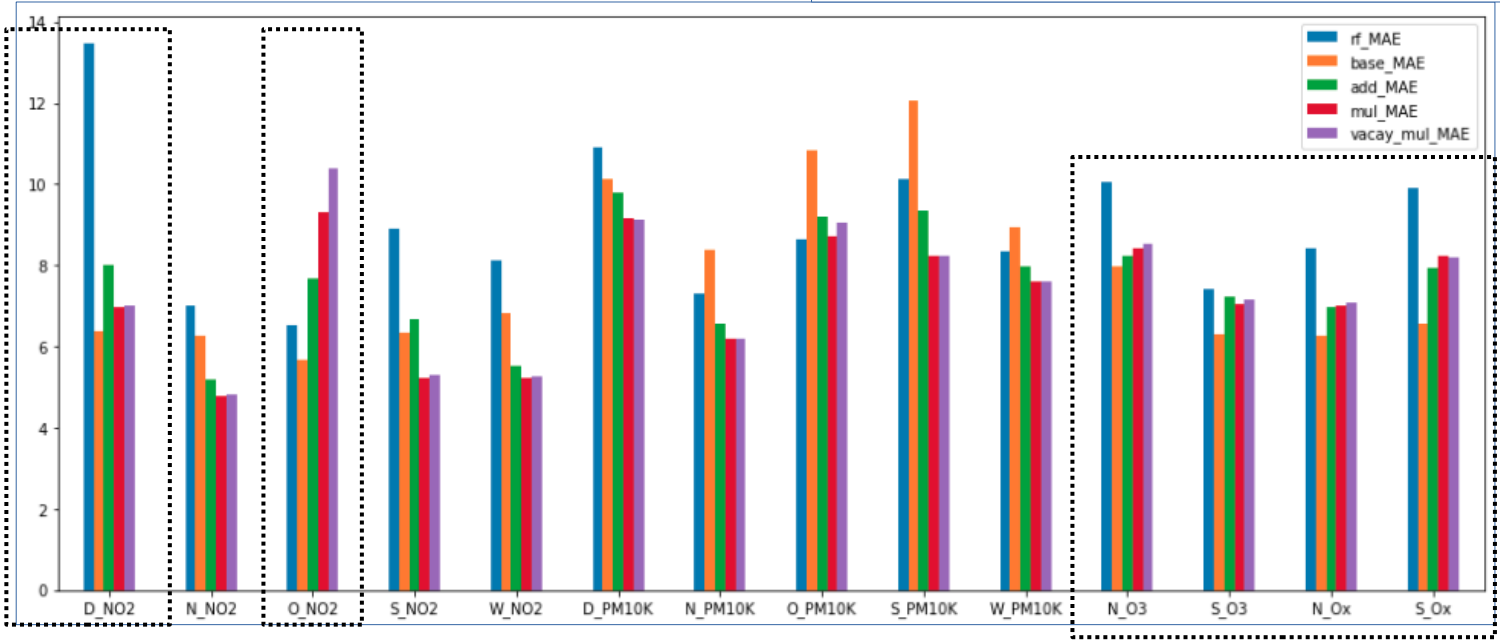
Methods

- rf_: random forest
- base_: only *y* value
- add_: *y* + additional regressors (*'Temp', 'RH', 'Pressure', 'Winddirection', 'Windspeed', 'Precip'*) with *additive* mode
- mul_: *y* + additional regressors with *multiplicative* mode
- vacay_mul: *y* + additional regressors with *multiplicative* mode + *holidays*

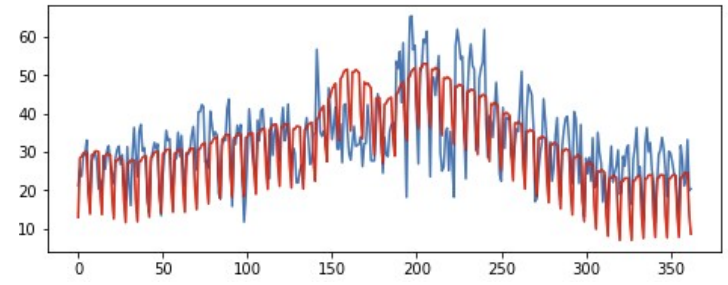
https://facebook.github.io/prophet/docs/multiplicative_seasonality.html

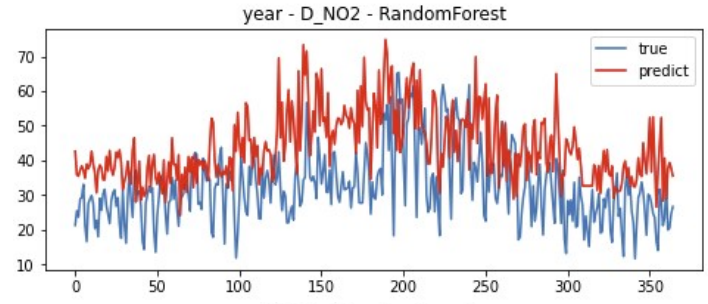
- RF: O_PM10K
- Additive trend: no???
- Multiplicative trend:
  - NO2
    - N
    - S
    - W
  - PM10K
    - D
    - N
    - S
    - W

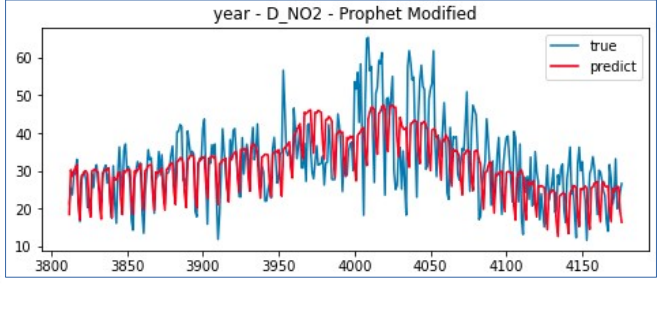


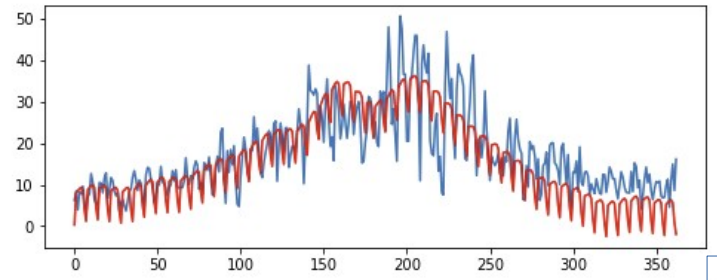


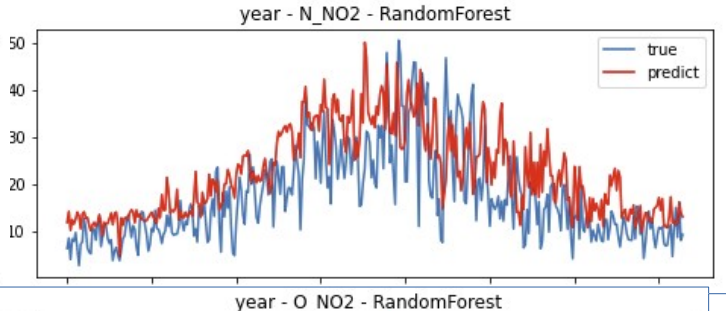
- Seems to be independent on additional regressors
  - D_NO2
  - O_NO2
  - N_O3
  - S_O3
  - N_Ox
  - S_Ox

