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Atmospheric Chemistry and Physics Discussions

Supplement of

Ground-level ozone in four Chinese cities: precursors, regional transport and heterogeneous processes

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Table S1. The quantified hydrocarbon species and the categorization.

Category		Species
AHC	LRHC	methane, ethane, propane, ethyne, benzene
	C4HC	*n*-butane, *i*-butane, *n*-pentane, *i*-pentane, *n*-hexane, *n*-heptane, *n*-octane, *n*-nonane, *n*-decane[*], *2*,*2*-dimethylbutane, *2*,*3*-dimethylbutane, *2*-methylpentane, *3*-methylpentane, *2*,*2*-dimethylpentane[=], *2*,*3*-dimethylpentane[=], *2*-methylhexane, *3*-methylhexane, *2*,*2*,*4*-trimethylpentane, *2*,*3*,*4*-trimethylpentane[#,=,&], cyclopentane[=,&], methylcyclopentane[#,&], cyclohexane[&], methylcyclohexane[#,=,&]
	Alkenes	ethene, propene, *1*-butene, *i*-butene, *trans*-*2*-butene, *cis*-*2*-butene, *1*,*3*-butadiene, *1*-pentene, *trans*-*2*-pentene[=], *cis*-*2*-pentene[=], *3*-methyl-*1*-butene[&], *2*-methyl-*1*-butene[#,=,&], *2*-methyl-*2*-butene[#,=,&]
	R-AROM	toluene, ethylbenzene, *m*-xylene, *p*-xylene, *o*-xylene, *n*-propylbenzene[&], *i*-propylbenzene[#,&], *m*-ethyltoluene[&], *p*-ethyltoluene[&], *o*-ethyltoluene[&], *1*,*2*,*3*-trimethylbenzene, *1*,*2*,*4*-trimethylbenzene, *1*,*3*,*5*-trimethylbenzene, styrene[#,=,&]
BHC		isoprene, α-pinene, β−pinene[&]

[*] Species that were not measured in Beijing;
[#] Species that were not measured in Shanghai;
[=] Species that were not measured in Guangzhou;
[&] Species that were not measured in Lanzhou.

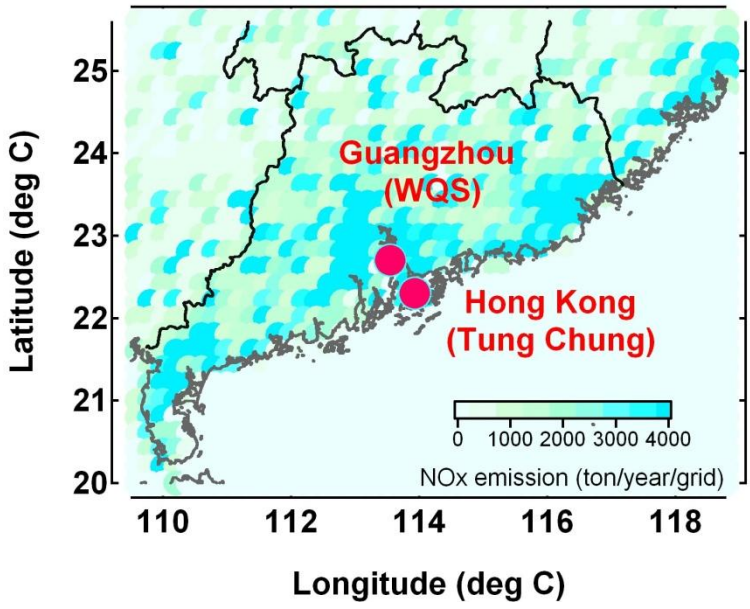

Figure S1. Locations of the Wan Qing Sha (Guangzhou) and Tung Chung (Hong Kong) sites.

