

***Interactive comment on* “Data-driven estimates of evapotranspiration and its drivers in the Congo Basin” *by* Michael W. Burnett et al.**

Anonymous Referee #2

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Review of Data-driven estimates of evapotranspiration and its drivers in the Congo Basin By Burnett et al

This article presents (1) the development of evapotranspiration estimate for the whole of the Congo Basin based on a water balance equation where components are either derived from up-to-date satellite estimates (P , ds/dt) or in-situ measurements (Q , P), (2) a comparison with 6 existing products developed at global scale from different sources (model, reanalyses, satellites, in-situ) and (3) an analysis of the drivers of ET variations at the mean annual and interannual scale.

I find the article particularly well written and structured, with a careful use of the multiple databases selected for analysis and interesting discussion sections regarding the drivers. A lot of the papers cited are also quite recent ones so that this paper itself is

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a nice review of the last findings for the CB. It is also particularly relevant as the functioning and inter-relationships of the hydrologic, biospheric and climatic components of the Congo Basin are far less well known and documented than those of Amazonia. An interesting finding is the potential role of the radiative forcing.

I do not have any major comment, just a few minor ones listed below to improve somewhat the paper:

L125: amongst the quite recent and few attempts of rainfall estimates validation against in-situ measurements for CB you could also refer to Camberlin et al 2019 QJRMS

L247: I would specify here the correlation at the interannual time-scale (and not for the mean annual cycles)

Fig1 + all your figures: would be very helpful to readers if gridlines were provided so that we can better pick the peaks and lows, the lead-lags between variables etc

L286: part of the discussion about the shape of the mean annual cycle with a minima in JJA being driven by the southern pixels (which are dominant in the CB, e.g. L360) should appear as soon as this section

L289: to me when reading the figure the fastest S decrease is between April and May ...

L308-311: these differences in terms of dynamics, amplitude and ratio between MAM and SON are an important point that certainly plays then on the analysis of drivers ... your ET estimate is singular from this point of view. you might provide these two statistics (amplitude, ratio) to support your discourse ...

Table 3: why don't you provide the annual mean on 2002-2011 if you compute correlations etc on this period? You should also provide the significance level for the correlations ...

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L346: could you explain a bit the added value of normalising SIF by PAR

L352: I don't think that the ratio is significantly greater in SON as compared to MAM as the greatest ratio is observed in May; it seems quite comparable (and easy to check) so to my opinion this does not play ...

L371: the positive trend in radiation might not be a regional signal only as many studies have shown a brightening at global scale the past decade (as opposed to a dimming in the 90s)

L400: the scale of your study is far larger than the ones by Betbeder et al and Philippon et al which focus on very specific forests growing on particular soils, therefore I would not be so affirmative about a unique and consistent peak of EVI in SON across the whole central Africa forests even if these authors have not used the latest EVI product...

4.2.4 water storage: Your discussion is valid for southern pixels but not the northern ones ... while the wettest rainy season is SON over the whole CB, the driest rainy season is DJF to the north and JJA to the south so this changes the dynamics of water storage and available water for trees at the beginning of each rainy season ...

L540: I would also add, amongst the reasons why you do not capture the negative trend in rainfall, that this trend mainly affects the northern part of the CB and your index is mainly driven by southern pixels

Fig.2S: would be good that the CB be contextualised ie by presenting a larger map of Central Africa with countries borders

Lastly I would have liked seeing in this paper a short perspective section on the further analyses these results call for and the study limits (unfortunately ET at the monthly and CB scale that does not allow documenting spatial variations in the drivers of ET that might be significant nor fine temporal - daily or infra-daily - variations which might be key to understand differences between the two wet or the two dry periods)

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Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2020-186/hess-2020-186-RC2-supplement.pdf>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2020-186>, 2020.

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