



EGUsphere, referee comment RC1
<https://doi.org/10.5194/egusphere-2022-292-RC1>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on egusphere-2022-292

Anonymous Referee #1

Referee comment on "Interactive biogenic emissions and drought stress effects on atmospheric composition in NASA GISS ModelE" by Elizabeth Klovenski et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-292-RC1>, 2022

Interactive biogenic emissions and drought stress effects on atmospheric composition in NASA GISS ModelE

By Klovenski et al.

The research in this paper implements the updated drought stress parameterisation of MEGAN3 into the NASA GISS ModelE. The new model is used to improve isoprene emission predictions at the Missouri Ozarks site in the US, which experienced a severe drought in 2012. Isoprene was measured during this severe drought period making these observations crucial to the study of impacts on BVOC emissions caused by drought. Applying the parameterisation globally also led to emission reductions of the order ~3%, and improved the model comparison with satellite HCHO measurements over the US. The paper concludes by suggesting the variables required by the drought parameterisations in MEGAN3 are quite model specific, such that they should be tuned on a model by model basis.

I think the paper is well written (particularly the discussion and conclusions section) and should be published. I have a few comments.

Line 74. The CO2 parameterisation serves to inhibit isoprene emissions (Heald et al., 2009)?

Line 80-82. Very confusing sentence. 'During drought, increases in SOA and O3 are to be expected'. Why? What aspect of drought would cause this? (In my mind, less isoprene would mean less ozone?) Needs explanation. Then the second part of the sentence suggests isoprene reductions will decrease the magnitude of the increase.

Line 199. $1 \times 10^{-9} / 3600$ looks like it also contains the conversion from the emission factor units of μg to kg (rather than just being a timestep conversion).

Line 250 add drought stress 'parameter' developed by.....

Line 427 define USDM

Figure 1. there looks like a gap in the observations towards the end of the timeseries (mid august). Consider whether these time periods should be removed?

Lines 511-520. You talk about the general over/under estimation of the model but what about the shape of the fit details? Does the model hit or miss the daily peaks? What could be the reason for the missed peaks?

Section 3.2. MOFLUX_DroughtStress is not one of the models shown in the fig 1 timeseries, yet promises to be a better fit. I'd like to see it compared with the observations at the MOFLUX site.

Line 585. Soil moisture products 'resulted in' isoprene reductions....

Line 657. 'model agreement' here is a bit strong since the scatter plot shows the data points well spread from the 1:1 line.

Line 669. 'As shown below'. Below where? Underneath this line is a table of global emissions, not details on the south east US.

Line 820. Affect, not 'effect'

Line 821. Higher mean O3. I need more explanation about what is leading to the higher ozone if the isoprene is reduced.

References

Heald, C. L., Wilkinson, M. J., Monson, R. K., Alo, C. A., Wang, G., and Guenther, A.: Response of isoprene emission to ambient CO₂ changes and implications for global budgets, 15, 1127–1140, <https://doi.org/10.1111/j.1365-2486.2008.01802.x>, 2009.