Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2021-670

Anonymous Referee #2

Referee comment on "Ozone deposition impact assessments for forest canopies require accurate ozone flux partitioning on diurnal timescales" by Auke J. Visser et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-670-RC2, 2021

This work compares a well know big leaf model with a multi-layer canopy model to demonstrate that the latter best represent ozone deposition in two forest canopies. As the author mention, there are not many field measurements globally, therefore testing models vs observation remains challenging. However, for future studies the authors are invited to use data from other field studies which have been collected in the last decades, especially those collected in dry sites. Results are quite predictable in the sense that a multi-layer model constrained with observation return more realistic data especially in reproducing diurnal site. Unfortunately, without field data to constrain MLC models, it is hard to obtain realistic results and therefore global application of MCL model remains challenging. The work reads well, and shed light on the need to use multi-layer models to derive ozone fluxes, in particular CUO used as a metric for ozone damage to vegetation.

Introduction

"…these are limited to short timescales. For these reasons, quantifying temporal

variability in stomatal and non-stomatal ozone deposition solely based on observations remains challenging.”

>>Please define what is an appropriate timescale to derive ozone flux partitioning. In my opinion having year-long continuous measurements is timescale long enough.

Site description

Other than a temperature broadleaf forest and a coniferous forest, it would have been wise to select also a dry forest in order to test models in environments with rather different climate conditions and vegetation features (i.e. the capacity to emit different VOCs). Furthermore, the effect of high VPD and drought on Gs is acritical point for models, therefore you missed such representation.

Lines 150-154: please provide a definition and/or reference for the relaxation factor of 0.5.

Line 154: please provide the formula or the reference to estimate In-canopy resistance.

Line 158: unclear the way adopted to estimate Ag. The latter parameter is crucial to estimate properly Gs. Have you tried to compare Cumulative Ag with GPP derived from EC measurements?

Lines 220-230: il looks like a mid-day depression in ozone deposition most likely due to partial stomatal closure is not taken into account by the MLC model.

Line 326: why do you exclude relevant chemical removal of ozone which may contribute to non-stomatal deposition? Perhaps low NOx and low BVOC emitted by the two ecosystems? Sesquitrpenoids from pines and to a minor extent monoterpenoids may react with ozone at time scales even lower than those used in the study.

Line 354: have you tried gap-filling so to produce CUOst for all year?

Line 488: rather than using the term “plant’s interior” I would say “plant’s chloroplast” or more generally “plant’s carboxylation site”.