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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Wintertime particulate pollution episodes in an urban valley of the Western US: a case study" *by* L.-W. A. Chen et al.

Anonymous Referee #2

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In this manuscript, the authors investigated $PM_{2.5}$ mass concentration and chemical speciation in Truckee Meadows, an urban valley of Nevada during winter 2009/2010. The authors found that the high $PM_{2.5}$ concentrations were associated with specific meteorological conditions, such as intense and multi-day temperature inversions, snow on the ground and low wind speeds. $PM_{2.5}$ exceedances of NAAQS were associated with elevated ammonium nitrate (NH_4NO_3) and water concentrations due to low temperature and high RH. The manuscripts also discussed the results from an effective-variance chemical mass balance (EV-CMB) receptor model, and identified major contributors to $PM_{2.5}$ in this region as secondary NH_4NO_3, residential wood combustion and diesel engine exhausts. Secondary NH_4NO_3 was mainly formed from engine NOx emissions, which provides a possible reason between snow cover and elevated NH_4NO_3 and $PM_{2.5}$ concentrations. The findings from this manuscript

can also be applied to similar situations in other urban valleys. The manuscript was generally well written and the results were clearly discussed, although some details need to be improved. I recommend the publication of this manuscript in ACP after consideration of the specific comments as listed below.

Page 15804, although the sampling period can be realized later in the manuscript, it is better to state the sampling period clearly either in the introduction or in the monitoring description part.

Page 15804, line 20, need to specify the instruments used for continuous measurements. PM_{10}, CO and ozone don't have to be mentioned here because they were not discussed through the manuscript.

Page 15807, Eqs (1) - (3), references are needed for these calculations.

Page 15810, line 7, this is related to Figure 6. The four points for episode days are associated not only with low AAE, but also high OC concentration. If the OC fraction is high, it may not be safe to say that $PM_{2.5}$ was contributed by flaming RWC and motor vehicles. Can the authors provide information on EC/OC fraction not just the concentration to justify this statement?

Page 15814, line 14, EC1, EC2 and OP were not defined in the manuscript. Furthermore, based on Table S1, these carbon fractions were not selected for EV-CMB modeling. How could their calculated concentrations be plotted in Figure 7?

Page 15816, Section 3.4, this is a very interesting finding. I noticed that continuous NOx concentration was also measured in the study. Have the authors investigated the relationship between secondary NH_4NO_3 and measured NOx concentration? Will the result provide some hints about the origins of secondary NH_4NO_3?

Page 15828, the plot of snow cover may require a separate part in the figures. Sharing the axis with deltaT makes it confusing.

Page 15831, Figure 5, I suggest also put total $PM_{2.5}$ concentrations in this figure for better illustration.

Page 15833, Figure 7, the labels of the species are too small and some of them overlap with each other.

Page 15834, Figure 8, the font size of the legend is too small and very difficult to recognize in a normal scale. Also I suggest change “salting” to “de-icing” in order to be consistent with the discussion in the main text and Table S2.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 15801, 2012.