Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2020-235-RC1, 2020

Biogeosciences Discussions
Open Access
EGU

Interactive comment on "Biogenic volatile organic compound ambient mixing ratios and emission rates in the Alaskan Arctic tundra" *by* Hélène Angot et al.

Anonymous Referee #1

Received and published: 24 August 2020

This paper aims at quantifying terpenoid mixing ratios and emission rates of dominant vegetation in northern Alaska. The authors have intensively compared their data with the published data from northern Sweden and Greenland and derived site-specific temperature response curve. This paper is well written and the data from this paper can provide base quantification of BVOC emissions from this less-studied area. A variety of measurements have been used in this paper and I, as a modeler, will leave the measurement part to other reviewer(s).

My main concern of this paper is that the mixing ratio measurements are not much linked to the emission rate measurements. It is a lot of data presented (which was

Printer-friendly version

Discussion paper

good), but I think the authors should bring these data together to present a whole story. Then, another part is about comparing emission ranges with literature values. The measurement conditions could vary largely and also in different periods of growing season. It is difficult to directly conclude that the measurement values are in the range of published values. I think standardized emission rates (using commonly-used Guenther algorithm) are needed in this case.

Here are some detailed comments:

Introduction: I would think one to two sentences could be needed to justify the importance of studying BVOC emissions on impacting atmospheric chemistry from this less-polluted arctic region . Then I think the aim of this study should be elevated, so what are the main aim of this study apart from quantifying emissions and mixing ratios.

L52-53, the field warming increases of BVOC emission is not only seen with long-term warming but also found with a short-term field warming like 3 years in the same area.

L97, please describe the start and end of a normal growing season for this site.

Table1 Rhododendron tomentosum seems the 2nd highest covered in this area and why not present emission from this species separately?

Fig. 3, I have a bit difficulty to find all measurements points at different heights. Suggest to use more distinguishing colors combining with different symbols.

L362, as far as I know, Cassiope tetragona is also a MT emitter.

L372-L380, how valid it is to state that the values are in the range of published values if focusing on the emission rates potentially measured at very different temperature and light conditions. I would suggest comparing the standardized emission rates with other studies if possible.

L435, What does this mean “account for differing leaf area. . .”? This is the emission rate of the per ground area, right? Please clarify.

L436, If dividing all fluxes with the standard emission rates at 20 degree, then it gives a multiplication of environmental responses (unit-less). As PAR is measured in the chamber, why not take away the light variation part before only looking at temperature response curve? Then about Fig. 9, how did you deal with the MEGAN temperature response curve, as I did not see the normalized emission rate to 1 around 30 degree?

L464-L468, MEGAN uses leaf temperature, not ambient air temperature for emission estimations. With predicted strong increase of air temperature in the Arctic, it still remain largely unknown (interesting to know) how plant leaf temperature can change and thus impact on BVOC emissions. I think it is important to have this in the discussion context.

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2020-235, 2020.

Printer-friendly version

Discussion paper