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Hydrology and Earth System Sciences Discussions

Interactive comment on "Seasonal forecasts of drought indices in African basins" *by* E. Dutra et al.

Anonymous Referee #3

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This paper analyzes the monitoring and short-term forecast of standardized precipitation index spatially-averaged over 3 medium-sized river basins (Niger, Blue Nile, Zambezi and Limpopo) in Africa. The SPI is computed on gridded datasets and also reanalyses from ERA interim and coupled seasonal predictions from Hadley Center S4 system. A main conclusion is that monitoring and short-term forecasts are difficult and spatially variable across Africa, partly because of the difficulty to measure the true rainfall and to get it in realtime. In that context, using the short-term forecasts from S4 could be a valuable alternative. It is an interesting study but I found that some paragraphs are unclear and also that authors do not pay enough attention to significance of some statistical scores and their confidence intervals.

Two major concerns

1. The authors used the GPCP as a benchmark for the truth. We know that monitoring rainfall variability across the tropics is a difficult task and such gridded dataset merging rain-gauges and satellite estimates is probably a valuable choice. But the fact is that we have no estimate of the error between GPCP and the true rainfall. Is there a simple mean, using for example few stations from GHCN dataset to get an empirical estimates of the SPI computed on stations and thus validate someway GPCP for the 4 basinsÂă? In the same context, I am intrigued by the correlations between CAMS-OPI and GPCP (Figure 5b-e) since it is rather noisy. Are the correlations related to the number of rain gauges included in CAMPS-OPI (highest values when a large number of rain-gauges are included both in CAMS-OPI and GPCP ?): if so, can we be really confident that GPCP is a better product (closer to ground truth) than CAMS-OPI ? In summary, I think that the authors should provide more information to illustrate the quality of GPCP as a benchmark for the true variations of rainfall and SPI. If it is not possible to do that at large scale, it is perhaps possible for the 4 river basins emphasized in this study.

2. A second major concern is more statistical: you discuss almost all results about differences (for example in correlation with GPCP), without really considering the confidence interval which should be rather large for your rather short records. I think that you need to be perhaps more balanced about your conclusions and the fact that one product is better than another when the difference is in the confidence intervals of both correlations. So you need to pay attention to this source of uncertainty as well as differences between the products.

More minor concerns

- title is not fully adapted to the study. I think you should clearly state that you use SPI to monitor and forecast drought since it is a well-known index and also because there are other alternatives. It makes also sense to state that you consider wery short lead times (mostly 0-month and 1-month delay) and it is not a study of classical seasonal

prediction.

- There are instances where a significance level is included as in Figure 6. You need to assess systematically the significance of the correlations all along the text (Table 2, Table 3, Figure 5) and restrict your comments to significant values.

- In the abstract, state clearly that the "integrated drought" index is indeed SPI. I found that several parts of sentences could be more precise; for example, what is exactly the sense of "temporally extending", "all the datasets show similar patterns" (patterns of what ?), "in the tropical region" (do you mean equatorial area ? It is perhaps better to state clearly a band of latitudes or a specific area by its name). "larger time-scales" is perhaps less appropriate than "longer time-scales".Âă

- line 18 page 11098: "including precipitation provided every 3 hours"?

- line 23 page 11103: GPCP version 2.2

- line 26 page 11104: Zambezi and Limpopo are more in southern Africa than in Eastern Africa that usually refer to the horn of Africa till Kenya/Tanzania or so. In the same sentence it is better to refer to "Austral summer" rather than to "Boreal summer" for the wet season in these basin rivers.

- Line 1 page 11105: do you have a precise reference to corroborate this statement (dipole between western and eastern (or southern) Africa)?

- Line 19 page 11105: I don't what you mean by "a better intra-seasonal ...". please add a specific reference for that topic since there are no real illustration in this paper.

- Table 2: add a significance level. Can you speculate on the decrease of the correlations from 3-month to 12-month integration for ERAI and CAMS-OPI for Niger and Blue Nile basins?

- Page 11106: you use discharge for Niger and Zambezi as an independent measure of SPI-12. You state that the agreement is reasonable for Niger and lower for Zambezi.

I disagree with this specific statement since (1) you have a shorter record for Niger (seen from figure 4a and c) and (2) it is well-known that Niger has more decadal and longer variability, thus inflating the correlation. I am not sure at all that a correlation of 0.65 (Niger) could be considered as significantly larger than a 0.54 (Zambezi) one considering these two facts. In that context, I think that stating "a much lower correlation" for Zambezi is exagerated.

- Page 11106: "CAMS-OPI tends to have a better performance than ERAI". This statement seems weird when we look at the values of Table 2 and if we consider the confidence interval for such length of record.

- Figure 5: add a significance level. Can you speculate about the fact that SPI-12 does not give higher correlations (in mean) than SPI-3. We expect that a longer time integration would remove some of the noise/uncertainty but it seems not to be the case.

- Page 11109 line 15:I don't really understand the part "by the accumulated skill of the S4 precipitation forecasts".

- Page 11110 alinea 1: It is better to clearly state a band of latitudes or a named region rather than "outside the tropical region"

- Page 11111 line 5: "climatology" instead of "climate"

Typos

- In introduction, "Mckee" should be "McKee"

- Line 12 page 11104: "except"

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 11093, 2012.