Earth System Dynamics Discussions

Earth Syst. Dynam. Discuss., referee comment RC1
https://doi.org/10.5194/esd-2020-93-RC1, 2021

Comment on esd-2020-93

Anonymous Referee #1

Referee comment on "Modelled land use and land cover change emissions – a spatio-temporal comparison of different approaches" by Wolfgang A. Obermeier et al., Earth Syst. Dynam. Discuss., https://doi.org/10.5194/esd-2020-93-RC1, 2021

In this study, the authors analyze three DGVM-derived fLULCC estimations for twelve models within 18 regions and quantify their differences as well as climate- and CO2-induced components. Results showed a global fLULCC of 2.0 ± 0.6 PgC per year for 2009–2018, of which □40% are attributable to the LASC. Regional hotspots of high cumulative and annual LASC values are found in the USA, China, Brazil, Equatorial Africa and Southeast Asia, mainly due to deforestation for cropland. Distinct negative LASC estimates, in Europe (early reforestation) and from 2000 onward in the Ukraine (recultivation of post-Soviet abandoned agricultural land), indicate that fLULCC estimates in these regions are lower in transient DGVM- compared to bookkeeping-approaches. By unraveling spatio-temporal variability in three alternative DGVM-derived fLULCC estimates, our results call for a harmonized attribution of model-derived fLULCC. This study proposes an approach that bridges bookkeeping and DGVM approaches for fLULCC estimation by adopting a mean DGVM-ensemble LASC for a defined reference period. I would recommend this work for publication with few minor modifications.

Specific comment:
Line 130: More introduction about" gridded output" is needed. For example, the resolution of these data. Monthly data or Annual data?

Line140: All abbreviations must be explained. For example, HYDE and FAO.

-Line 154: 'the amount of precipitation in the Poyang Lake Basin' was not consistent with the caption.
-Line 166: Descriptions of three alternative fLULCC are not clear in the current version.

Line 385: I have some serious concern about the assumption that the last 100 years due to climate change –clarify it?

Eq 1,2,3: I really had difficulty in understanding these equations. I suggest the authors made them easy to follow in the revised manuscript.

-Figure 1 box4 presents fLULCC differences, but no information about different line.