

Interactive comment on “A relaxed eddy accumulation system for measuring vertical fluxes of nitrous acid” by X. Ren et al.

Anonymous Referee #1

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General Comments

This is a nicely organized and well-written paper describing one of the few instruments used for field measurement of HONO fluxes. Much uncertainty exists about the importance of HONO in radical cycling in the troposphere, especially in forested areas. The system described was field deployed in two field studies. The picture of surface photochemistry affecting near-ground OH chemistry through HONO is strengthened by this study.

Specific Comments

4110 L2: might want to indicate here that at least one of the channels (updraft or

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donwdraft) is going to be sampling zero air at any given time so all samples will be diluted at the analyzer. This imposes even greater conditions of sensitivity on the instrumentation. Maybe modify and move the paragraph at the end of section 2.2 to here.

4111 L11: what is the pH of the buffer?

4112 L5: Can the authors indicate where the inlets were situated relative to the forest, field, road that was closest? Were the measurements made above a forest in both cases? From the same height above the forest?

4114 L8: From this discussion it is not clear WHY Eq. (2) was used to calculate beta and then why Eq. (3) was even discussed. A few sentences here will help the reader understand the authors' rationale for their analysis.

4114 L12: The description of time lag calculation can be made clearer. Based on the diagram in Fig1, the delay time is going to vary based on the mode of sampling. Total flow rate through the inlet is going to be the sum of 3 different flows. Because at least one sampler will be sampling zero air at any given time, there are two possible total flows: 9 LPM during deadband periods or 11 LPM during sampling. Which flow rate was used to calculate the delay time? Will the ~20% change in flow during deadband or any pressure effects in the inlet affect the delay time for molecules to get to the scrubber? I would have been more comfortable with a dosing experiment with a standard gas to determine this rather than straight calculation.

4115 L15: Testing for artifacts related to retention or destruction of HONO on the sampling line is good, but were zero tests done through the end of the inlet to determine if other effects, like photolysis of particle nitrate on the tubing, were an issue? Were there any issues/interferences under high NO_x conditions?

4118 L13: The detection limit is given here for the REA-HONO system in units different than described previously for the analyzer. Given that there is a total uncertainty for a

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single analyzer of about 15% and that 56% of air sampled was zero air, can the authors show that their system has sufficient PRECISION to calculate fluxes? I think this needs to be explicitly included in the manuscript since the flux is essentially the difference of two numbers.

Is Fig 4 from CALNEX or BEARPEX? I think CALNEX but it's not mentioned in caption. Why include both graphs in this figure? It seems that the one on the right is sufficient.

Technical Corrections

4109 L23: “digital”

4109 L27: How was delay time of 350 ms determined? Maybe mention it will be discussed later

4113 L8: Not sure what “When a non-zero threshold issued” means

4119 L12: “environment”

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 4105, 2011.

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