



Supplement of

Regional impacts of black carbon morphologies on shortwave 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	Purdue Lin scheme (CHEN and SUN, 2002)
Cumulus parameterization	Grell 3D (Georg A. Grell, 1993; Grell and Dévényi, 2002)
Long-wave radiation	RRTMG (Rapid Radiative Transfer Model for GCMs) (Iacono et al., 2008)
Short-wave radiation	RRTMG
Surface layer	Revised MM5 Monin-Obukhov scheme (Jiménez et al., 2012)
Land surface	Unified Noah land-surface model (Chen et al., 1996; Ek et al., 2003)
Boundary layer	YSU (Yonsei University) scheme (Hong et al., 2006)

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

Name in WRF-chem	Mapped name
Sulfate aerosol	Inorganic salt
Nitrate	Inorganic salt
Ammonium	Inorganic salt
Black carbon	Black carbon
Organic carbon	Organic carbon
Chloride salt	Sea salt
Sodium salt	Sea salt
Other inorganic aerosols	Dust

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

Name in WRF-chem	Mapped name
Sulfate	Inorganic salt
Ammonium	Inorganic salt
Nitrate	Inorganic salt
Elemental carbon	Black carbon
Anthropogenic secondary organic aerosols (SOA) from aromatics	Organic carbon
Anthropogenic SOA from alkanes and others	Organic carbon
biological SOA from aromatics	Organic carbon
Anthropogenic primary organic aerosols (POA) from aromatics	Organic carbon
Other primary PM _{2.5}	Dust
Coarse anthropogenic aerosols	Dust
Coarse soil-derived aerosols	Dust
Coarse marine aerosols	Sea salt
Sodium salt	Sea salt
Chloride salt	Sea salt

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

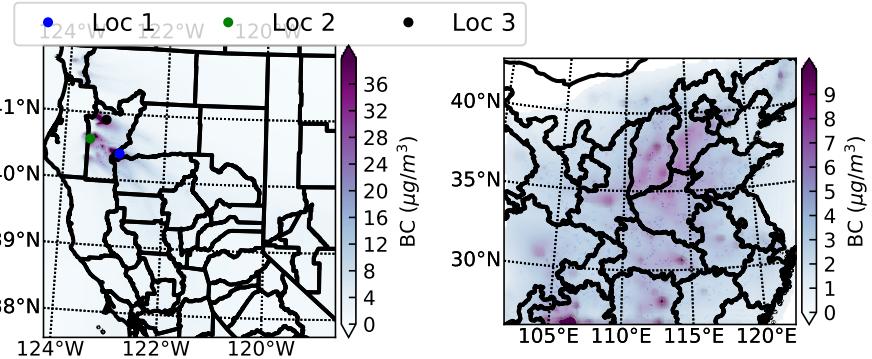


Figure S1. The mean BC distribution in typical north America and East China ($\mu\text{g}/\text{m}^3$).

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