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Interactive comment on "High resolution modeling of gaseous methylamines over a polluted region in China: Source-dependent emissions and implications to spatial variations" *by* Jingbo Mao et al.

Anonymous Referee #1

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Gaseous amines represent a category of base compounds which plays import roles in many aspects of atmospheric chemistry including nucleation and growth of newly-formed particles. Compared to ammonia, concentrations of individual amines are several orders of magnitude lower, far below ppb levels. In addition, there are a variety of sources of amines in the atmosphere. Furthermore, most amines are rather reactive, bearing shorter lifetimes than ammonia. Hence the temporal and spatial distributions of amines can vary significantly. This paper presents a high resolution modeling study of methylamines (C1-C3) in Yangtze River Delta Region (YRD) by considering

source dependent amine-to-ammonia ratios (SDR) whose results demonstrate much better agreement with observations than those assuming fixed ratios (FR) in the model simulations. Here four domains are considered and the simulated results from the smallest two domains showed that models with higher spatial resolution yield better agreement with observations, demonstrating the need for employing high resolutions when modeling spatial distributions of amines in order to better understand their roles in atmospheric chemistry. The paper can be publishable after the following issues are resolved: 1. The paper models the amine concentrations and their spatial distributions from five different source types (chemical industry, other industry, agriculture, residential, and transportation). What is the rationale behind this classification? Are there any previous studies that employed a similar classification? 2. The study used measured data from two sites (NUIST and Fudan sites). Since the measured amine concentrations might be strongly affected by the close-to-site sources, the authors should provide some evidences that those sites are not significantly affected by local sources which may lead to systematic biases for the data. According to Table 4, the Fudan site may be affected significantly by local sources. 3. Table 3 lists emission rates of C1-C3 amines from different sources based on the SDR ratios from this study. However, it is not very clear how those values are obtained. In section 2.2, the authors only used SDR from the data measured in 2012 (NUIST site) and did not even mentioned those measured in 2015 (Fudan site). The authors should provide the reasons for only considering one data set rather than both data sets. In addition, the paper mentioned very briefly the uncertainties associated with the measured data. Can those uncertainties be quantified? How a single (or even two) measured site can be representative of the domains of interest (i.e., D3 and D4)? How those five different sources of amines are determined, for example, based on what criteria, the emission rates of the five sources are distributed? 4. Some rather minor points: 1) L7 on p2, change "model's" to "of the model"; similarly for "model's skill" on p7 (L27); 2) L27 on p4, change "amines concentrations" to "concentrations of amines"; there are lots of those usages throughout the paper. Please correct them; 3) L1-2 on p5, year 2014 is not up-to-date; 4) L23 on p5,

change "The point sources data" to "the data of the point sources"; 5) L15 on p6, "at an urban site" not "in an urban site"; 6) L21 on p6, delete "seek to"; 7) L9 on p7, "in details" not "in detail"; 8) L15-20 on p7, this ratio of 0.026 might be problematic if the measured site is so close to the source and affected strongly by the emissions from the source; 9) L23 on p7, delete "would like to"; 10) L4 on p8, "prior to this study" might be better replaced by "in previous studies"; 11) L9 on p10, change "that" to "those" since it refers to as "distributions"; 12) L28 on p10, "general underprediction of the model", do you mean that it is compared to measurements? 13) L10-11 on p11, where those values are from? 14) L18-20 on p11, I don't think wind direction and speed are the reasons.