Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2017-301-RC3, 2017

Biogeosciences Discussions

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 #3

Received and published: 11 September 2017

In the article "An enhanced forest classification scheme for modeling vegetation-climate interactions based on national forest inventory data", the authors present the method to upgrade the Land Cover (LC) product, a remote sensing derived LC map in the frame of European Space Climate Change Initiative (ESA CCI), with the national forest resources data for Norway, Sweden, and Finland. The work presented here has a great potential to bridge the gap between observation (remote sensing and field data) and modelling community, but it is not mature enough to be published in the presented form. A major argument for that is author's claim that their enhanced forest dataset "can improve climate predictions in intensively managed forested regions and is consistent with climate model routines that simulate the effects of land transitions through area-

based changes in vegetation cover". However, they do not provide any evidence for that assertion. There are several approaches to improve that:

1) Comaprison of their enhanced dataset and ESA-CCI-LC against other available LC maps for Fennoscandia.

2) It seems that authors confuse LC classes and Plant Functional Types (PFTs). Climate models do not use LC classes as their input, but PFTs and different models can employ different PFTs depending on the land surface processes implemented in the model. However, ESA-CCI-LC product is accompanied with the user tool that converts LC classes (via cross-walking table) into major (generic) PFTs, that later need to be adopted for particular climate model. In that process of conversion from LC classes to PFTs used in models information implemented in the enhanced ESA-CCI-LC classes might be lost. Therefore, comparison of major PFTs generated from original ESA-CCI-LC and enhanced ESA-CCI-LC is needed to see if the authors' efforts really can make an impact on climate model input data. And if not perhaps suggestions for improving cross-walking table (sometimes also called Look-Up Table (LUT), but it should not be confused with LUT that authors define in text) of the ESA-CCI-LC user tool can be made, so that enhancement of the ESA-CCI-LC data can be really seen by modelling community.

3) The only true test to estimate the impact of enhanced ESA-CCI-LC on climate models would be to perform regional climate simulations for Fennoscandia, and compare the results between two simulations with different Plant Functional Types (PFTs), derived from ESA-CCI LC and their enhanced ESA-CCI LC.

From all of the above, only point 3) might prove the main claim of this paper, but this is probably out of the scope for this paper and it should be a subject of another (modelling) study. However, for modellers to decide if is worth to conduct a modelling study it is necessary to know the difference between input PFTs datasets derived from enhancend and original ESA-CCL-LC. Therefore, in order to make valid contribution to

link modelling and forest observation community (as this seems to be more objective of the manuscript, rather than speculating about the improvement of climate predictions), points 1) and 2) are needed to confirm that effort. Furthermore, the method of classification described in the paper is not well documented. Method lacks in depth explanations and references are missing. For example, on several occasions, authors are quoting R routines with their cryptic abbreviations, but not providing any information or reference what is the basis for the algorithm used in that code.

Summing all of the above here are specific comments and suggestions to authors:

Abstract

Provide clear results of your study after major revision as suggested above by comparing generic PFTs derived from ESA-CCI-LC and enhanced ESA-CCI-LC, rather than speculation about an improvement of climate predictions.

Introduction

Research topic and objective should be clearly defined. However, here a description of LC classes in ESA-CCI-LC dataset and PFTs used in climate models is confusing. Page 2 lines 6-11: weak definition of PFTs is given with a couple of examples for PFT properties. More elaborate description or some reference is needed here. Page 2 lines 12-15: it looks like authors are using LC classes and PFTs interchangeably which makes confusion. Therefore it is not clear from the text that follows in the Introduction, if the objective is either to improve Look-Up Table (LUT) (by adding a new property in LUT that will indicate that forest is managed or not, or to improve some of the existing variables in LUT on the basis of field data) or to improve the ESA-CCI-LC. Make the introduction to the point, provide a clear overview of the research area and clearly state your objective.

Materials and method

Page 3 Line 22: Fig. 3 is referenced in the text before Fig.1. This is unusual, figure

numbers should increase monotonically otherwise, can confuse readers. Page 4 lines 13 – 20: ESA-CCI-LC data set is accompanied by the confidence level for each grid, i.e. an estimate of the accuracy that each grid is correctly classified. It might be worth to explore this field as well and if the forest is present on the ESA-CCI-LC grid with low confidence, perhaps it should be discarded as well. Page 6, line 10: The ESA-CCI-LC product does not contain PFTs, but LC classes. You can generate generic PFTs with user tool accompanying ESA-CCI-LC dataset. Page 6, line 12: Fig. 4 is referenced before Fig. 2. Page 6, line 10-18: Subclasses 61, 62, 71, 72 in ESA-CCI-LC dataset are regional and they are not available for the whole globe. It is not clear from the statement in the lines 15-16, if they are not available only in the data set that you were using or not available at all.

Results

Though it is not clearly stated so far, I got the impression that the main outcome of this study should be enhanced LC map, speculating that enhancement should also have an impact on climate simulations. However, the difference between the original and enhanced map is very short and confusing described on page 8 with Confusion matrix. There is no clear description how to interpret numbers in that table, and is quite confusing that the highest agreement between two datasets for LC class 70 is only 30.4%

Discussion

Page 8, line 21: not clear terminology. As far as I understand four key forests structural attributes have been used for adding forest LC classes to the ESA-CCI-LC. The discussion should be more on the significance of these results, and that is potential to improve PFTs maps used in climate and land surface modelling community. However, if the enhanced LC map would improve climate simulations or not remains speculations. This is for at least two reasons: 1) regional climate models operate on 1-10 km resolution, and 2) LC classes need to be converted into PFTs (by cross-walking procedure). The ques-

tion is how different would these 2 PFT maps converted from enhanced and original LC maps appear after aggregation to coarser resolution and cross-walking. Therefore, I suggest authors rewrite the article and clearly explain what they have done or to perform an analysis as I have suggested above. The latter approach would certainly serve to link the climate modelling and forest observation community, as they seem to aspire in the manuscript.

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2017-301, 2017.