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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Establishing the dominant source of uncertainty in drought indicators" *by* G. Naumann et al.

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Response to Review 2 of the paper: Establishing the dominant source of uncertainty in drought indicators. Authors: Naumann et al. Manuscript Number: 10, 13407–13440, 2013

I am very interested to see and in fact appreciate the research outcome presented by the manuscript. The experiment of using various most-commonly used drought indices on up-to-date datasets, and the geographically representative study areas are the highlights that contribute well to the research community. I do, however, have some points listed below that may need authors' attention and explanation.

We would like to thank the reviewer for the positive comments and suggestions.

The specific comments are addressed in detail below. Please note that Reviewers' comments are shown in plain text and authors' replies in bold typeface.

1. The title is inaccurate if not misleading. The paper indeed discusses the (dis)agreements among various drought indices. The (dis)agreements can certainly be referred to as variations but using the term uncertainty might have gone to far. I do notice that the authors mentions sources of uncertainty but I am afraid they are not fully explored by the paper.

Apart from the errors inherent to the precipitation datasets, which in our opinion are the main source of uncertainty in the computation of the indicators, there are other sources of uncertainty which are related with the methodology or algorithm that is used to compute the indicators. In this paper we focus on the uncertainty derived from the different precipitation datasets. We acknowledge however that we are not comparing the different sources of uncertainty and hence we have changed the title to: "Comparison of drought indicators derived from multiple datasets over Africa"

2. P13408, L22: "Further comparison suggests that the main source of errors ...". I am not sure if "error" is an accurate term since we don't know the true value. The word "discrepancy" might be closer to what is discussed.
We agree with the comment. The word error was changed to differences

3. P13410, Section 2.1 mentions that several river basins are taken as the study areas. I wonder wether using the term "river basin" make too much sense other than referring to the geographical locations. For example, does the boundary of the basin play a role in getting the areal precipitation (and as such deriving the indices) or the river flow data is used to validate the indices. Also they are indicated by the rectangle boxes on Figure 1. Are these boxes used to derive the indices or the basin shape/size has been taken into account.

The study areas were defined as the land area inside a bounding box falling in the four river basins as seen in Figure 1 as well as the Greater Horn of Africa (GHA). Four bounding boxes were named after the river basins where they were placed. In order to make this clear the original text was changed to: "The analysis was performed at continental level over Africa with particular focus on the areas falling in four river basins (Oum er-Rbia, Limpopo, Niger, and Eastern Nile) as well as the Greater Horn of Africa (GHA). The regions were defined as the land areas inside each bounding box (seeFigure 1). The area and geographical extent of the study areas are provided in Table 1."

4. It would be helpful to see more details of each and every dataset. Especially the number of rain gauges involved (e.g., being merged) when referring to each study area. Although understandably it is difficult to have data of the rain gauges (to derive a reference set of indices), it still very useful to get a sense which dataset may be more accurate/reliable.
The only dataset that uses only rain gauges is the GPCC and the number of rain gauges used is presented in Table 1. The remaining datasets don't use rain gauges (ERA-I) or use them indirectly through gridded precipitation for product calibration (TRMM and GPCP).

5. I am rather curious to see (if I am not missing) the comparison of precipitation value over each study area from various datasets before deriving the indices. I notice that there is a continental one (Fig 2) showing the closeness in annual average, but looking at local scale with higher temporal (say monthly) resolution will ensure the quality/performance of the dataset and to avoid any unrealistic rain data is used in the derivation of indices.
The annual cycle of monthly precipitation is depicted in Figure 3. The results obtained here are also similar for the monthly time series of precipitation (not shown).

6. P13434, Fig. 4, please explain the large chunks of white areas near and over ITCZ.

The withe areas in Fig. 4 correspond to the areas where it was not possible to obtain a reliable estimation of the gamma parameters needed to compute the SPI. This is related with the large amount of months with zero or near zero precipitation. A clarification was added in the caption of figure 4.

7. P13416 L13: "coefficients which is" should "... which are..."
Changed

8. P13421 L1: " are those that ..." I suggest to remove "are those".
Changed

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