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Climate of the Past Discussions

Interactive comment on "Strength of forest-albedo feedback in mid-Holocene climate simulations" *by* J. Otto et al.

Anonymous Referee #1

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"Strength of forest-albedo feedback in mid-Holocene climate simulations" is a useful contribution to the scientific literature, addressing the uncertainty in climate model simulations due to the treatment of snow-vegetation albedo. I primarily recommend a number of changes to the wording and question such strong albedo responses to deciduous trees in the cold season.

Page 810. Change "persumably" to "presumably".

Page 810. I recommend rewording ". . .prevail a three times higher spring warming". The word "prevail" seems like an awkward choice of words.

Page 810. I recommend changing "gain of forest" to "expansion of forest".

Page 810. I recommend changing "of the vegetation-climate" to "of the vegetation-

climate feedback".

Page 811. What about the role of melting sea ice and land snow?

Page 811. I recommend changing "forest cover increased and ..." to "boreal forest cover increased and ..."

Page 811. Change "warmer temperatures" to "higher temperatures".

Page 811. Change "polward" to "poleward".

Page 811. Why do mid-latitude grasslands expand? Due to boreal heat stress to evergreen trees?

Page 812. Why didn't Otto et al. 2009b produce any warming?

Page 812. The CMIP3 models do not include DGVMs.

Page 812. Write out the full model names for MP-ESM, ECHAM5, and JSBACH.

Page 812. State the resolution of the model. In the abstract, coarse models are criticized, but it seems this model is also being run coarsely.

Page 812. How well does MPI-ESM simulate the modern day temperature, precipitation, snow line, and Arctic vegetation?

Page 813. Are the weak albedo feedback experiments run with the standard MPI-ESM model?

Page 813. Change "wether" to "whether".

Page 813. I thought mostly evergreen trees expanded poleward during 6K, rather than deciduous trees. Any paleo evidence for both expanding? Also, I thought that the stems of a deciduous tree should not produce a big albedo impact, as compared to the needles of an active evergreen tree. Why focus on deciduous forests ("...in particular by deciduous forest").

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Page 813. I recommend changing “As during winter” to “Since winter”.

Page 814. Where did the SSTs and sea ice cover come from?

Page 814. I recommend including the names of the “two corresponding atmosphere-only simulations”.

Page 814. For the prescribed vegetation runs, did the authors prescribe the mean PFT distribution from the interactive runs?

Page 815. It seems to me that an albedo impact of 0.5 by deciduous trees masking snow is excessive.

Page 816. I recommend changing “size of sample” to “and size of sample”.

Page 816. While the literature specifies a range of 0.1-0.6 for snow masking, I doubt the 0.6 end of the range could apply to deciduous trees. It’s better not to group them together.

Page 816.Define “springtime”.

Page 816. The sentence “The reason for this is. . .” makes it sound like spring snow extent is greater than winter’s. Is that true?

Page 816. Does “land north of 60N” include Greenland? Based on Fig 1, do you get vegetation in Greenland?

Page 816. The temperature responses are quite weak. I recommend for these and other deltas in the paper and tables to include significance testing. I doubt a warming of “0.12C” is significant.

Page 817. Could you explain the deciduous tree response alluded to in “The simulations with strong. . .”?

Page 817. The authors are not really looking at the “variability of the seasonal cycle” but rather just the mean seasonal cycle.

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Page 818. A change of -4 mm is not a “strong melting of snow”.

Page 819. I recommend changing “drive of the vegetation-climate interaction” to “drive vegetation-climate interactions”.

Page 819. I recommend changing “latent flux increases” to “latent fluxes increase”.

Page 820. I recommend changing “To test out model how well it” to “To test how well the model”.

Page 820. Is the first paragraph referring to anomalies compared to pre-industrial? Also is it referring to 60-90N?

Page 820. Regarding the second paragraph, note that sea ice dynamics is not included.

Page 821. I recommend rewording “. . .a factor of three more increase in forest. . .”.

Page 821. I recommend changing “of the vegetation-climate” to “by vegetation-climate”.

Page 822. It seems now the emphasis is on grid size and treatment of vegetation as tiles rather than albedo parameterization, which seems to go in a different direction than the rest of the paper and the design of the experiments. How do the models discussed on pages 821-822 treat snow-vegetation albedo?

Page 823. I recommend changing “ECHAM5/JSBACH we support” to “Our experiments with ECHAM5/JSBACH support”.

Page 823. The final recommendation is for tests with different resolutions. So it seems now the albedo treatment is secondary and the vegetation tile treatment is secondary and the focus is on grid spacing.

Page 825. How many PFTs are included in the model?

Table 2. Is “desert fraction” referring to tundra? What changes are significant? Seems

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the changes in precipitation, clouds, snow are not. Why does latent heat decrease?

Figure 1. How did you separate the effects of evergreens and deciduous trees?

Figure 2. Does the model include boreal heat stress?

Figure 4. Change “effects” to “affects”.

Interactive comment on Clim. Past Discuss., 7, 809, 2011.