

Interactive comment on “Sensitivity of stomatal conductance to soil moisture: implications for tropospheric ozone” by Alessandro Anav et al.

Anonymous Referee #1

Received and published: 4 February 2018

This paper describes an analysis of the seasonal effects of soil drying on ozone stomatal deposition and surface ozone concentrations. The analysis utilizes the CHIMERE chemical transport model coupled with WRF, DOS3E, and the NOAH soil models. Results show large changes in ozone deposition and surface ozone concentrations in Mediterranean climates in Europe.

My main concern is the lack of discussion. The Results section is thin and should be supplemented with quantitative information not readily derived from the maps, for example, differences resulting from the different soil moisture scenarios. Critically missing is a Discussion section, or a combined Results and Discussion, describing the reasoning, importance, and context of the results. For example, the discussion of the change in model performance is just a few sentences long and is entirely descriptive.

C1

Minor comments:

The manuscript should be edited for grammar and flow. There are numerous grammatical errors.

Figure 1: Increase the font size. The titles should be changed to be more easily understood. The color bars should be labeled.

Can you add measured data to Figure 1? I understand that soil moisture measurements are made at different soil depths than the depths where the simulations are done, but they should still agree qualitatively with the gradients.

I find the model and measured precipitation correspondence difficult to discern. To my eye, it is easier to distinguish when the model and measurements do not agree. Is there some other way to represent the data? In the text, you state that the measurements are “well reproduced,” but on what timescale? Weekly? Seasonally? They do not appear to coincide day-to-day.

Is there another variable that can be added to the precipitation panels that makes it visually clear why precipitation does not coincide with soil moisture seasonally?

Lines 342–346: The annual change across Europe is not a very interesting statistic. I recommend highlighting certain regions, especially the portion of Europe with a Mediterranean climate. Second, does the variability in deposition change, rather than just the mean?

Figure 2: The color scale saturates over large regions of southern Europe. I’m curious to know how large the observed percent change was.

There is little to no discussion of whether ozone deposition and ozone concentration differences were observed between soil moisture schemes. These differences, if they exist, are not apparent to me from Figures 2 and 3. Results and discussion to this point should be added.

C2

I find Figure 4 and the small portion accompanying text to be unconvincing and not useful. I recommend removing this piece of the analysis.

The text concerning changes to ozone measurements and model agreement should be clarified and expanded. It isn't clear to me what the authors are communicating.

Can the authors quantitatively contextualize the change in ozone concentration results in terms of the attainment of European ozone standards?

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2017-1057>, 2017.