

Reply on RC1

Simon Besnard et al.

Author comment on "Mapping global forest age from forest inventories, biomass and climate data" by Simon Besnard et al., Earth Syst. Sci. Data Discuss.,
<https://doi.org/10.5194/essd-2021-77-AC2>, 2021

We appreciate the time and efforts of the editor and referees in reviewing this manuscript and the valuable suggestions offered. In addressing all issues indicated in the review report we trust that the revised version meets the Reviewers' comments and the journal's publication requirements.

The forest age is a variable measurable in those forests subject to stand-replacing disturbances only, which are:

- **fires (only in those forest types where fires determine the total loss of biomass, e.g. conifer forests (especially in boreal climate)),**
- **clear-cut (although this management option is increasingly limited to some forest types only (in particular conifer boreal forests)),**
- **pest may also determine a complete loss of forest biomass,**
- **other forest types and management systems do not qualify the biomass stock with an age, and the artefact assignment of an age-value may determine biases in the derivation of other variables considered to be associated with the age e.g. biomass stock, biomass growth rate.**

The suggested way forward is to:

- **identify those forest types where stand-replacing disturbances occur and map those**
- **use as datasets all data-points for which the age from the last stand-replacing event has been established with certainty from the latest registered stand-replacing disturbance (e.g. not just extrapolated from the biomass stock present).**

This means that all data points for which the age has been derived from the biomass stock level only have to be excluded from the analysis; unless have been collected in those forest types likely subject to stand-replacing disturbances (e.g. forest fire in boreal forests); which means that for most of the boreal conifer forests such age derivation from the biomass stock may be done

(although for instance it cannot for boreal rainforests, unless subject to clear-cut).

- **apply the methods described to identify the most significant variables to extrapolate age to those forest land for which age data are available**
- **assign an NA to those lands for which an age-value cannot be assigned with certainty, e.g. all rainforests not subject to clearcut.**

Response:

Thank you for all the suggestions. We agree that disturbances regimes and management practices influence the age-AGB relationship and growth/mortality rates and that it would have been relevant to add such variables as covariates. However, it is relatively challenging to infer management practices and disturbance regimes at the global level. To our knowledge, there is no global product describing management systems globally.

The best we could do was to derive a series of proxies for disturbance and management regimes. We intended to do so by creating two proxies for management/disturbance derived from the Hansen tree cover dataset:

- The intensity of tree loss from the Hansen tree cover loss layer (Hansen et al., 2010, Science). This metric was derived by counting the 30m pixels that experienced a tree cover loss for the period 2000-2019 within 1km.
- Last time since tree cover loss from Hansen tree cover loss layer (Hansen et al., 2010, Science) – standard deviation metric. This metric was calculated as the last time from 2019 since a 30m pixel experienced tree cover loss and we further computed the standard deviation of this last time since tree cover loss within 1km.

These two statistical layers are now included as part of the global forest age product to allow the user to mask out pixels that did not experience disturbances in the last 20 years. However, we disagree that age cannot be determined in tropical forests that were not subject to clear cut, albeit more uncertain. For this reason, we did not assign an NA value to the pixels for which an age-value cannot be assigned with certainty, as suggested by the referee. Instead, we let the user decide whether he/she wants to mask out pixels that did not experience disturbances in the last 20 years (by using the statistical layers derived from the Hansen data that we now provide as part of our dataset).