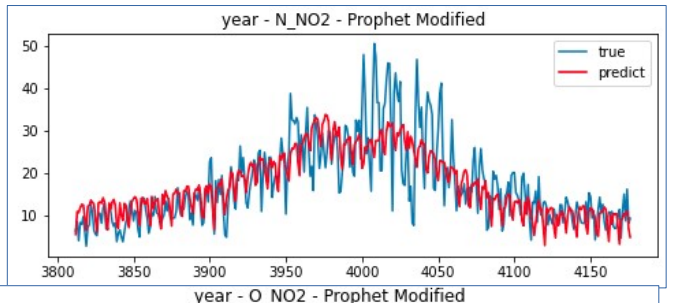



year - D_NO2 - RandomForest
true
predict


year - D_NO2 - Prophet Modified
true
predict




year - N_NO2 - RandomForest
true
predict


year - N_NO2 - Prophet Modified
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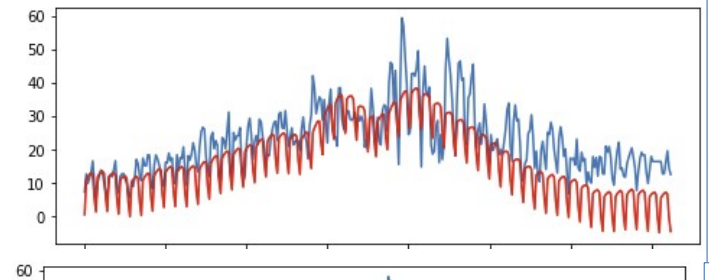
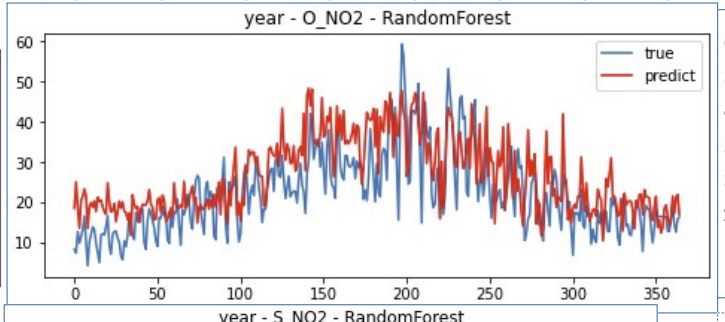
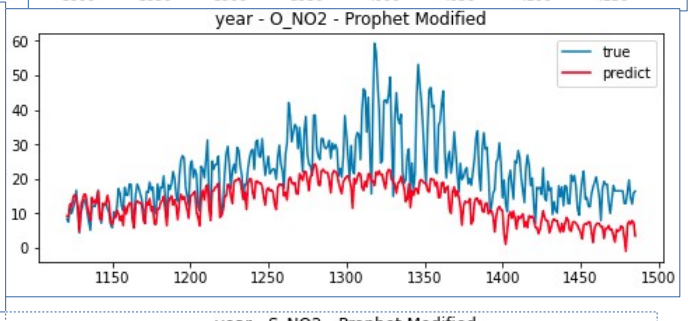
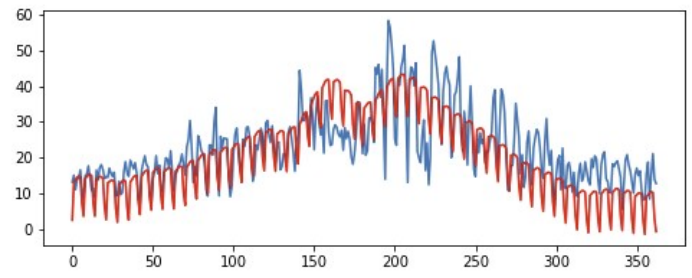
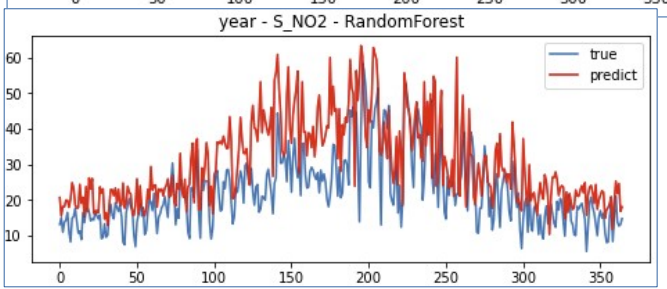
predict

