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Natural Hazards and Earth System Sciences Discussions

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Interactive comment on "A joint probabilistic index for objective drought identification: the case study of Haiti" *by* Beatrice Monteleone et al.

Anonymous Referee #2

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This paper proposes a new composite drought index that accounts for both meteorological and agricultural drought conditions, by combining in a probabilistic framework two consolidated drought indices: the Standardized Precipitation Index (SPI) and the Vegetation Health Index (VHI). The new index, called Probabilistic Precipitation Vegetation Index (PPVI), is scalable, transferable all over the globe and can be updated in near-real time. is focused on the extremeness of recent drought events in Switzerland by looking at different types of drought, including meteorological, hydrological, agricultural, and groundwater drought. The paper is a new research study and is generally well-written as it explains the methodology, the mathematical framework and the assumptions used. However, the application research part needs minor improvements and corrections to verify the novelties of the method employed in the study area. Based

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Discussion paper

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on this general comment the following points should be addressed and clarified.

1. Use of CHIRP dataset instead of the CHIRPS dataset. Please justify why the CHIRP dataset is used for the study area. Based on the study of Funk et al., 2015 it is proved that constraining the CHIRP by the CHPclim reduces systematic estimation errors and the CHIRPS dataset produces low MAE and bias statistics than the CHIRP dataset. It would be interesting to see a comparison of the observed precipitation pattern with the used rainfall datasets. How close is the used dataset with the observed rainfall in Haiti? Please provide scientific evidence in the revised manuscript which demonstrates the superiority of the used dataset when compared with the CHIRPS dataset for spatial and temporal (monthly) rainfall modelling at the study area.

2. Vegetation Health Index: It should be mentioned that all remote sensing indices could be expressed as deviations from the mean using the standardization procedure (i.e Mckee et al., 1993) as used by Peters et al. [2002]. Hence, the adopted classification of VHI using Eq. 1 is a transformation procedure of the typical VHI (from 0 to 1) to a normal distribution using the standardization procedure as proposed by Peters et al., [2002]. I recommend to the authors to clarify this issue on the revised manuscript and to mention that equal weighting is used for VCI and TCI. Furthermore, please discuss why VHI is used using the approach of Kogan and why VCI and TCI and are not first standardized and then combined with equal [??? see also Bento et al., 2018a,b] weighting in a probabilistic form to give the VHI (similar approach to PPVI or the approach of multivariate distributions using parametric [Hao and AghaKouchak, 2013] or a non-parametric approaches [Hao and AghaKouchak, 2014]).

3. Comparison with identified drought events. Is it possible to include a section with a comparison of PPVI with historical identified drought events? This comparison could exemplify the proposed index and strengthen the scientific quality of the manuscript.

For the motivations listed above, the paper in its present form needs revisions in order to evaluate the innovative character of the proposed method. The paper is of general

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interest for international audience and merits publication in NHESS journal when the revisions and comments are addressed. Addressing these comments will improve the quality of the paper and help the general reader of the paper.

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