

***Interactive comment on* “Comparing three vegetation monoterpene emission models to measured gas concentrations with a model of meteorology, air chemistry and chemical transport” by S. Smolander et al.**

Anonymous Referee #1

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General The paper is well written, timely and very well suited to Biogescience. In my opinion this is really an excellent example of model/ measurement integration beyond mere evaluation.

However, I am a bit surprised about the use and application of emission models here. As far as I recall, pine monoterpene emissions may come directly from chloroplasts [1, 2] but the dominant part is thought to origin from specific storages [3, 4]. This is at least partly reflected in the range of Guenther-Emission factors that can be found in the literature for direct monoterpene emission (0.9-2.5; [5, 6]) and emission from

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storages (1.4-5.7; [7, 8]) although occasionally much higher values are observed [9, 10]. So storage emission is at least an important if not the dominant part of emissions. However, the models applied seem to consider only the light-dependent emission. This is certainly true for the SIM-BIM model because this is developed for direct emissions only but seems to be the case for Guenther and MEGAN approach also. In the latter cases, the models assume a separate emission factor (EFs) that is modified by (leaf) temperature as follows: $E_s = EF_s * \exp(BETA * (temp - TREF))$, with BETA and TREF being parameters. This model is not affected by age or soil moisture but only scaled with leaf area index and is thus probably not what is meant with the gammaT function (indicated in Line 13, Page 18569). If it is true that the emission from storages has been neglected, I would see it as a major flaw in the overall exercise. In this case, I would recommend to a) skip the SIM-BIM simulations (delete chapter 2.3 and parts of 5.2, delete App. A, Table A1 and A2, Fig.1), b) apply the storage emission type in a realistic relation to the light-dependent emission type in the other two models, and c) recalculate the results. If I have overlooked something here, please be sure to clarify.

Specific

Introduction

P18566, L15: This would include birch and aspen which are isoprene emitters. Please reword in order to avoid misunderstandings.

Emission models

This section needs some information about how soil emissions are modeled. This is to some degree explained later on but should be indicated here.

Results

P18583, L25ff: As I recall there is also considerable birch contribution to the forest [e.g. 11].

Mentioned references

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