

Supporting Information for "Regional impacts of black carbon morphologies on aerosol-radiation interactions: A comparative study between the US and China"

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Table S1. Physical scheme in WRF-chem.

Physics	Option
Micro-physics (mp_physics)	Purdue Lin scheme
Cumulus parameterization (cu_phy)	Grell 3D
Long-wave radiation (ra_lw)	RRTMG
Short-wave radiation (ra_sw)	RRTMG
Surface layer (sf_sfclay)	Revised MM5 Monin-Obukhov scheme
Land surface (sf_surface)	Unified Noah land-surface model
Boundary layer (bl_pbl)	YSU scheme

Table S2. Species Mapping of WRF-Chem and FlexAOD in Northern America.

Name in WRF-chem	Mapped name
so4_a01	inorganic salt
so4_a02	inorganic salt
so4_a03	inorganic salt
so4_a04	inorganic salt
no3_a01	inorganic salt
no3_a02	inorganic salt
no3_a03	inorganic salt
no3_a04	inorganic salt
nh4_a01	inorganic salt
nh4_a02	inorganic salt
nh4_a03	inorganic salt
nh4_a04	inorganic salt
bc_a01	black carbon
bc_a02	black carbon
bc_a03	black carbon
bc_a04	black carbon
oc_a01	organic carbon
oc_a02	organic carbon
oc_a03	organic carbon
oc_a04	organic carbon
cl_a01	sea salt
cl_a02	sea salt
cl_a03	sea salt
cl_a04	sea salt
na_a01	sea salt
na_a02	sea salt
na_a03	sea salt
na_a04	sea salt
oin_a01	dust
oin_a02	dust
oin_a03	dust
oin_a04	dust

Table S3. Species Mapping of WRF-Chem and FlexAOD in Eastern China.

Name in WRF-chem	Mapped name
so4ai	inorganic salt
so4aj	inorganic salt
no3ai	inorganic salt
no3aj	inorganic salt
nh4ai	inorganic salt
nh4aj	inorganic salt
eci	black carbon
ecj	black carbon
orgaro1i	organic carbon
orgaro1j	organic carbon
orgaro2i	organic carbon
orgaro2j	organic carbon
orgalk1i	organic carbon
orgalk1j	organic carbon
orgole1i	organic carbon
orgole1j	organic carbon
orgba1i	organic carbon
orgba1j	organic carbon
orgba2i	organic carbon
orgba2j	organic carbon
orgba3i	organic carbon
orgba3j	organic carbon
orgba4i	organic carbon
orgba4j	organic carbon
orgpai	organic carbon
orgpaj	organic carbon
seas	sea salt
clai	sea salt
claj	sea salt
naai	sea salt
naaj	sea salt
p25i	dust
p25j	dust
antha	dust
soila	dust

Table S4. Physical properties of different aerosols.

	inorganic salt	organic carbon	black carbon	sea salt	dust
$r_g(\mu m)$	0.0695	0.075	0.05	0.085	-
σ_g	1.6	1.6	1.6	1.5	-
a	-	-	-	-	0.9
b	-	-	-	-	0.2
$\rho(g/cm^3)$	1.7	1.2	1.8	2.2	2.65
m at 550 nm	1.53+0.006i	1.634+0.021i	1.85+0.71i	1.50 10^{-8} i	1.558 +0.0014i

Table S5. The positions of selected Fire sites.

Fire Sites	Latitude	Longitude
LOC1	40.4°N	-122.9°W
LOC2	40.6°N	-123.5°W
LOC3	40.9°N	-123.2°W

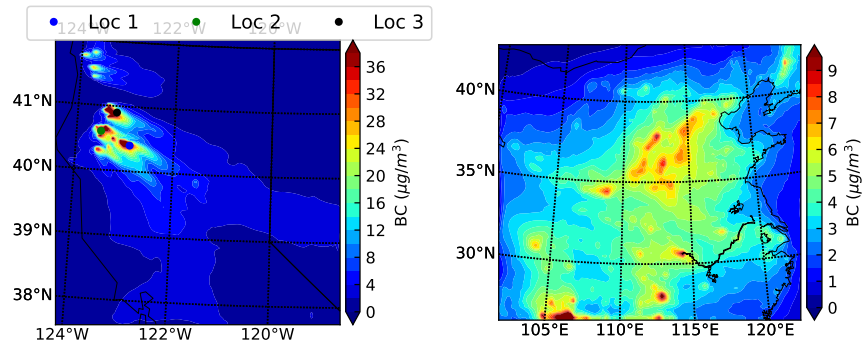


Figure S1. The mean BC distribution in typical north America and East China ($\mu\text{g}/\text{m}^3$).