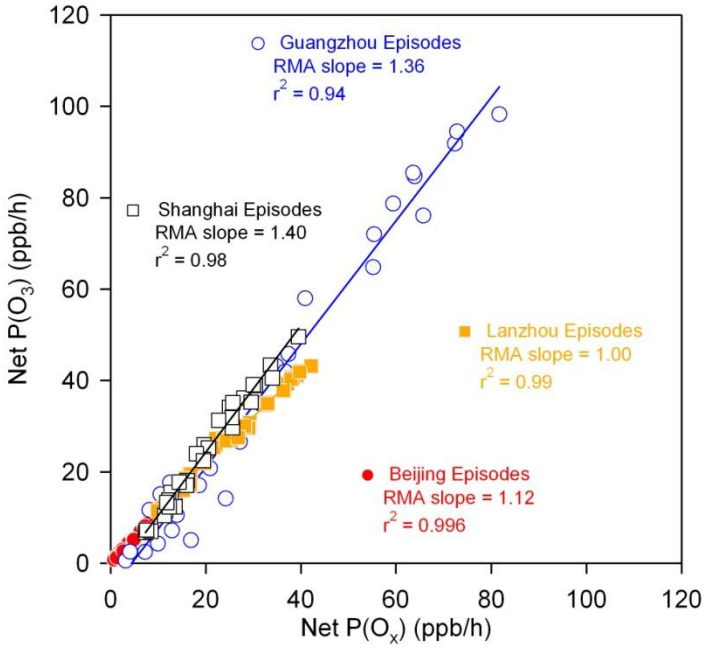

Figure S2. Comparison of the OBM-calculated daytime net production rates of O_3 and O_x (=O_3+NO_2; from traditional method) in the four cities. The net O_3 rates are overall systematically higher than those of O_x because of the net loss (oxidation) of NO_2 at daytime. The larger slopes in Shanghai and Guangzhou are due to their higher levels of NO_x (and hence higher loss rates of NO_2).

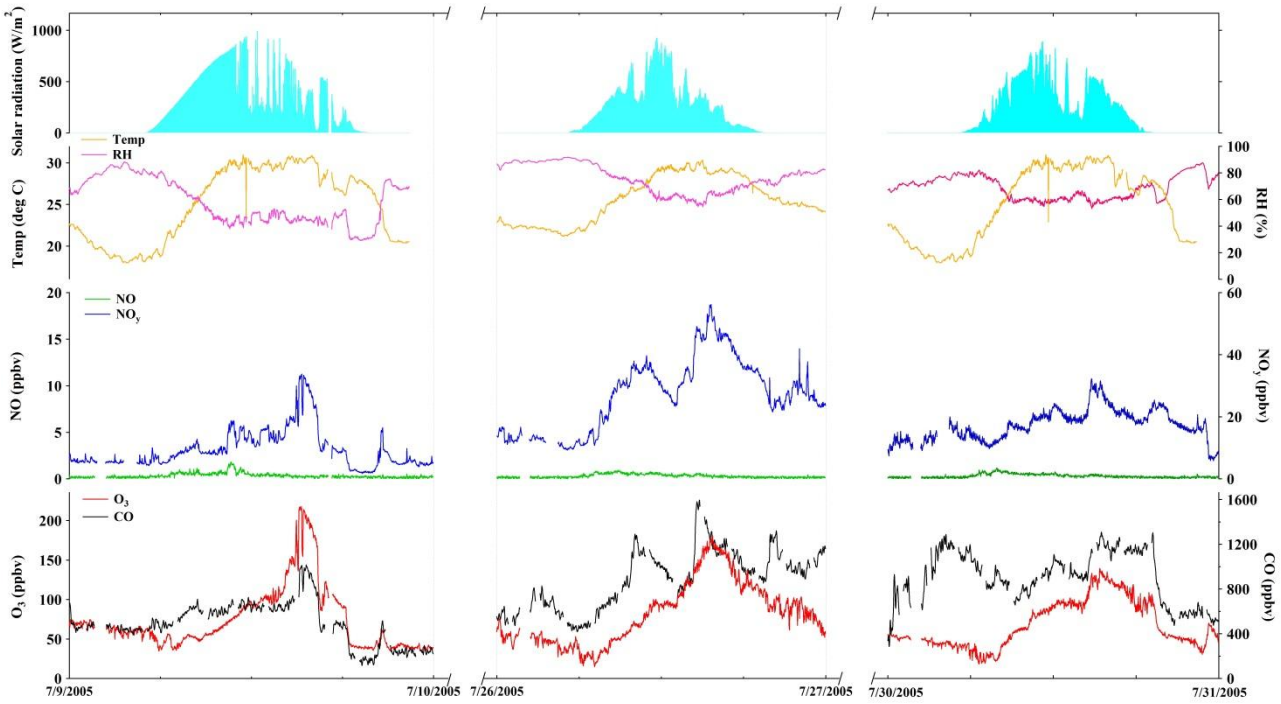

Figure S3. Time series of trace gases and meteorological parameters observed during the selected ozone episode days in Beijing in summer 2005

