

Interactive comment on “Seasonal variations in the high time-resolved aerosol composition, sources, and chemical process of background submicron particles in North China Plain” by Jiayun Li et al.

Anonymous Referee #1

Received and published: 26 May 2020

This study was conducted at a regional background site of NCP for four seasons using a high-resolution aerosol mass spectrometer. Highly time-resolved chemistry and sources of submicron aerosols were investigated. The authors found that nitrate was the most abundant inorganic species and submicron particles were almost neutralized by excess ammonium in all seasons except summer. Source apportionment of organic aerosol (OA) identified two oxidized OAs, more-oxidized oxygenated OA (MO-OOA) and less-oxidized oxygenated OA (LO-OOA) in all seasons. Significant contributions of aged secondary organic aerosol in OA were observed in all seasons, especially in

C1

summer. The oxidation degree and evolution process of OAs in the four seasons and the comparison with urban studies were further investigated. Overall, the long-term dataset provided in this study is a valuable addition to the literature. I recommend publication after the following issues are addressed. Specific comments: 1. In the introduction, the importance of background site should be emphasized, which is important for highlighting the significance of this paper. 2. Two OOA factors resolved in this study are less-oxidized OOA (LO-OOA) and more-oxidized OOA (MO-OOA), rather than semi-volatile OOA (SV-OOA) and low-volatile OOA (LV-OOA). Please provide more info about the definition for LO-OOA and MO-OOA? 3. The names of submicron aerosol species in the figures should be consistent, e.g., “ClăĂŖ” vs ChI, “NO3” vs. “NO3-”. 4. Line 77-80: please provide more discussion and reference(s) about the higher atmospheric oxidizing capacity in the background site. 5. Line 153: Please add the standard deviation of the average PM1 concentrations of all seasons here. 6. Line 154: The full name is needed when abbreviation is shown at the first place, such as “SIA” here. 7. Line 337-339: “These characteristics were similar to the results found in previous researches conducted in urban Beijing showing that. . . .” please add references. 8. Line 328: “in the each season” should be “in each season”. Line 309: “high oxidized ability” should be “high atmospheric oxidizing capacity”. Please go through the manuscript for similar typos.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-213>, 2020.

C2