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Atmospheric Measurement Techniques Discussions

Interactive comment on "A fast and precise chemiluminescence ozone detector for eddy flux and airborne application" *by* A. Zahn et al.

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Thanks for the good review. To your points:

1. Of course, OH is not the only detergent, and NO3 during night or O3 for some organic compounds also important. Thus, the wording "most efficient" is maybe not appropriate and we changed it to "principal".

2. We only give 1-sigma noise and specifically write this in the new manuscript version.

3. All flow tests were done at ambient pressure and ambient temperature. The temperature of the sampling air is not an issue as it quickly adopts the temperature of the inlet line. Even at sample air temperatures of below -60°C (during the CARIBIC flights), its

temperature at the detector is 20-35°C (depending on instrument temperature). However, we clarified this point in the text.

4. The requested information was already given in the figure 6 (box).

5. You are right. Bendings, edges, and changes in the inlet line diameter trigger turbulence. This fact explains that well below the critical Reynolds number of 2300, turbulent mixing much better explains the observed instrument response time than a laminar flow regime. This information was already given at the end of this section and we explained this point in more detail in the new manuscript version.

6. Of course, inter-disc variability and sensor disc ageing is the most severe shortcoming of dry CI techniques. We strongly expanded the relevant discussion in the conclusion of the new manuscript, see below. However, we still believe that it should not be the subject of this publication to describe the properties of certain disc types, simply, as the (technical) performance of the instrument is independent on the disc sensitivity. However, in the new version we added a sensitivity c in the equations, so that the reader can retrieve the noise in dependence on the actual sensitivity of the used sensor disc. Moreover, the development of new sensor discs in Mainz was successful and the Mainz guys plan a relevant publication.

= Modified conclusion =

Currently (December 2011), the new sensor dics from Mainz reach almost (75 % of) the initial sensitivity of the Bagus discs (i.e. are slightly more sensitive than the old GFAS discs we have used here) and the durability could be enhanced to an O3-dose of $\sim$7000 ppbv·h. It can currently not be foreseen when these new types of sensor discs will be commercially available. These new sensor discs will become available early next year (Mainz, personal communication). Their development and properties will be described in an independent publication. Importantly, the performance of the O3-sonde described here is independent on the properties of the sensor disc. The instrument signal is certainly proportional to the sensitivity c of the sensor disc (equa-

AMTD

4, C2434–C2436, 2011

tion 18) and the instrument precision (1-σ noise) is proportional to the square root of c. With the actual sensor disc sensitivity c, which depends on the disc material, age, and manufacturing (which may cause significant inter-disc variability, Muller et al., 2010), the actual measurement precision can easily be inferred from the equations 19 and 20.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 6539, 2011.