Machine Learning to disentangle drivers of air quality changes in China during the COVID-19 lockdown

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Machine Learning (ML) model is widely used to make predictions of air pollutant concentration in the 'business as usual'scenario. Compared with chemical transport model, ML model cannot be limited by its spatial resolution and potentially outdated emission inventories. To quantify the contribution of the meteorological driver of air pollutants during the COVID-19 lockdown period in China, Gradient Boosting Machine (GBM) was applied to predict the concentrations of NO2 and O3 in the first three months of 2020. To select the best ML model, the time-series split rolling method is selected to execute the cross-validation. The results show that the prediction is reliable with RMSE = $13.2 \,\mu$ gm-3 and PCC (Pearson Correlation Coefficient) = 0.71 for the prediction experiment. Finally, we conclude that the meteorological conditions prevailing in 2020 contribute to an increase in NO2 with an average value of 7.8% when compared to climatological 2015-2019 conditions.

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