Interactive comment on "A joint probabilistic index for objective drought identification: the case study of Haiti" by Monteleone et al. (nhess-2019-296)

Drought is a naturally occurring event, which takes place in virtually all of the world's climatic regimes that results in significant economic, social, and environmental impacts in both developing and developed countries. Moreover, drought is widely recognized as a creeping natural hazard (Gillette, 1950) that occurs as temporary phenomena due to the natural climate variability. The increasing demand for food and water resources caused by a growing population and the potential to increase in severity, frequency and/or duration of droughts because of climate change have raised questions as to how humanity will withstand and confront future droughts. Consequently, drought is a serious problem throughout the world.

Due to the multi-discipline character of the drought, a single, unique definition of a drought does not exist, but is subject to the domain of interest of the observer (Niemeyer, 2008). The lack of general acceptance of a precise and objective definition of drought has been one of the principle obstacles to the investigation of drought (Yevjevich, 1967).

Drought studies have been suffering from the lack of consistent methods for drought analysis. "Creeping" phenomena make detection of the onset and the end-point of a drought difficult to detect. Often these factors are determined long after the drought event has finished.

For the identification, quantification and monitoring of drought phenomena, various methodologies have been proposed. The most popular of them seem to be single factors known as drought indices. Over the years, many drought indices were developed and used by meteorologists and climatologists around the world, which ranged from simple indices such as a percentage of normal precipitation and precipitation percentiles to more complicated indices such as the Palmer Drought Severity Index the Percent of Normal (PDSI), the Standardized Precipitation Index (SPI), and the Deciles and the Crop Moisture Index (CMI). However, no one of them has inherent priority over others, some of them have better performance in specific conditions.

As Eslamian et al. (2017) pointed out, the drought monitoring using modern indices to predict the onset and termination of drought period, severity and other features is deemed necessary in order to develop the required measures to overcome the drought before its occurrence. The recent widespread and severe droughts that have resulted in serious economic, social, and environmental impacts in many countries have highlighted the need for improved drought monitoring.

Hence, the manuscript investigates an important and timely environmental topic with global interest. Specifically, it suggests a new composite drought index, the Probabilistic Precipitation Vegetation Index (PPVI) based on the combination in a probabilistic framework two well-known drought indices, as the SPI (Standardized Precipitation Index) and the VHI (Vegetation Health Index) are.

The PPVI presents some advantages such as: (a) Few data are required for its computation (precipitation and Vegetation Health Index); (b) It is a remote-sensing product; (c) It is easily transferable and scalable over the entire globe; (d) It can be a very useful tool in areas with scarce gauge coverage; (e) It is a powerful tool since it can identify events of vegetation stress, and at the same time, select among those the ones actually due to drought; etc.

This manuscript is well written, clear and well structured, follows a logical argumentation and restrictions of the results. My evaluation is positive. I suggest publishing the paper, but before the authors have to take into accounting my specific comments and remarks.

REFERENCES

Gillette, H. P.: A creeping drought under way, Water and Sewage Works, 104-105, l950.

Eslamian, S., Ostad-Ali-Askari, K., Singh, V.P. , Dalezios, N.R., Ghane, M., Yihdego, Y., Matouq, M. A.: Review of Drought Indices, Int J Constr Res Civ Eng (IJRCRE), 3(4), 48-66, http://dx.doi.org/10.20431/2454-8693.03040052017, 2017

Niemeyer, S.: New drought indices, in: Drought management: scientific and technological innovations, edited by:López-Francos, A., CIHEAM, Zaragoza, Spain, 267-274, (Options Méditerranéennes: Série A. Séminaires Méditerranéens; no. 80), . http://om.ciheam.org/om/pdf/a80/00800451.pdf, 2008

Yevjevich, V.: An objective approach to definition and investigations of continental hydrologic droughts, Hydrology papers, 23, Colorado State University, Fort Collins, USA, 1967