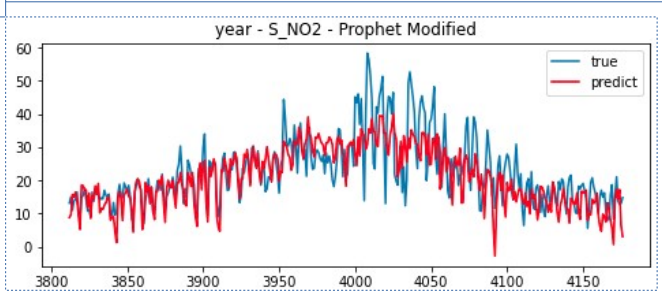


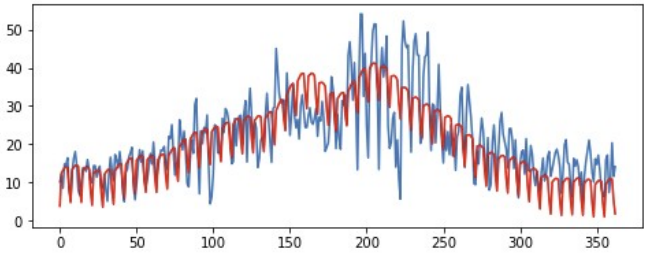

year - O_NO2 - RandomForest
true
predict

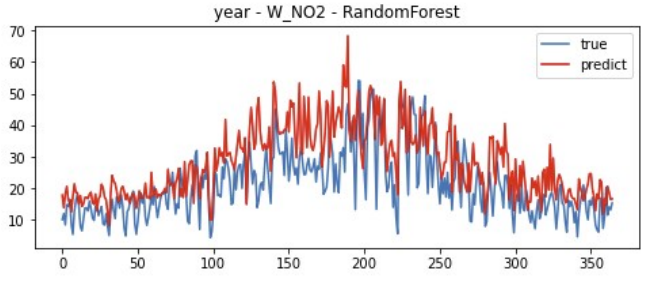

year - O_NO2 - Prophet Modified
true
predict

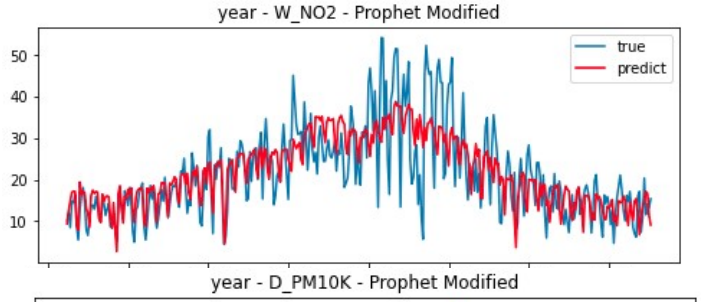


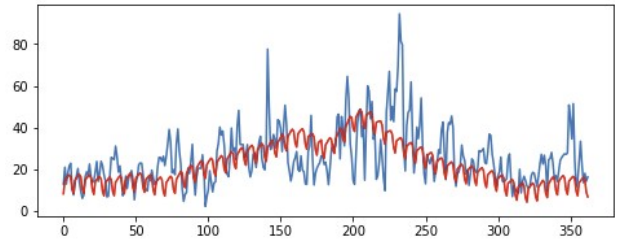

year - S_NO2 - RandomForest
true
predict

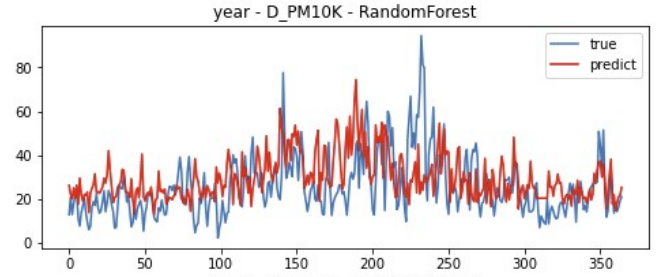

year - S_NO2 - Prophet Modified
true
predict

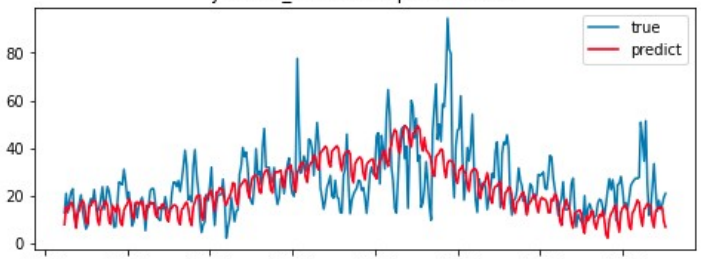


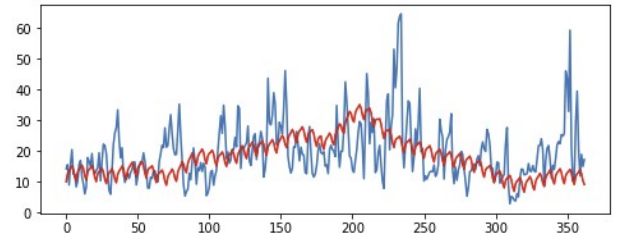

year - W_NO2 - RandomForest
true
predict

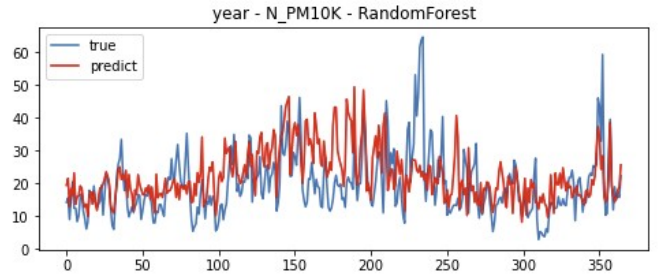

year - W_NO2 - Prophet Modified
true
predict

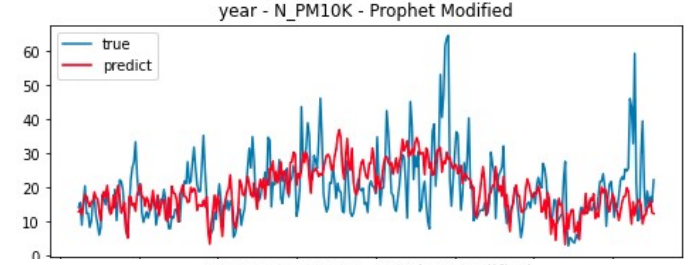


