The authors used GLASS CDRs data and Google Earth Engine platform and produced the long-term continuous land cover dataset from 1982 to 2015. This is a very valuable dataset for further applications in the analyses of energy and carbon dynamics and the global land surface modelling. However, I have some concerns about the data processing in the classification, accuracy assessment and the interpretation of the land cover change results. I think these problems must be solved / addressed before publication.

1. Differences between forest and tree cover

The authors used vegetation cover fraction (VCF) data from Song et al. 2018. However, in their paper, they specified "tree cover" increase. This is not equal to forest increase. Usually, the forest is defined by canopy closure (e.g. tree cover fraction >10% in FAO, >25% in Hansen et al. 2013), tree height and minimum area. The authors showed that a lot of forest increase occurred in Siberia (Fig. 10) and was from grassland (Fig. 11). This could be artificial considering the coarse resolution (5 km) and poor ability of LC mapping for mosaic pixels (see below) in the methods used in this study. For example, there is 5 ha forest with tree cover fraction of 35%, and the tree cover fraction increased to 45% because of better growth (e.g. longer growing season, CO2) in the same 5 ha forest. In this case, we cannot say the forest area increased 5 ha x 10% = 0.5 ha because it is the same 5 ha forest but with denser tree cover. Therefore, I doubt that there is confusion of these concepts in this manuscript and maybe in the classification system. The authors briefly mentioned this issue on L450-454, but this really needs to be clarified, assessed and solved.

2. The majority LC in a 0.05 deg pixel

The majority method in a coarse resolution (5 km) may work for some pure pixels but is expected to work poorly for the mosaic pixels with high heterogeneity or similar fraction of different vegetation types. For example, in a 5 km pixel with 43% tree cover, 44% grass and 13% others in the first year, it became 45% tree cover, 44% grass and 11% of others in the second year simply because of the good climate. If I understood correctly, this pixel would be classified as grassland in the first year and forest in the second year, and thus there is a 25 km2 land cover change from grassland to forest. This may also partly explain the strong forest increase in Siberia, high variations in the temporal LC dynamics in Fig. 8 and the high uncertainties in the intensive LCC regions (e.g. savanna in Africa).

3. Accuracy of change detection

The authors only assessed the accuracy for year 2015, not mentioning that the uncertainty of FROM-GLC_v2 was not propagated. First, the same product was used for training the classification system and for the accuracy assessment. Although the samples in the same product may be not overlapped, we cannot exclude the coherence since both are from FROM-GLC_v2. So, some independent evaluation dataset would be helpful. Second, an important feature of this continuous LC maps is the temporal dynamics. So, the change detection needs to be further validated / evaluated in addition to the one-year classification accuracy assessment. This part is currently lacking in this work.

4. Comparison with other datasets

A suggestion for the evaluation may be to compare the total area, spatial and temporal changes with other datasets e.g. ESA-CCI 300 m, Hansen forest, FAO and some cropland datasets. This would help to verify the mapping results in this study and to understand their differences. It would also

help to define the possible applications of this dataset (e.g. whether it can be used for carbon accounting, land modeling).

5. Superficial and fragmented interpretations of reasons for LCC

The authors made a lot of figures and tables to show the spatial and temporal changes and also reasons for such changes. These sections are not well organized and lack some internal logics. What I learned is only some fragmented information. The reasons for the LCC are not very solid (see my detailed comments below). Just taking one example, the author mentioned several times of "greening" and its effects on LCC. However, greening is very far away from LCC. It may only be caused by more leaves and extended growing season. We don't know whether this increased productivity was converted to carbon stock or leaded to a LC transition from grass to forest. The increased carbon uptake by greening may just release back to the atmosphere through the enhanced respiration due to increased temperature. So, I would suggest being cautious when interpreting the reasons for the LCC. In fact, I don't think these sections are necessary for this manuscript. Adding comparisons with other datasets and discussing the differences between various data and the reasons (e.g. data sources, classification methods) would be enough for a nice data paper. The reasons for LCC can be separated to another paper after adding more analyses. Putting it here only attenuate the main objective of this manuscript.

