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# Regional transport of $PM_{2.5}$ and $O_3$ based on complex network method and chemical transport model in the Yangtze River Delta, China

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Ground-level ozone ($O_3$) and atmospheric fine particulate matter ($PM_{2.5}$) pollution are the major challenges for continually improving air quality in the Yangtze River Delta (YRD) region of China. Understanding regional transport patterns of $PM_{2.5}$ and $O_3$ pollution is essential for the development of regional cooperative prevention strategies. This study shows the annual concentration of $PM_{2.5}$ in the YRD decreased by 18.5% from 2015 to 2018, while the mean values of the daily maximum 8-h average (MDA8) $O_3$ concentration during March to October increased by 16.3%. A complex network method is utilized to investigate the regional transport of $PM_{2.5}$ and $O_3$ in different grid cells (nodes). The source apportionment method within the chemistry transport model is applied to verify the reliability of the complex network method. Interregional and intraregional transport play an important role in both $PM_{2.5}$ and $O_3$ over the YRD. The northern part of the YRD contributes much more than other areas, while the central part of the YRD, especially the southern part of Jiangsu, is the largest contributor of $O_3$ in the YRD in the summer, accounting for about 70%. Intraregional transport plays more of a major role in increasing $PM_{2.5}$ pollution than $O_3$ pollution. This study not only verifies the transport patterns of heavy pollution through the complex network method and traditional source apportionment technology, it also reveals that both methods provide great potential in understanding transport patterns and air pollution relationships, which are the solid foundation for emission mitigation in the YRD region.