

## Response to Anonymous Referee #2

*Comments on the manuscript entitled "A pan-African high-resolution drought index dataset"*

*Drought is recurring and posing a certain threat to water resource and food security around the globe. Accurate and timely monitoring of droughts is essential for many applications to mitigate the potential impacts. The study aimed to generate a new high-resolution drought monitoring dataset with satellite observations, which provides a timely contribution to the scientific community. I think the produced product has a great potential to benefit drought study in Africa. To the best of my knowledge, high resolution drought dataset is not existing in the community. The widely used SPI/SPEI indices are normally based on interpolated ground measurements and have spatial resolution of 0.5 degree (~50 km). The use of satellite products is a novel way, and should be highly encouraged. Although 5 km is still quite coarse for agriculture applications, it might be useful for other applications e.g., regional hydrological/meteorological drought monitoring. Based on my review, I think the presented dataset adds great values for drought related applications in Africa. The manuscript is well written. The newly generated product is clearly described. I have a few fairly minor comments/suggestions below for the authors to consider for further improving the manuscript.*

Response: Many thanks indeed for your positive evaluation and constructive comments. We have revised the manuscript carefully according to your comments and suggestions. In the following, we provide an item-by-item response to your comments. Your comments are written in italic black color; our responses are shown in upright font blue color.

*1. Unlike other hydrological disasters such as flood, drought is very hard to define. To this regard, there are no agreements on its definition and hundreds of drought indices have been proposed in last decades. Why do the authors choose SPEI? Why not using PDSI or others widely recognized and used index? For practical applications, how should end-user use your dataset to monitor drought? The information is missing in the manuscript, and I advise the authors to elaborate on this aspect.*

Response: Thanks for your comments and questions. The motivation of choosing SPEI rather than other drought index is mainly due to its relative simplicity, which allows us to produce a high spatial resolution drought dataset that entirely relies on satellite-based products. In addition, SPEI has the ability to characterize different types of droughts given the different times of response of different usable water sources to precipitation deficits (Kumar et al., 2016; Zhao et al., 2017). Regarding practical applications, there is a wide range of studies that have used SPEI for different types of droughts. In addition, the SPEI negative values indicate dry conditions while positive values correspond to wet conditions. The table below has been added in the revised manuscript to show the categories of dry and wet conditions indicated by SPEI values.

Table 1. Categories of dry and wet conditions indicated by SPEI values.

SPEI	Category
2 and above	Extremely wet
1.5 to 1.99	Verv wet
1.0 to 1.49	Moderately wet
-0.99 to 0.99	Near Normal
-1.0 to -1.49	Moderately dry
-1.5 to -1.99	Severelv drv
-2 and less	Extremely dry

2. Drought is a global disaster and deserves research at global scale. As far as I know, the satellite products used in your dataset like CHIRPS, GLEAM cover nearly entire globe (e.g. 50 dgree N-S). Why do you only focus on Africa? Why not extending to the global scale?

Response: It is a good point. Theatrically, Yes, the dataset can be extended to global scale. The current study is supported by the UK Space Agency's International Partnership Programme (417000001429), which aims to focus on Africa. However, the whole framework has been established, we can produce the SPEI-HR at any regions once there is a request from potential users.

3. Regarding evaluation of your dataset, indirect comparison is definitely informative. Direct evaluation against ground-based measurements is essential. This part is missing in the current manuscript.

Response: Thanks for the suggestion. We fully agree validation with ground-based measurement is important. However, it is very challenging to implement due to the missing of ground-based measurements for both precipitation and potential evapotranspiration. As stated in the manuscript, the CHIRPS dataset has been validated in Africa with in situ measurements. However, the ground-based potential evapotranspiration measurement is not available in Africa, which hampers the calculation of SPEI using ground-based measurements. Therefore, we use indirect comparison to present the validity of generated SPEI dataset.