Atmos. Meas. Tech. Discuss., 8, C4404–C4406, 2015
www.atmos-meas-tech-discuss.net/8/C4404/2015/

Atmospheric Measurement Techniques Discussions

Interactive comment on "Twin-cuvette measurement technique for investigation of dry deposition of O₃ and PAN to plant leaves under controlled humidity conditions" *by* S. Sun et al.

Anonymous Referee #1

Received and published: 18 December 2015

Sun et al. show that a twin-cuvette system is able to finely control concentration of water vapor and trace gases for an accurate estimation of fluxes of O3 and PAN. The authors present a convincing research, with rigorous explanation of methodology. I find this kind of study particularly useful, since leaf-level experiment under controlled conditions can provide important information (e.g. deposition velocities) which are fundamental inputs for canopy models and in turn help better understanding stomatal and non-stomatal sinks of very reactive trace gases. Experiments with other plant species with different physiological behavior (e.g. high rates of stomatal conductance) would

have been appreciated, however this is a convincing methodological paper. The paper reads well without language flaws, therefore I recommend publication after answering those very minor comments below.

Pag. 12054 line 22: Ortega et al. (2008) extensively discussed dynamic cuvettes in two reviews, it may be worth mentioning. Line 25: a twin cuvette approach was also adopted for branch cuvette by Fares et al. 2010 (Atm. Env.). Table 1 could be modified accordingly. Pag. 12062 line 6: did you consider the possibility that reactive monoterpenes could react with ozone in the gas phase? ABA is known to interfere with the biosynthetic pathway of Monoterpene formation, so this may affect O3+Monoterpene reaction an therefore ozone flux in the cuvette. Pag. 12064 eq. 9: if you assume that intercellular leaf concentration is 0 for both PAN and O3, the equation formalisms does not need to be shown. Possibility that non-0 concentration of O3 occur could be discussed in the text, especially if you can demonstrate from your experiments that the relationship between vmr(out) and FO3 is not linear under conditions of high vmr(out). This does not seem the case looking at fig. 13. Using a fast growing species with high stomatal conductance may lead to different results. Pag.12071. fig 9: the figure is really hard to read, too much inmportant information for such a small picture. It is not clear why the time reference of the flux unit is missing, e.g. FO3 should be nmol m-2 s-1. Pag. 12100: Figure 10 show identical pictures!! Pleas add the picture related to ozone. Pag 12073. Can you demonstrate that the % reduction in stomatal conductance due to ABA is equal to the % reduction is FO3? Otherwise the experiment lead to interesting alternative hypothesis on further O3 sinks inside leaf and/or in the gas phase. Pag 12074 line 10: you may consider discussing the recent paper by W. Jud et al. on ACP for what concern surface reactions. Pag 12076 line 7: the mentioned papers indeed showed that RH control was applied by passing air through a bubbler and controlling by dew-point generator. Perhaps the authors can mention that RH was not finely controlled, but saying that a humidification system was not used is not correct. Pag 12076 line 9: Fares et al. 2010 is cited but not present in the reference list.

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Interactive comment on Atmos. Meas. Tech. Discuss., 8, 12051, 2015.