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Interactive comment on “Overview of the LADCO winter nitrate study: hourly ammonia, nitric acid and PM_{2.5} composition at an urban and rural site pair during PM_{2.5} episodes in the US Great Lakes region” by C. O. Stanier et al.

Anonymous Referee #2

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This paper describes a three-month intensive monitoring program in 2009 at two sites in Wisconsin designed to better characterize and understand the causes of high winter PM_{2.5} concentration episodes that are dominated by particulate ammonia and nitrate ion. The monitoring program consisted of an impressive array of hourly gaseous and aerosol mass and composition monitoring along with integrated 24-hour duration PM_{2.5} filtration sampling with subsequent compositional analysis. The authors have defined and identified episodes, summarized the monitoring data, characterized the meteorology associated with the episodes, and discussed possible atmospheric forma-

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tion processes. This paper will be of interest to anyone wishing to better understand winter PM_{2.5} winter episodes in the Mid-western United States. Future publications are promised that report on results of thermodynamic box and chemical transport simulation modeling that use these monitoring data to help explain the cause of winter ammonium nitrate episodes in the Midwestern US.

My single technical complaint with this work is that the authors neglected a relatively simple way to assess the geographic extent of the episodes that they document so well at the two study sites. Ten of the thirteen episodes seen at the Milwaukee monitoring site include IMPROVE and CSN speciation samples collected on the national 1 in 3 day sampling schedule. Earlier work using these data has indicated that winter nitrate episodes can cover multistate regions. An examination of the data from the dozens of rural and urban sites in the Midwestern region has the potential to provide much broader geographic context that may be important to fully understanding the causes, sources, and effects of these episodes. For example, it would be useful to know if the six episodes seen in Milwaukee, but not in Mayville were geographically small episodes, or larger scale episodes with Milwaukee within and Mayville beyond its influence. The authors have already used these speciation sampling data in a different way to show that the 2009 study period had somewhat higher concentrations than the same months in other recent years. It would be a relatively simple matter to use these data to map the spatial extent of particulate nitrate concentrations for the 10 episodes that are coincident with the speciation sampler schedule to provide broader scale geographic context for the high time- and composition-resolved information from this two site special study.

The paper is generally well written. I have only a few minor suggestions to improve clarity (see specific comments).

Page 14125, line 11 to 16 – The first of these sentences could more clearly indicate that the data adjustment is to the continuous data (as opposed to the filter data). The second sentence states the mean absolute errors for the adjusted continuous data, but

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doesn't indicate how the adjustments were done, nor how the mean absolute errors were calculated. A little more detail provided in this paragraph or at least referenced there would make these two sentences more informative.

Section 5.2 (and perhaps elsewhere) – The first sentence in this section start “The continuous and integrated measurements. . .”, while elsewhere the term “semicontinuous” is often used. Are there three categories of measurement, or is the continuous and semicontinuous measurements in-fact the different terms for the same category? Some clarification here would be helpful.

Page 14137, line 20 – The first sentence in section 5.10 end with “(Fig. 13)”, while the beginning of the next sentence is “Figure 12. . .”. The correct figure number is 13 and it need only be included in one of these two sentences.

Figure 9 – This bar plot of enhancement ratios should have a horizontal reference line added at 1.0 to aid in distinguishing enhancement from depletion of the various components.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 14115, 2012.

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