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Interactive comment on "No tropospheric ozone impact on the carbon uptake by a Belgian pine forest" *by* L. Verryckt et al.

L. Verryckt et al.

lore.verryckt@uantwerpen.be

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Dear referee

Thank you for your comments on this manuscript and the thoughtful suggestions to increase its scientific quality. Below you find our response to each of your main comments.

The referee's comment: 1. The adopted methodology is based on the assumption that, if an O3 detrimental effect occurs, a GPP model parameterized for days with low O3 stomatal uptake would overestimate GPP during days with high O3 stomatal uptake. In my opinion, this assumption is not valid. As the authors themselves suggested (lines 267-272), solar radiation is usually high during high O3 events, so that a model parameterized under low O3 condition would be also parameterized under low irradia-

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tion, leading to a GPP underestimation. The authors poorly discussed the confounding effect of solar radiation on the study.

The authors' answer: We understand this comment since we didn't provide much details about the radiation conditions on the days we used to train the ANN model and on the days with high O3 uptake, on which we expected an O3 effect. It was however not the case that low and high solar radiation conditions were both exclusive to one of the datasets. (Our statement on lines 267-272 about solar radiation being usually high during O3 events is in this regard misleading). This is demonstrated in the upper left graph of Fig. 1 below, which shows the histograms of daily total radiation (Rg) for the training dataset (red) and the high O3 uptake dataset (blue). While it is true that Rg is on average rather high on days with high O3 uptake, as we suggest on lines 267-272, the figure shows that the training dataset included equally well days with high Rg as days with low Rg. Moreover, the training dataset covered an Rg range that contains the Rg range of the high O3 uptake dataset. We hence believe the model is unlikely to include a bias that is due to poor parameterization at high Rg and that leads to GPP underestimation for days with high O3 uptake. We have plotted in the figure below also the histograms for temperature and VPD, two other main drivers of GPP. Also for these two variables the training dataset covers a variable range that contains the variable range of the high O3 uptake dataset. In general, we believe that the training dataset and the high O3 uptake dataset overlap sufficiently in the 'multi parameter space' for the model not to include a bias that would result in a GPP overestimation that we might wrongly interpret as an effect of O3. This information and the graphs below will be added to the revised manuscript to inform all readers.

The referee's comment: 2. Line 192: Why is g_areo set to 1?

The authors' answer: The aerodynamic conductance was set to a fixed value of 1, because we were not able to calculate g_aero accurately from other measured parameters and because g_aero was expected to be very high relative to the other conductances, as O3 concentrations were measured at only 3 meters above the (rather smooth) canopy surface. For these two reasons we set g_aero to a rather high and fixed value of 1 nmol m-2 s-1. We admit that the choice for this value lacks further scientific basis. Therefore, in the new analyses for the revised manuscript, we will put this value infinitely high. In other words, we will omit g_aero from the conductance scheme. This will only have a negligible effect on the calculated O3 fluxes.

The referee's comment: 3. Lines 213-218: Authors should provide more information about network's building. Please clarify: How did the authors choose the nodes number? Before training the network, did the authors scaled inputs and target data so that their magnitudes were similar (e.i. [0 1] or [-1 1])?

The authors' answer: The numbers of layers and nodes were chosen after testing the network with different numbers of layers and/or nodes. Since the model is not too complex, the model does not need many layers and nodes. The model with 1 layer and 10 nodes gave the best R^2 value for the validation dataset for which also a high R^2 value was given for the training dataset (see Fig. 2). A normalization process was applied for training and testing the data. The default settings of the Matlab Neural Network Toolbox were used. Data were scaled to [-1 1] based on the lowest and highest value in the dataset. We will add a line to the manuscript to inform the reader that we tested different models and the network with 1 layers of 10 nodes came out as the best performing. We wouldn't show Fig. 2 below with all results, though. We will also add the information about how data were scaled to [-1 1] in the Matlab Toolbox.

The referee's comment: 4. Some technical corrections.

The authors' answer: We agree with all technical corrections and will adjust these in the revised manuscript. We would like to thank you again for the helpful comments and suggestions on the manuscript.

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-12, 2016.

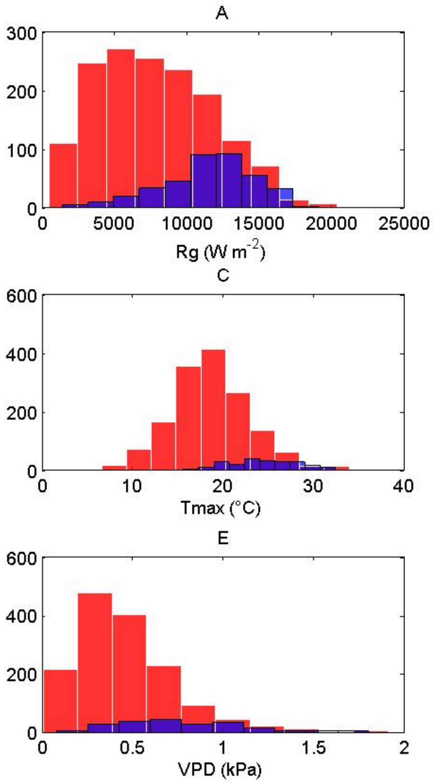

Fig. 1. Histograms of meteorological variables for the trainingsdataset (red) and the high O3 uptake dataset (blue).

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Layers	Nodes	R^2 - training	R^2 - validation
1	1	0,6064	0,6239
1	5	0,7881	0,7293
1	10	0,8457	0,7656
1	15	0,8647	0,7534
1	20	0,9603	0,6959
1	50	0,9632	0,6055
2	1	0,6136	0,6088
2	5	0,7967	0,7711
2	15	0,9469	0,7367
2	20	0,8808	0,7146
10	1	0,621	0,5959
10	10	0,8924	0,7476
10	50	0,9969	0,4989

Fig. 2. Layers and nodes tested in a neural network with the R^2 value of the training and validation dataset.