

An Estimation of Impact of Grid-Nudging on the Ozone Simulation in Asia

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Abstract

Air pollution and climate change, both recognized as critical environmental issues, are closely interconnected. In air quality modelling for the past to present situation, meteorological fields are often nudged into reanalysis data inside model domain (i.e. grid-nudging) to ensure their reproducibility. This is also expected to better simulate air pollutants concentration. However, whether this approach is valid for the future where no reanalysis data is available has not been well investigated, especially when using pseudo-global warming methods. Here, we evaluated the impact of meteorological conditions on O₃ concentration in Asian region by conducting two WRF-CMAQ simulations with and without grid nudging under the current (the year 2016) situation. The simulated average of surface O₃ are larger increased in East Asia, the central-east part of India, around Thailand and Laos, and around Malaysia and Sumatra with grid nudging than without. The largest difference in surface O₃ were mainly occurred in the Bay of Bengal, where O₃ concentration increased up to 10 ppbv compared to without grid nudging. The difference in O₃ between with and without nudging occurred in different seasons in each area ; for instance, it enhanced during the warm seasons in East Asia but during the cold season in India. The annual average of the daily maximum 8-hour average surface O₃ exhibited a similar tendency to the annual average O₃, but the magnitudes of O₃ increases were larger by 4 ppbv. Moreover, surface O₃ in Japan is larger increased by up to 8 ppbv with grid nudging than without. In the presentation, we plan to show the impacts of grid nudging on surface O₃ by comparing simulation results with air quality monitoring data.

Early Career Scientist

NO, I am not an early career scientist.

IGAC Activities

TOAR: Tropospheric Ozone Assessment Report