

4.027 Agricultural fire impacts on ozone photochemistry over the Yangtze River Delta region, East China.

Early Career Scientist

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Abstract:

Agricultural fire could affect tropospheric photochemistry by emitting trace gases, interacting with solar radiation or providing reactive surfaces for heterogeneous reactions. We examine the effects of an agricultural fire event (8–13 June, 2012) on ozone photochemistry over the Yangtze River Delta (YRD) region, East China. The on-line WRF-Chem model is used, with the inclusion of a detailed agricultural fire emission inventory and seven heterogeneous reactions on soot surface. Comparisons with satellite and ground observational data indicate that the model is capable of reproducing the transport and evolution of this crop fire event. The precursor emissions from agricultural fire play a major role in modifying ozone photochemistry, with a maximal increase in ozone mixing ratio reaching 20 ppb (40%) near the fire zones in northern Anhui. The radiation feedback generates a small increase of surface NO_2 by 2% and less surface O_3 by 1% in the smoke plume. The effects owing to the heterogeneous uptakes on soot are quite small, with an average change value of +0.8%, -0.5%, -0.7% and +0.8% for O_3 , NO_2 , $\cdot\text{OH}$ and HO_2 .