

Interactive comment on “A conceptual prediction model of seasonal drought processes using atmospheric and oceanic Standardized Anomalies: application in four recent severe drought events in China” by Zhenchen Liu et al.

Anonymous Referee #2

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This paper proposes a statistical drought prediction model based on atmospheric and oceanic variables. The authors first identify severe and extreme drought events based on the SPI3 and identify predictors for these events. Based on these, they build a drought prediction model and propose a drought outlook. The performance of the full chain is then illustrated in the case of four drought events in China.

General comment

I believe that this paper is a valuable contribution to the special issue. However, I believe that, in its current form, it is hard for the reader to follow and process the large

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amount of information it contains. For clarification, I would suggest reorganizing the paper. Indeed, some of the subsections in the Methods section bring little to the paper in their current state (especially subsections 3.4 and 3.5). I could suggest two ways (non-restrictive) to reorganize the Methods and Results sections. (1) The first suggestion would be to keep the current structure but making sure that the Methods section (a) is more detailed and explains even briefly all methods, including the computation of the SPI, the step-wise regression and the EOF analysis, and (b) excludes statements on what has been done (move to the Results section). (2) The second way could be to separate the paper by “themes” or “work steps” as listed at the end of the introduction: this way, the continuity between the steps could be easier to follow, and, for instance, the drought periods and predictors would be available to the reader to understand the steps of “structuring predictors” and “building the prediction model”.

Major comments and general questions

- Introduction: Even if it becomes clear early in the paper, I think it should be stated that the droughts studied are restricted to meteorological droughts.
- Section Methods: I was missing descriptions of the computation of the SPI, the EOF analysis, as well as of the step-wise regression used to build the prediction model. These could simply be described in very brief sentences.
- Lines 112-114: Could you please explain why you chose the first date of the period as the beginning for the drought period? Couldn't that lead to overestimating the duration of the droughts, and subsequently influence the selection/use of predictors?
- Line 142: Are these the circulation pattern variables used in the building of the model? If so, it could be worth emphasizing them throughout the Methods section when appropriate.
- Lines 148-150: in my opinion, these lines state analyses that have been carried out and do not really inform on the methodology itself. A brief sentence describing the

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EOF analysis could be useful here. Knowing the severe and extreme drought process segments at this stage could help towards a more pragmatic description of the method.

- Lines 162-163 (also see previous comment): The sentence “All the atmospheric and oceanic predictors from all the dry/wet spells were adequately used for model calibration, which reflected drought-related information as integrally as possible.” does not seem to be supported by anything at this stage. I would suggest moving it to the Results section if appropriate, or reformulating the sentence.

- Section 3.6: I would have liked the authors to explain the advantage of this method over the methods found in the literature. In addition, I think this subsection needs some clarifications.

- Figure 8: could you please further detail the legend for Table 8? I believe “above table” should be changed to below. Could you describe what should be read in each column? More specifically, the column “Asses.” seems to indicate when the simulation and observation agree. If this is correct, the “yes” entry for 30/6/2009 should be “-”, and the “-” for 11/4/2011 should be “yes”.

- Lines 287-288: Is this observation based on a visual inspection of Figure 10?

- Tables 8 and 9: It seems that the prediction model performs better when forecasting the 2009/2010 drought in Southwest China than in simulating it. Why do you think this happens?

Minor comments

- Throughout the paper, citations were sometimes organized based on alphabetical order and sometimes based on year of publication. These should be consistent.

- L.32: The full name of SPI is “Standardized Precipitation Index”.

- L.69: Please explain the abbreviation “SA”, as it has not been explained before in the text (only in the abstract).

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- Section 3 Methods: I would recommend changing the titles of subsections 3.1 to 3.6. The titles should reflect what is presented in the sections, i.e. here methods and techniques, and therefore should avoid action verbs (using, divide, apply, ...). In my opinion, action verbs can be misleading and can make the reader expect results.

- Lines 147 and 303: "spatial-temporal" and "spatio-temporal" are used in these two sentences.

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