

Interactive comment on “BVOCs emission in a semi-arid grassland under climate warming and nitrogen deposition” by H. J. Wang et al.

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We would like to thank the reviewer for the comments on our manuscript. Below we reply in detail to all comments.

1. Really this study was more about changes in the biomass of *Artemisia frigida* and how that translates to changes in area monoterpene emissions. The study did not address how the plot treatments affect the leaf level monoterpene emissions from individual species of plants, which would make the study much more useful to those who would like to predict how environmental factors may change VOC emissions in other ecosystems.

Response: We initially also tried to measure the leaf level monoterpene emissions.

C1183

However, *Artemisia frigida* had many small and dense leaves, generally forming a mat, and also was very short (mostly 1-3 cm). Moreover, there were about 5-10 species in each plot. We can't find a feasible and reliable method to collect in-situ gas samples without wounding effects in leaf level. Based on some studies conducted in grassland (Bai et al., 2006; Tiiva et al., 2008) and also the approaches of emission factor in Guenther et al., (1995), we selected area-averaged flux measurement. In order to detect the effects of environmental factors and compare with other studies, we simultaneously measured biomass and converted the natural emission to standard emission factor (SEF). Although the variation of *Artemisia frigida* biomass determine the changes of natural emission, our results did show the reasonable effects of climatic warming on SEF in arid and semi-arid grassland, and highlight that warming-induced drier condition might largely offset the warming effects on BVOCs emission in such region.

2. Could the emissions from each plot (accounting for changing biomass density and species distribution) be modeled using the Guenther 95 algorithm? Any divergence between the model and the measurements may point to an effect from warming, nitrogen, or water availability.

Response: We did not measure in-situ emission rate of each species and can't get their standard emission factors, so the emissions can't be modeled currently. In future, special sampling equipments are needed to collect in-situ gas samples in leaf level in grassland.

References

Bai, J., Baker, B., Liang, B., Greenberg, J. and Guenther, A.: Isoprene and monoterpene emissions from an Inner Mongolia grassland, *Atmospheric Environment*, 40(30), 5753-5758, doi:10.1016/j.atmosenv.2006.05.019

Guenther, A., Hewitt, C. N., Erickson, D., Fall, R., Geron, C., Graedel, T., Harley, P., Klinger, L., Lerdau, M., McKay, W. A., Pierce, T., et al.: A global model of natural volatile organic compound emissions, *Journal of Geophysical Research*, 100(D5), 8873-8892,

C1184

doi:10.1029/94JD02950

Tiiva, P., Faubert, P., Michelsen, A., Holopainen, T., Holopainen, J. K. and Rinnan, R.: Climatic warming increases isoprene emission from a subarctic heath., *The New phytologist*, 180(4), 853-63, doi:10.1111/j.1469-8137.2008.02587.x

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 12, 787, 2012.

C1185