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Interactive comment on "New foliage growth is a significant, unaccounted source for volatiles in boreal evergreen forests" *by* J. Aalto et al.

Anonymous Referee #1

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General comments

The manuscript is well written and describes a very important topic that has been largely overlooked. My main (but little) concerns are that the importance of emissions with regard to aerosol formation should be discussed a bit more careful given the uncertainties that are still connected to the topic. Also, I would like to see the results laid out in a bit more detail (see below). Despite this and the modifications recommended below, I have no major concern about publication.

Specific comments

Abstract:

- P1, L23: two orders of magnitude seem to be exaggerated. And while it is said that

the higher emissions are particularly found during spring time, it is worth mentioning that in summer the two branches show emissions of similar magnitudes.

- In the end, I recommend a more cautious formulation because the implications on aerosol formation have not been demonstrated directly.

Introduction:

- P2, L26ff: This is not true. The seasonal isoprenoid model presented by (Zimmer et al., 2003) has been applied to derive seasonal dependencies of monoterpenes emission also for evergreen trees (Grote et al., 2006). More discussion and comparisons with the MEGAN approach can also be found in (Grote & Niinemets, 2008; Monson et al., 2012). The problem however, is that the summer-time emission factor is assumed to represent the maximum emission while enzyme activities related to emission that are specific for leaf expansion are neglected so far.

Methods:

- P6, L27: Could you please give a reference for the assumption that all needle age classes have the same biomass? It is somehow against intuition. Also literature that I am aware of indicates that at least needle ages classes of three years and older are considerably diminished l(Niinemets & Lukjanova, 2003; Xiao & Ceulemans, 2004).

- P7, L6: I think you assume everything identical, not almost identical, right?

Results / Discussion

The results are presented biomass-based. However, as also noted by the authors, emissions are often expressed on a leaf area basis. For comparison reasons, I would therefore recommend to calculate the emissions also based on leaf area. This could also been used for a tree-level upscaling exercise. Additionally, I would like to see a table with summed up emission values per year, otherwise the numbers presented in the text are difficult to digest.

- P10, L6: ‘using a model of needle and shoot’ is a bit puzzling. Please refer to the method section where this has been explained and to what is the essence of the model.

- P10, L28: 100 days – reference? Seems to be a bit high (reference?), i.e. compared to (Jach & Ceulemans, 1999)

- P10, L31: I wonder why poplars are missing here.

- P12, L20: also light dependent isoprenoid and MBO production respond on temperature and not ‘light only’.

Technical Comments:

- P1, L25: double ‘from’

- P2, L13: Guenther instead Gunther

Cited References:

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