Reply to the Editor and the Referees of the manuscript
"Contrasting changes in hydrological processes of the Volta River basin under global warming"
(Manuscript hess-2021-525)
## by M. Dembélé et al.

Reply to the Editor

Based on your responses and the carefully revised manuscript, I am pleased to accept your paper for publication pending a few minor corrections.

We thank the editor for handling our manuscript and for accepting to publish it after minor corrections. Below are our answers to the minor corrections.

Figure 1: the symbology of the DEM can be updated to make it more intuitive. The colour scheme should be inverted to make the lower ground more blueish and higher elevation more brownish.

I also note Figure 1 is exactly the same as what you used in your previous paper e.g. 2020b. Please check if you have the copyright to reuse the published material in this manuscript.

Our previous paper is published in WRR (https://doi.org/10.1029/2019WR026085), an AGU journal. According to the AGU policy, we have the right to reuse our published figure (see https://www.agu.org/Publish-with-AGU/Publish/Author-Resources/Policies/Permission-policy). However, we have now added the mention "Adapted from Dembélé et al., 2020b" and made some modifications to the figure to invert the colour scheme of the DEM as requested.
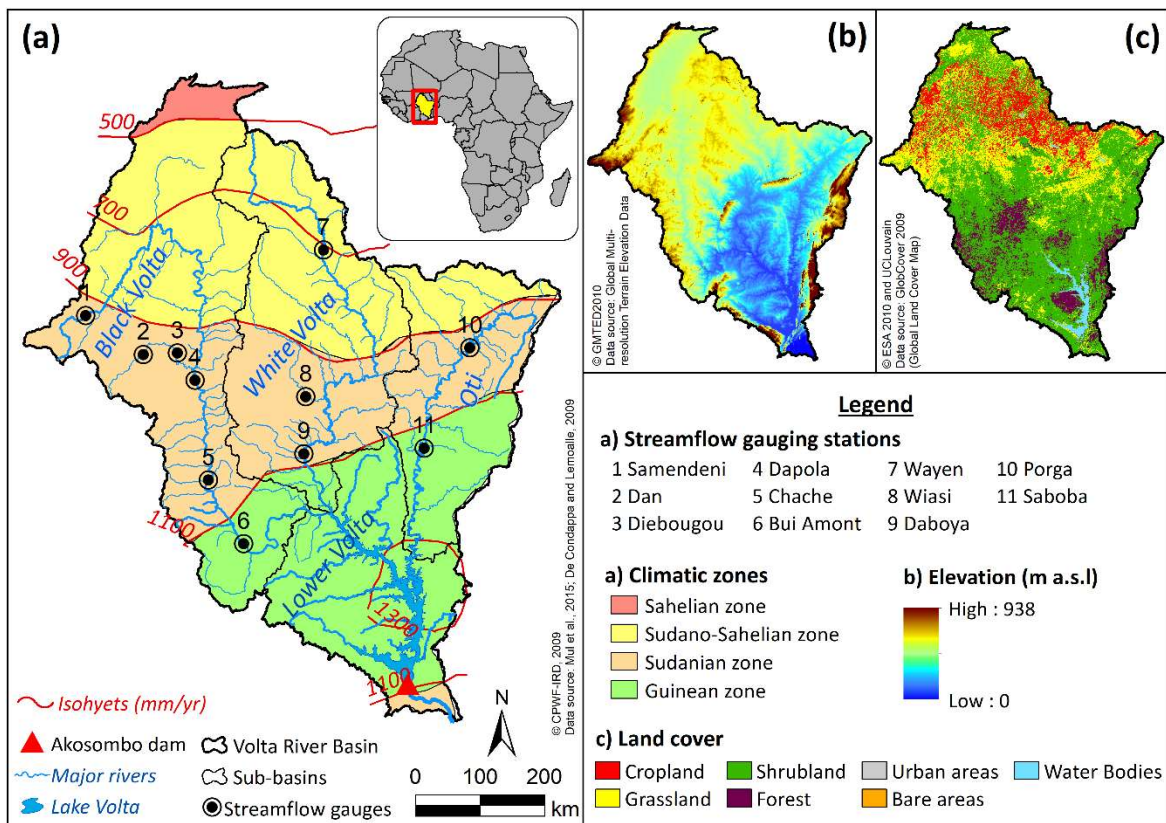
Line 271: shifted towards a lower evaporative index and they large model dependent variability in aridity ranges

Change to '… and larger model dependent variability in the aridity index ranges'

Corrected to: "…and they have larger model-dependent variability in aridity ranges"

Figure 5: please confirm if the unit of each variable shown in the figure is a monthly value. If so, why is it St (mm) and Su (mm/mm)? If they are all monthly values, you can remove '/month' from the unit of all the variables. Please also check the other similar figures in the SI and make appropriate correction.

Yes, the unit of each variable in Figure 5 is a monthly value. Here, and in the entire manuscript we make a difference between the units of variables that represent fluxes or flows (i.e. dimension is [L/T]) and units of state variables (i.e. dimension is [L]). See for instance, Table 1 of Bouaziz et al. 2021 (https://doi.org/10.5194/hess-25-1069-2021). Rainfall, evaporation, runoff and recharge are fluxes (i.e. mm/month), while temperature, soil moisture (Su) and terrestrial water storage (St) are state variables (i.e. °C or mm). In addition, Su is given with a volumetric unit (i.e. mm/mm) corresponding to the amount of water per depth of soil, as simulated by the mHM model (see e.g. Figure 3 at https://doi.org/10.5194/hess-2021-402), and also Figure 1 at https://crops.extension.iastate.edu/blog/mark-licht-mike-castellano-sotirios-archontoulis/facts-soil-moisture-benchmarking-tool).

Line 339-340: The largest uncertainty in annual climate projections over the historical period is observed for rainfall with a V2 of 3.2% for the inter-model variability.

Please refer to the figure number as it is not from Figure S32 and check if 3.2% is correct.

Actually, V2 of 3.2% is the variability among the median of rainfall projections over the historical period under different RCPs (Figure S32). This sentence is removed to avoid confusions.

Line 523: Here, the Hargreaves and Samani (1985) method is used to calculate potential evaporation.

This should be placed in the method section.

Done. Now placed in section 3.4.1.