Hydrology and Earth System Sciences

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Discussions

Interactive comment on "Temperature and rainfall estimates for past 18 000 years in Owens Valley, California with a coupled catchment–lake model" *by* Z. Yu et al.

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Received and published: 24 July 2015

The paper describes an interesting approach to develop a model based approach to develop snapshots of climate conditions in the Owens valley over the past 18,000 years. It will contribute important new knowledge to the study of the paleolakes and paleoclimates of the American Southwest. There are significant opportunities for improving the paper, which are presented as the following points.

1. The paper sets out to test the hypothesis that physically-based lake models offer a more robust way to infer climates and paleosettings. This approach has already been

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tested in a WRR paper by Matsubara and Howard (2009), which was overlooked in the review of previous work. This study used a similar model-based approach to infer settings of paleolakes in the broader Great Basin area. For my taste, the model is over-referenced in the sense that many papers are referenced but not actually used for much of anything. In addition, the same references are presented over and over again. A rewrite could find ways to make clear larger sections are based on particular works, rather than repeating them over and over.

2. The review of previous paleoclimate studies beginning at line 19 on 6509 and continuing on to the next page is difficult to follow and needs more careful organization and presentation. A vague reference is made to the North Atlantic region without appropriate context. Similarly, isotope values are provided without much elaboration. The references to Forester, Li et al, etc have no useful information associated with them. I would recommend making this section longer and explaining things in more detail. This rather cursory discussion is not helpful. Another strategy would be to touch a few key points in the text and add a long discussion as "Supporting Information".

3. Section 3 – describing the modeling approach – needs to be improved. A reader cannot look at this section and understand how this modeling was done. The model needs to be described systematically including some of the mathematics. If much of this work is represented by older work, then at least provide some of this material as "Supporting Information". It is important to emphasize what is new in this study and what has been done previously. I still think the test of sufficiency is the ability to reproduce the model based on descriptions in the paper. At this stage, the descriptions come up short.

4. It is not clear why the section on calibration comes before the section on input parameters. The paper needs to explain what the "calibration" means in the context of the overall study and specifically what parameters were available to be calibrated. So little is written about the parameters that this section on calibration is vague. The system that exists at the present time is really different than those in the past. I would be con-

cerned about what parameters actually would be the same and considered calibrated. The goodness of fit criterion needs to be explained more clearly.

5. The paper needs to describe the inverse process in detail for the various time snapshots. Clearly a trial and error process was used. How many trials were involved, what parameter(s) formed the basis for goodness of fit and how well was that parameter fitted. The paper must convince the reader that the inversions were done properly and a very good fit was achieved. Were temperatures and rainfall correlated in the inversion process? Did many combinations giver a very good fit? In other words, how unique was the inverse.

6. Several different aspects of the overall presentation of the study results need to be improved. First, the organization should be more conventional. The methods should be contained in a single section. As is, the methods are sprinkled through several sections. The writing and grammar need improvement by a native English speaker. Many sections are basically Chinese-English.

The figures need improvements as well. Figure 1 has overly small fonts. Figure 2 is a cluttered mess with some lines undefined and missing units (e.g., per mil). Figure 7 has 6 small maps which are difficult to see and compare. I would suggest a 2-D schematic map providing the sequence of lakes in proper elevation context (like a computer program flow chart) with a 2-D basin shape with elevations.

It is not clear with Figure 8 that the simulated temperatures and the estimated temperatures actually fit that well. Additional discussion is required.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 6505, 2015.

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