

Interactive comment on “Nitrate-driven haze pollution during summertime over the North China Plain” by Haiyan Li et al.

Anonymous Referee #1

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Nitrate-driven haze pollution during summertime over the North China Plain

Li et al.,

This study focus on nitrate during summertime in two cites of North China Plain. They did find nitrate concentration is higher and keep high concentration in nighttime. They tried to understand why nitrate concentration varied in daily PM1 and gave some explanation. It is interesting that they used ISORROPIA-II thermodynamic model to explain nitrate formation. Finally, they extend this study and compared with other studies in the world. The paper is suitable for the ACP. The point about nitrate is much attention for the potential readers in recent years. I would like to address one minor revision under some revisions.

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(1) Generally, the title is not suitable. Through the whole ms, the authors only obtained data from two urban cities not rural, and background sites. “Nitrate-driven urban haze pollution during summertime over the North China Plain”

(2) Could the authors give more explanation WHY you choose the Beijing and Xinxiang? I am considering why Xinxiang is representation of urban cities. Seemly, the city is too far away from Beijing.

(3) I requested the authors shorten the section 3.1. Because the content is repeating section 3.2. For example (L153-174), nitrate concentration and production should be not given the reason here. I hope that authors carefully compared the part with section 3.2 and deleted the repeat

(4) L162 why is it ammonium chloride? There is no any citation and reason. I recommend the authors deleted the explanation. Because the chloride is too low, there is no need to give more explanation except no obvious sources in summertime.

(5) In section 3.2 L194-196 and L229-231. I might suggest the authors consider the RH and nitrate DRH here. One recent publication (Sun et al., (2018), Key role of nitrate in phase transitions of urban particles: implications of important reactive surfaces for secondary aerosol formation, Journal of Geophysical Research: Atmospheres, DOI:10.1002/2017JD027264.) They obtained nitrate-containing particles have more nitrate and lower DRH. I supposed the RH increase, these particles become mixture of liquid and solid or completely liquid particle. The liquid-surface on particles probably promotes more nitrate-formation from the heterogeneous reactions during the nighttime.

(6) L212 How to explain “nitrate may associate with other alkaline species or be part of an acidic aerosol” Maybe you need references here.

(7) It is great to compare with other studies in summer in the world. Based on Figure 9, nitrate fraction is quite higher than other places. These results might push the authors

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give one conclusion to cut down the NO_x emission here. I just want to mention the authors make sure all data quality is from AMS or ACMS in PM₁. Maybe different technique could have different fraction here.

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