

Interactive comment on “Biogeophysical impacts of peatland forestation on regional climate changes in Finland” by Y. Gao et al.

Anonymous Referee #2

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General comments

The authors provide an analysis on the biogeophysical effects of the dominant land cover change on regional climate in Finland. They found a spring warming due to the conversion of peatlands to coniferous forests that can be mostly related to the modification of the corresponding albedo values. The slight cooling in the growing season is explained with the increased evapotranspiration. The spatial distribution of the climate impacts are introduced for the whole country, furthermore the local scale effects are investigated more in detail for 5 selected subregions.

It is a very recent and important topic, with several practical aspects, especially regarding to the projected climate change and land cover change. The concepts of the manuscript are understandable, the results are interpreted correctly. The novelty of

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the presented work as well as the need of the regional scale and the use of a regional climate model is clearly explained.

The abstract of the discussion paper provide a concise summary of the paper but I would suggest referring to the practical application also in this place.

The Methodology chapter contains a very detailed and complete introduction and evaluation of the applied land cover maps and the land surface scheme and parameterization of the regional climate model. It underlines the importance of the appropriate representation of the land cover in climate models that has been improved by the corresponding author. I suggest keeping sect. 2 shorter and including the technical details in the Appendix.

The uncertainties and the limitations of the applied methods are well discussed at the end of the work.

Specific comments

Following are few comments and questions that the authors should consider clarifying:

1. The simulated changes of temperature, evapotranspiration, . . . and their magnitude are closely related to the modification of the corresponding main land surface parameters in the climate model. Therefore for the better representation and interpretation of the process chain I would suggest to include some maps about the changes (2000s vs. 1920s) of albedo, leaf area index and fractional vegetation cover for the whole domain (e.g. on monthly timescale, next to figure 3).

2. In order to support the better understanding of the main outcome and to make possible to compare the results of the 5 subregions, please add a summary-table that includes the modification of the land cover types (in %), the corresponding change of the albedo, leaf area index and fractional vegetation cover as well as the impacts on the analysed climatic variables for each subregions (complete table 1 with the above mentioned information).

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3. I would suggest preparing a sensitivity study with unchanged vegetation cover for the same time periods. In this way the contribution of the GHG emission and land cover change to the observed climate tendency could be separately assessed.
4. Outlook: How does projected climate change affect the existing land cover (primarily forests and peatlands) in Finland? How could these changes alter the regional climate?
5. Please refer short in the discussion part also to the possible biogeochemical feedbacks: how are the carbon sequestration and methane concentrations altered by the forest cover increase/peatland decrease? What are the climatic impacts of these changes?

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/11/C4689/2014/bgd-11-C4689-2014-supplement.pdf>

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