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Impact of urban heat island on inorganic aerosol in the lower free troposphere: a case study in Hangzhou, China

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Table S1. Parameterizations used for WRF-CMAQ simulations

WRF		CMAQ	
Microphysics	Thompson scheme	Gas chemistry scheme	CB05
Short- and long-wave radiation	Rapid Radiative Transfer Model for General circulation models (RRTMG) scheme	Aerosol scheme	Aero6
PBL scheme	Bougeault-Lacarrère PBL (BouLac)		
Land surface model	Four-layer Noah land surface model		
Urban canopy model	Multi-layer Building Environment Parameterization (BEP) scheme		

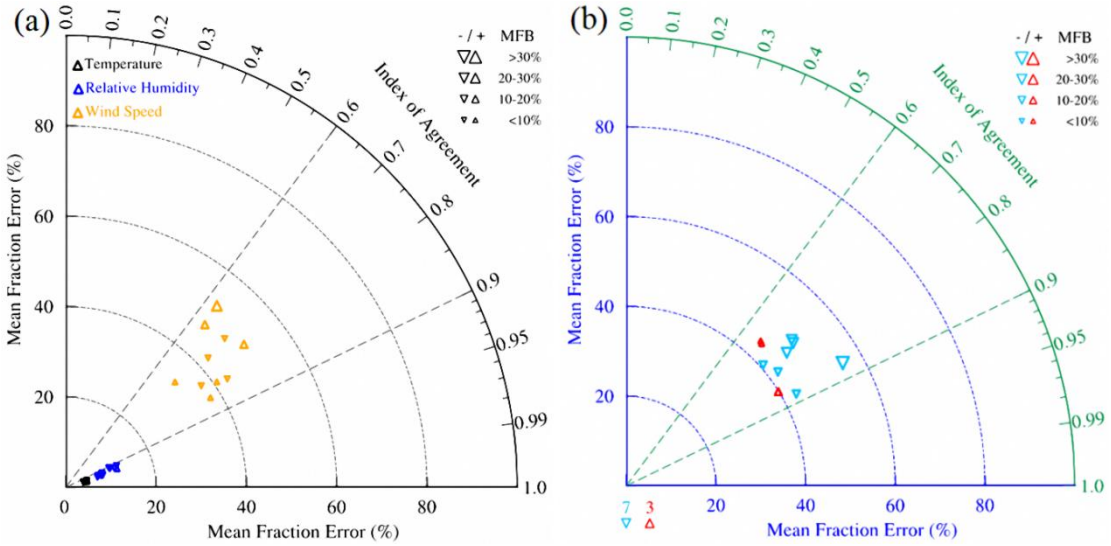

Figure S1. Taylor diagram of index of agreement, mean fraction bias (MFB) and mean fraction error (MFE) between simulated (CTL experiment) and observed (a) air temperature, relative humidity, and wind speed at 10 sites in Hangzhou (white stars in Fig. 1b); and (b) $PM_{2.5}$ concentrations at 10 sites in Hangzhou (yellow filled circles in Fig. 1b).

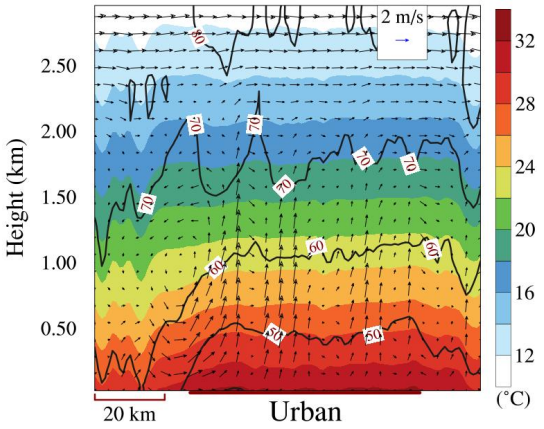

Figure S2. Vertical cross section of averaged (from 12:00 to 17:00 LT, on 18 September 2017) air temperature (°C; filled colors), relative humidity (%; solid contour lines), and in-plane vectors (m s^{-1}; arrows), where vertical wind speed is expanded by 10 times, in the CTL simulation.

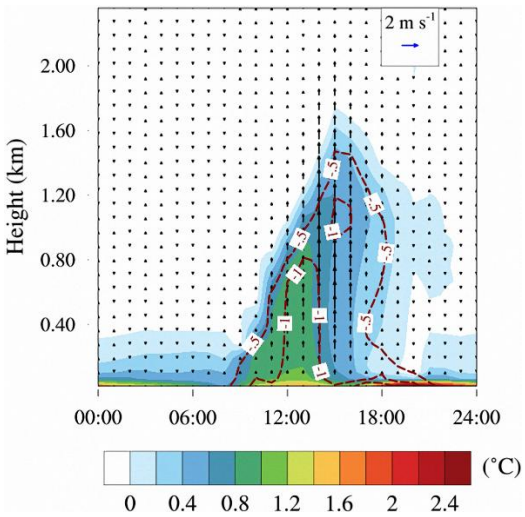

Figure S3. Spatially averaged diurnal variation of the differences between the vertical profiles from the CTL and NUB experiments over Hangzhou on September 18, 2017, for temperature (°C; filled colors), specific humidity (g kg^{-1}; dashed contour lines), and vertical speed (m s^{-1}; arrows). Note that the vertical speed is expanded by 10 times.

