

Interactive comment on “Multiple steady-states in the terrestrial atmosphere-biosphere system: a result of a discrete vegetation classification?” by A. Kleidon et al.

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1. Yes, we agree that there is the possibility of multiple steady states in the continuous representation. We added text in the revision to address this aspect. However, as far as we can tell it is likely impossible to estimate the slopes of the curves $W=f(P^*)$ and $P=g(W^*)$ from observations since one only observes the steady state, i.e. the intersection of the two lines.

2. No, we were not able to find more than two steady state solutions in the model. With alternative initializations it may be possible to find additional steady states, although this is not straightforward to do and one would possibly need a rather large number of different initial conditions to test this out.

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3. This is a very good point. With climate variability, the biomass values in Fig. 1 would not stay constant, but "wobble" around the steady state solution. With increased variability, it would seem that there is a greater chance to shift to another steady state, resulting in more likely (rapid) transitions to other steady states. This also links back to comment #2 above. As the number of vegetation classes increases, the range of stability (roughly the width of the "steps" in Fig. 1 over which biomass is insensitive to precipitation) decreases, and it would seem that the steady states would become increasingly less stable, at least the intermediate ones (although the resulting changes in biomass would be less). This would, however, require further investigations.

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