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Earth System Dynamics Discussions

Interactive comment on "Regional feedbacks under changing climate and land-use conditions" *by* L. Batlle Bayer et al.

Anonymous Referee #1

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Although this is not obvious from the title and abstract, this paper should be considered a "review paper" since it does not present new results or analysis. Instead, the conclusions are based only on previously published literature.

This review is very broad in scope, namely it investigates the role of terrestrial-climate feedbacks (both biogeophysical and biogeochemical) at regional and global scales.

I would like to stress the fact that there are already published reviews on these topics, in particular: Bonan, Science, 2008 (land cover change) Seneviratne, et al., Earth-Science Reviews, 2010 (soil moisture feedbacks) Arneth et al., Nature Geoscience, 2010 (terrestrial biogeochemical feedbacks)

The present work somehow tries to cover these different aspects all at once, but I am

unable to conclude that it provides the sort of novel perspective or argument on these issues.

The main deficiency of the paper is the lack of quantitative arguments to support its conclusions. The authors compare different feedback loop mechanisms in 3 different regions and make statements about which feedback process is supposed to be the most important for a given region. However, no quantitative tool is proposed to help comparing these feedbacks and give an objective basis to judge whether one feedback process has more "strength" than another. (Note that for instance in Arneth et al. (2010) different biogeochemical feedbacks are compared quantitatively in terms of their radiative effect).

In addition to the lack of quantitative arguments, the comparison is also confused by putting at the same level mechanisms acting on different spatiotemporal scales. For instance, the carbon cycle-climate feedback is of global importance and impact the climate over very long time scales. The soil moisture feedback, on the other hand, has a local effect and impacts the climate over short time scale in particular in the context of drought and heat waves. The paper does not clarify this issue of time/space scale which again means that the common basis to compare the feedback processes is missing.

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