Specific comments and remarks

Lines 17 & 18
"World Meteorological Organizations (MWO)" should be "World Meteorological Organization (MWO)"
Line 32
"…. subsurface water supply??" **COMMENT**: Please, clarify what does it mean the term "subsurface water supply"?
Line 40
"…..such as in (Gu et al., 2008). Many…." should be "…..such as in Gu et al. (2008). Many…."
Line 52
Please define the abbreviation "VegDRI"
Line 55
"…Drought Indicators (OBDI)…" should be "…Drought Indicator (OBDI)…"
Line 59
"… as in (Serinaldi et al., 2009) and (Bonaccorso et al., 2012), where…"
should be
"… as in Serinaldi et al. (2009) and Bonaccorso et al. (2012), where…"
Line 60
"…..or in (Shiau, 2006), where…" should be "…..or in Sh iau (2006), where…"
Line 61
"…..in Taiwan. (Shiau et al., 2007) investigates…" should be "…..in Taiwan. Shiau et al. (2007) investigates…"
Lines 62 & 63
"…..is used in (Songbai and Singh, 2010) to model…" should be "…..is used in Songbai and Singh (2010) to model…"
Line 68
Please define the abbreviation "AMDI-SA"
Line 78
"…Vegetation Temeprature Condition…" should be "…Vegetation Temperature Condition…"
Line 110
"…..described in (Funk et al., 2015). In the present…" should be "…..described in Funk et al. 2015). In the present…"
Line 130
"…..as proposed in (Mckee et al., 1993), is reported….." should be "…..as proposed in Mckee et al. (1993), is reported….."
Line 140
"…as proposed in (Dalezios et al., 2017), is presented…" should be "…as proposed in Dalezios et al. (2017), is presented…"
Lines 152 & 153
"…..proposed in (USDA Risk Management Agency et al., 2006)," should be "…..proposed in USDA Risk Management Agency et al. (2006),"
Lines 156 & 157
"…as it is defined by (Kotz et al., 2000). The normality…" should be "…as it is defined by Kotz et al. (2000). The normality…"
Line 164
"…according to Eq. 3 and Eq.4 respectively, where…" should be "…according to Eqs. 3 and 4 respectively, where…"
Line 168
"…as done in (Kao and Govindaraju, 2010). The bivariate…" should be "…as done in Kao and Govindaraju (2010). The bivariate…"
Line 169
"…..according to (Nelsen, 2006) using the…" should be "…..according to Nelsen (2006) using the…"
Line 188
"…..described in (Joliffe and Stephenson, 2012). The ROC…." should be "…..described in Joliffe and Stephenson (2012). The ROC…."
Line 198
"…according to (Joliffe and Stephenson, 2012) with the…" should be "…according to Joliffe and Stephenson (2012) with the…"
Line 247
Please define the abbreviation "NAO"

Line 248
"….while (Hongshuo et al., 2014) investigated the…" should be "….while Hongshuo et al.(2014) investigated the…"
Lines 250 & 251
"….as suggested in (Wedgbrow et al., 2002). The number…." should be "….as suggested in Wedgbrow et al. (2002). The number…."
Line 253
"…studies such as (Hongshuo et al., 2014), that found…" should be "…studies such as Hongshuo et al. (2014), that found…"
Line 256
"…and (Ma'rufah et al., 2017) that found that significant correlation.." should be "…and Ma'rufah et al. (2017) found that significant correlation.."
Line 284
"…as done by (Zhu et al., 2016). The Area…" should be "…as done by Zhu et al. (2016). The Area…"
Line 285
"…should be preferred (as was done by (Dutra et al., 2014; Mason and Graham, 2002; Zhu et al., 2012)). An…" should be "…preferred as was done by Dutra et al. (2014); Mason and Graham (2002); Zhu et al. (2012). An…"
Lines 304 & 305
"…good in the literature (see (Khadr, 2016)) for drought… " should be "…good in the literature (Khadr, 2016) for drought… "
Line 306
"…as done by (Zhu et al., 2016). The best…" should be "…as done by Zhu et al. (2016). The best…"
Line 309
"…as was done by (Dutta and Kundu, 2015)…." should be "…as was done by Dutta and Kundu (2015)…."
Lines 405-407
Dutta, D. and Kundu, A.: Assessment of agricultural drought in Rajasthan (India) using remote sensing derived Vegetation Condition Index (VCI) and Standardized Precipitation Index (SPI), The Egyptian Journal of Remote Sensing and Space Sciences, 18, 53–63, https://doi.org/10.1016/j.ejrs.2015.03.006, http://dx.doi.org/10.1016/j.ejrs.2015.03.006, 2015.
Should be
Dutta, D., Kundu, A, Patel, N.R., Saha, S.K., and iddiqui, A.R.: Assessment of agricultural drought in Rajasthan (India) using remote sensing derived Vegetation Condition Index (VCI) and Standardized Precipitation Index (SPI), The Egyptian Journal of Remote Sensing and Space Sciences, 18, 53-63, http://dx.doi.org/10.1016/j.ejrs.2015.03.006, 2015
Lines 421 & 422
Hao, Z.: Review of dependence modeling in hydrology and water resources, Progress in Physical Geography, 40, 549–578, https://doi.org/10.1177/0309133316632460, 2016.
should be
Hao, Z. and Singh, V.P.: Review of dependence modeling in hydrology and water resources, Progress in Physical Geography, 40, 549–578, https://doi.org/10.1177/0309133316632460, 2016.
Line 489
Palmer, W.C.: Keeping Track of Crop Moisture Conditions, Nationwide: The New Crop Moisture Index, Weatherwise, 21, 1968
should be
Palmer, W.C.: Keeping Track of Crop Moisture Conditions, Nationwide: The New Crop Moisture Index, Weatherwise, 21, 156-161, https://doi.org/10.1080/00431672.1968.9932814, 1968
Line 496
Shiau, J.-T.: Fitting Drought Duration and Severity with Two-Dimensional Copulas, Water Resources Management, 20, 795–815, 2006.
should be
Shiau, J.-T.: Fitting Drought Duration and Severity with Two-Dimensional Copulas, Water Resources Management, 20, 795–815, https://doi.org/10.1007/s11269-005-9008-9, 2006.