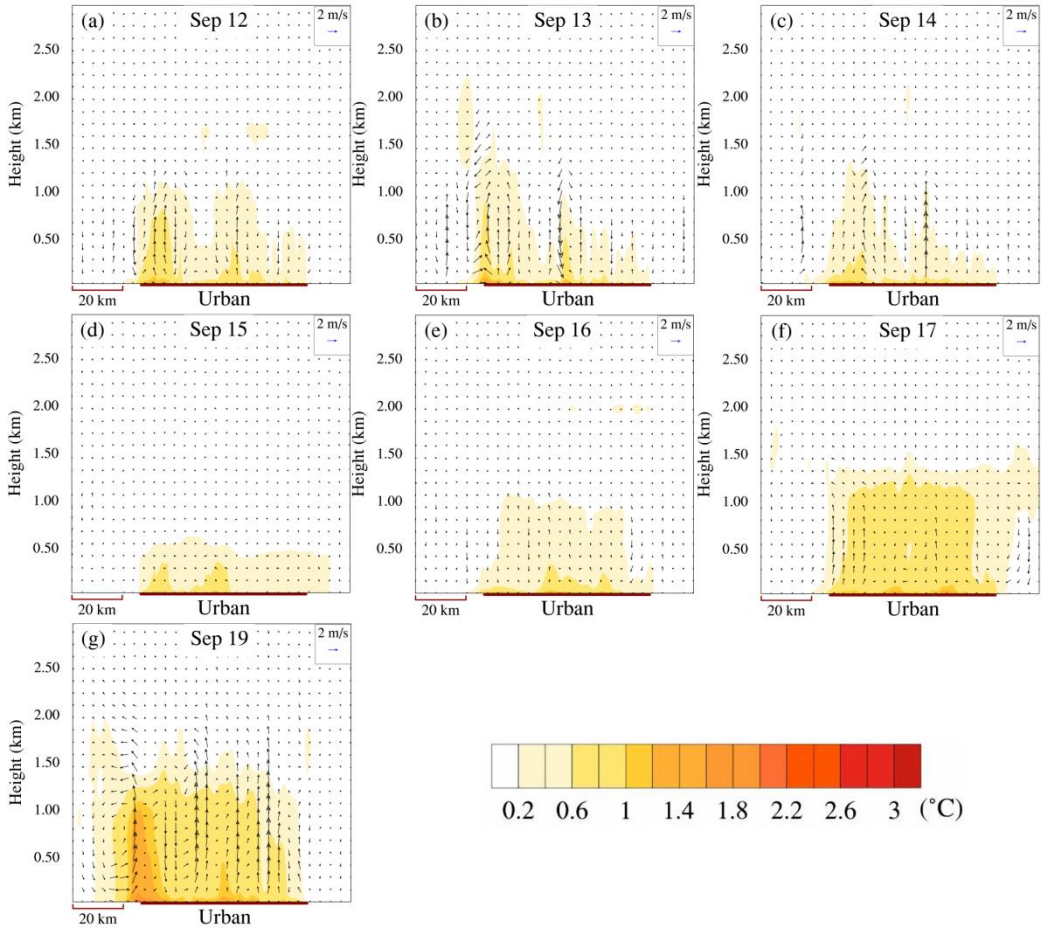

Figure S4. Vertical cross sections of the difference in averaged (from 12:00 to 17:00 LT on each day) temperature (°C; filled colors) and in-plane vectors (m s^{-1}; arrows) between the CTL and NUB experiments (CTL-NUB). Note that the vertical wind speed vectors are expanded by 10 times.

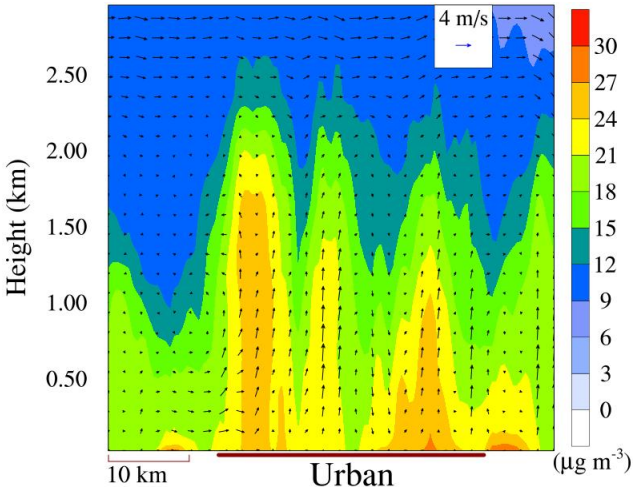

Figure S5. Vertical cross section of averaged (from 12:00 to 17:00 LT, on 18 September 2017) $PM_{2.5}$ concentration (μg m^{-3}; filled colors) and in-plane vectors (m s^{-1}; arrows), where vertical wind speed is expanded by 10 times, in the CTL simulation.

