

Interactive comment on “What are the challenges for modelling isoprene and monoterpene emission dynamics of subarctic plants?” by Jing Tang et al.

Anonymous Referee #3

Received and published: 13 May 2016

Overview:

This paper presents a very valuable and interesting work, focusing on isoprene and monoterpene emissions from subarctic plants, a topic that has not been investigated or published much so far. I really appreciate the originality of this study, which helps to improve our understanding regarding emission estimates. However, as also raised by the two other referees, I think that this manuscript would really benefit from a deeper and more detailed presentation, of the result analysis and discussion especially, which would help to appreciate more clearly the validity of the conclusions of this work. Here are some feedbacks and corrections that would need to be considered before publication in BGD, that I warmly support.

General comments:

C1

Abstract: in “evaluating BVOC related processes”, which processes for instance do you refer to, photosynthesis?

Generally in the manuscript, the analysis is rather qualitative than quantitative and should be more detailed and specified. Some elements giving more precise information on the context could also be added. For instance, what is the estimated contribution of subarctic plants to global isoprene and monoterpene emissions? This could be specified for both the present-day case and the different warming scenarios, giving more perspective to the work carried out, and is important to be discussed, especially in section 4.

Page 5, section 2.2.2 BVOC modelling: Could you please detail what the seasonality function used in isoprene production calculation stands for?

Page 6, section 2.2.2 BVOC modelling: Works published so far agree on the CO₂ inhibition effect regarding isoprene emissions, but not regarding other BVOC emissions. Is the $f(\text{CO}_2)$ function considered in the model only for isoprene or for every BVOCs? On which work is it based and is the same parameterization considered for every compounds?

Page 9, line 25: What do you mean exactly with “dynamic vegetation” in “simulating dynamic vegetation enables us to assess the model performance”? Day-to-day variability? Higher frequency? Indeed the term of dynamic vegetation can also refer in vegetation modeling to long-term changes in vegetation distribution due to climate and CO₂ changes.

The model/data comparison would also really benefit from a deeper analysis. If isoprene and monoterpene emission estimates fall into the data values, it is however difficult to come to a clear conclusion, as data are not that numerous, and as model estimates are given either as daily average or for noon. At what time were emission data collected and how are they compiled for model-data comparison?

C2

The parameterization is calibrated and adjusted in order to better represent BVOC emission from Arctic plants. This is a crucial and one major contribution of this work and yet it is only very quickly mentioned in section 4.2. It is important to add a more detailed and quantitative analysis of the emission improvement, both in the results section and in the discussion part.

Specific comments:

Page 1, line 23: change “the model’s responses” to “the model responses”

Page 1, line 23: change “higher levels’ warming” to “higher warming levels”

Page 2, line 4: change “ÁPFT’s reponses” to “PFT responses”

Page 2, line 6: change “Biogenic volatile organic compounds (BVOC)” to “Biogenic volatile organic compounds (BVOCs)”

Page 2, line 11: change “atmosphere’s oxidative capacity” to “atmosphere oxidative capacity”

Page 2, line 15: change “(. . . respectively (Sindelarova et al., 2014))” to “(. . . respectively; Sindelarova et al., 2014)”

Page 3; line 29: change “and to advance our understandings of the” to “and our understanding regarding”

Page 3, line 30: remove comma in “ecosystem model, LPJ-GUESS”

Page 7, line 28: please change “LAI of the year 2006 and 2007” to “LAI of the years 2006 and 2007”

Page 7, line 33, change “due to plants’ adaptation” to “due to plant adaptation”

Page 8, line 20-21: change “Due to lacking of data about the daily maximum” to “Due to the lack of data regarding the daily maximum”

Page 9, line 26: change “to assess the model’s performance” to “to assess the model

C3

performance”

Page 15, line 11: change “the model’s ability” to “the model ability”

Figures:

It is hard to distinguish the observations from the emission estimates. Could you please try using another color?

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