

Interactive comment on “Detecting hotspots of atmosphere-vegetation interaction via slowing down – Part 2: Application to a global climate model” by S. Bathiany et al.

Anonymous Referee #3

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This manuscript presents the application of a new hotspot detection algorithm to a climate model outputs in order to provide some hints at the physical causes of some simulated abrupt transitions. The paper is very interesting and the methodology developed is useful, in particular for better understanding transitions observed in climate models. Some points (below) are quite confusing and the authors should pay attention to describe in more details what they are doing. Along this line, I have minor comments below that could improve significantly readability. I nevertheless recommend publication of the manuscript.

Specific points.

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p690 line 21: "the bifurcation parameter B...". This is quite an obscure definition of B. It becomes clear afterwards that B is simply time. Please just say so.

p691 line 11: there are here 2 options to generate noise (additive or multiplicative). This point is not mentioned anymore in the following of the text, and it seems that RM1 and RM2 are based only on one option (additive noise ?). This point is not clear at all: if only additive noise is used in the following, please say so explicitly. There is a comment in the conclusion (p700 line22) stating that large multiplicative noise is in conflict with this methodology (this also appears in Part 1). I would like the authors to discuss this point in more depth.

p691 line22: the orange area in Fig1 is red

p692 line8: " $V_i^*(P)$... is constant in time". Well, since P varies with time, $V_i^*(P)$ should also change through time. Again, this is very confusing... May be it would be useful to add time t as a discrete index in equation (2) in the same way as in equation (3). Or may be I did not understand the regression model at all...

p695 lines5-10: The authors are mentioning parameters of the hotspot detection algorithm that are not described here (but only in Part 1). This appears quite awkward... First, this should be mentioned at the beginning of the paragraph (eg. "The detection algorithm developed in Part 1 requires some parameters.... We will use x and y values... because ..."), but not at the end ("...mysterious notations and numbers... For explanations of these parameter options see Part 1"). Second, it is necessary to specify the choice of these numbers if these are not "default" or "standard" options defined in Part 1. If they are, what is the point of mentioning them ?

p695 line 25 typo "emergence from"

p696 line 12: Reference to Fig8. Previous figure was Figure 4. Maybe Figure 8 should be renumbered to Figure 5? Again, this kind of jump between figures does not help the reader

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p698 line10-11: Fig.8d is not the difference between green and desert state as mentioned (should be Fig8f probably).

p709 Fig4. When reading the text (p694), I spend some time trying to understand what the colored areas meant... This is explained only much later (p698). Maybe these colored areas should be defined on another figure, or at least, some explanation should be given in the Figure legend...

p710 Fig5: Here again the Figure caption is very elliptic. Something like "The five equilibrium states obtained in paragraph 5.1..." would be more appropriate than "Fixedpoints...". In order to help the reader, figure legends should be "almost" self-explanatory... This is not the case here.

p713 Fig8: The difference between panels a-b and panels c-d is not clearly stated....Please say more clearly that the vegetation cover is the same, but the moisture transport is in the lowest levels (a-b) and integrated vertically (c-d).

Interactive comment on Earth Syst. Dynam. Discuss., 3, 683, 2012.

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