

Interactive comment on “Analyzing the future climate change of Upper Blue Nile River Basin (UBNRB) using statistical down scaling techniques” by Dagnenet Fenta Mekonnen and Markus Disse

Anonymous Referee #2

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Review for "Analyzing the future climate change of Upper Blue Nile River Basin (UBNRB) using statistical down scaling techniques" by D. F. Mekonnen and M. Disse

This paper investigated future climate variability across various GCMs from CMIP3 and CMIP5 for UBNRB by incorporating two downscaling schemes (i.e. LARS-WG and SDSM). It is challengeable to properly evaluate future climate change at a local scale due to a large cascade uncertainty from emission scenarios (e.g. RCP), GCMs, downscaling methods, etc. This study evaluated a range of change in precipitation and temperature based on 6 GCM from CMIP3 and 2 GCM from CMIP5. However, I

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have several main concerns on your work. First, you mentioned that the objective of this study is to analyze and better comprehend the possible future climate trend for UBNRB. If you select a set of representative climate scenarios that properly capture future climate variability, the results are reasonable and accepted for other colleagues. However, I do not believe that you can do a comprehend analysis with only a set of climate scenarios without a systematic techniques to select representative scenarios. The second issue is downscaling scheme you chose, LARS-WG and SDSM. LARS-WG is a weather generator for a single site without consideration of spatial correlation. If you apply a single random number when you generate weather conditions for all stations, spatial correlation might be intrinsically preserved. If you applied LARS-WG for individual station, however, you significantly distorted the spatial correlation between stations. In this case, you need to check in validation. SDSM requires an efficient process that selects predictors. This study applied a perfect prog scheme that selects predictors from the most reliable data, e.g. NCEP. However, many researchers have recently used a Model Output Statistic (MOS)-based approach that builds relationship between coarse and local data for individual GCM. In addition, I am not sure if it is reasonable to inter-compare the skill between weather generator (LARS-WG) and regression-based (SDSM) downscaling methods because SDSM considers sequencing of GCM but SARS-WG generates a new sequence. Lastly, the authors need to include more climate index for a comprehensive inter-comparison.

Below find more specific comments that highlight the weakness of the format and structure of the paper presentation. 1) In Figure 2, font is too small. 2) Table 2: Showing only percentage of passing tests might be enough. 3) Table3: Please describe how you selected these predictors. 4) Table 5 & 6: I am sure these table can be exchanged to figures for readers to easily understand the results. 5) The authors need to address limitations of this study in the discussion section.

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