

Earth Syst. Sci. Data Discuss., referee comment RC2
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Comment on essd-2021-226

Anonymous Referee #2

Referee comment on "High-resolution biogenic global emission inventory for the time period 2000–2019 for air quality modelling" by Katerina Sindelarova et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-226-RC2>, 2021

Review of the manuscript "High resolution biogenic global emission inventory for the time period 2000-2019 for air quality modelling" by Katerina Sindelarova and coworkers.

GENERAL COMMENTS

The manuscript "High resolution biogenic global emission inventory for the time period 2000-2019 for air quality modelling" presented by Katerina Sindelarova and coworkers, describes the development of 3 new global inventories for biogenic VOC emissions. These inventories are available online for the community and provided as monthly mean or monthly-averaged daily profile over the 2000-2019 period for a large range of biogenic compounds (isoprene, monoterpenes, methanol, etc.). A substantial effort has been made in taking into account updated emission factors for isoprene, together with the change in land-cover, that affect significantly the regional distribution of BVOC emissions together with their global amounts.

This work is clearly presented and the manuscript is well written. These inventories are definitely a great contribution for climate or air quality modeling studies, providing BVOC emission forcings at high spatial and improved, compared to other inventories, temporal resolution. It is a huge amount of work that has been carried out, and that will benefit generally to the scientific community. I therefore warmly support this manuscript for publication in ESSD, with minor corrections and request for clarifications, given below, to be considered beforehand.

SPECIFIC COMMENTS

Introduction, line 53: I agree that BVOC emissions from vegetation are driven by temperature, radiation, vegetation types and atmospheric composition (CO₂ concentrations for instance), but I don't see how atmospheric chemistry is driving those emissions, as stated in the text. Could the authors clarify this point ?

Methodology/Emission model, line 115: it is stated that MEGAN, emission model used for this study, calculates BVOC emissions from vegetation and soils. Later in the manuscript, biogenic emissions are presented and described essentially as vegetation emissions. Is the soil contribution actually taken into account in the estimates given and activated in the model for this work, and could the authors precise the order of magnitude of these emissions, compared to vegetation ones ? If considered, how are soil emissions calculated in the model? Do they follow the same dependency than vegetation emissions?

Methodology, lines 225-227: The impact of using EP calculated from PFT coverage is specified for isoprene (-10%) and other compounds. Where does this estimate come from? Is it a general understanding (and if so, relevant papers should be cited) or did the authors run specific simulations to provide this estimate (if so, this should be clarified).

Biogenic VOC emissions are driven in particular by temperature and radiation. Therefore, they are strongly variable over the course of a day, and can vary significantly from one day to another. For climate or air quality modeling purposes, considering as forcings monthly means or monthly averages daily profiles (even if subsequently interpolated hourly) instead of hourly emissions could impact the results of the investigations. Can the authors give an estimate of this impact, considering ozone for instance?

A great effort has been made in improving and updating emission factors for the different PFT classes considered in the model. Could the authors specify if/how biofuel crops are considered? As usually high BVOC emitters, especially regarding isoprene, these vegetation species could strongly impact global and regional emissions, but are not always considered, and easy to consider, in emission models.

TECHNICAL CORRECTIONS

Line 44: for a better reading replace at the beginning of the paragraph "Their oxidation" by "BVOC oxidation". Same line, replace "an important role in formation of low-level ozone" by "an important role in the formation of low-level ozone".

Line 71: change the second sentence to "The models differ in the approach used to estimate BVOC, in the level of complexity in processes considered and in factors affecting the emission".

Line 96: replace "calculated with modified version" by "calculated with a modified version".

Line 178: replace "Yuan et al." by "Yuan et al. (2011)".

Line 254-255: remove "to" in "maps are well suited to for the tropical region".

Line 311: replace "The crops category" by "The crop category".

The different inventories v3.0, v3.1 and v1.2 are characterized each by specific conditions for spatial resolution, time-period, land-cover map and emission factors/potentials, which are given in different locations in the text but are not easy to put together. The simulation description would really gain in clarity by adding a table presenting the different conditions for the 3 inventories.

Table 4, caption: please specify what NMVOC means (not used anywhere else in the manuscript).

Line453: replace "Temporals variation" by "Temporal variations".

Line 566: replace "to more detail described in Sect. 2.5" by "described in more detail in Sect. 2.5".