

## ***Interactive comment on “Future challenges of representing land-processes in studies on land-atmosphere interactions” by A. Arneth et al.***

**Anonymous Referee #2**

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### General Comment

This paper reviews aspects and recent progresses on land-atmosphere interactions related to biophysical, atmospheric chemistry, and socioeconomic issues. Then, authors try to identify areas where understanding of process can substantially alter global-model projections of land-atmosphere interactions and climatic change. The overall presentation is well structured and clear. It is also informed related works for this issue without exaggeration and without omission. The topic is within the scope of the Biogeosciences, and I believe journal's reader will have interest on this paper.

### Individual Scientific Issues

(a) In the section "Quantification of uncertainties and dynamic system responses", I

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suggest to add a paragraph concerning plant-migration issue, which is also shown to have significant impacts on predictions of ecosystem structure and functions under changing climate. Followings are prior works for this issue.

Solomon, A. M., and A. P. Kirilenko (1997), Climate change and terrestrial biomass: what if trees do not migrate!, *Global Ecol. Biogeogr. Lett.*, 6(2), 139-148.

Van Minnen, J. G., R. Leemans, and F. Ihle (2000), Defining the importance of including transient ecosystem responses to simulate C-cycle dynamics in a global change model, *Global Change Biol.*, 6(6), 595-611.

Neilson, R. P., L. F. Pitelka, A. M. Solomon, R. Nathan, G. F. Midgley, J. M. V. Fragoso, H. Lischke, and K. Thompson (2005), Forecasting regional to global plant migration in response to climate change, *Bioscience*, 55(9), 749-759.

Higgins, P. A. T., and J. Harte (2006), Biophysical and biogeochemical responses to climate change depend on dispersal and migration, *Bioscience*, 56(5), 407-417.

Higgins, P. A. T. (2009), Carbon cycle amplification: how optimistic assumptions cause persistent underestimates of potential climate damages and mitigation needs, *Clim. Change*, 95(3-4), 363-368.

(b) P3557, Line20: I suggest to include the following work to the citation list. Scheiter, S., and S. I. Higgins (2009), Impacts of climate change on the vegetation of Africa: an adaptive dynamic vegetation modelling approach, *Global Change Biol.*, 15(9), 2224-2246.

### Technical Corrections

(a) P3549, Line 9: "per se" should be in Italic.

(b) P3573, figure 1: Abbreviation for 'Steady State' is indicated to be 'SSt.' in the caption, but 'S.St.' in the figure.

(c) P3577, figure 5: In the caption, please clearly state which color of line indicates

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which data.

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