

Interactive comment on “Evaluation of nitrogen dioxide chemiluminescence monitors in a polluted urban environment” by E. J. Dunlea et al.

E. J. Dunlea et al.

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Response to Anonymous Referee #1:

>> The authors thank the referee for his/her valuable comments and in particular his/her attention to detail. Responses to individual comments are listed below and denoted with ">>".

General remarks: The data presented raise some concerns about the representativeness of these measurements

>> The intent of this paper is to highlight the issue of the NO_x interference in a highly polluted area, not to show a comparison that is representative of all areas. Therefore, a full discussion on the representativeness of these measurements is beyond the scope of this work, as confirmed by Referee #2. The overall meteorological conditions have

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been discussed in other publications and these references have been included in the revised manuscript.

Specific comments: The paragraph 'measurements' should also include the following information: Inlet materials, possible memory effects, residence times, use of inlet filters, meteorological conditions during the campaign(s).

>> Details related to the various inlets used were presented in the companion paper to this paper (Dunlea et al. ACP, 6, 3163-3180, 2006) and this is now explicitly stated in the revised manuscript.

Paragraph 3.2.1. and 3.2.2. Consider to shorten these paragraphs...

>> These paragraphs have been shortened (and reorganized within the paper as suggested by Referee #2).

Page 582, line 5 to 24: It should be considered to shorten or re-write this paragraph

>> This paragraph has been shortened.

Page 583, line 11 to 23 Particulate matter can evaporate and subsequently dissociate. What were the temperatures outside and in the labs? If there is a considerable fraction that is dissociating, the comparison with AMS results of PM₁ can lead to misleading results.

>> None of the inlets for the NO₂ instruments were heated relative to ambient temperatures, such that pNO₃ should not have been converted to gas phase reactive nitrogen before detection. A sentence to note this specifically has been added to the revised manuscript.

Page 588, line 1 to 21 This approach is not feasible at least during the night.

>> We concur that the approach used to estimate ambient alkyl nitrate levels is not valid at night is noted. However, this is not relevant for the arguments presented because the observed NO₂ interference is only important during the day.

Page 590, line 23ff I do not agree that side-by-side comparisons of ‘absolute’ NO₂ measurements with standard chemiluminescence NO_x monitors will really help to further quantify these interference

>> See response to General Comment above and discussion from Referee #2. Also in regards to this point, the recommendations made at the end of the manuscript have been revised to emphasize changes to future instrumentation rather than further characterization of this interference.

Figure 2: when looking at the scatter plots, especially for CENCIA. There seem to be even more data with negative interferences than with positive interferences. Furthermore, it is PAN that shows no interference at all, but PAN will be converted to NO₂ on any heated surface and should therefore be quantitatively measured in the CL NO_x monitors. How can these results be explained?

>> The scatter plots showing the CL NO_x monitor interference from the CENICA site used data from the DOAS-1 instrument, when the DOAS-2 instrument provides a better comparison; the figures have been updated and now contain data that have more positive values of the CL NO_x monitor interference than negative values. As for PAN, as explained in the manuscript, PAN does not show an interference because the ambient PAN levels are too small to contribute significantly to the interference, not because it is believed that PAN is not being dissociated on the heated converter. Wording in the revised manuscript has been changed to emphasize this point.

Minor remarks: Table 1: Consider to remove column ‘R2’ since the R2 are already given in parentheses. Instead values of the number of data points used should be given.

>> This column has been removed.

Page 571, line 18: don’t use the term ‘CL NO_x’ in the abstract

>> This has been removed.

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Page 584, line 1: pNO₃ should be read as pNO₃-

>> Change made.

Page 586, line 3: Neuman et al. show HNO₃ losses not only on steel.

>> Wording has been changed to reflect this point.

Figure 1: Is it the whole campaign that is shown? If no, do the other periods look like the presented case study?

>> No, only specific cases are shown. Other periods do look like this. This was described in the text, but has been emphasized in the text with an additional sentence ("The periods in Fig. 1 are typical of the observations during both campaigns.").

Figure 3 and 4: for which time periods have the diurnal profiles been calculated?

>> Profiles were calculated for the entire MCMA-2003 campaign; this has been noted in the figure captions.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 569, 2007.

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