

# ***Interactive comment on “Characteristics and sources of aerosol aminiums over the eastern coast of China: Insights from the integrated observations in a coastal city, adjacent island and the marginal seas” by Shengqian Zhou et al.***

## **Anonymous Referee #1**

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This paper describes long-term observations of aerosol phase aminiums in three sites near Shanghai, in an extremely polluted coastal megacity and a relatively remote island sites and over the open-sea. Comprehensive (yet still indirect correlation) analysis was performed and the results are self-consistent, in terms of explaining sources and chemical processes involved in aminiums measured at different locations in different seasons. I believe that this paper provides important database of amines at the polluted coastal and remote marine atmosphere and provides interesting aspects of anthropogenic emissions of DMA and its contributions to the frequent NPF observed in

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Chinese mega-cities. This is a very well-written paper and I have only minor comments.

Abstract: It would be worthwhile to strengthen the abstract to increase the impact of the paper.

Line 17: What is the reason to group TMA and DEA together?

Introduction: I understand the authors focused on the aerosol phase aminium only, but it would be useful to discuss some gas phase measurements of amines as well, at least for those measured in the same region (e.g., Shanghai).

This is also related to the discussion of the source analysis of aminium and I would wonder how aminium and amines are related to each other. In particular, I would suggest the authors to look at Yao et al. amine data in Shanghai to see what is the correlation or ratio of each amine vs aminium – roughly (considering different measurement times). See discussions in You, Y., et al. (2014), Atmospheric amines and ammonia measured with a Chemical Ionization Mass Spectrometer (CIMS), Atmos. Chem. Phys., 14, 12181-12194, for example.

Related to this, it seems that we should not ignore the direction emissions of aminiums (rather than only focusing on those converted from the gas phase amines). The authors mentioned one example in the text but I am curious what is the status of the field.

Line 48: what is emission factor? Please check the unit?

Section 2.1: Table 1 shows the measurement periods at each site but it would be helpful if those dates are mentioned in the section as well.

Line 117: How close were the sampling location of those trace gases (used here) to the Fudan measurement site?

Section 3.2.2: You et al. ACP also found that gas-to-particle conversion is an important contribution to the aminiums in the aerosol phase. Please include the results shown Figure 6 in You et al. in Table 2.

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Section 3.2: So, the emerging picture is that the winter time is favorable for higher aminium due to lower BLH, colder temperatures and less oxidation reactions. This is very interesting.

Lines 184-185: Need a ref at the end of the sentence?

Section 3.2.4: The last sentence – fog and high RH are also favorable conditions for gas-to-particle conversion.

Section 3.3: The first paragraph – the mass fraction of aminiumes is very high. Is this expected or not?

Line 216: How did you define the droplet mode and condensation mode sizes?

Lines 238-239: Either here or in the conclusion, it would be useful to add some discussions, like “Our results consistently show that DMA was originated primarily from anthropogenic sources, as opposed to natural marine emission sources. Considering the unique role of DMA in new particle formation (Almeida et al., 2013), our results thus re-enforce that the frequent new particle formation events observed in extremely polluted Chinese cities are indeed, at least in part, due to amines (Yao et al., 2018).”

Minor suggestions:

Line 39: “other gases” should be “oxidation products” to be more specific? Line 80: remove “a” in “be a representative”. Line 96: remove the first “sample”. Line 105: change “might” to “may”. Line 130: “Differently” should be “By contrast”. Line 143: “firstly” should be “for the first time” or “initially” or “previously”? Line 157: “improvement of diffusion condition” should be “enhanced diffusion”? Line 235: “on land” to “on the land”. Line 267: “judgement” to “analysis”? Line 267: “pointing directions of back trajectories” should be “forward directions of airmass trajectories”. Line 294: “The DMS” to “DMS”. Line 321: “Speculation” should better be “hypothesis” or “analysis”? Line 333: “Significantly” to “Significant”. Line 339: “Differently” should be “By contrast”. Line 348: “firstly” should be “for the first time”.

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-107>, 2019.

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