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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measurement Report: Size distributions of inorganic and organic components in particulate matter from a megacity in northern China: dependence upon seasons and pollution levels" *by* Yingze Tian et al.

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Response: Thank you very much for the reviewers' time. Size distributions of chemical compositions have been reported in some literatures and demonstrated their importance in examining the sources and formation pathways. However, as far as we know, the size distributions of organic components are not so much, especially for their variations dependence upon seasons and pollution levels. Characterizing the variations is valuable for understanding their sources and fate. In addition, in the revision, we applied two-way and three-way factor analysis models to conduct size−resolved

source apportionment based on joint inorganic and organic components in the revision, so that the study can explore the better way to conduct size−resolved source apportionment. And more interesting findings were found. For example, two coal combustion associated factors were extracted. One Factor, which is characterized by high C30$\beta\beta$+C34$\alpha\beta$R, four−ring PAHs and carbon fractions at sizes 1.1−5.8 μm, was extracted because of its unique pattern of size distribution, and was identified as combustion of less mature coals. In addition, three factors associated with the formation processes of secondary components were identified. One factor, which was characterized by high NO3−, SO42− and NH4+ at sizes 1.1−3.3 μm, significantly correlated with relative humidity (RH) and is named as high RH-related secondary aerosol (RHSA). Peaks of PM, NO3- and SO42- shifted from the usual 0.43-0.65 μm to 1.1-2.1 μm during high RHSA periods, due to enhanced aqueous-phase reactions, hygroscopic growth and coagulation. This work demonstrates the value of size-resolved source apportionment of joint inorganic and organic markers in understanding the sources and physicochemical processing of PM.

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