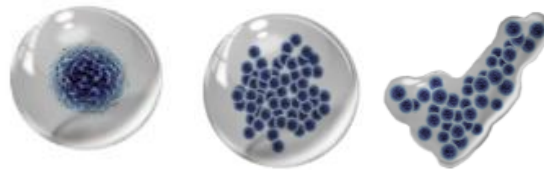


1 Supplementary

2 Table. S1 Optical characteristics from the different models

MODEL	DF	DC	DP	CEXT	CABS	CSCA	MEC1064	MAC1064	MSC1064	MAC532	S/C RATIO
C	2	127	194	0.008249	0.007222	0.001028	4.273068	3.740848	0.53225	7.200429	1.527559
C	2.2	127	194	0.008481	0.00731	0.001171	4.392802	3.786476	0.606372	7.288254	1.527559
C	2.4	127	194	0.008713	0.007426	0.001287	4.512995	3.846496	0.666484	7.403781	1.527559
C	2.6	127	194	0.008807	0.007442	0.001365	4.562144	3.85507	0.706998	7.420285	1.527559
C	2.8	127	194	0.008894	0.007465	0.001429	4.607159	3.867013	0.740192	7.443273	1.527559
B	2.6	118	211	0.009052	0.006749	0.002303	5.845469	4.358303	1.487188	8.388915	1.788136
B	2.8	118	211	0.009081	0.006776	0.002306	5.864437	4.37569	1.488904	8.422382	1.788136
C	2	118	211	0.007509	0.00607	0.001438	4.848982	3.920012	0.928948	7.545286	1.788136
C	2.2	118	211	0.007634	0.00607	0.001565	4.930047	3.919786	1.010442	7.544851	1.788136
C	2.4	118	211	0.007902	0.006153	0.00175	5.103241	3.973302	1.129984	7.64786	1.788136
C	2.6	118	211	0.00805	0.006192	0.001859	5.198757	3.998593	1.200255	7.696539	1.788136
C	2.8	118	211	0.008196	0.006236	0.00196	5.292919	4.02727	1.265694	7.751738	1.788136
B	2.4	111	225	0.008644	0.00569	0.002954	6.706476	4.414534	2.292127	8.497148	2.027027
B	2.6	111	225	0.008784	0.005813	0.002971	6.814749	4.509543	2.305237	8.680022	2.027027
B	2.8	111	225	0.008772	0.005799	0.002973	6.805804	4.499055	2.306625	8.659835	2.027027
C	2	111	225	0.006794	0.005059	0.001735	5.270542	3.92499	1.345706	7.554867	2.027027
C	2.2	111	225	0.007256	0.005202	0.002054	5.629294	4.036039	1.593255	7.768617	2.027027
C	2.4	111	225	0.007386	0.005195	0.002191	5.729856	4.030178	1.699492	7.757336	2.027027
C	2.6	111	225	0.007596	0.005246	0.002349	5.892728	4.07028	1.822603	7.834523	2.027027
C	2.8	111	225	0.007747	0.005275	0.002472	6.010565	4.092798	1.917643	7.877867	2.027027
B	2.2	110	238	0.010017	0.005874	0.004144	7.985556	4.682386	3.303418	9.012713	2.163636
B	2.4	110	238	0.010097	0.005946	0.004151	8.049037	4.740193	3.309057	9.123981	2.163636
B	2.6	110	238	0.010119	0.005962	0.004156	8.066415	4.752961	3.313348	9.148556	2.163636
B	2.8	110	238	0.010234	0.006061	0.004174	8.158623	4.831337	3.327179	9.299416	2.163636