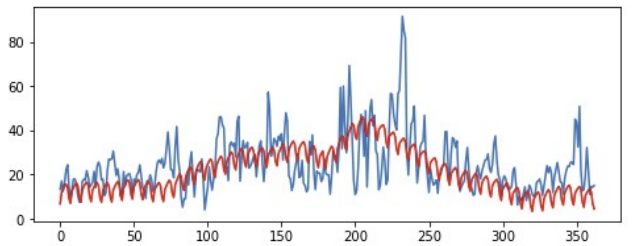

year - D_PM10K - RandomForest
true
predict

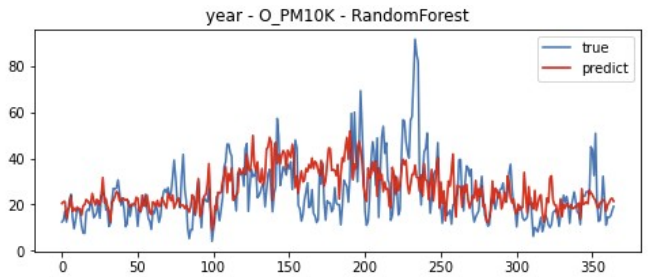

year - D_PM10K - Prophet Modified
true
predict

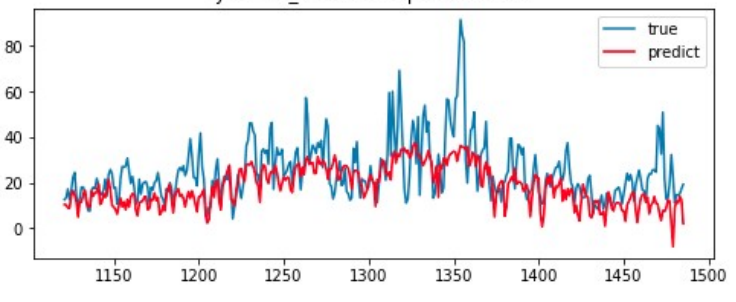


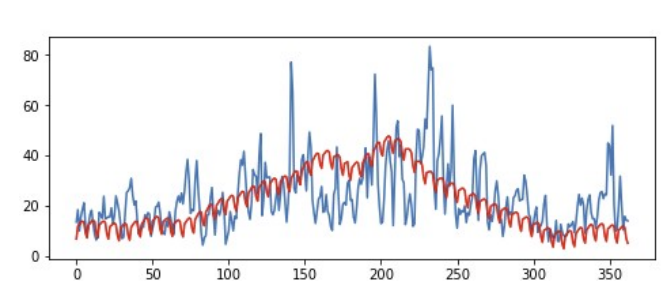

year - N_PM10K - RandomForest
true
predict

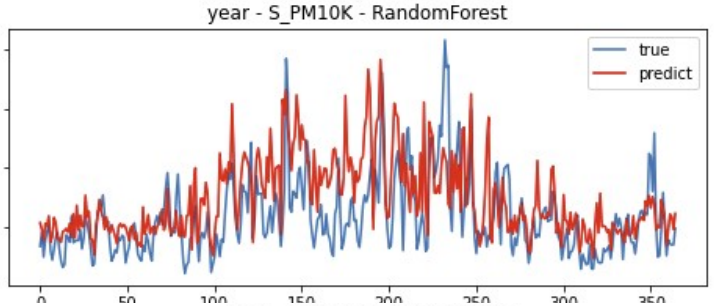

year - N_PM10K - Prophet Modified
true
predict

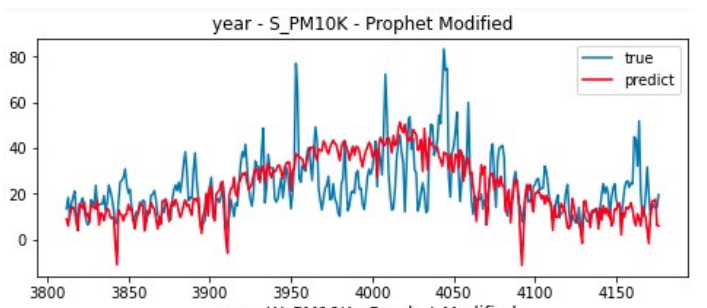


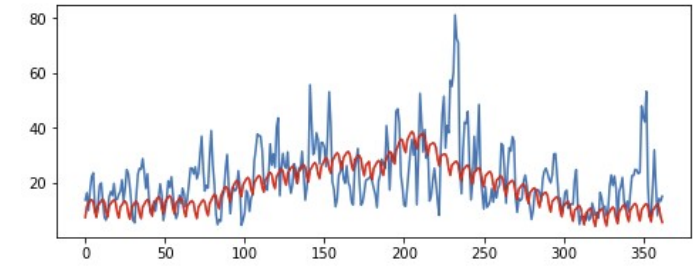

year - O_PM10K - RandomForest
true
predict

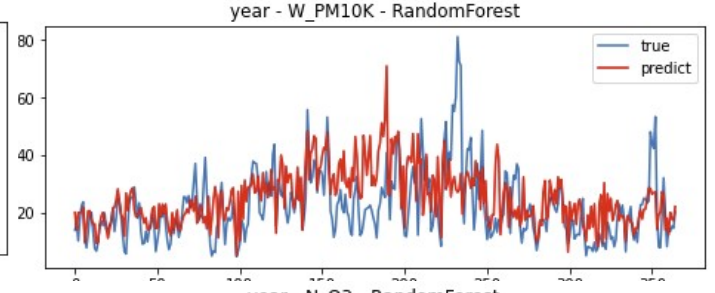

year - O_PM10K - Prophet Modified
true
predict

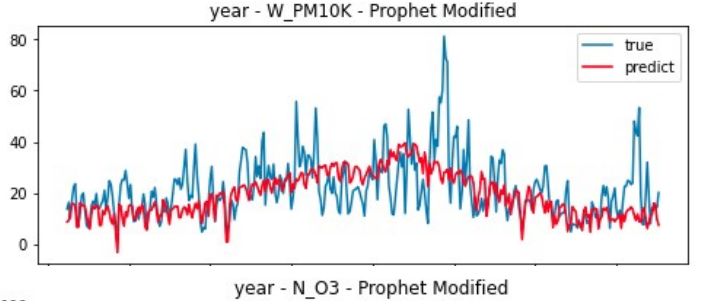


