This is a study of importance. The water use of Miombo Woodland is poorly studied and this paper could make a significant contribution to addressing this gap in knowledge. However, in its current form, I do not believe that the paper is publishable. In particular, there are some major assumptions which introduce so much uncertainty in the analysis that the results produced cannot be assumed to be representative - leading to a lack of confidence in the interpretation and conclusions. For the the basin scale ET analysis:

- the assumptions made in producing annual estimates of rainfall and runoff need to be much better justified and the way in which the values used better explained. However, even if this is done, I believe that this would highlight a flawed approach, so I suggest that in teh cas eof the basin scale analysis that the author's need to "go back to the drawing board".

We believe the approaches used are appropriate and good enough for the objective we intended to achieve. While we acknowledge that the approaches are not error free, we think that actually our approaches are meant to minimise errors.

We explain below what we mean.

Field observations of spatially distributed rainfall data are not available because the Luangwa Basin is sparsely gauged. It's practically impossible to have these data at basin scale. It is why satellite-based rainfall products have been used in this study. For rainfall, satellite-based rainfall products showed mixed performance of underestimating and/or overestimating rainfall. There was not a single satellite-based rainfall product that performed consistently, underestimating or overestimating, when compared to point scale field observations at four weather stations in the Luangwa Basin. We think the actual rainfall values are somewhere in between the two extremes of underestimation or overestimation. By getting an average of several rainfall products we observed that the magnitude of error of underestimation or overestimation was minimised.

For the run-off data we could not provide all the information on how the time series were extended because we were avoiding producing an extremely length manuscript. However, we believe the procedure we used to extend the time series gave us closer to field observations time series of run-off. The

TerraClimate run-off data is used as a predictor to extend the run-off time series for the period 2009 - 2020 which did not have reliable field data. The TerraClimate run-off data showed significant correlation (Pearson r = 0.83, *p-value* < 0.005) with observed run-off data though it overestimated run-off (average 50 mm year^{-1}). However, estimates of run-off using the TerraClimate as a predictor are closer to field observations (RMSE = 27.9 mm year^{-1} and MBE = 21.89 mm year^{-1}). The regression equation using the TerraClimate run-off data as predictor is cross validated with field observations. This is the basis of its use as predictor in our study.

For better understanding of the regression procedure used in this study more information can easily be included in the manuscript.

The results of the comparison of water balance-based evaporation to satellite-based evaporation estimates are only indicative of the possible performance of satellite-based evaporation estimates. It is, however, true that more robust approaches are needed if the results are to be definitive. More field observations are needed. Nevertheless, for the purpose of this study and to the extent that this study in itself raises these questions, we think our approaches are sufficient.

- the process where an assumed uniformity of Miombo Woodland is assumed and how this influences basin level ET estimtes is quite unclear to me. In addition, the assumptions of extend of Miombo vs Mopane Woodland seem incorrect based on recent studies in the catchment.

This leads to an analysis where ET is derived from (I believe) flawed estimates of rainfall, runoff and land cover leaving little confidence in the annual values produced. To then use this as a basis for comparison with ET estimates from RS products seems a step to far to me.

We acknowledge that the Luangwa Basin has heterogenous woodland cover the largest being the miombo woodland and the mopane woodlands. Of these two the miombo woodland is by far the largest vegetation cover. It is true that the results at basin scale can not entirely be attributed to the difficulty of obtaining accurate evaporation estimates of the miombo woodland using satellite-based approaches. What our study intended to show was that satellite-based evaporation estimates potentially underestimate actually evaporation of the Luangwa Basin regardless of the vegetation type. Based on our approach, regardless the flaws, our study has showed one possibility, that satellite-based evaporation estimates potentially underestimates evaporation of the Luangwa Basin. The result of our study is an invitation for the use of more robust approaches to prove otherwise.

However, what we think should be done is to provide more information on the approaches we used for rainfall and run-off data at basin scale.

The link to phenophase through the year and it's spatial variation is a stronger part of the paper, although the assumptions around extent of the Miombo Woodland and it's realtive homegeneity between different parts of the catchment need more careful analysis.

By its very nature the miombo woodland is heterogenous. No two locations of the miombo woodlands are the same. They differ in species composition and other environment factors such as soil moisture, nutrients and rainfall thereby facilitating the heterogeneity. What we think would help is by focusing on known miombo woodland sites at pixel level. Taking into account the dry miombo woodland and wet miombo woodland stratification. We can then observe if the trend and magnitude of satellite-based evaporation estimates substantially/or significantly differ in these two categories. We can also compare the results for the two known miombo woodland sites with the basin scale miombo woodland. At basin scale only the areas "officially" mapped as miombo woodland should be considered. This is what the study endeavored to do though it appears we need to provide more information and be clear on how the delineation of the miombo woodland was conducted.

I provide more detailed comments in the annoated attachment.

We will respond to the annotations in the attachment