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Interactive Comment

Interactive comment on "Foliage surface ozone deposition: a role for surface moisture?" *by* N. Altimir et al.

A. Carrara (Referee)

arnaud@ceam.es

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General comments:

This paper presents one of the very few existing dataset of long-term measurements of ozone deposition fluxes. The dataset also includes the most pertinent environmental parameters for ozone deposition which technology allow to measure continuously. The paper is well structured and written, and subsection titles describe well the content. That make the paper relatively easy and pleasant to read. The experiment, including measurement methods and data treatment, is described in details (Methods chapter, Appendix, previous publications by the Finnish group).

The ozone deposition is separated into stomatal and non-stomatal deposition, the existence of a stomatal pathway for ozone deposition and the method to estimate it from water vapour flux beeing well accepted within the scientific community. The estimation of stomatal ozone uptake from stomatal CO2 conductance is an interesting exercice, although the results presented here do not suggest that it could improve the understanding of ozone deposition behaviour compared to the classic water vapour flux approach. It could have been interesting to compare both approachs also for wet conditions (for example to estimate non-stomatal sink), since the stomatal conductance infered from water vapour flux is likely to be overestimated due to evaporation occuring during wet conditions, as mentionned by the authors. The authors assess the importance of the relative contribution of non-stomatal uptake (about 50% of total uptake on average in this study). This fact, while already suggested by other studies, is particularly robust in this study since it is assessed by long-term measurements made at two different scales (canopy and shoot).

As expected from the paper title, the authors focus on the influence of moisture conditions on ozone deposition. By combining analysis of time series of ozone total deposition, of correlation between non-stomatal conductance and environmental parameters, of correlation between leaf surface wetness and ambiant relative humidity, the authors conclude in a convincing way that moist conditions enhanced the non-stomatal ozone deposition and that an ozone sink associated with aqueous films at leaf surface could be responsible for this enhancement.

The discussion is clearly structured and authors make clear statement of all potential shortcomings and limitations of their analysis. Additionally, for a paper which is not a review, the discussion chapter includes an impressive number of appropriate references. In particular, authors refer to most (if not all) of the publicated studies addressing moisture effect on ozone deposition.

Most of the publicated studies on ozone deposition use the resistance analogy to interpret the measurements at canopy scale. In principle, this allows to account for the effect of transfer processes onto ozone deposition (through Ra and Rb). Generally, this approach leads to an analysis of the canopy conductance (gc) in which the role of transfer processes is no more discussed. In my opinion, both the use of the resistance analogy approach and the parametrisation of Ra and Rb should be sometime discussed. I think that it is a important shortcoming in ozone flux studies and I appreciate that this point is mentioned by the authors.

Specific comments:

- Definition of dry conditions is a bit confusing. From both (Page 1745 line 19 and Fig. 2. caption), I understand it is no rain + more than 12h since RH$<$70%. From (Page 1751 lines 26-27), I understand it is no rain and the posterior 12h + RH$<$70%. It is not a major difference in the definition, but since the separation between dry and moist conditions is a key point of the analysis, the definition of these conditions should be cristal clear.

- The marker for general moist conditions (X) in Fig. 2. and Fig. 3. is lacking for spring 2003 and, if I understood correctly its definition, is sometimes not consistent with the RH data presented (examples: 1-10 Sep 2002; 14Oct-11 Nov 2003).

- Fig. 1: Ozone flux measured at shoot scale is not defined in the text. I suspect that units are not consistent. For CO2, the ratio between canopy flux and shoot flux is about 3 during growing season, while for O3, the ratio between canopy flux and shoot flux is about 0.1. If canopy fluxes refer to 1 m2 of horizontal surface and shoot fluxes refer to 1 m2 of needle surface, I do not understand such a discrepancy between these ratios. I would have expected a ratio of about 7 between canopy and shoot O3 fluxes, as in Fig. 6.

- Fig. 8: In my opinion, 2 more graphs presenting dependence on surface wetness would be welcome.

- Fig. 10: In my opinion, the addition of similar graphs with Gnonsto,O3 at canopy scale, even if patterns are not so "nice", would strengthen the demonstration.

Technical corrections:

- "Q" instead of "q" (Page 1748, line 7)

BGD

2, S883–S886, 2005

Interactive Comment

- Eq(1): C(t) and V are not explicitely defined (Page 1748)

- "he" instead of "the" (Page 1760, line 4)

- "Frenquancy" instead of "Frequency" in Y-axis of Fig. 4.

- Units are lacking in Fig. 7.

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BGD

2, S883–S886, 2005

Interactive Comment