

Interactive comment on “Assessment of climate change impact on hydrological extremes in two source regions of the Nile River Basin” by M. T. Taye et al.

Anonymous Referee #2

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The paper investigates the potential impact of climate change on the hydrological extremes using two hydrological models in two catchments. This approach is useful in making comparisons between the models and between the catchments. However, only a few of these comparisons are discussed in the results. Some sentences are not well constructed making it difficult for the reader to understand, and the grammar needs to be checked. Generally, the paper needs to be more focussed and a fair amount of work is needed to improve the paper.

Specific comments are: 1) Study area – while the north-south movement of the ITCZ

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controls the MAM and OND rainfall, the rainfall in August is controlled by the east-west movement of the ITCZ. Include the area of the catchments. 2) The ‘materials and methods’ section needs to describe in more detail the relevant aspects of the models and any other model (e.g. exponential equations) used in the study. For example the equations given in the ‘results and discussion’ section could have been presented in the methods section. Describe how ETo was estimated using maximum and minimum temperature. Is there any particular reason you chose 0.1mm to define a wet day and not, say 1.0mm or 0.05mm? 3) GCMs - the core of the paper seems to be about climate change and the downscaled projections yet there are no statistics, graphs or any numbers to show their performance and how well they reproduced the observed climate, given that this was the basis for their selection. Why were A1B and B1 SRES scenarios chosen? A brief note on this is necessary. Different baseline periods are mentioned throughout the paper, there is need for consistency. A table showing mean values of rainfall, temperature, ETo and flow for the baseline and the two scenarios may help the reader understand the context better. 4) Two hydrological models were used in the study. However, the differences in their performances that could be attributed to differences in their model structure and/or parameters are not discussed, and how these impact on the uncertainty in the flow predictions. Also, the results presented, especially in the graphs, do not indicate which model they are from. The authors mention in their introduction that the impact of using different hydrological models is not widely investigated and this gives the reader the impression that the authors will address the issue. 5) Model validation was mentioned in the ‘methods’ section. In addition to calibration results in Table 1, validation results on model performance need to be given. Time series graphs of observed and simulated flow would also be appropriate. Figure 2 may not be necessary. Also mention how WBD was calculated. 6) There may be little basis for comparing the two catchments because; i) they use different baseline periods, ii) different GCM runs, iii) great difference in the number of rainfall stations between the catchments (38- Nyando and 5-Tana). Given that the authors have attributed poor rainfall simulation to inability of GCMs to capture topography and the complex climate

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system, the sparse data (5 stations) for Tana in itself may have been inadequate to drive the hydrological model, and to generate future representative rainfall scenarios. The authors could comment on whether they believe that sparse rainfall data in Tana catchment could have biased their results. 7) Include in the 'references' section all references cited in the text (e.g. Anderson et al., 2006). 8) The conclusions need to be more precise and not repeat the results already presented. Some of the conclusions given are not supported by the results presented in the paper.

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