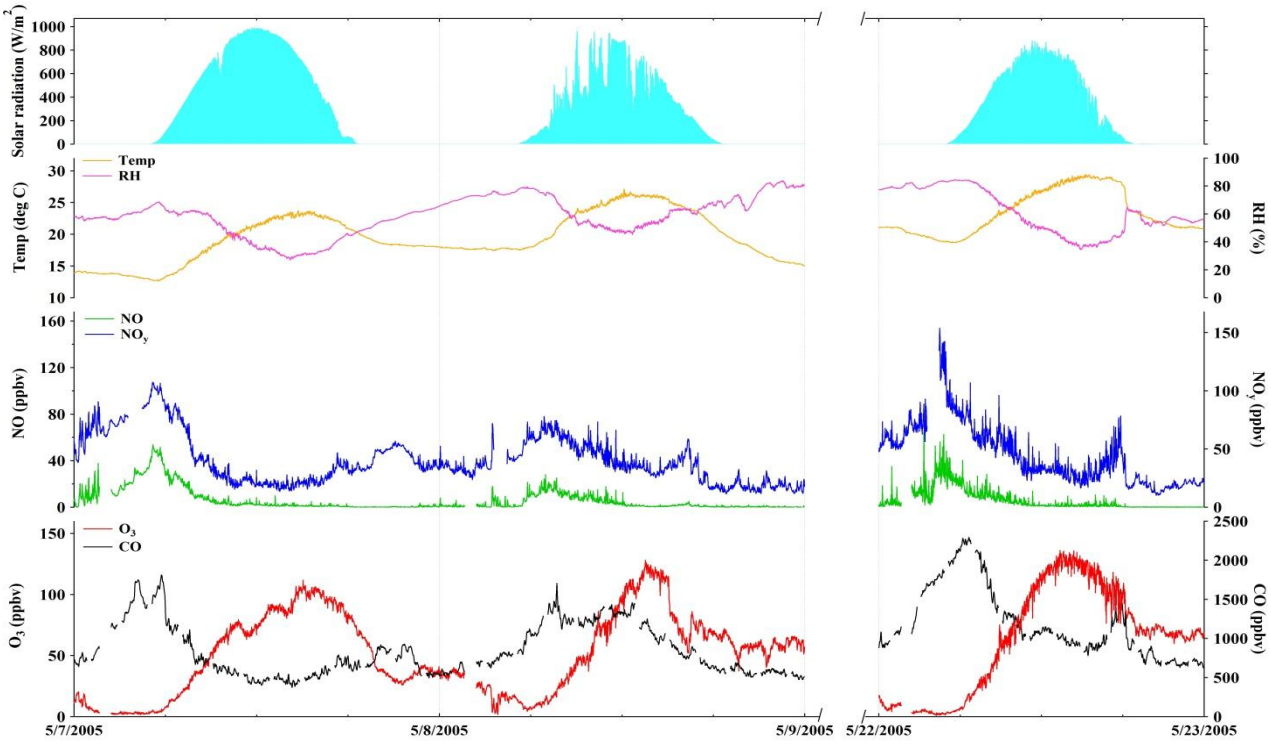

Figure S4. Time series of trace gases and meteorological parameters observed during the selected ozone episode days in Shanghai in late spring/early summer 2005

