Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2017-220-RC2, 2017
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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Searching for the optimal drought index and time scale combination to detect drought: a case study from the lower Jinsha River Basin, China" *by* Javier Fluixá-Sanmartín et al.

Anonymous Referee #2

Received and published: 29 May 2017

General comments

This is an interesting paper thanks to the region of interest, the compilation of historical documents, the use of station data and the comparison of various drought indices.

Specific comments

While the ODE and ODI indexes proposed are indeed relevant in this context, I don't think they can be presented as extremely innovative, as similar indices have been used to study drought area and intensity.

Second, a big caveat is that the skill scores are computed on the same period than the one chosen to determine the ODE thresholds for detection. The fact that only 13 events have been documented is an understandable limitation; however, this method will likely create an overestimation of the power of the index to detect droughts. A more rigorous "cross-validation" procedure is needed (e.g. segmenting the record period and perform the study leaving one segment out each time?).

Moreover, while it is absolutely true that drought measures such as the SPEI and PDSI have shortcomings – in particular the reliance on PET rather than ET, they do capture features that precipitation-only indices cannot see. It is absolutely fine if data is not available to compute such indices, but it should be the main reason for not comparing what these other indices would say relative to the historical data. It may not be very useful, but I wonder if global PDSI/SPEI datasets capture anything in that region during the drought events mentioned (even if they have a much lower resolution).

Furthermore, for clarity, it may be useful for the authors to develop a little more the compilation process of documents relative to drought in the paper itself, and explain in a little more detail why they consider that the spatial distribution of the stations and the quality of the records are good enough for the study they want to perform. It would also be nice if the question the bias introduced by station locations was treated with more detail. Related to this, how was the grid resolution chosen (p.12)?

Finally, the sensitivity of the ODE thresholds chosen to the classifications proposed in table 6 and to the definition of the beginning and end of droughts should be discussed briefly.

Technical corrections

I have found that the paper should undergo significant editing. However, I am not a native English speaker myself you may not want to follow exactly the suggestions given below. In the following, I suggest replacements:

p.1:

l.25: “Historical drought events which occurred”?

l.27” “that best reproduce”

p.2:

l.7 : “in agriculture” by “to the agriculture sector”?

l.16: “that is the case of” by “an example is”?

l.17: “the China’s National Climate Change ” by “China’s National Development and Reform Commission”?

l. 26: “Main advantages” by “the main advantages”?, “the ease of use” by “their ease of use”, “the limited need of data “ by “the limited data requirements”,

l.27: “capacity to an early detection of drought events” by “capacity for early detection of drought events”?

l.33: “is depending on” by “depends on”

p3:

l.2: “ more exhaustive work” “more time-consuming work”

l.4 “This allows identifying” by “ This enables on to the identify”

l.10: “do not imply necessarily” by “do not necessarily imply”

l.23-24 “fall” by “discharge”?

l.31 “are susceptible to be affected” by “can be affected”?

p.4:

l.3 ‘location” by “locations”

p.5

l.8: “For the last 20 years, detailed information is available regarding all drought events” by “Detailed information is available for all drought events over the past 20 years”

l. 18: “The use of meteorological indices allows analyzing the influence” “allows one to analyze”

p.7

l.5: “This allows characterizing” “This allows for the characterization of... and thus facilitates”

l. 6: “each station surroundings” by “each station’s surroundings”

l.19: “This allows defining” by “This allows us to define”

l.25: “it helps defining” by “it helps define”

p.13

l.8: “completing the collected historical records for little information regarding the magnitude of the events has been found” by “complete the collected historical records which include little information on the magnitude of the events

l. 9 “Not defined values” by “Undefined values”

l.11: “On purpose, only cells under drought conditions have been considered for the definition of this indicator by” Only cells under drought conditions have been considered to define this indicator” “If the ODI was calculated as an average value for the entire basin (as adopted for instance in Trambauer et al. 2014)) higher (or lower) indicator values in a part of the basin may compensate lower (or higher, respectively) indicator values in the rest of the basin, offering an overall value close to normal precipitation.” by “If the ODI had been calculated as an average value for the entire basin (as adopted for instance in Trambauer et al. 2014)) higher (or lower) indicator values in a part of the

basin may have compensated for lower (or higher, respectively) indicator values in the rest of the basin, yielding an overall value close to normal precipitation."

p.14

l23-24: "have been" by "were"

p.15

l.3-4: idem

p.17

l.1: "that correspond with" by "that correspond to"

l.7: "the droughts occurred" by "the droughts which occurred"

p.19:

l.1: "higher" by "highest"

l.2: "false positives" by "false positive"

l.4: "quite" by "well"

l.5: "in relation" by "in comparison"

l.7: 'droughts have been chronicled" by "drought has been chronicled"

l.10: 'not wide' by 'spatially concentrated'

l.12: 'have been' by 'were'

l.13 'identifying these events is possible, although it is difficult to disentangle them"

l.16: 'by the use' by 'using'

l.27: "some considerations are recommended" by "caution is advised"

l.29: delete "some", "proved by 'proven'

l.30: "The variability of temperature, for instance, may have an important impact on the crop water availability and then in the assessment of agricultural droughts, although it has not been taken into account" by " temperature variability, not considered here, can play a significant role in the onset of agricultural drought"

p.20

l.10: "This work represents an attempt at building a tool..."

l.13: "was compiled"

l.14: "were identified and catalogued"

l.23"indexes and time scales"

l.25" "consecutive or "clustered in time' rather than "more consecutive"

l.28" supposes" by "represents"

l.32" facing" by "for"

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