Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
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Comment on hess-2021-525

Anonymous Referee #2

Referee comment on "Contrasting changes in hydrological processes of the Volta River basin under global warming" by Moctar Dembélé et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-525-RC2, 2022

Dembele et al. (2021) evaluate uncertainty in hydrologic variables based on twelve GCMs from CMIP5 dynamically downscaled by five RCMs over the Volta River Basin in Africa. This paper is written clearly, and it is an interesting study, particularly considering the expected population doubling between 2010 and 2050 and implications, which can be associated with changes in water redistribution. I have some minor comments which I kindly ask the authors to consider during manuscript revisions.

Some less critical analyses could possibly be moved to Supplement to ease the reading and to keep the focus on the most important results. Mainly, if a figure is explained in one sentence, it requires to be moved to Supplement, e.g. Fig.12). Possibly, the Supplement itself is also very lengthy, and I suggest, remove less important figures.

On the other hand, I have missed some evaluation of hydrologic model performance. I understand that was done in earlier studies, but it might be helpful to include observation-based climatology, say from ERA5, into Figure 5.

By using the historical period 1991-2020, the historical and RCP simulations get mixed. Should not be the historical period be considered only prior 2005?

The title requires changes. Please replace mainly these two words that do not fit the current version of the paper: “dynamics” and “processes”.

Which PET method was used in the climate projections? This study (e.g. https://www.nature.com/articles/nature11575) suggests that different results can be obtained for different PET methods). Could you please clarify?

Bootstrapping should be considered for the analysis presented in Fig. 9, Fig. 13, to account for varying sample sizes between RCPs.

Textual suggestions:

lines 16-17: Rephrase abstract, the first sentence, into something like: “This study conducts a comprehensive evaluation of the impacts of climate change on the West Africa Volta River basin's water resources, as the region is expected to be hardest hit by global warming.”

lines 22-23: Reformulate into something like: “The bias-corrected climate projections are then used as input to the mesoscale Hydrologic Model (mHM) for hydrological projections over the twenty-first century (1991-2100).”

Lines 31-32: rephrase into: “and amplifying the local population's vulnerability.”

line 37: “at a faster rate” => “faster”

lines 43-44: “Climate change and anthropogenic pressures increase water resources' stress (Sood et al., 2013)”

line 45: “for” => “to”

line 60: rephrase into “usually focused”

line 67: reformulate to “the repercussions”

line 72 remove “provide knowledge to”

line 75: maybe “central” instead of “major”

Figure 1: it would be more helpful to split the grand legend block into figure panels, where individual classes are shown.

Line 94: “the assessment of” into “assessing”

Line 123-124: Possibly rephrase into “As the RCMs downscale not all GCMs,…”

Line 188: “a steady-state”

Figure 3 caption: Write clearly this is the historical period (keep consistency with the other figures)

Figure 5 caption: should be: “… for the historical and future periods (under RCP8.5).”

Figure 6-7 caption: synchronize legend (e.g., *_2050) with figure caption (2021-2050).