

Response to reviewer comments

We are sincerely grateful to the editor and reviewers for their valuable time spent on reviewing our manuscript. The comments are very helpful and valuable, and we have addressed the issues raised by the reviewers in the revised manuscript. Please find our point-by-point response (in blue font) to the comments (in black font) raised by the reviewers.

Referee #3:

COMMENTS TO THE AUTHOR(S)

This study employs the random forest models to predict typhoon-associated air quality quantitatively in the Guangdong-Hong Kong-Macao Greater Bay Area. The prediction models are established for typhoon and non-typhoon days. Thus, the results suggest that different air pollution control strategies for typhoon days and non-typhoon days should be adopted. The work is innovative well written and interesting to the readers of AMT.

I have two questions below.

1. The present study takes 36 air quality monitoring stations in 10 cities in the GBA (Guangzhou, Shenzhen, Zhuhai, Foshan, Zhaoqin, Jiangmen, Huizhou, Dongguan, Zhongshan, Hong Kong) as research objects. Why did you not consider data from the rural regions?

Response: Many thanks for your efforts for reviewing our manuscript and your kind suggestion. Both the population and stations are denser over urban area relative to rural areas. Our objective is to explore the performance, indication and possible application of machine learning-based algorithm in typhoon associated air quality in the Guangdong–Hong Kong–Macao Greater Bay Area. We hope this study can help improve the prediction and assessment of typhoon-associated air quality over cities in the GBA.

2. The study used ERA5 reanalysis from meteorological data. Couldn't these data be integrated with those coming from other high-resolution instruments? For example, lidar or meteorological radiosondes?

Response: Thank you for the question. Indeed, the inputs of observations from other high-resolution instruments (e.g., lidar and radiosondes) can help improve the accuracy of RF model. Nevertheless, we cannot obtain lidar or meteorological radiosondes in the GBA in the present stage. More importantly, by using the ERA5 reanalysis, we can introduce the ECMWF's forecast data into the model, along with the predicted typhoon tracks and intensity (such as that released by the CMA), into our model to make the prediction. We stated this point at lines 99-101 in section 2.1 as follows:

Using the model constructed with the data above, the future air quality under the effect of the typhoon can be predicted. To be specific, the forecasted air quality can be acquired by replacing the ERA5 reanalysis meteorological data with the ECMWF's forecast field and introducing the predicted typhoon location and intensity (for example, from the CMA).