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Understanding the Causes of Ozone Pollution in the Pearl River Delta, South China: Budget Analysis and Typhoon Influences

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Abstract

Along with the rapid increase of ozone levels in recent years, near-ground ozone pollution is widely concerned in China. The Pearl River Delta (PRD) region, located in the southeast coast of China, is one of the ozone pollution “hotspot”. Understanding the causes of ozone pollution in the PRD is essential to improve air quality, protect human health and ecosystem here in future.

This presentation will show our recent progresses in studying ozone pollution in the PRD, which including the following two parts:

(1) Quantifying ozone budget in the PRD: Budget analysis is a useful tool to quantifying the contributions of multiple ozone processes, especially transport and photochemical production. Based on the modelling results of regional chemical transport model, WRF-CMAQ, we calculated ozone mass and concentration budgets in the atmospheric boundary layer of the PRD. Results show that ozone mass budget was controlled by transport, whereas ozone concentration budget was controlled by photochemical production. Different selections of budget types can lead to different conclusions about the roles of transport and photochemical production in the regional ozone pollution, thus should be careful.

(2) The influence of typhoon periphery on ozone pollution in the PRD: Typhoon periphery is linked to the occurrence of most ozone pollution in the PRD. The general influences of typhoon peripheries on ozone transport, production and accumulation, as well as its difference between two ozone polluted seasons (autumn and summer), are worthy exploring. Thus we designed this systematic comparative study, where meteorological conditions, the contributions of ozone processes and sources with and without typhoon influences were compared. It was concluded that typhoon periphery promotes ozone transport to the PRD in both autumn and summer, but ozone production and accumulation cannot be enhanced simultaneously. Therefore, the contributions of emissions outside the PRD increase during typhoon-influencing periods, and regional emission reduction may be more efficient to alleviate ozone pollution.