

Interactive comment on “Ammonia at Blodgett Forest, Sierra Nevada, USA” by M. L. Fischer and D. Littlejohn

Anonymous Referee #1

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The present manuscript includes a description of a fast response QCL NH₃ instrument, a method used to calculate the aerodynamic deposition velocity expected under different meteorological conditions, and a predictive model for NH₃ mixing ratios at the measurement site. In general this work falls into the scope of ACP.

The study site was not located as stated (Pg 14142, Ln 10) in the west but in the east of Sacramento adjacent to the Sacramento Valley. The predominant wind direction at the study site is from the west and the source area does not include areas with extensive cattle but rather crop production. In fact, the San Joaquin Valley (SJV) where dairy production takes place to a considerable extend is located much further south of BFRS and it is highly unlikely that SJV dairies contribute to the emissions measured at the study site. The very low emission rates measured at the present study site using both

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measurement methods (denuder and QLC) confirm that the source region was low in NH₃ emissions. Measured emissions of 1-2 ppb NH₃ are not indicative of substantial contributions from animal agriculture.

The instrument validation efforts show large data noise of the QLC instrument and poor agreement with the denuder technique. This item requires further discussion and additional investigation to establish the usefulness and precision of the QLC.

The outlined simple NH₃ emission model assumes that NH₃ emissions are distributed evenly throughout the year. To the contrary, substantial diurnal and annual fluctuations are known to occur in the central valley of California. The estimated emissions factors (EF) of 185 g NH₃ per cow per day for dairy animals are biologically unreasonable and beyond the scope of this paper.

Figure 10 which is showing estimated surface NH₃ fluxes from cattle based on the above mentioned questionable EF. The indicated back trajectory seems highly improbable considering wind flow patterns and activity factors in this region.

The results from this short pilot study are not sufficient to support many of the interpretations and suggestions regarding contributions of animal agriculture on potential secondary particle formation in the Central Valley of California. Studies of the contributions of animal agriculture on NH₃ flux would require a longer term efforts at a different location (i.e. in the San Joaquin Valley where cattle actually contribute to real NH₃ emissions).

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 14139, 2007.

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