

Interactive comment on “The variation characteristics and possible sources of atmospheric water-soluble ions in Beijing” by P. F. Liu et al.

Anonymous Referee #2

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In this study Liu et al. characterized the water-soluble ions (WSIs) of PM_{2.5} in Beijing on the basis of one-year filter sampling. This kind of intensive field and lab experiment is laborious. However, the authors fail to provide new findings and/or sound conclusion that can advance our understanding of haze pollution in Beijing, compared with previous dozens of publications. Most of important, solid evidence is critically needed to support their statement regarding the possible sources from agricultural activities. In addition, the concentrations of WSIs are so high that close to PM_{2.5} (e.g., Figure 1), arising the concern of the data quality. In general, organics are equally as important as WSIs in PM_{2.5}, especially during days with lower PM_{2.5}. If possible, the authors should perform mass closure studies to ensure the data quality.

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Detailed evidence to support the points is critically needed. For example: (a) Line 15: Farmers' activities; (b) Line 17: fertilization of NH_4Cl ; (c) Line 18: Cl- from coal combustion by farmers.

Line 18: Biomass/biofuel burning also contributes to Cl- emissions in winter?

Line 19: Mineral dust, including Ca, was transported from farmland to urban region? Construction activities also contributed to high values of Ca in urban region.

Line 27, Note that industrial emissions from south regions in NCP are also massive.

Line 36: $\text{PM}_{2.5}$ is not defined due to haze. The terminology should be clarified.

Line 47-48: The authors should specify what traffic emissions included here, particles, gas, or both? Is it true that 4% of $\text{PM}_{2.5}$ was attributed to vehicle exhaust from Huang et al., 2014? This may be a wrong citation.

Line 55: How does this work advance our knowledge?

Line 65: totally?

Line 73: What is the size of the particle on the crop leaves? More information is needed to show how long it can be transported. Also, wind speed is a key factor here.

Line 80: The authors should provide more solid evidence to show farmers' influences on an urban site in BJ?

Line 84: Can the contribution be quantified in this study?

Line 91: Is this kind of filter suitable for the sampling at the site with high loading of $\text{PM}_{2.5}$?

Line 93: Why started at 3 pm, background information is needed.

Line 99: How blank filters are sampled? It is better to show the blank values.

Line 114: How far is it from the observation site? Are the meteorological data and air

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pollutants similar at these two different sites?

Line 116: Why 72h and 500m above sampling position were selected?

Line 128: Are there new findings by using this filter sampling method, compared with method described in section 2.1?

Line 135: How the mass of PM_{2.5} filter was determined?

Line 140: Base on the comparison between filter sampling method and the TEOM 1405 Monitor, the authors can give out the underestimated percentage of concentrations of PM_{2.5} and WSIs due to the volatile even semi-volatile component.

Line 154: This may be a good point to argue, but more details are needed.

Line 192: Why nitrate was faster than sulfate under higher pollution levels.

Line 195: Please show the pattern in different seasons.

Line 213-215: Detail explanation was needed here, how can the authors identify that coal combustion by farmers in winter might make great contribution to atmospheric Cl- other than coal combustion from urban area?

Line 217: Why the ratio Cl- to NO_x was selected? They are different in phases in the atmosphere.

Line 229-233: Again, more direct evidences are needed, if the authors wish to link the Ca in urban site to farmland.

Line 248-249: This is an important point and the evidence is critically needed.

Figure 1: The concentrations of WSIs are so high that close to PM_{2.5}. In general, organics are also as equally important as WSIs in Beijing, especially during days with lower PM_{2.5}. Mass closure studies are needed to check the data quality.

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