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Earth System Dynamics Discussions
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Interactive comment on "The role of spatial scale and background climate in the latitudinal temperature response to deforestation" *by* Y. Li et al.

Anonymous Referee #1

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Dear Authors,

I congratulate you to this paper which elegantly addresses many aspects of deforestation-induced climate change such as local versus remote effects of deforestation, the nonlinear dependence of the magnitude of change on the scale of deforestation, a decomposition of the total change into contributions from the three most important biophysical factors, and an explanation of the latitudinal change signal in terms of background climate conditions. I only have some minor suggestions, questions and technical corrections.

1 Specific comments

I will first give comments on the text referring to the respective locations in the format p*l* (page, line) followed by comments on tables and figures.

p1899l20–23 "Further analysis [. . .]": I do not really understand this sentence. Surely, it can be written more intelligibly.

p1903l3–6 So VEGAS does calculate a land surface albedo. Why don't you use these data directly? Are the albedo changes calculated by VEGAS used as is, I mean, don't they need to be adjusted (rescaled maybe) to the corresponding satellite observations?

p1903l25–27 Please briefly discuss the limitations this entails. For example, would your results change much if you used a perpetual 30-year (1960–1990) cycle of SST observations? Please also state which SST data you used.

p1904l3–5 This part is not well written. Please polish. Also, I think you should include some observational precipitation data for comparison in Fig. S2. I mean, you allude to the possibly detrimental impact of precipitation biases on the quality of simulated PFT distributions but then it appears as if you tried to get away from this issue as quickly as possible. Please address the issue briefly but properly.

p1904l10–12 What would happen if you replaced the forest by grass? Wouldn't that be the more realistic change? Please at least briefly address this point in the discussion section.

p1906l6–7 Polish your English here, please.

p1906l21 Precipitation in W/m^2: Please use a more common unit throughout the manuscript or specify the equivalent of 1 W/m^2 in a more common unit such as mm/day at first mention.

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p1908l2–3 “despite different spatial scales”: I don’t understand. . .

p1908l14–16 Please write this more clearly.

p1910l1 “when ΔH is considered”: I suggest to refer to Tab. 2 once again, here.

p1911l11 Shouldn’t you better specify the albedo changes in percent, just as you do for ET?!

p1913l10–12 “[. . .] in the tropical region (Table 4) where its effect on climate can be isolated [. . .]”: This holds everywhere, not just in tropical regions, right? Please rephrase.

p1913l16–18 I guess you mean that even if deforestation was not associated with roughness change, some parts of the tropics would warm because the reduction in evapotranspiration efficiency would still outweigh the albedo impact in those parts. I don’t know how clear you will find this statement but you should definitly rephrase your version.

p1913l23 “Lower ET” $\rightarrow$ okay “and higher sensible heat” $\rightarrow$ not necessarily as you show in Tab. 2.

p1914l22 “perhaps”: You don’t need to be so cautious here, do you; doesn’t Sect. 3.4 strongly support this statement?

Tab. 2 The caption is not entirely precise. I assume the Δ values of a column refer to averages over the respective latitudinal band specified in the top row? Are these land surface variables? (These two questions also pertain to Tab. 3.) What exactly are the turbulent flux and the available energy? Moreover, I wonder why there is a difference in Δalbedo between regional and global deforestation scenario runs. Where does this come from?

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Fig. 6 Why do you show the solid curves for all four deforestation fractions? If I understand the corresponding part in the text correctly, then the curves are just scaled versions of one and the same curve in all subplots, so it would suffice to show only subplot (d). (Okay, I see that the relative changes of ET and SW differ from fraction to fraction. Well, your choice whether to leave it as is or not.)

2 Technical corrections

p1902l18–23 Please explain all the abbreviations in the model names.

p1913l2 does → did

p1917l7 Could you please give a reference for LUMIP.

Fig. 4a Please append a ↓ to ΔLW in the figure legend.

Fig. 5 Where you write (e, f) in the caption I guess you mean (d–f).

Fig. S2 Wrong unit, I suppose.

Fig. S5 Unit missing.

Moreover, in all map plots, the grid cells seem to be shifted relative to the coastlines by one or at least half a grid cell (certainly for the longitudes, maybe also for the latitudes). Please fix that.

Interactive comment on Earth Syst. Dynam. Discuss., 6, 1897, 2015.