

Interactive comment on “Identifying forecast uncertainties for biogenic gases in the Po valley related to model configuration in EURAD-IM during PEGASOS 2012” by Annika Vogel and Hendrik Elbern

Anonymous Referee #1

Received and published: 24 November 2020

This paper presents a very interesting study analyzing a variety of meteorological and physical impacts on biogenic emissions and the resulting ambient concentrations. Gaining a greater understanding of these processes, their impacts and uncertainties is of great importance for air quality modeling. The design of the experiment, changing a variety of model parameterizations in turn, provides a wealth of data for this study. The analysis of the impacts on biogenic emissions (isoprene and lumped aldehydes) is interesting and useful for the community.

However, the results on the effect on surface concentrations are presented without any

C1

consideration of the atmospheric chemistry that might affect their results. Isoprene reacts with OH very quickly, and OH distributions are likely influenced by the meteorological changes (clouds, humidity). This should at least be mentioned and preferably OH fields also shown, to allow a greater understanding of the changes in isoprene among cases. It would also be interesting to use the sensitivity studies performed for this work to analyze the intensity of segregation and see how the model parameterizations affect that and thus the chemistry. See Kaser et al., GRL, 2015, doi:10.1002/2015GL066641.

I have greater concern about the aldehydes results because aldehydes have a large secondary production that is not even mentioned in the paper. So the surface concentrations will be affected not only by biogenic emissions but chemical production (from isoprene and anthropogenic sources). It might have been better to study something like methanol, which has large biogenic emissions, longer lifetime and no secondary production. Thus, in order to keep Section 5 in the paper, much more discussion should be included about the impact of atmospheric chemistry on the surface concentrations.

Some additional comments:

I.90: aldehydes are also photochemically produced.

I.236+: You might want to refer to Jiang et al., <https://doi.org/10.1016/j.atmosenv.2018.01.026> for a discussion of the implementation of drought impact in MEGANv3.

Figure 4: It is very difficult to pick out the differences highlighted in the discussion in these tiny panels. It would be nice to find another way to illustrate these differences. Perhaps all except the first column should be differences (percent) from the ref case. Or show just averages over the Po Valley and other regions of particular relevance (not on a map).

Figures 6 & 7 are also too small - they could at least be enlarged to the width of the page, but difference plots would help illustrate features.

C2

There are a number of spelling and grammar errors, but the paper is understandable. Here are some corrections:

l.112: through -> trough

l.269: 'neglectable' -> negligible

l.305: 'friction velocities does only' -> 'friction velocities only'

l.307: do you mean 'exemplary' (best of its kind) here, or perhaps just 'example' or 'representative'? [similarly elsewhere in the paper]

l.309: does -> do

l.353: plain -> plane

l.364: hove -> have

l.419 'so large' -> 'to large'

l.420 add comma after 'common'

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-608>, 2020.