

Interactive comment on “Hydroclimatology of the Nile: results from a regional climate model” by Y. A. Mohamed et al.

Anonymous Referee #1

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This is a very interesting paper and I would like it to be published eventually. It is generally well-written although there are numerous grammatical and spelling mistakes, mainly typographical, which the authors should screen and eliminate.

However, I have a number of somewhat more serious concerns about the results and unless the authors satisfactorily address these concerns I will have trouble accepting the paper for publication in HESS. In particular, since the paper does not include details of the coupled limited area climate model, I take it that this paper is a regional water balance and water recycling paper, and I am reviewing it from this perspective. It cannot be seen as a test of the climate model! 1) An obvious question that comes to mind when reading the abstract and the conclusions. The authors compare the strength of recycling between the Nile, Mississippi and the Amazon - this is very interesting indeed. First of all, how did they come up with these numbers for the Amazon and the

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Mississippi? However, clearly they did not apply their coupled model to the Amazon and the Mississippi. Secondly, why couldn't they use the same method on the Nile, or did they? I find it troubling that this comparison is a major conclusion of the paper, taking up 50% of the abstract - surely it cannot be a validation of the coupled model?

2) I also have concerns about the coupled climate model. The authors took an existing model, the details of which are not presented in the paper, made modifications to it, and then applied it to the Nile. I am not convinced, given the evidence presented, that the model has been validated. I am novice in this kind of coupled model, the authors downplay the complexity of the model by not including any details of the input requirements and model assumptions - how does one validate such a model? The authors should go over, at least briefly, the fundamentals and the assumptions behind the model, and demonstrate how these are tested with the data at their disposal?

3) The recycling percentage over the Nile is about 11%. This seems very small to me - how is one confident that this is statistically significant, given the fact that main transverse fluxes are quite large - the 11% is just the difference between two large numbers!

4) I have a very polemical question. While congratulating the authors on implementing a coupled climatic-hydrological model on the Nile basin, I suggest that the fundamental limitation of the work is the availability of precipitation data and runoff data. Therefore, I suggest that the authors could have come up with similar conclusions by analyzing just the available precipitation, runoff and reanalysis data. Is this correct? If this is correct, what good did the application of the limited area climate model do to the whole analysis? What is the essential role of the coupled climate model here? I would like the authors to discuss these points in their rebuttal, and clarify these points in their revision of the paper. I would also like the paper to be reviewed by people working on the recycling question in any of these three major river basins, to seek their perspective.

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