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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Ozone deposition into a boreal forest over a decade of observations: evaluating deposition partitioning and driving variables" *by* Ü. Rannik et al.

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## 1 General comments

The manuscript reports a very long (multi-annual) series of ozone flux measurements over a boreal forest. By measurements and modeling the flux is split into stomatal and non-stomatal pathways. The paper includes an analysis of the possible role of chemical reactions with sesquiterpenes and a multivariate analysis revealing the main parameters correlated with ozone deposition.

The dataset presented is very impressive and in general the analysis is quite sophis-

ticated. I miss a better analysis of the role of chemical reactions with monoterpenes and a more detailed description of other possible non-stomatal removal mechanisms and quantification of their individual contribution to the total flux.

I recommend that the paper is accepted with minor corrections as detailed below.

## 2 Specific comments

p. 12720, l. 23: The instrument used for $O_3$ fluxes was an LOZ-3. How was this calibrated and what was the flux data coverage for this instrument which has a reputation of being rather delicate and not so easy to maintain on a very long term?

p. 12723, l. 7-9: I am not sure what is meant here. Should it be "*calculated*" rather than "*accounted (for)*"?

p. 12725, sect. 2.3.3: This section only deals with sesquiterpenes. How was the chemical reactions with monoterpenes dealt with?

p. 12726, l. 5: What was the reason for the longer measurement break? What was the overall coverage for $O_3$ flux data?

p. 12726, l. 13: In addition to fig. 2, I suggest to add a figure showing the average annual variation in the $O_3$ concentration (relevant for the statement given in l. 7-9 on the same page).

p. 12727, l. 19-20: How did $G^S_{O_3}$ and $G^T_{O_3}$ compare around RH$\approx$ 70%?

p. 12728, l. 3-5: Does the lack of a diurnal variation during the dormant period mean that there is no temperature influence on the non-stomatal uptake? This is a bit in contradiction to the statement on p. 12731, l. 29, where temperature is identified as an important variable for non-stomatal conductance.



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p. 12728, 6-13: Is there a diurnal variation in the non-stomatal $O_3$ conductance? Or is the diurnal variation in total $O_3$ conductance only due to the variation in the stomatal conductance?

p. 12735: The paper presents a detailed analysis of the role of chemical reactions with sesquiterpenes, but it seems that a similar analysis of the role of monoterpenes is missing. The conclusions made about reactions with monoterpenes as an important removal mechanism is based on the multivariate analyses only. Would it be possible to simulate reactions with monoterpenes in the same way as for sesquiterpenes?

p. 12737: I suggest that the conclusion part try harder to describe the quantitative role of the different non-stomatal sinks. I find that the last sentence is a bit weak.

## 3 Technical comments

p. 12717, l.26: There is a significant lack of indefinite and definite articles in the manuscript. Here is an example, where I have added articles in bold: "*... noted that **the** life-times of many reactive terpenes can be less than a minute and **a** significant part of **the** ozone deposition into **the** ecosystem ...*" The lack of definite and indefinite articles throughout the manuscript is probably due to the fact that they are not used in the Finnish language. I therefore suggest that the authors send the manuscript for language revision by a person with English as his/hers native language.

p. 12718, l. 9: change to "*...that there **are** various mechanisms...*"

p. 12719, l. 4: ''*results in*" rather than "*present*"

p. 12725, l. 3-5: The sentence starting with "*The stomatal conductances ...*" is redundant. The information was already given a few lines above (p. 12724, l. 22-23)

p. 12735, l. 18: "*ponderosa*" in stead of "*Ponderosa*".



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