The paper by Hurtt et al. describes the LUH2 dataset and the harmonisation required to achieve a continuous dataset of human land-use activities required for CMIP6 ESM simulations. Thank you for this tremendous effort and this dataset.

While the scope of the methods and the results seem to cover the important aspects, I would appreciate if the discussion section would be a bit more elaborate. Topics that could be helpful to be discussed would be

(a) in particular a discussion of emerged/possible issues for the usage of the data in LSMs/ESMs, since this is stated to be one of the main goals of the dataset (three examples coming into my mind are (1) how to deal with the interpolations used to construct wood harvest; (2) how to deal with inconsistencies between the static forest/non-forest-map used in LUH2 when calculating with another (disagreeing) vegetation cover; (3)how to treat rangelands);

(b) a discussion of uncertainties (including the three scenarios but if possible even broader; further examples could be pointing to where uncertainties of underlying data are discussed; conflicts of assumptions taken with shifts in country borders; climate dependent changes in biomass (or is this accounted for in the MIAMI-LU model?),...);

(c) comparisons to other datasets, e.g. the land cover dataset ESA-CCI?

E.g. regarding (1) the interpolations used to construct wood harvest: the two time dependent interpolation rules (regarding slash fractions and inclusiveness of wood cut in conversions in the wood harvest statistics) probably cause problems for a straightforward usage of the data in ESMs. The fate of the carbon in the LSMs matter, i.e. it is important to which carbon pool the harvested carbon should be assigned (such as construction wood, fire wood, etc, since these have different turnover times).

(2) albeit LUH2 is a land-use data set and not a land cover dataset, there are several assumptions where information on the land cover is used in the construction of the LUH2 data and which might be in conflict with the land cover assumed in an ESM simulation?

(3) there has been quite some discussion about this in the TRENDY process, particularly if rangelands involve land cover change, or not.

Furthermore, while reading I sometimes had the feeling that knowledge required for understanding was only given later (e.g. how grazing lands are treated and when rangelands and pastures are aggregated for grazing lands and information about the uncertainty scenarios).

Some specific comments:

l.80: Starting the 2016 version of the global carbon project (GCB) LUH2 has been used, i.e. LUH1 has not been used for the following GCBs: Le Quéré et al., 2016; Le Quéré et al., 2017; Le Quéré et al., 2018; Friedlingstein et al., 2019

l.281: First time mentioning of "low, baseline, and high LUH2 scenarios" (i.e. maybe not introduced so far?) – it would be nice to have some more information on these three scenarios, also to understand a bit more assumed uncertainties involved with LUH2.

l.342: Please add that the "potential forest or potential non-forest" map described in this subsection is a static map for the whole 850-2100 time-span, or if this is not correct please give more detail.

l. 370: Could you give some information on wood harvest in the different SSPs?

l.501: Why 2010, l.372 indicates start in 2015?

l.507: What does this mean in terms of harvest – is the resulting harvest scenario specific – or taken from one of the two GCAM scenarios? (If the latter, do the two GCAM scenarios differ in terms of wood harvest? If so which one is used?) Why is the GCAM model used and not one of the other IAMs?

l.510: How was pasture treated? As part of grazing-land?

l.517: Can you specify which scenarios did not include slash?

l.591: Could you please clarify if wood harvesting on primary land degrades this to secondary land? (i.e. if harvest on primary land is a transition from primary to secondary land?)– reading on I found this information in line 653

l.654: "whereas wood harvested from secondary land provides an age-(and biomass-) resetting transition" secondary to secondary"." What does this mean? Where is the age and biomass tracked?

l.733: Changes into land use -> agricultural land use?

l.745: Could you add a figure showing the three scenarios? Maybe in the supplementary?

l.862: has -> have

l.910: One of the two bookkeeping models used in the GCBs uses the FAO statistics, the other model - the BLUE model - uses the LUH2 data.

l.913: What do you mean with earlier land cover reconstructions? (not LUH1 since this also includes wood harvest?)

Table 3: Why is there a question mark in "FAO value?" for Fuelwood and Wood harvest?

Table 5 and Table 7: Maybe add the explanation here that negative "Total net transitions" are changes towards agricultural land use?

Fig.4: What is shown in panel b, pasture or total grazing land or? Panel c axis are hardly readable. It is interesting that in comparison to the IAMs LUH2 nearly always seems to have larger crop fractions, do you have an idea why?

Fig.5: Legends are difficult to read.

Fig.8: Category names hardly readable for scenarios. Overlaps of circles and text. Why different names for scenarios and time-periods?