Interactive comment on "An enhanced forest classification scheme for modeling vegetation-climate interactions based on national forest inventory data" *by* Titta Majasalmi et al.

Anonymous Referee #2

Received and published: 10 September 2017

The manuscript deals with an important subject: improving the spatial characterisation of forest cover based on their structural properties by exploiting the rich information available in national forest inventories. Such work has the potential of improving land surface and earth system modelling predictions by providing a representation that is closer to reality than what is currently available. I therefore support the publication of this work, but I would require three main modifications that I believe would make the work stronger and more relevant.

First, the methodology should be clarified. I do not find all the steps to be crystal clear while reading it, even though if latter, by deduction, I end up understanding better the

reason for making them. To clarify things, I strongly suggest to separate the "material" from the "methods" part. By describing first the datasets used, I expect the flow of the methodology will naturally be improved. In the methods sections, avoid several levels of sub-headings: use only one. Also, at each step, try to start by specifically mentioning the objective of each step, e.g. "here we cluster the NFI plot data to get the mean structural properties (V, H, etc.) for our desired output map classes" and "here we use the spatializedy values of V and h from the MS-NFI maps along with the classifier of the previous step to make a map of our 12 forest types".

Second, the newer version of the CCI-Land Cover product should be used. The version the is currently used in this manuscript (v1.6) has been rendered obsolete by the current one (v2.0.7), as mentioned on the CCI website. There might be some classification errors that have been corrected in the newer version. Furthermore, for your map and analysis to stay relevant for longer, it would be highly valuable to be compatible with the more stable v2 product, which is much more likely to be adopted by modellers. Since the CCI_LC project has just finished, the latest version is probably the one the will be adopted more. This new CCI-LC consists of annual maps (instead of 5 year epochs), and thus a single year should be selected: probably the latest one (2015) or the one closest to the moment the MS-NFI maps represent.

Third, this paper could additionally serve explicitly as a regional validation of the CCI product. By this I suggest you actually frame this as a sub-objective of your work, i.e. not only provide an enhanced map, but also describe where and how much (and perhaps why) the original CCI wrong. This kind on feedback is useful for users in Fennoscadia, but also for the map producers to know how they can improve their global methods. In this vein, I would suggest to enhance figure 4 to add a second bar next to each bar in the histograms with the percentage of the original CCI map as well; and perhaps to add three columns of squared sub-figures on the right showing close-ups of (a) the original CCI maps, (b) the enhanced maps, and (c) the 12 class maps. This series of subplots could also be placed in another figure if necessary (but keeping

boxes on the figure 4 map to indicate their location. The objective is to show to the reader the impact of your reclassification on the spatial patterns at finer scale.

Here are some more punctual remarks on the text:

Page 3. Lines 10-11: While NFI data is available in many developed countries, these are not necessarily harmonised. Also, having 'gaps' in other countries could lead to further biasing global estimates of fluxes towards ecosystems of developed countries (i.e. the temperate northern hemisphere). What would you suggest to remediate this issue? (and perhaps discuss this in your discussions)

Page 4. Line 23: Why not Finland?

Page 5. Line 16: Not clear to me if these maps have spatializedy information of species type? or is it just V and h?

Page 6. Lines 32 until line 4 in [age 7: This description of the new ID codes is a bit too much of a 'metadata' that I would expect to find in the Supplementary Information (SI) section.

Page 7. Lines 28-31 and table 2: why not add some information of the spread of these values, such as the IQR or the range.

Page 9. Lines 1-3: One could argue that for Fennoscandia the forest are so monospecific that land cover classes are almost equal to species mapping, no?

Page 9. Line 20: How about VOD? see Liu. Y.Y.,et al (2013), Global Ecology and Biogeography and/or Konings, A. G., et al. (2017). Remote Sensing of Environment, doi.org/10.1016/j.rse.2017.06.037

Page 9. Line 12. Also, some very useful traits can be hard (or impossible) to map with remote sensing data (such as some traits regarding the roots for instance)

Page 10 line 31: Could you specify here to whom should the MS-NFI maps be requested?

SI. Page 1. Lines 5-15: not so clear to me, is dbh the only input to extract LAI?

SI. Page 1. Lines 16-19: is there any way to do some error propagation to provide some uncertainty (i.e +/- sigma) on the LAI values?

SI. Page 4. I wonder to what extent quite some of this background information should be in the main text (in the new "material" section)