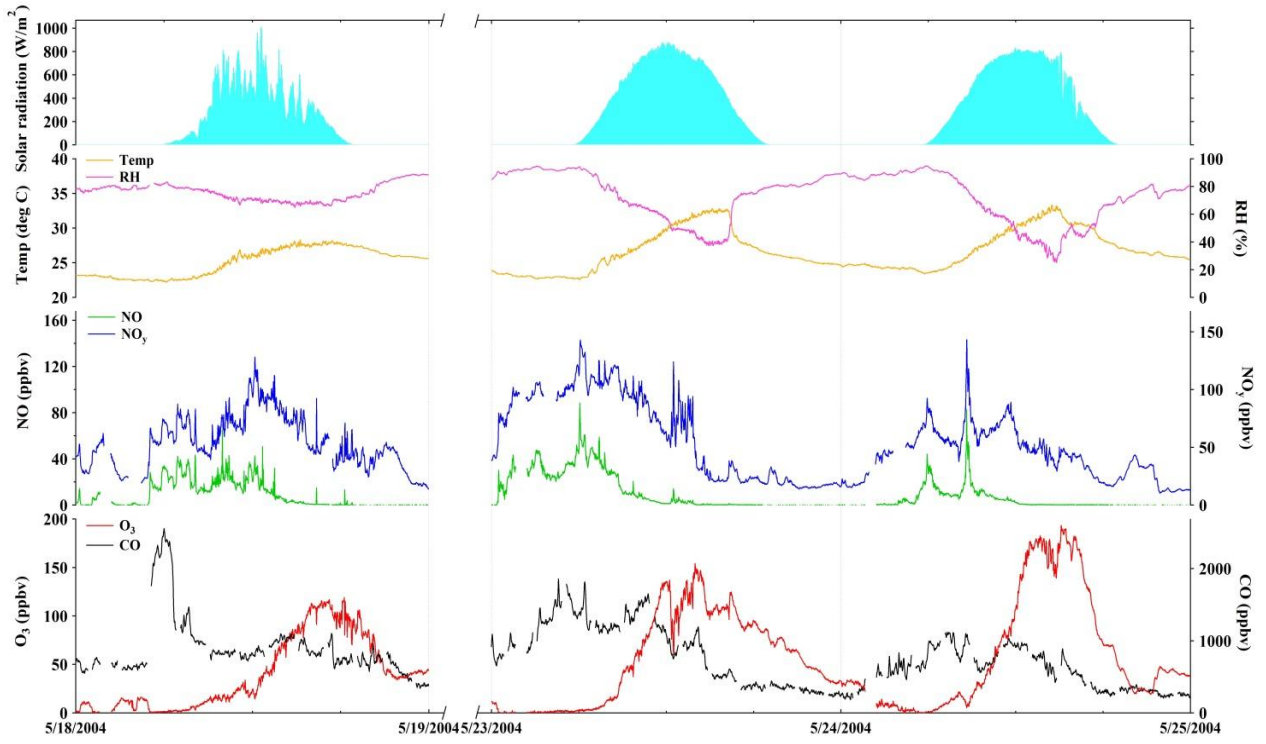

Figure S5. Time series of trace gases and meteorological parameters observed during the selected ozone episode days in Guangzhou in late spring 2004

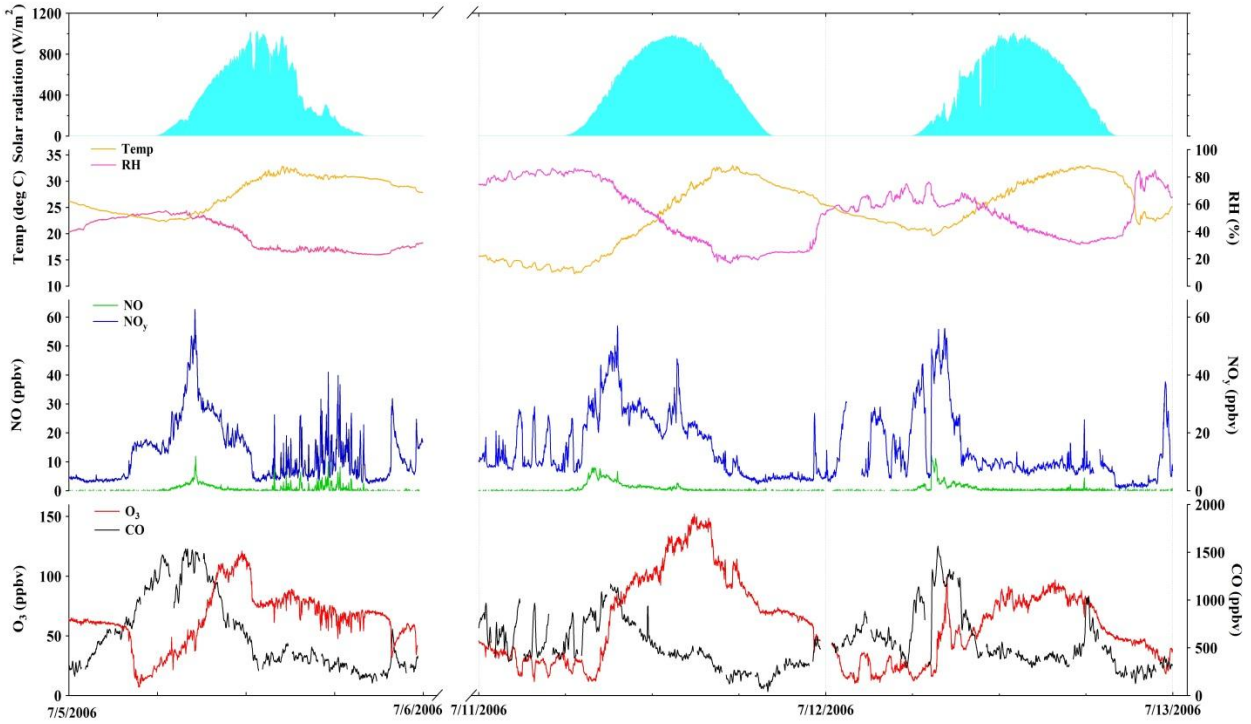

Figure S6. Time series of trace gases and meteorological parameters observed during the selected ozone episode days in Lanzhou in summer 2006

1. Hydrocarbon reactivity analysis

Analysis of the hydrocarbon reactivity is critical for understanding the ozone photochemistry at a given location. In the present study, we analyzed the OH reactivity of major hydrocarbons, which is calculated based on the following equation.

$$R_{VOCi} = k_{OH+VOCi} * [VOC_i] \qquad \text{(Equation S1)}$$

Where, the k_{OH+VOC} is the rate constant of the reaction between a VOC species and OH, and [VOC] is the measured concentration of the VOC species. The rate constants were taken from the Master Chemical Mechanism (v3.2; http://mcm.leeds.ac.uk/MCM/). As the OH reactivity takes both atmospheric abundances and reactivity towards OH into account, it is a better proxy than the concentration alone to predict the ozone formation potential of a given species.