



***Interactive comment on “The Model of Emissions of Gases and Aerosols from Nature version 2.1 (MEGAN2.1): an extended and updated framework for modeling biogenic emissions” by A. B. Guenther et al.***

**Anonymous Referee #2**

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General comments:

The intent of this paper is to describe model improvements to a biogenic volatile organic compound (VOC) emission model. The topic of this paper is suitable for GMDD, but I think that the paper needs re-focusing before publication is suitable. This includes clearly highlighting the model changes such that users can identify changes in model parameterizations and providing a comparison with prior model versions is needed to justify these changes.

C544

Major comments:

1. There is no discussion of how the MEGAN 2.1 biogenic VOC estimates are different from past model versions. Can this be compared in global annual total emissions in Table 5? Additionally, the current version does not clearly delineate the parameterization in equation form in Section 3. This is needed to more clearly highlight the new model and should be the goal of the paper.
2. Further explanation of the distinction of the 19 categories is needed. These BVOC category definitions are one of the major changes in this version of the model and a clearer delineation of these “newer” category types would assist readers in understanding the new outline of BVOC emission categories (e.g., p. 1506 lines 20-24 and page 1508, lines 18-24 are both vague).
3. It is unclear what type of data the authors are basing model changes on, including whether or not they are using whole-ecosystem observations or branch enclosures. This would make a rather large difference for some of the new category definitions. For example, page 1507, line 3 –are emission factors based on branch measurements or whole ecosystem measurements that would take these into account? A discussion of this issue and its role in model development should occur outside of the discussion of individual species (e.g., page 1509, lines 12-30)
4. Because this paper is focused on model development, it would assist the reader if section 2 focused on the major model parameterization changes followed by some specifics on emissions types. I find that the rather lengthy discussion of individual BVOC species in the existing section 2 distracts from the main goal of the paper, which should be to describe the model development.

Minor/editorial comments:

1. Introduction, page 1505 lines 11-14. Please edit to be more concise/clear. It also might be worth expanding on each of these reasons more explicitly, because this

C545

seems to be a major point in the model development.

2. Section 2, last paragraph, p. 1507, lines 8-24: better organization needed for this paragraph, seems to be a random collection of all possibilities
3. Section 2.1, lines 5-7: how are “major” and “minor” defined?
4. Section 2 is a strange mix of history of measurements and modeling that often seems disjointed. Some re-calibration of how relevant this background information is is needed. I would prefer to see more discussion of the new model results and how they have changed from prior model versions.
5. Section 2.1.2: line 15, What tree inventories are used? Is this the same as the original model (if so, please reference) and if not, then cite the new source.
6. Section 2.2 and 2.3: For many of the newer types of other VOC, there is too much discussion focused on the atmospheric budgets of these species, and it is unclear if this is relevant to the paper.
7. Section 3, line 20, change “table” to “user-specified values”
8. Page 1529, line 16-25. How is MEGAN 2.1 calculating leaf temperature? Are the authors referring to the CLM4 calculation of leaf temperature or is there a new parameterization added?
9. Section 3.3.3 – the authors recommendation on the soil moisture parameterization is rather ambiguous. Can a discussion of how model's soil moisture wilting point differs between application models be included?
10. Page 1533, lines 9-14, confusing, please re-summarize
11. Table 1: The distinction between “categories” and “compounds” is confusing in this table (although referring to Table 2 helps). Could rephrase to “XX categories and XX compounds”

C546

12. Table 5: Typo in methanol number?

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Interactive comment on Geosci. Model Dev. Discuss., 5, 1503, 2012.

C547