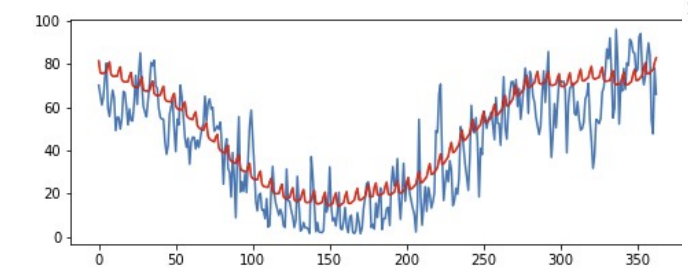

year - S_PM10K - RandomForest
true
predict

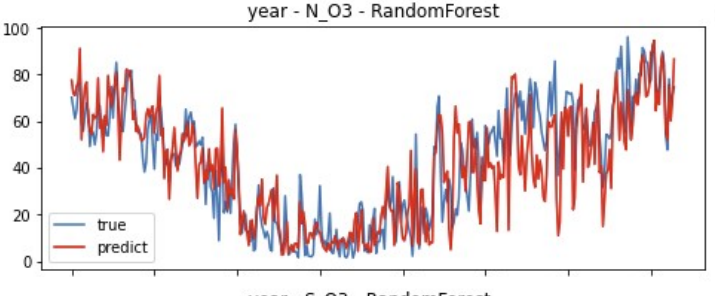

year - S_PM10K - Prophet Modified
true
predict

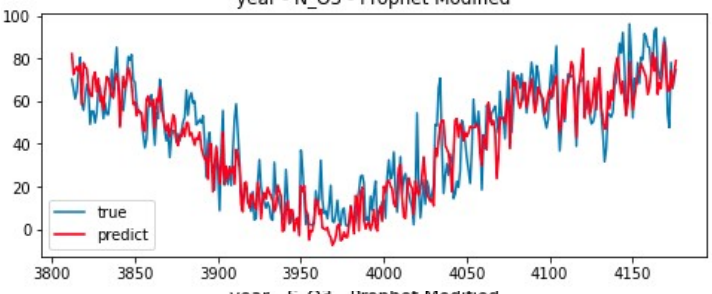


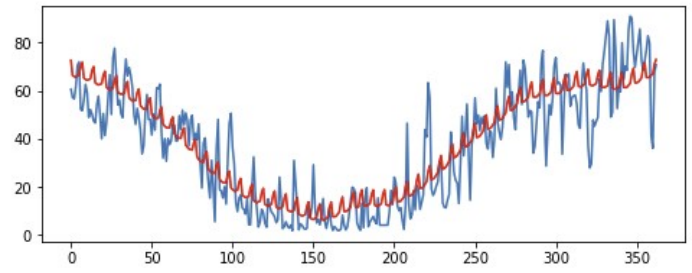

year - W_PM10K - RandomForest
true
predict

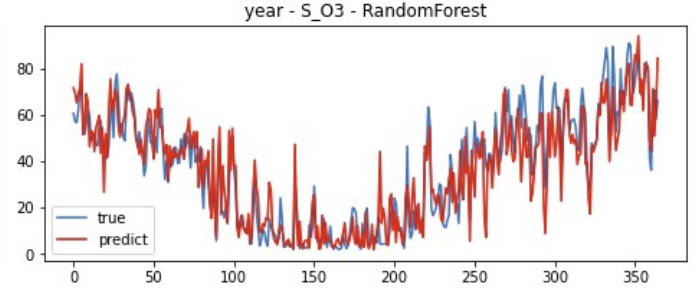

year - W_PM10K - Prophet Modified
true
predict

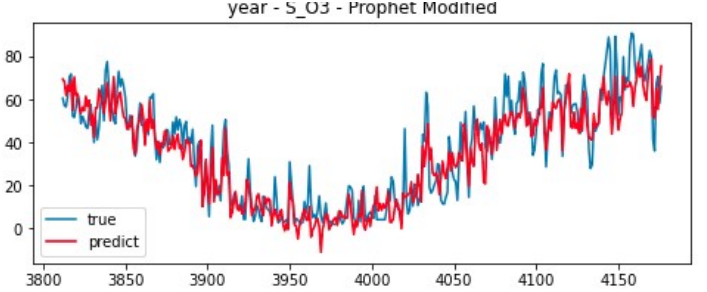


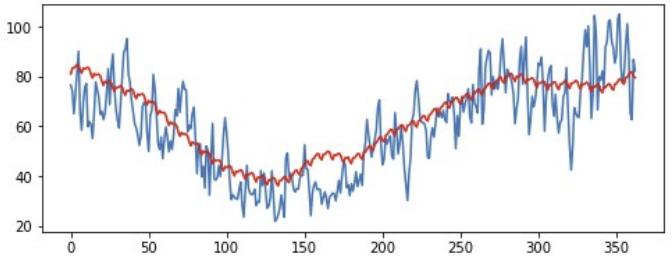

year - N_O3 - RandomForest
true
predict

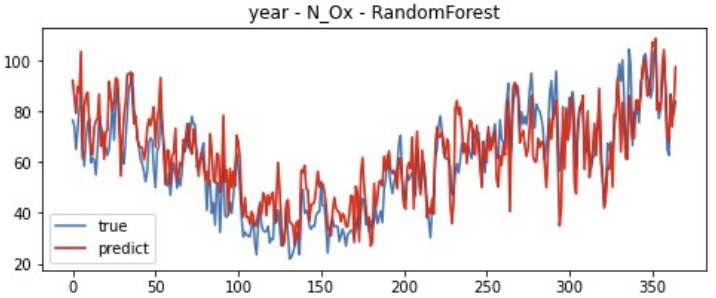

year - N_O3 - Prophet Modified
true
predict

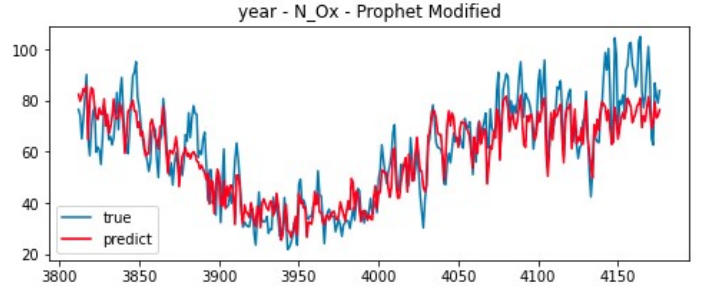


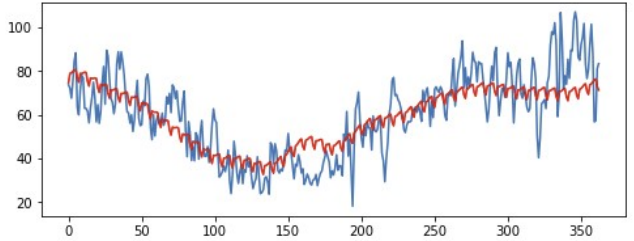

