

Interactive comment on “Influence of downscaling methods in projecting climate change impact on hydrological extremes of upper Blue Nile basin” by M. T. Taye and P. Willems

Anonymous Referee #1

Received and published: 7 August 2013

"general comments"

Authors examined the effects of different downscaling methods in projecting climate change impacts on hydrological extremes of the Upper Blue Nile basin. They chose LARS-WG and a perturbation method to downscale temperature and precipitation outputs from several GCMs. The downscaled temperature and precipitation data were used to force a lumped hydrological model. In the impact analysis, authors compared the hydrological model runs for GCM future periods to those for the control period. As a result, extreme high flows were projected to generally decrease, either by decreasing rainfall or increasing evapotranspiration. The main contribution of the study seems

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to lie in evaluating the downscaling methods. Considering that authors' main interest was about extreme events, choosing the quantile based perturbation method was appropriate and its comparison to LARS-WG useful. It was good to consider changes in frequency of rainfall in the perturbation method. I see a need to expand discussion of the perturbation method. There is a way to take modified variability into account for the perturbation method, as used in following studies. Leander & Buishand (2007), Journal of Hydrology Choi et al (2009), Climate Research

The manuscript is generally well written, but misses some important information. There are several sentences that did not read well. I also find a problem in authors' using articles ("a", "the") appropriately.

"specific comments"

p 7859 line 2: spell out SST p 7860 last line: "Such approach" what exactly is it? P 7861 last paragraph: authors emphasized that the study investigated the entire upper Blue Nile. Then the results should be discussed with respect to previous studies that had smaller scope and mentioned in the paragraph. What is the value of doing for the entire basin compared to those for a smaller part? It could be discussed in Section 7. P 7862 line 11: rainfall ranging between 800 and 2200 mm. ...specify the time frame. Section 2.2 Observed data: authors used inverse distance weighting for interpolation, but the study area has complex topography. Is it a good choice for such a condition? Also, how much is the evaporation different between Hargreaves and PM methods? A strong correlation is not enough. P 7863 line 14: describe and spell out SRES P 7865 lines 12-15: the sentence is too long and complex, and grammatically weird. There are several cases throughout the manuscript. P 7866 line 16: when wet days were added to the observed series, what rainfall values were given? Table 2: the result is based on the QPM method changing wet/dry days? Section 6.1: please show the calibration/validation results Section 6.2: it seems a table should be referenced here.

"technical corrections"

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p 7866 line 16: step 4? Tables 2-6: are the numbers in front of the GCM names necessary? Fig 3: please use signs different enough on black and white printing for each series.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 7857, 2013.