6. Writing

Language needs further improvements. A lot of sentences are difficult to understand, and some sentences are broken in the context. Please polish the language during revision.

Specific comments:

L19: report how many classes

L20: 85% accuracy based on what?

L22: how can you separate afforestation and forest expansion?

L23: land degradation? did you mean grassland loss? if it is degradation, it may still be grassland.

L25: greening is not directly related to LCC. very complex processes behind.

L37: What is "surface attributes"?

L44: too strong statement

L70: "which will…" useless half sentence

L75: not clear "more prone to consistency and data volume", rephrase

L87: "Because of…" duplicate

L91: analyses

L136: explain if you have level 2 class and how they were derived

L142: "2013-2015" is it a one-year map or three maps each for a year?

L145: “with a limited …” not clear what it is.

L147: “class distribution” do you mean “percentage of each class”?

L158: what is end-number? end of what?

L162: Is the smaller fluctuation the truth? Something you expected?

L172: How is the performance of you trained random forest classifier? OOB R2 or independent evaluation dataset?

L174: what are the other parameters and the default values?

L179: “the mode of…” not clear

L186: How about the heterogeneous pixels? Not assessed at all?

L190: “class distribution”

L206: It is OK to fit a linear trend, but you cannot say to remove … because it may be caused by the actual LCC

L212: why is summed?

L213: what is “annual change in slope of area ration”?

L219: why only statistically significant change was included? It is still area change even the trend is not significant. The way you process data exaggerate the changes.

L223-224: Again, why only change mask?

L225: “direct” duplicate

L242: Need to explain UA and PA for non-remote-sensing readers; explain what the column and row names refer to.

L245: “Grassland is …” , from Table 3, they are shrubland and forest

L248: samples

L255: these are regions with intensive LCC

L259: “variation curves” temporal changes

L260: Why so strong forest increase from 2006-2008? is it real?

L262: what about cropland? why so high variations, especially in 1994, 1999?

L263: Fig. 9, explain the meaning of your boxplot, mean, median, IQR, 90%, max, min? Why use the ratio, instead of total change area which is more straightforward?

L263: “different time periods” the gross change each year or on the difference between the first and the last year in each period?

L267: It's interesting to see a very likely decreasing trend of total LCC area.

L270: Fig. 10: The text and subplots in the figure is too small to read. I would suggest to only show the main LC types and put the others to SI

L271: why only significant LCC? is it really necessary? why not just sum all?

L287: Table 5-10: too detailed, may put into SI and merge these results in a plot with different subplots

L299: In In

L304-308: see my comments on greening above

L309: need to note the high uncertainty from Fig. 7

L310-311: greening again

L313: Look at Fig. 10 and 11, significant grassland changed to forest in your dataset in the high latitudes

L316-317: why barren land decrease implies the desertification effects?

L321: what is a coupling effect? non-relevant sentence

L324 and all below: referring a or b when you report something. Why no explanations on the transitions from grassland to forest, which is the most obvious pattern in your figure

L338: too strong statement. surface greening is not something that you can directly interpreted from LCC.

L345: "natural vegetation" managed forest or pasture are not natural vegetation

L346: how about reforestation?

L355: shy subtropical mountain system is also high?

L363: Fig. 15 is very misleading with only >0 and <0. Why not give gradient of change?

L365 and below: again, give the subplot title when you describing the results.

L381: Do you have evidence that global warming will increase vegetation in tropics?!

L383-384: Oil palm plantations are forest or crop in your classification system? I am not sure whether you can distinguish them!

L399: Is that partly why you detected forest increase at the expense of grassland?

L421-423: yes, this is the main defect of this product.

L435: This is definitely something that has to be done in this work.

L441: what about the heterogeneous pixels?

L460: NDVI and LAI increase not equal to forest increase

L455-463: not helping but expose the weakness of the product

L464-465: This contradicts that you said forest loss in SE Asia is due to oil palm plantations

L466-467: need more explanations to justify the reasons for doing this.