

Reply on RC2

Louise Chini et al.

Author comment on "Land-use harmonization datasets for annual global carbon budgets"
by Louise Chini et al., Earth Syst. Sci. Data Discuss.,
<https://doi.org/10.5194/essd-2020-388-AC2>, 2021

Thank you for your summary and assessment of our manuscript. Our responses to your specific comments are listed below (alongside the original reviewer comments):

1) My main concern is the capability of LUH2-GCB2019 data capturing regional trends of forest changes. As shown in Figure 5, LUH2-GCB2019 has greater secondary forest areas in mid-high latitudes but lower areas in low latitudes than previous LUH2 v2h dataset over all key time points (2000, 2009 and 2015). These large differences has been related to the changes of wood harvesting used in LUH2-GCB2019, but the changes of spatial patterns on primary forests have not been shown in Figure 5. Please add this information into Figure 5 and further discuss whether this update on secondary forest is better than previous versions especially over China and India, where the recent studies by Chen et al. (2019) showing leading greening tendency. The greenness in China is mainly caused by the afforestation while that in India is likely related to expansion of cropland. Can LUH2-GCB2019 capture those trends?

Response: Thank you for these helpful suggestions. We have now included primary forest difference maps in Figure 5, along with a brief discussion of the patterns observed in those maps. As noted in the manuscript, the LUH2 datasets provide land-use information rather than land cover information, and as a result are not guaranteed to capture regional patterns of land cover changes as observed in remote sensing data. We do include a simple representation of forested vs. non-forested natural vegetation, but this is also defined by the intended use of the land, i.e. a recently harvested forest that is just beginning to regrow would still be defined as a forest in our dataset, even though it does not yet contain any tree cover. However, to the extent that the land cover changes are already well-represented in the FAO data and HYDE data used by LUH2 as inputs, the LUH2 land-use changes will be consistent with those land cover changes. To that end, the LUH2-GCB2019 dataset does indeed show increased areas of cropland areas in India and China, as well as scattered areas of secondary land increases, when compared with the LUH2 v2h dataset for recent years, as indicated in Chen et al. 2019. We have added a short paragraph about these features of LUH2 to the manuscript, citing the paper you mentioned as an example.

2) Some acronyms need to be defined such as FAO, HYDE, BLUE and more at their first appearance.

Response: We have added definitions at first usage for the acronyms FAO, HYDE, BLUE,

CMIP6, and checked for other instances as well.

3) Figure 5: The unit is fraction or %? Please add it into caption.

Response: The units are fractions of gridcell. The figure caption has been reworded to hopefully make this clearer to the reader.

4) Reference: Chen, C. and coauthors: China and India lead in greening of the world through land-use management, *Nature Sustainability*, 2, 122-129, 2019.

Response: We have added this useful paper to our list of references and cited it in the text.