C	2	110	238	0.007595	0.005145	0.00245	6.054156	4.101122	1.952927	7.893889	2.163636
C	2.2	110	238	0.007898	0.005171	0.002727	6.296024	4.122401	2.173517	7.934847	2.163636
C	2.4	110	238	0.008168	0.005221	0.002946	6.510939	4.162121	2.348676	8.011301	2.163636
C	2.6	110	238	0.008391	0.00523	0.003161	6.689326	4.169569	2.519899	8.025636	2.163636
C	2.8	110	238	0.0087	0.005315	0.003385	6.93545	4.236597	2.698676	8.154652	2.163636
B	2.2	112	239	0.010308	0.006093	0.004215	7.784914	4.601424	3.183592	8.856876	2.133929
B	2.4	112	239	0.010509	0.006264	0.004245	7.936702	4.730851	3.205648	9.105998	2.133929
B	2.6	112	239	0.010464	0.006224	0.00424	7.902482	4.700357	3.202294	9.047304	2.133929
B	2.8	112	239	0.010527	0.006277	0.00425	7.950255	4.740337	3.210019	9.124258	2.133929
C	2	112	239	0.007729	0.005331	0.002398	5.837076	4.026119	1.811025	7.749522	2.133929
C	2.2	112	239	0.008068	0.005392	0.002676	6.093219	4.072197	2.021225	7.838215	2.133929
C	2.4	112	239	0.008395	0.005429	0.002966	6.340214	4.100319	2.239726	7.892343	2.133929
C	2.6	112	239	0.008832	0.005556	0.003276	6.670218	4.196203	2.47415	8.076902	2.133929
C	2.8	112	239	0.008973	0.005545	0.003428	6.776944	4.187733	2.589144	8.060598	2.133929

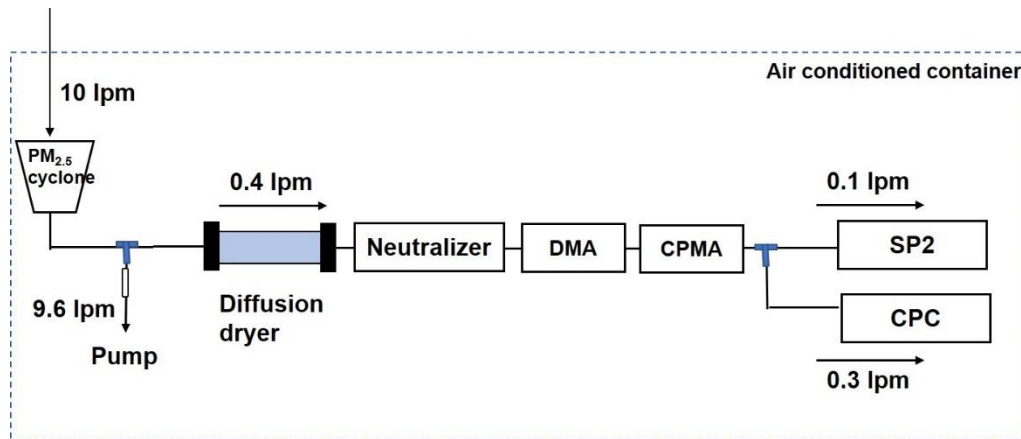


3 Cases 1-5, Models A/B/C from left to right

4 The fractal prefactor (k_0) is assumed to be 1.2. The monomer size (a) is assumed to be $0.02 \mu\text{m}$. The
5 monomer number (N_s) is calculated as the volume-equivalent radii of BC. The wavelength is $1.064 \mu\text{m}$.

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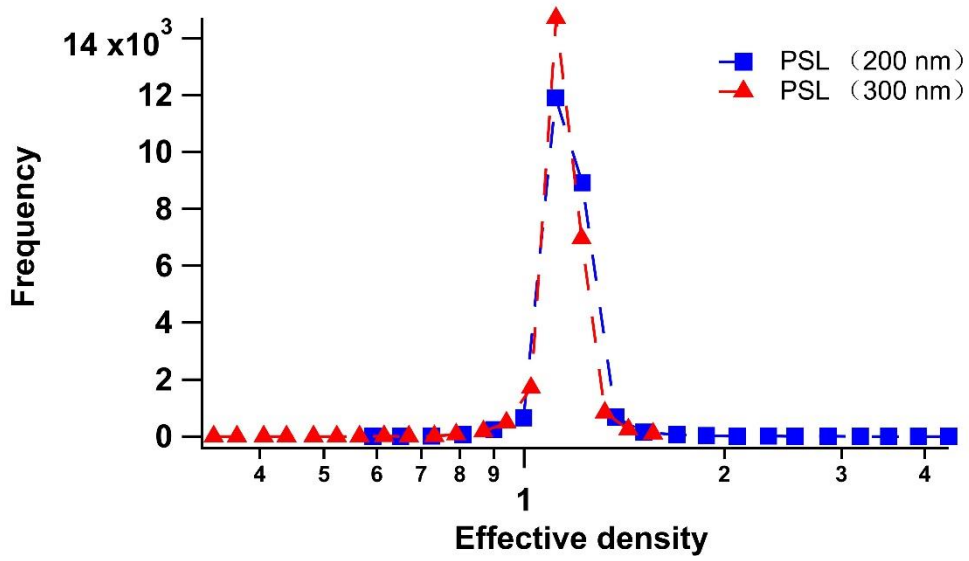
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9 Figure. S1 Schematic diagram of the measurement system.

