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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Insight into the in-cloud formation of oxalate based on in situ measurement by single particle mass spectrometry" *by* Guohua Zhang et al.

Anonymous Referee #2

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Review for "Insight into the in-cloud formation of oxalate based on in situ measurement by single particle mass spectrometry" by Zhang et al. submitted to ACPD

Overall comments

This paper presents investigation of in-cloud formation of oxalate based on single particle analysis of oxalate at a remote mountain site. Size-resolved mixing state of oxalate was analyzed separately in the cloud droplet residual (cloud RES), the cloud interstitial (cloud INT), and ambient (cloud-free) particles by single particle mass spectrometry. Several reasonable results were found including the enriched aged BB aerosol was mixed with oxalate and the enhanced formation of oxalate in the cloud RES and INT

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Discussion paper

particles. The investigation of the relationship between oxalate and organic acid ions also found glayoxylate as an important intermediate for the in cloud formation of oxalate. The topic is of great interest to a certain amount of readers and also proper for the scopes of the publication of this issue. However there are several general questions need to be answered before it can be considered for publication in this journal.

Comments

1. Definition: the determination of oxalate is not clear. It is according to the peak are or RPA of -89 larger than xxx? The definition of OA is also not clear. Since the manuscript refer to the calculation of OA intensity, the author should include the detail information in the section 2.3 or in the supporting informations.

2. Figure S7: Figure legend is not clear. No a-h is labeled, the label “cloud-free” is better on top of “cloud-RES”, open circle shows all the data?

3. It also can be connected with the time cloud last as it can be clearly seen the second cloud event last less time and did not have such a high mixing ratio of oxalate compared with the other events. The second event is unique. Author can investigate a little bit on this issue.

4. 319-321 Author showed a statistics of OA for Cloud-free, RES and INC. The reviewer just curious how about the time series of these OA markers and oxalate in this campaign? Is there any good anti-trends?

5. 322-325 The definition of organic acid is also one critical issue. As we all known levoglucosan also have fragment peaks in -45, -59 and -73. Biomass burning particles have abundant levoglucosan and it will also decay in the atmosphere during the aerosol aging processes . Is there possible some of these ions are partially levoglucosan? More detail discussion should be added regarding to the diagnosis of these organic acid peaks.

6. Section 3.4 Line354: K-rich and oxalate showed really low R2 really surprised me.

Is that really fresh biomass burning aerosol in the cloud-free case?

7. Line 354-358 cloud water content is not discussed in this manuscript, is there possible that the cloud water content influenced the process, or other factors? Cloud can promote formation of oxalate but it can also scavenge water soluble ions (Zhou et al. 2010ïijŻ Wang et al. 2012). More discussion can be added.

Y. Zhou, T. Wang, X. Gao, L. Xue, X. Wang, Z. Wang, J. Gao, Q. Zhang, W. Wang.Continuous observations of water-soluble ions in PM2.5 at Mount Tai (1534 m a.s.l.) in central-eastern China, Journal of Atmospheric Chemistry, 2010, 64, 107-127 Z. Wang, T. Wang, J. Guo, R. Gao, L. Xue, J. Zhang, Y. Zhou, X. Zhou, Q. Zhang, W. Wang, Formation of secondary organic carbon and cloud impact on carbonaceous aerosols at Mount Tai, North China. Atmospheric Environment, 2012, 46, 516-527

8. Figure 2. It is quite ingesting that the cloud-free oxalate showed a peak with such a small size. If the data is correct, it might be fresh emitted biomass burning aerosols. Is there any other evidence to support this phenomena?

Others

1. Figure 1, Cloud-free is better on top of other two labels.

2. Figure 3, color coded digital data with peak area information of oxalate can include more information.

3. Figure 5, regression method should be included. The author can refer the software made by Wu et al. 2017

https://www.atmos-meas-tech-discuss.net/amt-2017-300/

4. Table S1, K.rich should be K-rich; Table S2 what's 41 for? Table S3 what's 45 for?

5. Table S3 normalized by ???

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