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Interactive comment on "Isotopic partitioning of nitrogen in PM$_{2.5}$ at Beijing and a background site of China" *by* Yan-Li Wang et al.

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Received and published: 28 April 2016

Dear Anonymous Referee #1

Thank you so much for your review.

It is helpful to add δ15N analyses of nitrate and ammonium in PM2.5 for discussing major sources and processes of their precursors. This is some difficult at the atmospheric background site because of the low PM2.5 concentrations. We are trying to do that, while first of all we must verify if long sampling time can destroy in situ PM2.5 N chemistry by comparing on-line and off-line monitoring, whole period and sectional samplings of PM2.5 at the same site.

It is well recognized that nitrate, ammonium or organic N in aerosols was not derived

from single, but multiple sources. Even if δ15N values of nitrate and ammonium were measured, we always meet the truth of similar δ15N values between few sources for nitrate or for ammonium. Over a long term, it remains very qualitative and uncertain to interpret N sources based on δ15N values of atmospheric samples. This work, however, attempts to provide a new thinking for future isotopic interpretation on atmospheric N sources.

To explore exact contributions of N sources to N in PM2.5, we need to judge major N sources, potential isotopic fractionations, then estimate explicit contributions using isotope mass-balance models (such as IsoSource, SIAR). Bulk N isotope analysis has an advantage of integrating both inorganic and organic N. For PM2.5 N sources in Beijing, this study just provides very preliminary insights into anthropogenic sources based on episodic N chemistry, bulk N and IsoSource calculations, the source-apportionment regime based on natural 15N abundance of bulk N is feasible and can be improved and easily extended. More mechanically, this paper stresses the stoichiometry between NH3 and acids as an important regulator of PM2.5 δ15N signatures. In Line 320 to 338, Line 347 to 356, we tried to explicitly explain what kinds of source δ15N data were used and why others are not used in our method, which is very important for readers of this paper.

Again, we sincerely appreciate your comments and suggestions, which will allow us to better revise our manuscript and design future studies.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-187, 2016.