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## ***Interactive comment on “Inferring past land-use induced changes in surface albedo from satellite observations: a useful tool to evaluate model simulations” by J. P. Boisier et al.***

### **Anonymous Referee #3**

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The manuscript “Inferring past land use changes in land use induced changes in surface albedo from satellite observations: a useful tool to evaluate model simulation” by Boisier et al., is an interesting analysis aimed at analyzing the sensitivity of surface albedo to land-cover change (LCC), and assessing the realism of this sensitivity by using satellite observations (MODIS data) and NSIDC snow data. The study develops a new tool, building on Myhre et al. (2005), to reconstruct changes in surface albedo since the preindustrial period using satellite data. The information from the MODIS global albedo dataset is used to reconstruct albedo climatologies to assign seasonally and spatially varying albedo values to different land cover types under snow-covered and snow-free conditions. Also, the authors estimate the albedo response to the dif-

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ferent scenarios of land conversion used within the LUCID project, evaluating different model's albedo sensitivity to changes in vegetation in relation to simulated snow cover. As last step the authors evaluate the impacts of LCC in the net solar radiation at the surface based on the simulated and reconstructed albedo changes. In my opinion the manuscript is deemed to be of high quality and interesting for the readership of Biogeoscience.

My main concern regards the structure of the manuscript. Reading the Materials and Methods, I needed at a certain point to access some of the manuscript cited to fully understand the methodology used. In my opinion the authors should focus their efforts in the readability of the Material and Methods which is not completely clear. I propose to clarify first the methodology used for the reconstruction of the albedo, and second to stress the differences between models in representing snow patterns, land cover changes and differences in plant functional types (both in terms of parameterization and in terms of land use maps used for the simulation).

I do not have any specific comments on the analysis done and how the results are presented, which I think is of high quality and interesting. I appreciated the discussion of the results, also with some interesting suggestions for future directions of the work in particular related to the uncertainty. I have found most of figures and tables clear. Therefore, I recommend the publication of the manuscript on Biogeosciences after a revision and clarification of the Material and Methods.

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