Supplementary material of

Seasonal variations in the high time-resolved aerosol composition, sources, and chemical process of background submicron particles in North China Plain

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Figure S1. Scatter plots of the mass concentration of NR-PM₁ vs. total PM₁ measured by Sharp-5030 in spring (a), summer (b), autumn (c), and winter (d).

Figure S2. Mass spectra of the two- to five-factor solutions of PMF analysis from May 5 to 25, 2019.

Figure S3. Mass spectra of the three organic aerosol (OA) factors (fossil-fuel-related OA (FFOA), less oxidized OA (LO-OOA), and more oxidized OA (MO-OOA)) from ME-2 analysis of the HR-ToF-AMS during the spring (a), summer (b), autumn (c), and winter (d) observations.

Figure S4. The size-resolved concentrations of PM₁ species in different average 48 h backward air mass trajectories clusters in four seasons.