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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Long term measurements of sulfur dioxide, nitrogen dioxide, ammonia, nitric acid and ozone in Africa using passive samplers" *by* M. Adon et al.

Anonymous Referee #1

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There are relatively few measurements of air pollutants in regional background air in many parts of the world. Passive samplers offer a unique opportunity to perform such measurement at very remote places lacking electricity. The technique is very simple to use in the field, but not so simple to develop and, besides, proper QA/QC routines in the laboratory are of very high importance. It is therefore very important with validation of the technique, which is also pointed out many times in this manuscript.

There are very few long-term measurements of HNO3 despite that it is an important air pollutant. The main reason is probably difficulties with absorption in inlets, filter artefacts and interferences from NO2. 1998 might be the first time that passive sampling

is used to measure HNO3 concentration in air! This is the most original part in this work. Another original item is the very long measurement series (1998-2007). There is, however, no comparison with other HNO3 measurements in this manuscript. On page 4421 it says "For HNO3, SO2, NO2, NH3, we can cite Ferm and Rodhe (1997) and Ferm et al. (2005)." Only the latter reference deals with nitric acid and is of much later date. Under the results it further says that "Results show that monthly HNO3 evolution is highly comparable to NO2 monthly evolution, and thus follow the same gradient." Could it be that after all, the problem with interference from NO2 has not been solved here?

How was the validation described under 2.4.1. and Table 4 performed? Was it made in the laboratory or in the field, at which wind speed, was any reference technique used? No literature reference is given despite the large number of measurements.

4418 How was the detection limits estimated from the field blanks? For which exposure times are they valid?

4420 The mean comparative ratio (ratio of mean values?) is only 0.7 for ozone. According to Figure 3c, the passive sampler reading is higher so the ratio should perhaps be 1.3? The response is good, but the offset is substantial. It is explained by the indirect ozone determination, but rather the overall oxidation potential of the atmosphere. Ozone and nitrogen dioxide are the dominant oxidants in the atmosphere, except for oxygen. The concentrations of nitrogen dioxide and ozone are often anti correlated in a city. Can nitrogen dioxide interfere with the measurements? If this is the case, the interference must be significant!

4421 "Figure 4 details the NH3 results and shows the good linear relation between the two passive samplers (R2=0.76)." The comparison between IDAF and IVL sampler in Fig. 4 is not a good linear relation between the two passive samplers. The coefficient of determination R2 is only 0.76 and it looks more like a so called indicative measurement (30 % accuracy). On the same page it says "The IVL and IDAF measurements compare

well with acceptable correlation coefficient". If a correlation coefficient of 0.76 and a comparative ratio of 0.7 were here considered as good, what was then considered as an acceptable correlation between the IVL and IDAF measurements?

4423 This maximum is consistent with the emission of inorganic nitrogen (nitric oxide?) that accumulated in soils (ammonium, nitrate?).

Misprints A 4411 deposition velocity needs to be calculated. determined? 4418 MΩ is not a relevant unit! cation detection should be ammonium analysis? 4435 cm-1 is not a relevant unit! 4436 the content of vegetation in sulfur. Table 1 Côte d'Ivoire is a French name of the country Table 4. Two French words in the Table.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 4407, 2010.