year - S_O3 - RandomForest
true
predict

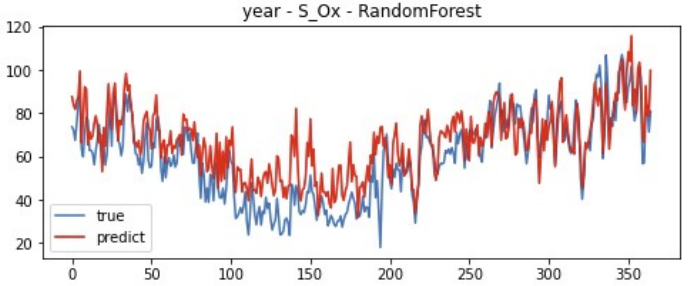

year - S_O3 - Prophet Modified
true
predict

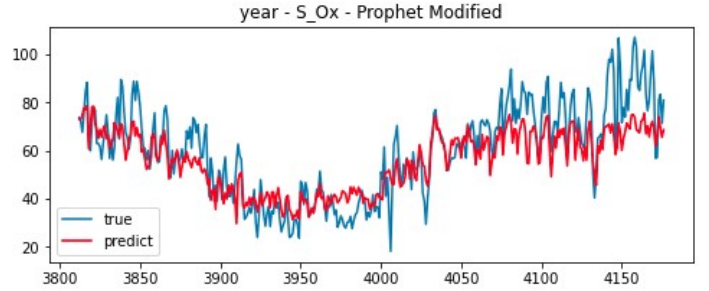



year - N_Ox - RandomForest
true
predict

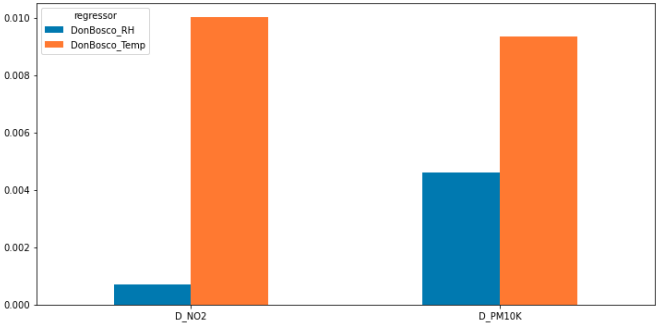

year - N_Ox - Prophet Modified
true
predict



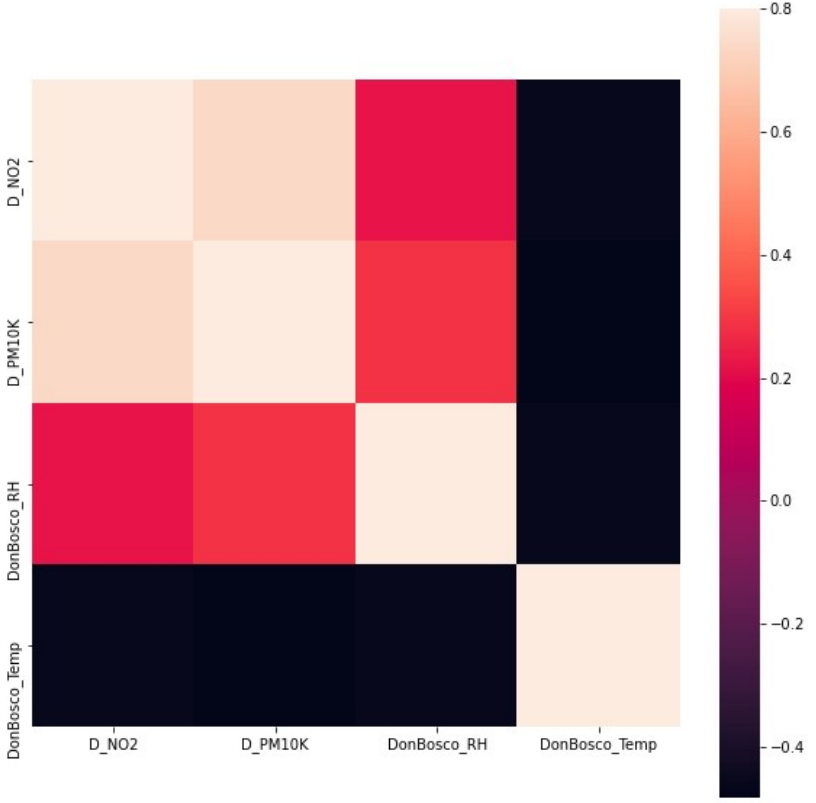

year - S_Ox - RandomForest
true
predict


year - S_Ox - Prophet Modified
true
predict

Coefficients & Correlation

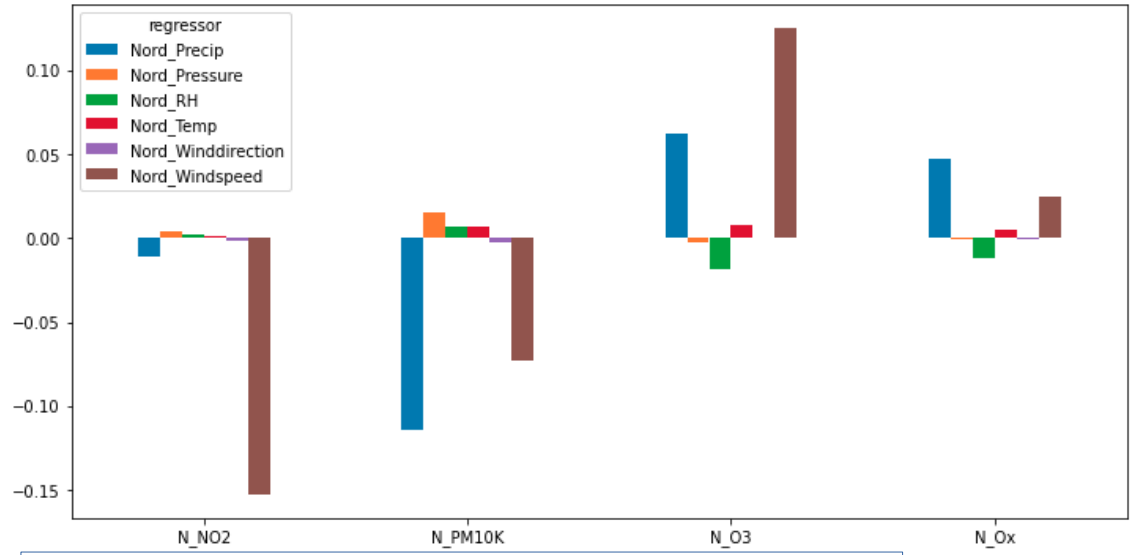


regressor	D_NO2	D_PM10K
DonBosco_RH	0.000707	0.004614
DonBosco_Temp	0.010019	0.009347

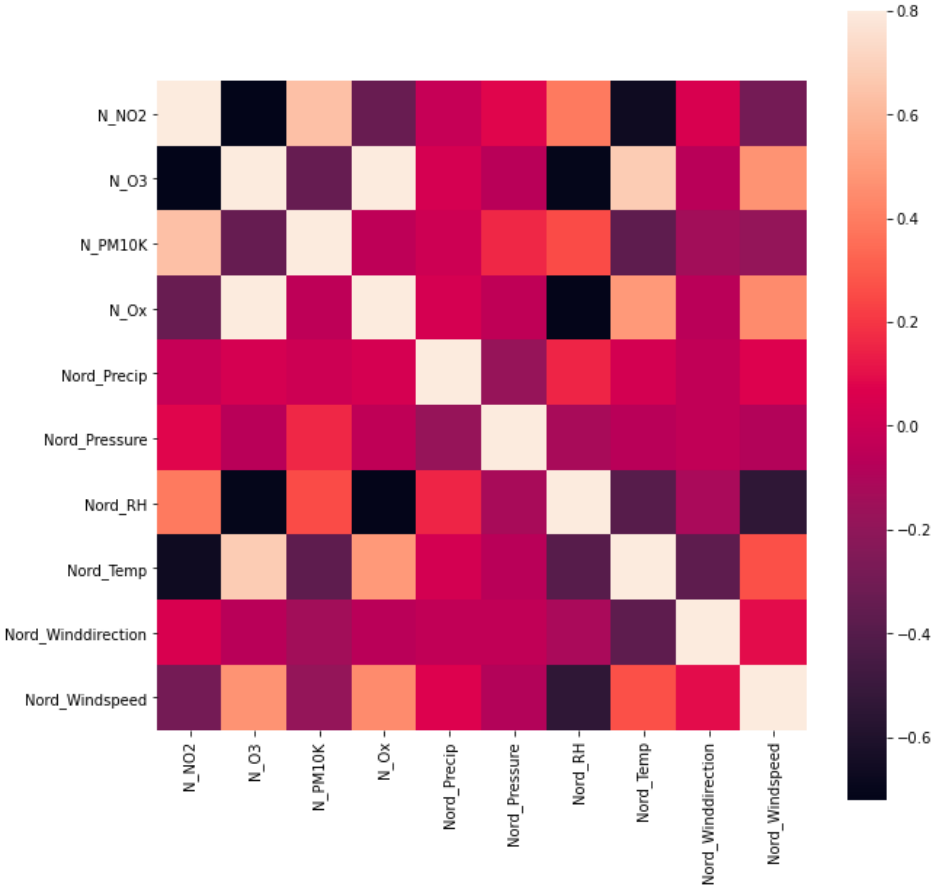


- Temp has high coef but corr is negative?

