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Nonlinear Processes in Geophysics
Discussions

Interactive comment on "A method to predict the uncompleted climate transition process" *by* Pengcheng Yan et al.

Anonymous Referee #1

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General comments

The paper needs major changes to address all issues. The developments in Subsection 2.1 from page 4 to page 7 line 5 already appear in the first part of section 2 of ref. "Yan PC, Feng GL, Hou W. A novel method for analyzing the process of abrupt climate change. Nonlinear Processes in Geophysics 2015; 22:249-258, doi: 10.5194/npg-22-249-2015" pages 250-251 and do not introduce any new information. They should be omitted and cited or resumed.

The method to determine the values of location parameters α and β, or the position of points A and B is not clearly specified.

The numerical tests of section 2.1 are not fully specified neither its purpose.

The results of simulated prediction method of section 2.2 are drawn in figure 5 but not quantified in the text, so the quality of the prediction method can not be appreciated.

The method described in the paper is based on the use of continuous functions: piecewise linear functions or logistic model; but it is applied to discontinuous functions: see figures 8 and 11. The lines have jumps and the application of the previous equations to discontinuous functions must be justified.

The table with the results of analysis of past 10 years in Section 3.2 is missing.

Specific comments

2.1 The detection method of transition process Page 3, lines 21-22. "... the period around point C is expanded to a longer period, or the period around point C is observed on a more short time scale ..." It is not the same. Figure 1b corresponds to the second option: "observe on a more short time scale" or better "observe on shorter time scale". The idea is that with a more detailed view, the transition process can be observed.

In page 6 line 13 and eq. (12), the amplitude of change is denoted by w, but in eq. (13) the notation is changed to ω.

Page 7, line 6 "According to the numerical experiment...". Figure 3 is not a numerical experiment; part (b) is a contour map of χ for $0 \leq \alpha \leq 1$ and $0 \leq \beta \leq 1$ and part (a) is a section of that contour map along the line $\alpha + \beta = 1$ (probably).

Page 7, line 8. The assertion "the sum of α and β is 1", does it mean that figure 3(a) is the profile of figure 3(b) along the diagonal $\alpha + \beta = 1$? Please, clarify. See the remark for the caption of Fig. 3.

Page 7, lines 13-15. "Let the sum of α and β be 1, then then the change of parameter χ is only related to parameter α ... (also in figure 3a)". This is obvious, χ depends on the two parameters (has two degrees of freedom), by imposing a relationship between the two parameters, you reduce the degrees of freedom to one. This sentence does not add any information and should be suppressed.

Page 7, line 16. “In figure 3c, three ideal experiments were carried out...”. The experiments were not carried out in the figure 3c. Figure 3c describes the parameters of the three experiments. As noted before, the experiments deserve their own subsection.

The setup of the tests is not clearly described. From the figure 3c, we know the parameters u, v and k, from figure 3c. Other parameters are in Table 1. The test setup will be clearer if Table 1 would include all parameters for each test. Parameter h0 in Table 1 is not defined. Nothing is said about the time span of tests; if the points are randomly perturbed and how. See the previous remark.

2.2 The prediction method of transition process

Page 8 line 7, “. . . there is the quartic function relationship between linear trend and amplitude of change.” Eq. (13) reads h=k ω2 χ. This equation is quadratic in the amplitude ω, not quartic. Page 8, line 18, We are supposing the repetition of events, assuming all events have the same k. We obtain ν and h. Which is the value of α? We are also assuming that α+β=1, so we can calculate χ.

Page 8, line 23, An ideal time sequence is constructed with a logistic model with parameters v=-1, u=2 and k=0.1. But in figure 5, the steady part of the curve is well above -1 in the left part and above 2 in the right part. From that graphics, the limits seem to be v=-1.5, u=2.5.

3.1 Threshold of stability parameter k

Page 9, line 15. The origin of the values for the parameter k (green dots) that appear in figure 6a is missing.

3.2 Determination of abrupt change and the threshold for initial state ν and linear trend h

Page 11, line 8, “We use the method to analyze...” But the method is not specified.

Page 11, line 10, “Parameters ν and h are obtained . . . abrupt changes (Table 1).” But

the title of Table 1 is “The parameters for ideal models” and also written in page 7, line 18. Is there another missing Table?

Page 11, line 21. “. . .the abrupt change determined through the percentile threshold method ...”. This method must be described or referenced.

Page 11, line 23. Along the paper, time series were approximated by piece-wise continuous functions: the system was in a steady state, and from that value changed up or down. But in figure 8 time series are approximated by functions with jumps from the value of the steady states to the beginning of the slope lines that approximate the changes. These profiles are different from those used in figure 5 to simulate the process of recovering the parameters and those of the logistic functions.

Page 13, line 4, “...the parameter h=1.054/a...” The units of h are not clear, what does a mean? Year? The same problem appears in line 9 in the same page.

Figure 3 Caption. (a) part: it is not stated which diagonal of (b) refers to, $\alpha = \beta$ or $\alpha + \beta = 1$. It, also, would be interesting to mark points 1, 2 and 3 from (b) in the part (a) of figure.

Technical corrections

Cites should be separated from text by a blank, e.g. p. 2 line 1 “. . . change (Charney ...)” and many more. Page 6 line 4 “Then, we do integration...”, I consider better “Then, we integrate...”

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