

## ***Interactive comment on “Exploring wintertime regional haze in Northeast China: role of coal and biomass burning” by Jian Zhang et al.***

**Anonymous Referee #1**

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This study attempted to integrated bulk chemical measurements with single particle analysis from transmission electron microscopy (TEM), nanoscale secondary ion mass spectrometer (NanoSIMS), and atomic force microscopy (AFM) to obtain morphology, size, composition, aging process, and sources of aerosol particles collected during two contrasting regional haze events (Haze-I and Haze-II) at an urban site and a mountain site in Northeast China. And they also investigated the causes of regional haze formation. Generally, the method was new and sound, and the study showed two haze events and provided information about haze formation in this region. Therefore, this MS may be considered for a publication in ACP after the authors address the following comments.

General comment

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Discussion paper



I have a major concern about the sampling. The authors should explain whether these 2 haze types within such a short period (1 week) could represent the typical haze type in NE China. What is the sampling strategy behind? What are possible limitations? I suggest the author include non-haze periods for comparisons. Without the detailed discussion, one may not agree that these 2 haze types could represent regional haze formation in NE China. In addition, only weak evidence was present to explain the formation mechanism. This should be clarified carefully.

Abstract: Lines 20-21: this may be not true. Line 23: delete the expression “for the first time” in the abstract.

Methods: PM2.5 mass: quartz filter was not a good option. So this should be compared with the nearby monitoring stations.

Line 259-261: the haze type was not only defined by the wind direction. In addition to the regional transport, changes in emissions and secondary formation play important roles. For example, biomass burning emissions can increase PM2.5 rapidly.

Line 273: what is the major difference for the chemical composition in type 1 and 2. Line 361: so what is the reason of this accumulation? Lines 365-367: are those secondary components formed locally or transported the sampling site? Line 371: what is the reason for such a conversion? Lines 393-394: how to exclude other emission sources? Line 395: coal combustion may emit K-OM particles. Lines 398-399: no direct evidence. How to exclude other sources, e.g., dust, soil, traffic, secondary formation? Lines 409-410: what is the direct evidence? Lines: 427-429: the evidence of heterogeneous reactions should be provided; otherwise it is too speculative.

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