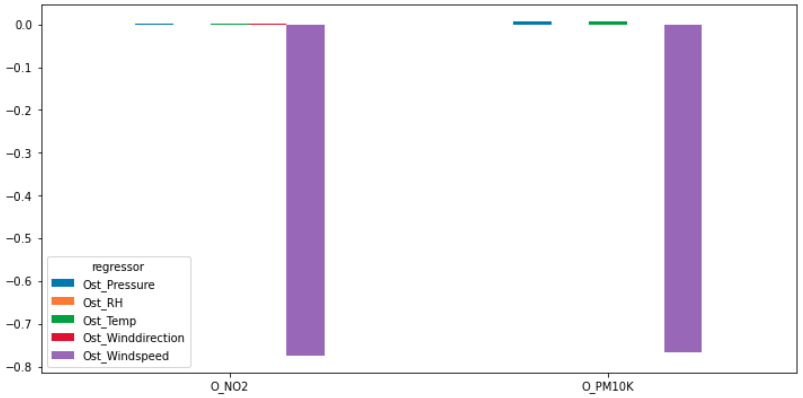
https://facebook.github.io/prophet/docs/seasonality,_holiday_effects,_and_regressors.html#coefficients-of-additional-regressors



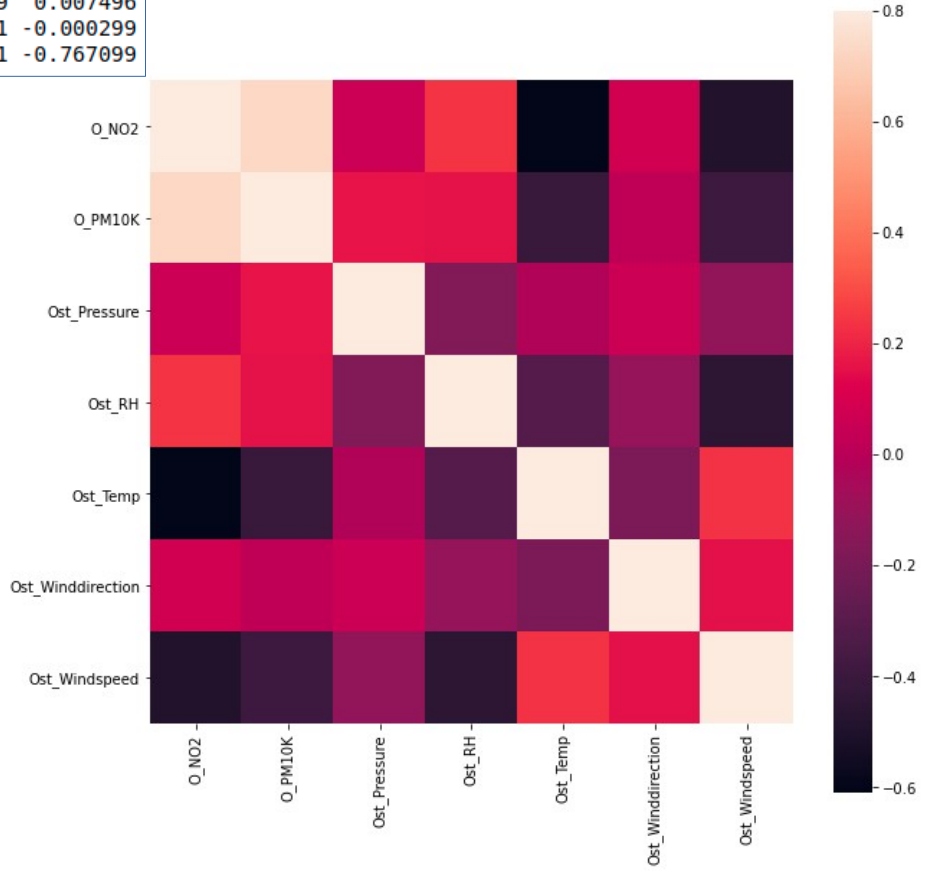
regressor	N_NO2	N_PM10K	N_O3	N_Ox
Nord_Precip	-0.010521	-0.114504	0.062641	0.047139
Nord_Pressure	0.003709	0.015173	-0.002355	-0.000276
Nord_RH	0.002398	0.007072	-0.018710	-0.011716
Nord_Temp	0.001723	0.007208	0.007975	0.004673
Nord_Winddirection	-0.001496	-0.002478	0.000282	-0.000432
Nord_Windspeed	-0.152573	-0.073217	0.125488	0.024473