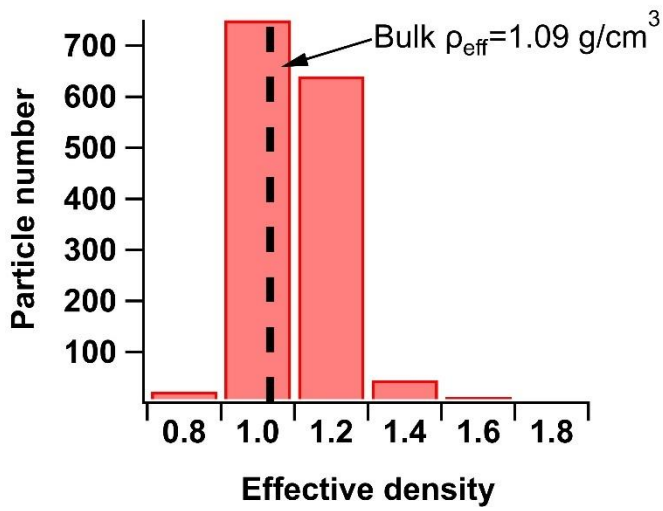
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12 Figure. S2 The effective density distribution of PSL determined by the DMA+CPMA tandem system.

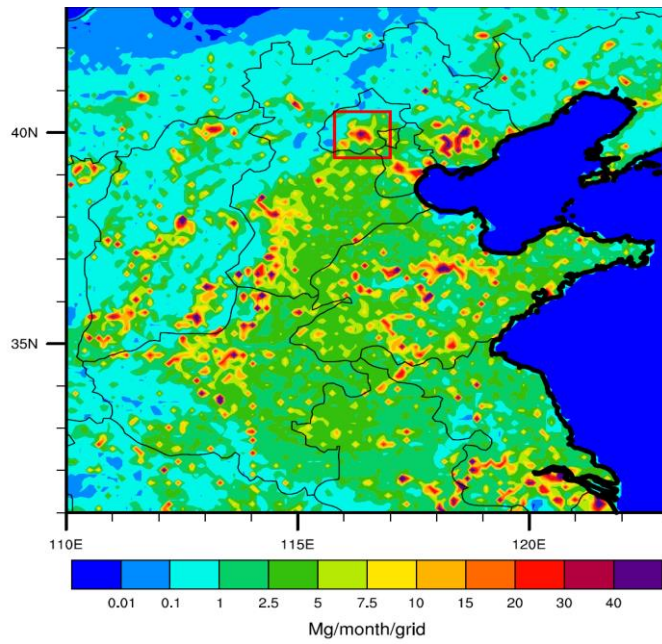
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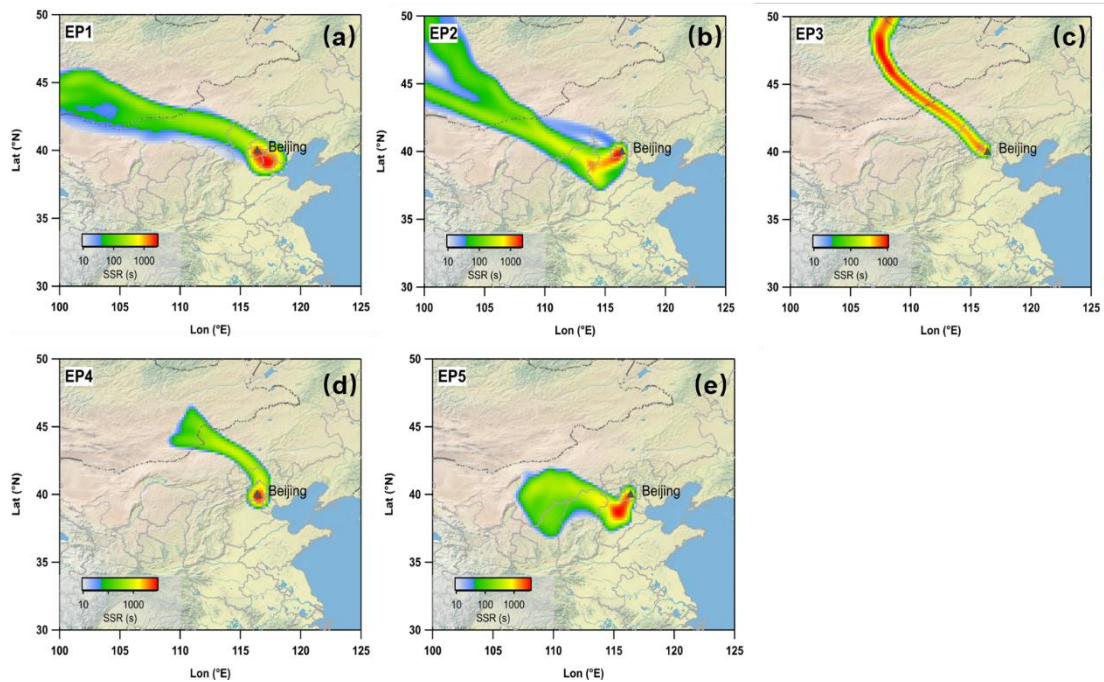
15 Figure. S3 The weighted average method used to determine the bulk aerosol density of PSL.

