

# **A global dataset of standardized moisture anomaly index incorporating snow dynamics from 1948 to 2010**

## **Overall comments**

This manuscript developed a new global monthly drought index dataset with multi-types and multi-scales, SZIsnow. The drought index SZIsnow incorporates different physical water–energy processes with snow process. The dataset also was comprehensively evaluated by different drought types, different spatial scales. The drought index SZIsnow and SZI are compared in different regions.

The dataset can serve as a valuable resource for drought studies. The paper is scientifically sounding. The topic well fits the scope of this special issue. The manuscript is well written and logically organized and the dataset was easy to access. However, some concerns still need to be addressed and make it clearer for the readers before publication. Below are my several comments.

## **General Comments**

1. The title used “standardized moisture anomaly index”, however, “drought index” is used more in the text. Need to consider a better title to attract the interest of the potential data users.
2. The abstract does not show the spatial resolution of your dataset. It is an essential parameter for reader and data user.
3. In the Line 20, “Our results also show that the SZIsnow dataset successfully captured the largescale drought events that occurred across the world; there were 525 drought events with an area larger than 500,000 km<sup>2</sup> globally during the study period, of which nearly 70% had a duration longer than 6 months.” What is the accuracy rate of this product? How to evaluate this more reasonable? The product capture all the drought events? Is its capture rate 100%?
4. In the Figure 1. I did not see the description of scPDSI in the manuscript.
5. I suggest adding the description of the advantages of the SZIsnow in the figure 1.

6. The GLDAS-2 data provide the variables to calculate the SZIsnow from 1948-2010. GLDAS-2.1 is one of two components of the GLDAS Version 2 (GLDAS-2) dataset, from 2000 to present. Is it possible to use GLDAS-2.1 to extend the time coverage of the product?
7. Section 2.4 “Metrics for the SZIsnow evaluation” is not the data. It is an accuracy assessment method, not the data description. Is it more appropriate to move this part to the section 3.
8. Line 164 “The prominent improvement of the SZIsnow is that it accounts for the influence of snowfall on hydrological processes, which was completely ignored in the SZI (Zhang et al., 2019; Zhang et al., 2015).”  
Line 171 “Both the soil moisture storage and snow storage are considered as reservoirs in the SZIsnow, which is different from the SZI that solely considered the former.”  
This section is to discuss how to produce the SZIsnow. The difference between SZI and SZIsnow should be placed in the validation section.
9. I suggest a procedure flowchart describing the production and validation of SZIsnow. It would be better that the advantages of the SZIsnow are mentioned in the figure. The flowchart can facilitate users to understand the dataset.