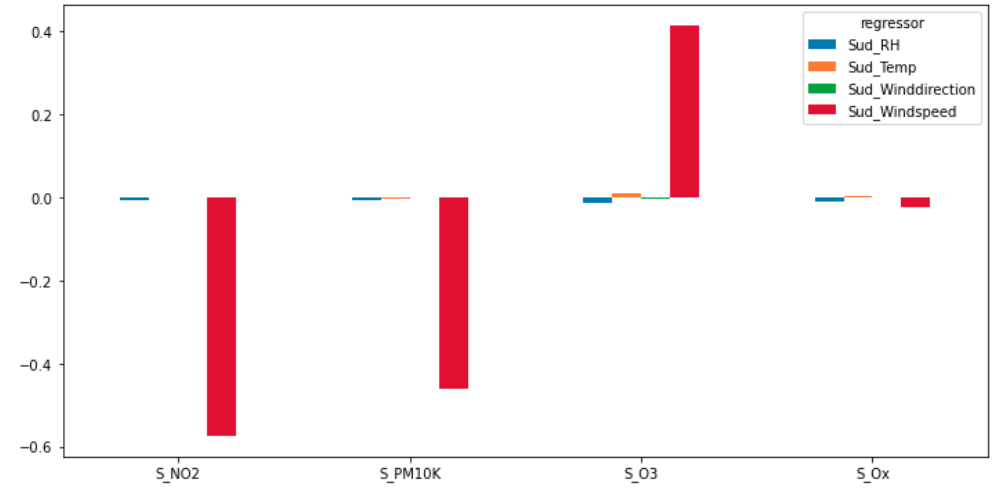


- Pressure > RH > Temp

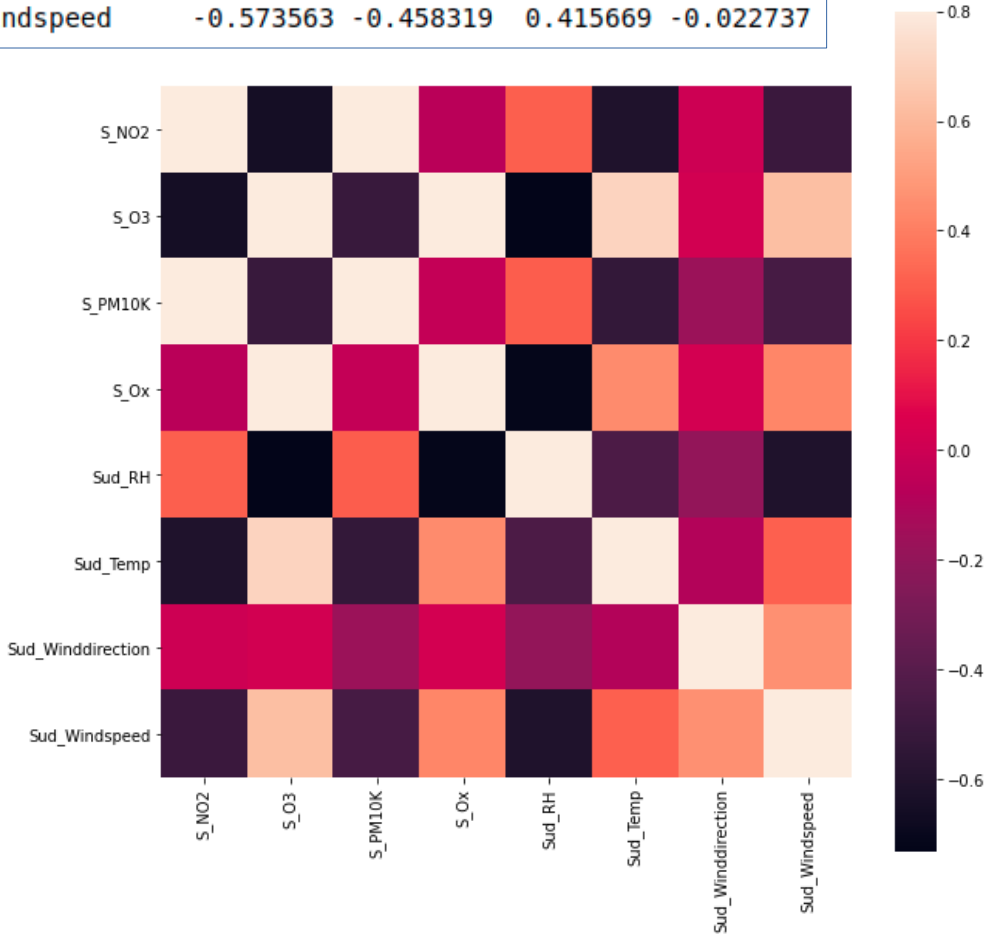


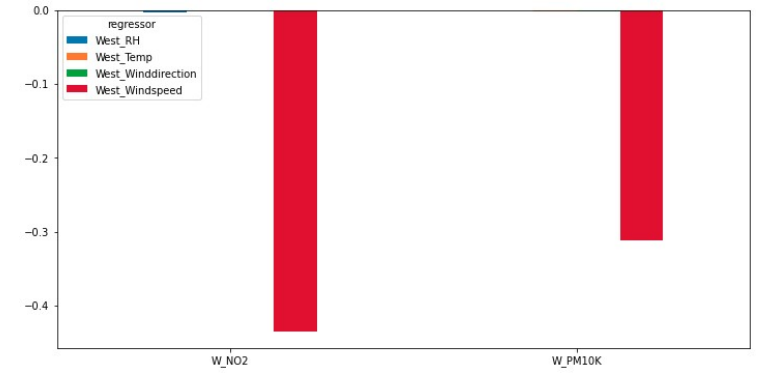
regressor	O_NO2	O_PM10K
Ost_Pressure	0.001655	0.008211
Ost_RH	-0.000690	0.000149
Ost_Temp	0.002909	0.007496
Ost_Winddirection	0.000461	-0.000299
Ost_Windspeed	-0.774771	-0.767099



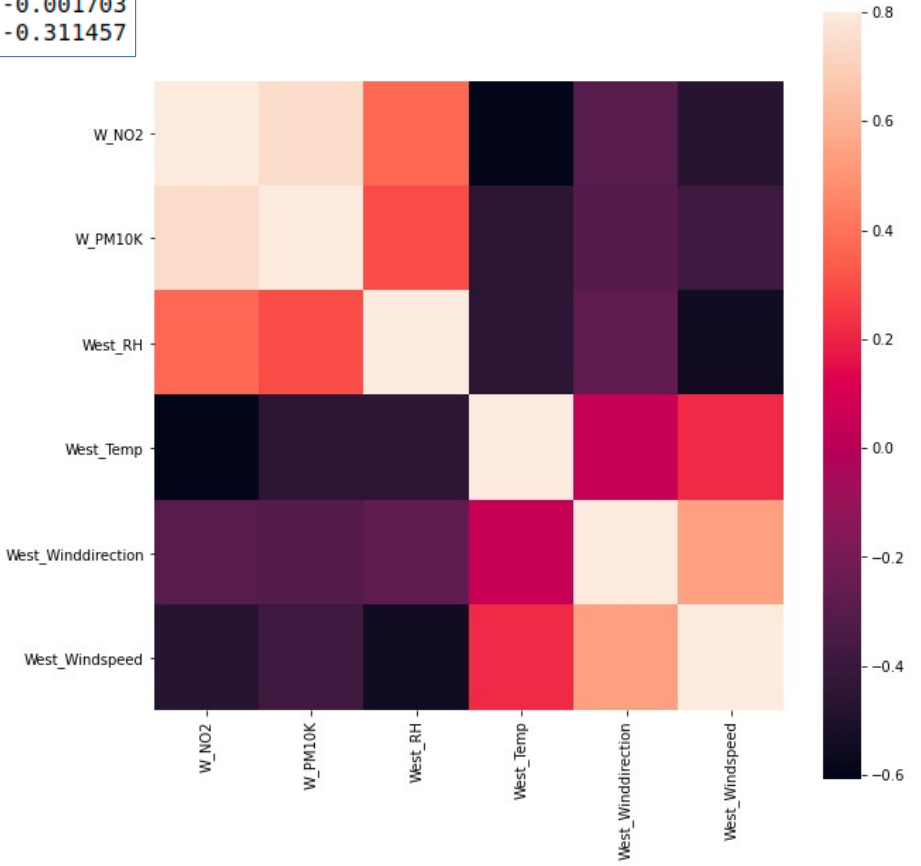


regressor	S_NO2	S_PM10K	S_O3	S_Ox
Sud_RH	-0.007267	-0.006160	-0.012604	-0.010230
Sud_Temp	0.000160	-0.002673	0.008860	0.003809
Sud_Winddirection	0.001981	-0.001101	-0.002295	-0.000373
Sud_Windspeed	-0.573563	-0.458319	0.415669	-0.022737





regressor	W_NO2	W_PM10K
West_RH	-0.003751	-0.000825
West_Temp	-0.000197	-0.001601
West_Winddirection	-0.000302	-0.001703
West_Windspeed	-0.435746	-0.311457



Too small coef

Improvements

- NN
- Parameter Tuning
  - Random forest
    - #trees
    - max_depth
    - C
    - ...
  - Prophet
    - Seasonal
    - mcmc_samples
    - holidays_prior_scale
    - changepoint_prior_scale
    - yearly_seasonality, weekly_seasonality, daily_seasonality
    - prior_scale (for add_regressor)
    - Normalization (?)
- Filter/Cross-features

Thank you!