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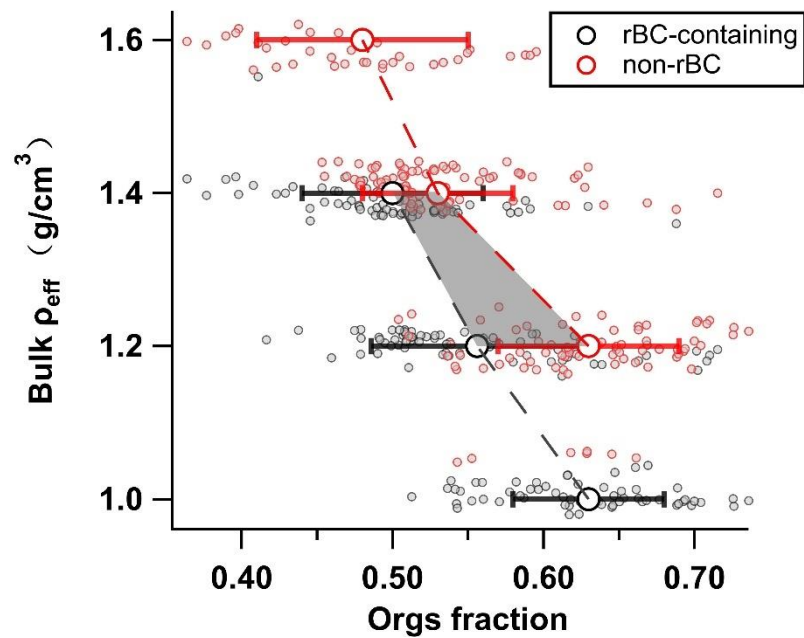
18 **Figure. S4** The emission of rBC in in eastern-central China. The red box denotes the geographical location of
 19 **the observation site.**



20

21 **Figure. S5** The 24 h backward trajectories during the five episodes. SSR is the residence time of particles in
 22 each cell. The FLEXPART (FLEXible PARTicle) dispersion model (<https://www.flexpart.eu>, last access: 15
 23 June 2018) developed by the Norwegian Institute for Air Research was used to predicted the backward
 24 trajectory. Global Data Assimilation System (GDAS) with $1^\circ \times 1^\circ$ resolution was used as the meteorology input

25 for HYSPLIT. Air samples were released at 50m above ground level and the simulation time of backward
26 trajectory is 3 days.
27



28
29 Figure. S6 The relationship between the bulk effective density and the organic mass fraction in the NR-PM_{2.5}.
30