Table S2. Average UHI effects during the 8-day experiment, for each day between 12:00 and 17:00 LT.

Date	**UHII (°C)**	**WS_BL[1] (m s^{-1})**	**W_BL_D[2] (cm s^{-1})**	**W_FT_D[3] (cm s^{-1})**
Sep 12	1.4	4.5	1.2	1.0
Sep 13	1.6	6.9	1.1	0.6
Sep 14	1.6	8.3	−0.2	0.0
Sep 15	1.1	7.8	0.2	−0.5
Sep 16	1.4	6.6	1.1	0.6
Sep 17	1.5	4.3	0.3	1.9
Sep 18	1.9	2.1	10.0	5.9
Sep 19	1.6	2.7	6.4	2.5

[1] Averaged horizontal wind speed in the urban boundary layer of Hangzhou. [2] Difference of averaged boundary-layer vertical velocity between the CTL and NUB simulations. [3] Difference of averaged vertical velocity in the LFT between the CTL and NUB simulations.

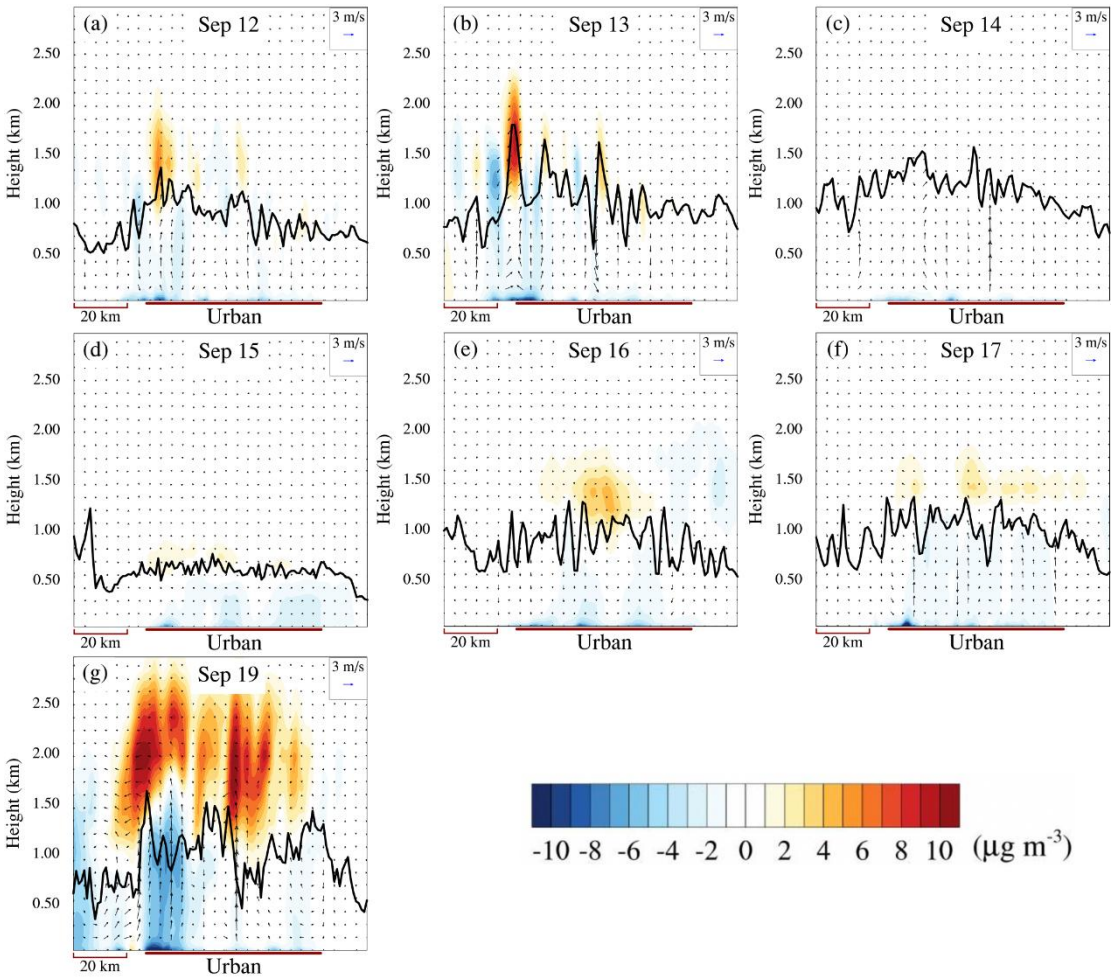

Figure S6. Vertical cross section of the difference in averaged (from 12:00 to 17:00 LT on each day) $PM_{2.5}$ concentration (μg m^{-3}; filled colors) and in-plane wind vectors (m s^{-1}; arrows) between the CTL and NUB experiments. Note that the vertical speed is expanded by a factor 10. The black line denotes the BL height.