Supporting Information

Rapid mass growth and enhanced light extinction of atmospheric aerosols during the heating season haze episodes in Beijing revealed

by aerosol-chemistry-boundary layer interaction

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Figure S1 Time series of (a) ultraviolet radiation (UVB) and atmospheric pressure (P), (b) wind speed (WS) and wind direction (WD), and (c) relative humidity (RH) and temperature (T) during the observation period.







Figure S2 . Composites of the sea level pressure field (units: HPa, shaded colors) and the ground wind field (units: $m s^{-1}$, black arrows) at different times, labeled as (a) - (e), during a typical haze period in BJ from February 19 to 22, 2019.

72h Emission Sensitivities for 2019-Feb-20



72h Emission Sensitivities for 2019-Feb-21



72h Emission Sensitivities for 2019-Feb-22



Figure S3 The 72 hour emission sensitivities (backward retro plumes) for the measurement period. The emission sensitivity values are proportional to the time that the air masses (model particles) have spent over a specific grid during their transport. The text above the figure panels indicates the particle release times in Beijing local time (LT). From these figures we can see that the polluted periods occur under southerly transport conditions, while the pollutants are cleared away during clean air masses from the north-easterly regions.









Figure S4 The dependence of different components (P_{HNO3} , EC, OC, NH₃, HONO, nucleated cluster concentration of sub 3 nm, OH concentration) during polluted and less-polluted conditions as a function of observed MLH. The data related to the upper fitting line represents $PM_{2.5}$ concentrations larger than 75 µg m⁻³, while the date related to the lower fitting line represents $PM_{2.5}$ concentrations less than 75 µg m⁻³. Only daytime conditions determined by the ceilometer from non-rainy periods (RH<95%) are considered. The dark grey points represent mean values; the red line represents median values. The shaded area corresponds to an increased amount of the specific compounds with decreased MLH assuming that the compound has the same variation pattern under highly- polluted conditions as in less polluted time.