<u>**General Comments**</u>
This paper describes the differences in BVOCs simulations using updated MEGAN. The concentrations of ozone, NO_2 and other trace gases over the two cases are also examined. Evaluation of the three updates made to the MEGAN coupled in WRF-Chem (v3.9) is useful to the model community. However, the value of this study has not been proved in the case that previous studies have already evaluated and compared the difference of V2.1 and V2.0 in WRF-Chem (Zhao et al., 2016; Zhang et al., 2021). It is not surprising that the updates to emission factors and activity factors would lead to the changes in BVOCs emissions. Therefore, it is important to quantitatively evaluate these differences and explain the reason. I appreciate that you collected the station and flight observations for evaluation. However, some analysis of OH, formaldehyde, and other necessary species may help explain the difference of the simulations. Most importantly, if the analysis found that the older version performances better against the observations than the newer version, the authors need to give some explanation and provide suggestion and guidance for further development or optimization of the model.

<u>**Specific Comments**</u>
1. Line 265-266: Please explain the difference of MG and MGPFT simulations in more details. Why is the activity factor related to the PFT emission factors?

2. Line 310-325: As the authors mentioned, BOVCs predicted by MEGAN are highly related to the environmental conditions. Therefore, there still need some comparisons of radiation, soil moisture, and other meteorological fields between the simulations and the observations (or reanalysis data) to confirm the reliability of the model.

3. Line 345-349: Adding similar plots of Figure 9 to show the PFT weighted emission factor (consider the PFT emission factor and PFT percentage) would make it clearer that the PFT percentage in four cities contributes to the difference of overall emission factors.

4. Line 392-393: Please explain a little more about the method of disaggregating station types here other than just citing a reference.

5. Line 405-406: Is soil NO_x changed in different MEGAN simulations or do you turn off the soil NO_x in these simulations? If soil NOx is different, the impact may not be from BVOCs only. In addition, please compare your results (the resulted impacts to NO_2 and CO are small) to other similar studies and provide some discussion.

<u>**Technical corrections**</u>
1. Line 31: It is not clear here about M2.04 and M2.10.

2. Line 195: There may be some errors in reference insertion.

3. Figure 11: "M10" and "M04" may cause confusion, please change to "M2.04" and

"M2.10" or give some explanation.

References

Zhao, C., M. Huang, J. D. Fast, L. K. Berg, Y. Qian, A. Guenther, D. Gu, M. Shrivastava, Y. Liu, S. Walters, G. Pfister, J. Jin, J. E. Shilling, C. Warneke (2016): Sensitivity of biogenic volatile organic compounds (BVOCs) to land surface parameterizations and vegetation distributions in California, Geosci. Model Dev., 9, 1959–1976, doi:10.5194/gmd-9-1959-2016, 2016.

Zhang, M.-S., C. Zhao, Yuhan Yang, Qiuyan Du, Yonglin Shen, Shengfu Lin, Dasa Gu, Wenjing Su, Cheng Liu: Modeling sensitivities of BVOCs to different versions of MEGAN emission schemes in WRF-Chem (v3.6) and its impacts over eastern China, Geosci. Model Dev., 14, 6155–6175, 2021.