We appreciate the careful review provided by the referee. Below are our responses to the comments of the referee. Changes in the revised manuscript are marked in red and in italics in the responses.

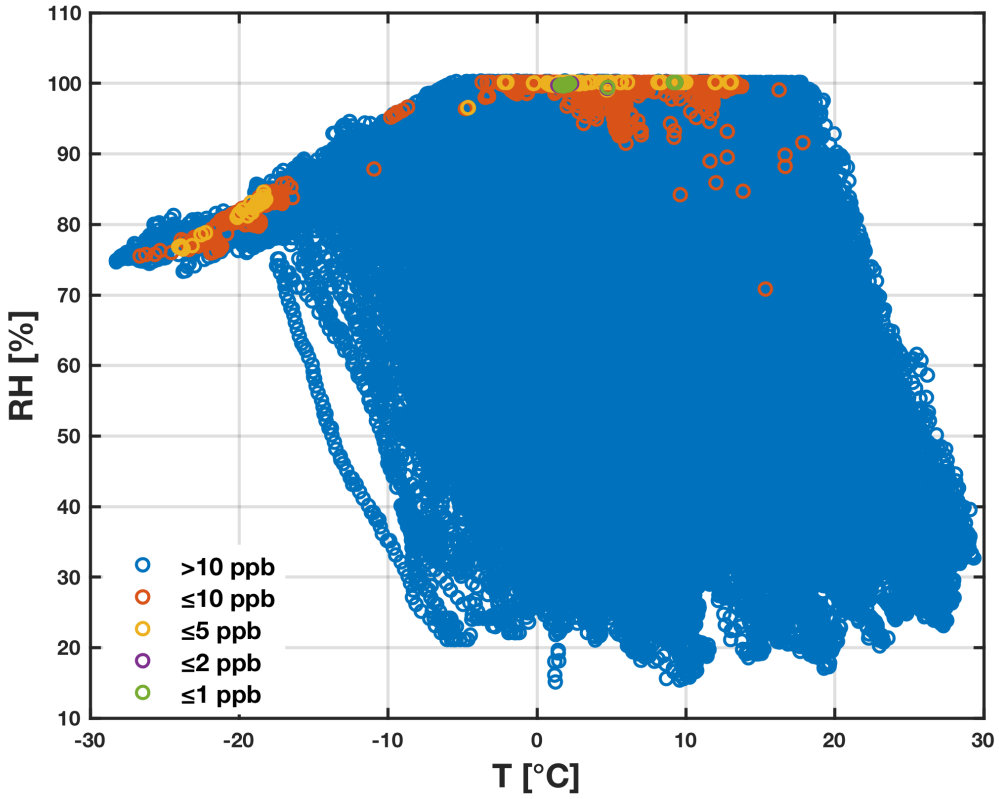
Specific Comments:

Section 3.3 first paragraph: Figure 7 appears to show a positive correlation between ozone and temperature and a strong negative correlation between humidity and ozone. It would be quiet interesting to see a plot of temperature versus humidity to see the trends between these variables. This could serve as an insight into the potential role stomatal closure of plants plays in the ozone depletion events. E.g. Lower tempera- tures and higher humidities tend to lead to plants opening stomata and thus enhancing ozone deposition leading to lower concentrations. The authors go onto showing the impacts of both RH and temperature together in Figure 10 for a couple of isolated events but it would be interesting to see the trend in the combined effect of RH and temperature over all events to see if this can explain any potential changes stomatal conductance could have on deposition and hence concentrations.

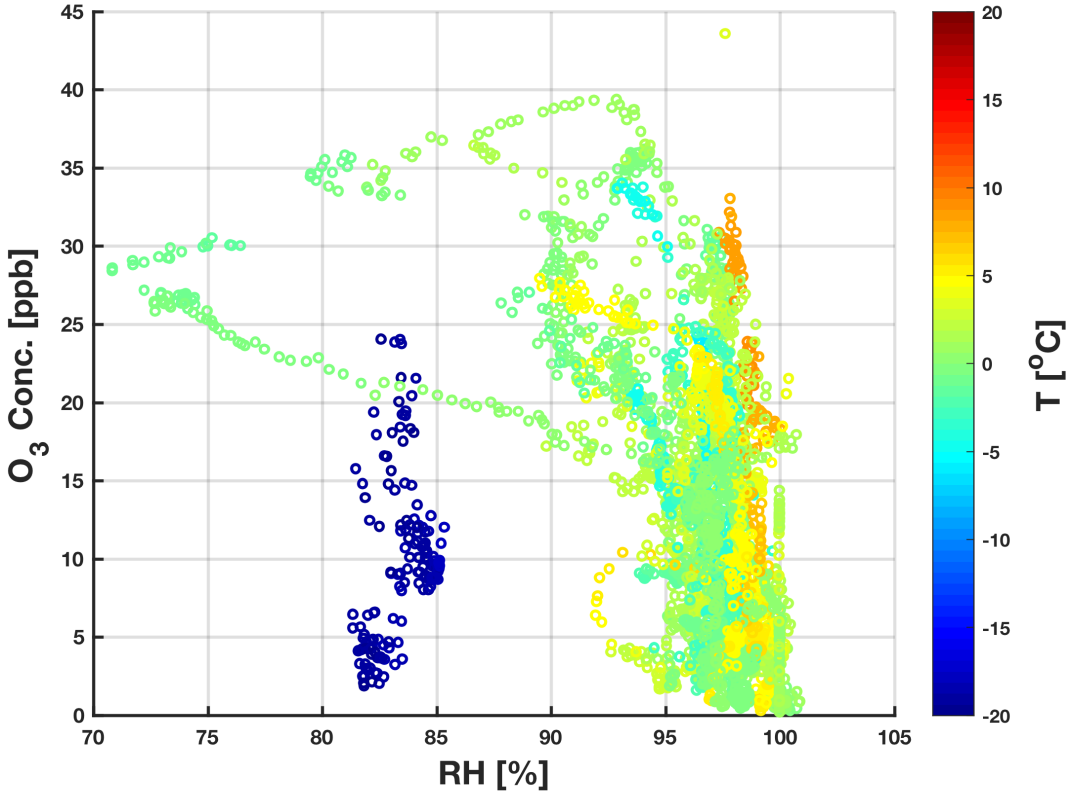
We appreciate the comments and suggestions from the reviewer! We made a T vs. RH plot to outline their synergic effect during the low ozone concentration episodes (see the figure below). The high RH and low T may favour stomata opening for biological uptake of ozone directly via stomata. However, many results show that wet surfaces can form an additional, non-stomatal sink for ozone, which is adsorbed to the water film formed on plant surface (Fuentes et al., 1992; Altimir et al., 2006). The high humidity ozone depletion events are thus probably linked to a combination of stomatal and non-stomatal behaviours. We clarified this in the manuscript in section 3.3.

At RH levels higher than 70% almost all surfaces of foliage are covered with thin water film, which efficiently adsorbs ozone and decouples the stomatal conductance from O3 fluxes, forming a significant non-stomatal sink for ozone (Altimir et al 2006). This can be responsible for about 40-60% of the observed decrease in O3 concentrations in the very humid cases in our data, and we can conclude that moisture content in the air is likely to be one of the key factors controlling these low ozone episodes.

We did not add the T vs. RH plot into the revised manuscript, because we think the information contained in this plot can be deduced from the Fig. 7 and this figure cannot add additional values to the manuscript. However, if the editor thinks it is necessary, we can have this plot as a supplementary figure.



We also had a look at the T and RH during depletion events. By plotting T and RH during all 26 full profile events below 5 ppb together, we could observe a general negative relationship between O3 and RH (see the figure below). But for T below -15 C, the relationship seems to reverse so that the O3 concentration shows an increase with an increasing RH. The effect of T is not as clear as expected, probably due to the large seasonal variations in T. Again, the stomata uptake of O3 under high RH conditions can be expected to be stronger, but the non-stomatal update of ozone can also be enhanced under moist conditions (Altimir et al., 2006). The reason behind the ozone depletion we observed is certainly interesting to find out, which however, requires further studies to quantify the relative roles of physical, chemical and biological loss mechanism of ozone in these phenomena.



Section 3.3. final paragraph, page 8 lines 15-20. The authors briefly touch on the influence of CO and NOx concentrations have on the specific ozone depletion events that they present in Figure 10. Although no clear trend is shown for the first event (Figure 10e and f), for the full depletion event (Figure 10 k and l) it is shown that both NOx and CO concentrations are high during the event and CO in particular is high leading up to the ozone depletion period. These values are a lot higher than is expected in typically clean forest environments. The location of the site is to the North/North East of two large cities (Tampere and Helsinki) and therefore perhaps regional transport of pollutants could be playing a role? I am thinking mainly in the terms of transport of high NOx which could contribute to ozone titration and enhanced depletion. Could this be a potential chemical pathway to the ozone depletion events?

Yes, our site can be influenced by pollution transported from nearby cities. This is clarified in the revised manuscript in section 2.

…and our site can receive transported pollutants from nearby cities (e.g. Tampere and Helsinki) and continental areas (Riuttanen et al., 2013)

And the reaction of NOx with O3 is a known chemical pathway that could decrease local ozone concentrations. However, by a look at our case studies shown in Figure

10, in both the near-surface and full-profile depletion events, the NOx level is rather low and largely unaffected at the onset of the depletion. While in the near-surface event not much change in NOx is observed during the whole episode, in the full-profile event the NOx level is seen to increase steadily from a low to a high value in relation to the measurement site, and retain the high value after the depletion event has passed. In light of these findings it seems that NOx cannot explain the observed O3 depletion phenomena. To ultimately reveal the potential role of NOx, and also CO, in ozone depletion, dedicated laboratory experiments are required to solve these issues.

Minor Comments:

Page 4, Line 33: Please correct extend to 'extent'

Thank you for spotting this typo out! It is corrected as suggested.

References: Please ensure that all references have associated DOIs.

We have added DOIs to all references that have been assigned one.

References:

Altimir, N., Kolari, P., Tuovinen, J.-P., Vesala, T., Bäck, J., Suni, T., Kulmala, M., and Hari, P.: Foliage surface ozone deposition: a role for surface moisture?, Biogeosciences, 3, 209-228, 2006.
Fuentes, J. D., Gillespie, T. J., Hartog, G. d., and Neumann, H. H.: Ozone deposition onto a deciduous forest during dry and wet conditions, Agricultural and Forest Meteorology, 62, 1-18, 1992.